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Wildfire Suppression Contracting: The Effect of Local Business Capacity During Large Wildfires

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Large wildfires can affect local economies in complex and dynamic ways, with both immediate and long-term impacts. Losses may occur in recreation, tourism, forestry, and natural resource sectors, which may be displaced during fire and recovery periods.[1] In contrast, the money spent on suppression, suppression support services, and recovery efforts can make contributions to local employment and wages.[2] For communities near wildfires to realize these potential benefits, local businesses and workers must be able to participate in wildfire suppression efforts.

Contracts with private firms for suppression services make up a substantial proportion of United States Forest Service spending on large wildfires. Contracted services include both direct suppression and suppression support services, which provide potential opportunities for local contractors in sectors that vary from traditional natural resource services to housekeeping and utility services. In the past decade, the proportion of funds spent on these contracts has increased along with the cost of suppressing large wildfires.[3]

Prior research has shown that the amount of suppression money spent in the county of the wildfire varies greatly.[4] Differences in local capacity to capture suppression contracts may explain some of the variation. However, no measures exist to quantify this capacity.

Contracting capacity and local capture can be the result of local economic conditions (supply side conditions) as well as agency contracting practices (demand side conditions). In order to capture contracts locally, local businesses that can perform the work need to exist, and past experience contracting with the federal government is a reasonable indicator of that capacity. To better understand local contracting capacity, we examined how local contract capture varied between wildfires and the relationship between local capture and contracting capacity measures. We investigated how the number of vendors prior to a wildfire affected local capture of suppression contracts when a large wildfire occurred, and whether counties with specific economic specializations were more or less likely to capture wildfire suppression funds when a fire occurred locally.

Approach

We collected fire incident data, suppression spending data, U.S. Forest Service contract data, and county economic typology information for wildfires in which the Forest Service was the lead protection agency and fire suppression costs exceeded $1 million during the five-year period of federal fiscal years 2004 to 2008.

Fire incident data from the National Interagency Fire Management Integrated Database (NIFMID) included fire ignition location, initial attack date, and the date suppression objectives were met. We requested transaction-level financial information from the Forest Service's Foundation Financial Information System (FFIS) for a sample of 135 of the large wildfires stratified by Forest Service Regions 1–6 and metropolitan/rural status. We coded each transaction for each wildfire based on the county of the recipient's address. We defined local transactions as those where the recipient was located in the same county as the wildfire.

We then determined the proportions of each fire's total suppression expenditure and each fire's total contracted expenditure that were captured locally. To better understand the geography of local contract capacity, we examined local capture levels based on county characteristics and economic specialization as defined by the USDA Economic Research Service (ERS). The ERS defines six county economic specializations based on employment and income: government, service, manufacturing, mining, farming, and unspecialized.[5]

We also developed a county-based wildfire suppression capacity index for all counties in the western United States, based on Forest Service contract records in the Federal Procurement Data System (FPDS). This capacity index measures the number of private vendors that contracted with federal land management agencies for services with increased activity following large wildfires.[6] We tested both the economic specialization indicators and the capacity index in statistical regression models to determine the influence of each on the local capture of wildfire suppression contracting dollars, while controlling for the total value of contracting expenses during a fire.

Findings

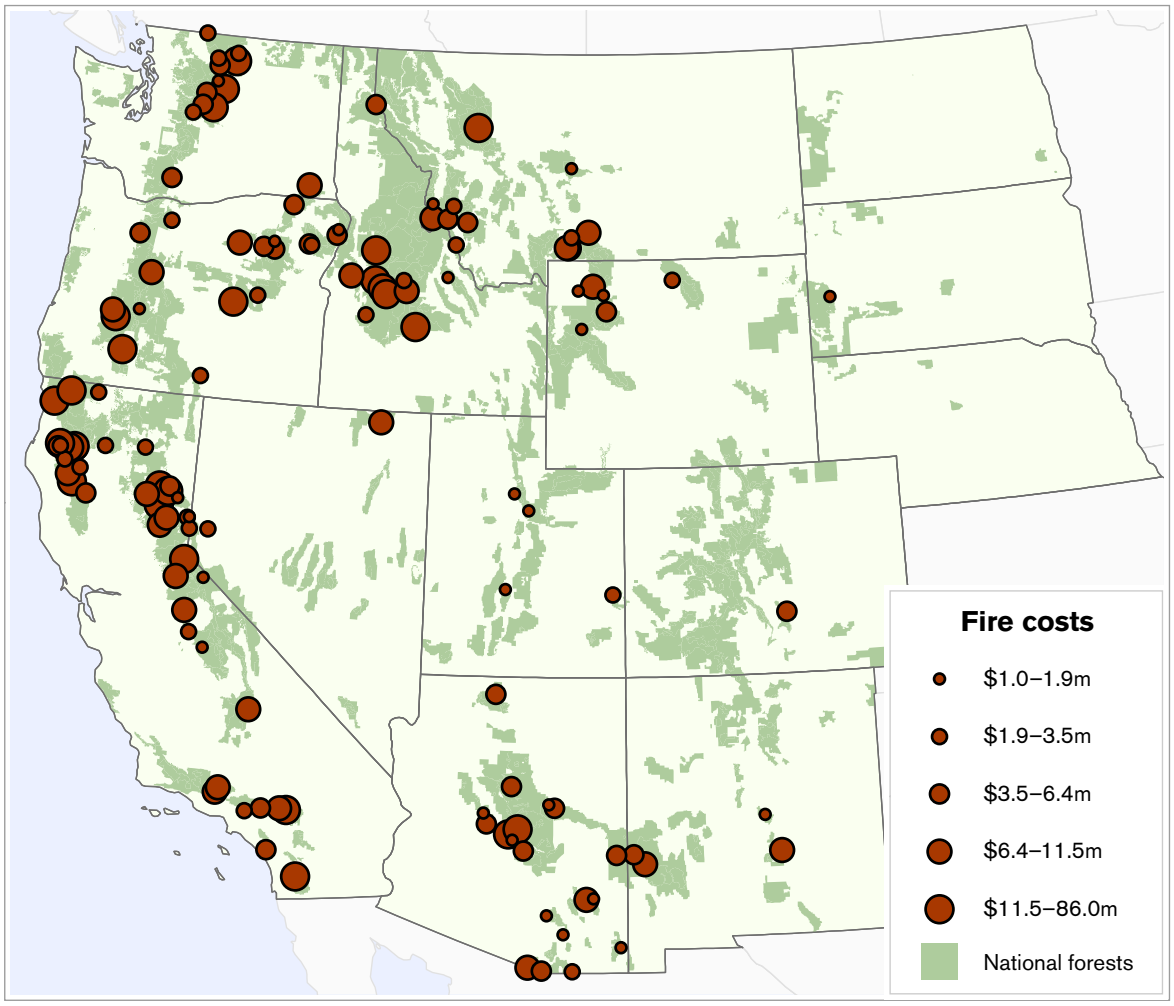
Large wildfires and local spending

The 135 large wildfires in our sample burned in 75 western counties (see Figure 1, page 3) and cost the Forest Service $1.2 billion to suppress from 2004 to 2008. These fires represented nearly 20 percent of the total suppression spending on all fires during the five-year period, which was just over $6 billion.[7] Each fire cost between $1 million and $86 million. The average fire cost $9 million to suppress.

Table 1 Total and local wildfire expenditures by category

	Total	Local			
Expense category	Percent of expenditure (%)	Percent spent locally (%)	Minimum-Maximum (%)	Average local amount ($)	Minimum-Maximum ($)
Contractual services	39	12	0–63	419,363	0–16,200,000
Federal personnel	26	10	0–72	235,751	0–2,500,000
Flying contracts	16	1	0–46	10,006	0–500,000
Agreements with states	11	11	0–100	100,325	0–3,300,000
Supplies and materials	3	2	0–100	5,371	0–400,000
Other expenses	6	2	0–55	11,910	0–600,000
Overall	100	9	0–39	782,727	0–18,700,000

Figure 1 Fire suppression costs of large wildfires occurring 2004–8



The proportion of suppression expenses spent locally was generally small, but varied greatly between fires, from 0 to 39 percent. Overall, 9 percent of total suppression costs were spent in the county of the fire. The large majority of fires had less than 5 percent local spending; however, a handful had more than 20 percent. Between zero and $18.7 million was spent locally per fire.

The amount of local spending also varied considerably between different types of suppression expenses (see Table 1, page 2). Suppression spending includes expenses for contractual services, federal personnel (including wages, benefits, hazard, and overtime pay), flying contracts, state agreements, supplies and materials, and other smaller expenditure categories. Although supplies and flying contracts had low levels of local spending (2 percent each), other types of expenditures, such as federal personnel, and state agreements, had higher levels of local spending (10 and 11 percent, respectively). Contractual services, excluding flying contracts, had the highest level of local capture, with 12 percent of overall contracted expenses remaining in the county.

The distribution of contract expenditures

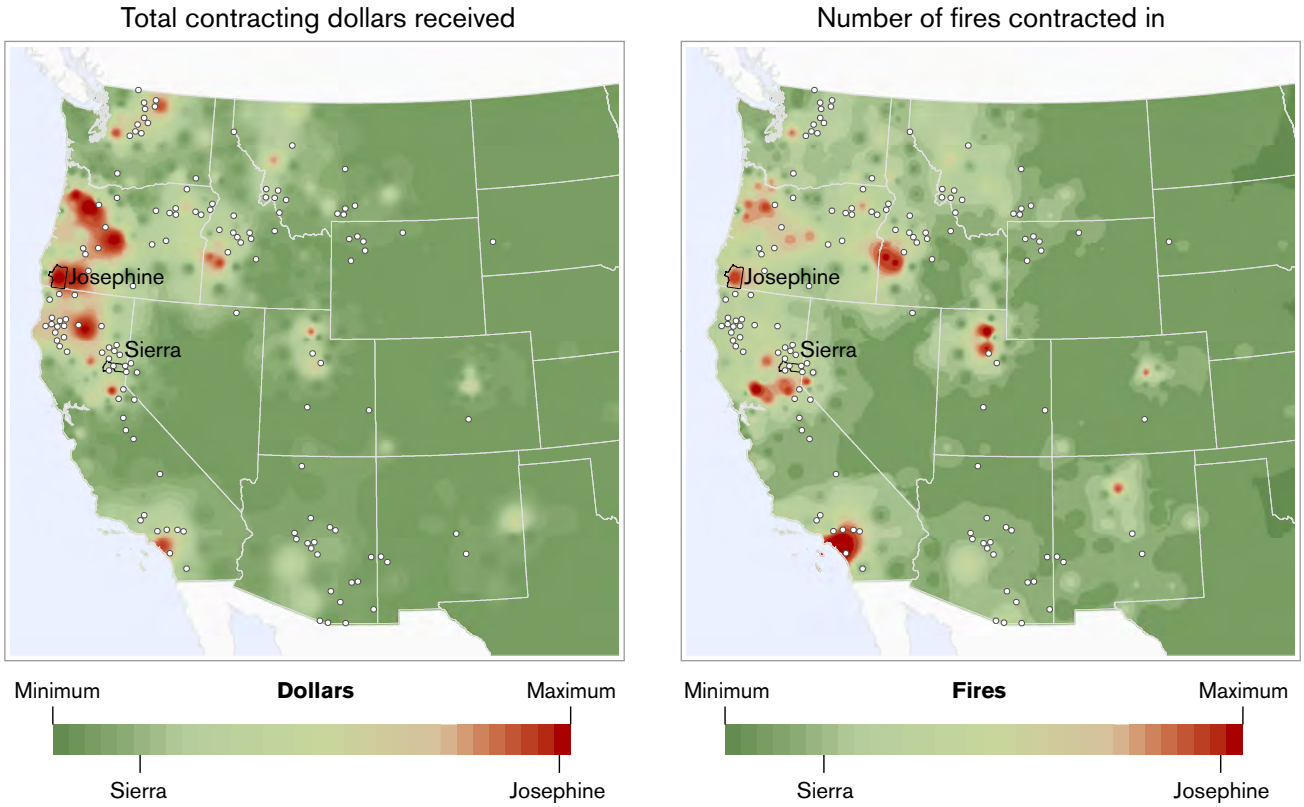
Suppression contracts with private vendors represent a central avenue for local businesses to provide services during wildfires and capture spending locally. Contracts for services with private firms made up 39 percent of the total federal suppression spending we analyzed, a greater proportion than wages for federal personnel and governmental agreements combined. The geographic distribution of contract expenditures was also widely dispersed. The 135 wildfires in our sample had suppression contract expenses that went to vendors in approximately 1,600 different counties across the United States, most of which were in the western U.S.

While vendors from across the U.S. worked on western wildfires, vendors in some areas participated in wildfire suppression disproportionately more than vendors from other areas. Whether measured by the amount of contract dollars received or the number of fires to which contractors were dispatched, there are clearly areas in the western U.S. that specialize in fire suppression work (see Figure 2, below).

For example, vendors from Josephine County, Oregon participated in 58 of the sampled fires and received a total of $14 million in private contract spending even though none of the fires in the sample occurred in Josephine County. Sierra County, California, on the other hand, experienced five large wildfires over the five-year study period, but vendors from Sierra County provided contracted services valued at just $47,000—less than 1 percent of the $5.2 million in contracted expenditures spent in the county.

The proportion of contract spending that occurred locally varied greatly by fire (see Figure 3, page 5). Variation in local contract spending was about 50 percent greater than the variation observed in all local suppression expenditures. For some of the fires, no money at all was spent on contracts in the same county as the fire. In others, the majority of contract spending was in the county of the fire, with as much as 62 percent spent locally. Money spent on local contracted services ranged from zero to $16.2 million per fire.

Figure 2 Distribution of contract expenditures relative to location of fires



Determinants of local capture of suppression contracting

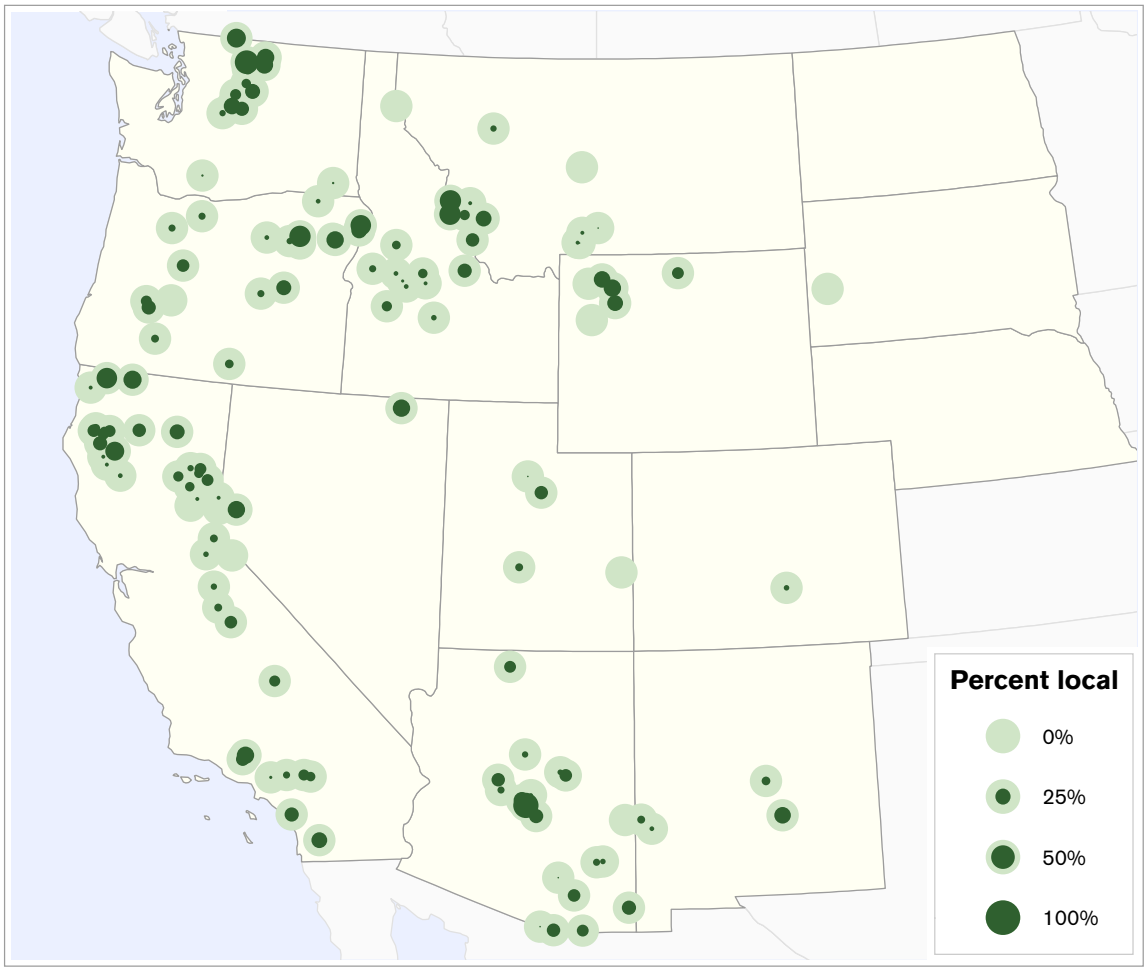
Local spending for suppression contracts was influenced by the total amount of suppression contracting, the economic specialization of the county, and the number of vendors that had contracted with federal land management agencies prior to the fire.

Generally, local contract spending increased as the cost of suppression contracts per fire increased, but that increase in local spending diminished as the total amount of suppression contracting increased above $1.0 million.

We found that counties with more vendors captured more suppression spending locally during large wildfires. To illustrate our results, according to our regression model a wildfire with the median value of contract expenses in our sample of fires ($1.34 million) would have significantly different levels of local contract capture depending on the number of vendors in the county. For example, in a county with the average number of vendors (38), 8 percent of the contract expenditures, or $112,000 would be captured locally. In a county with just five vendors (tenth percentile), 5 percent or $72,000 would be captured locally. In a county with 96 vendors (ninetieth percentile) 17 percent or $244,000 of the total contracting expenditure would be captured locally when a large wildfire occurred.

Each type of economic specialization (government, service, mining, manufacturing, farming, and unspecialized) was represented in our sample of wild-

Figure 3 Percent of contracted suppression costs to local vendors by fire

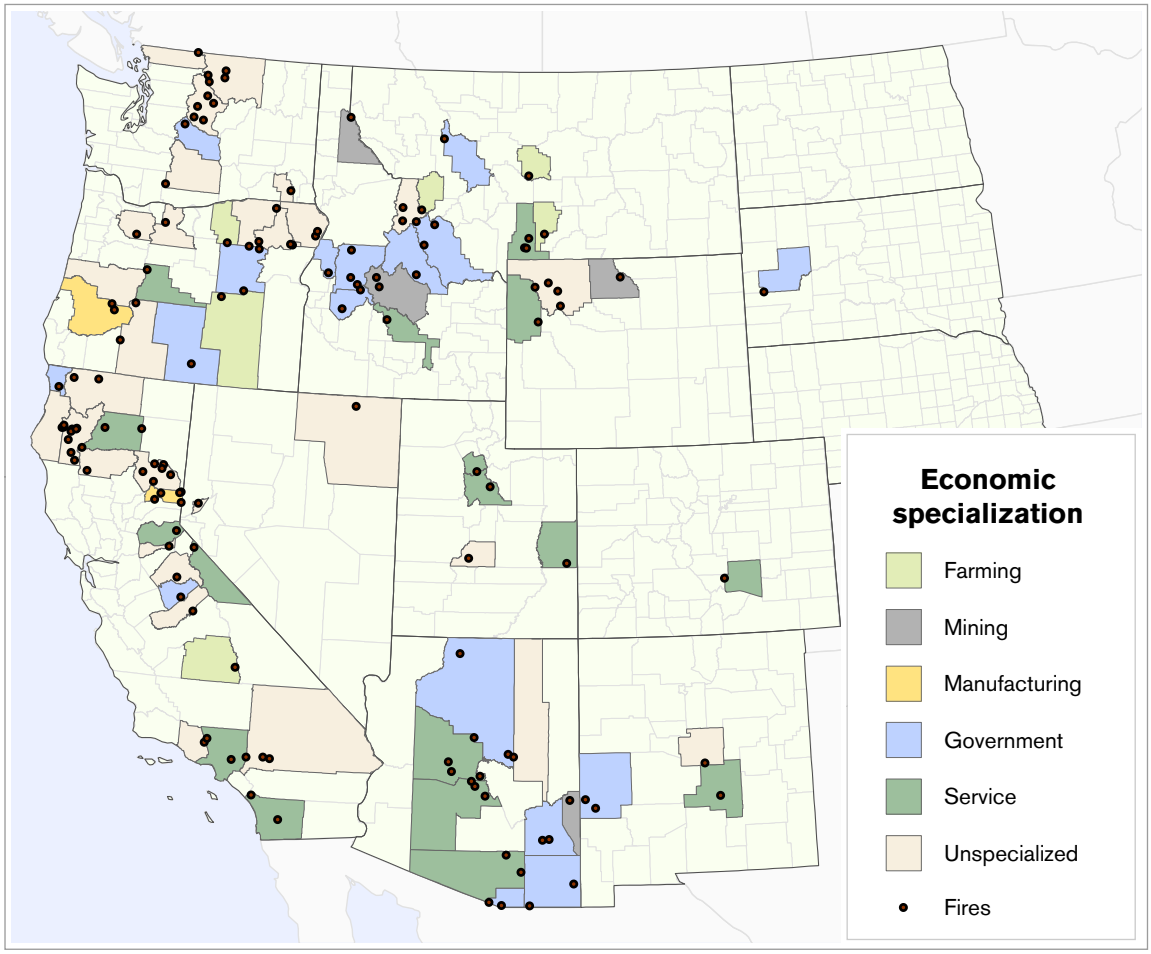


fire affected counties (see Table 2, page 7, and Figure 4, below). We found that in some types of counties, significantly less of the suppression contract money was spent locally. Unspecialized counties, or those with more economic diversity, captured the most contract spending, while counties with more narrow economic specializations, including specializations in services and government, had lower rates of local capture. Farming, manufacturing, and mining counties also tended to exhibit less local capture, but the number of wildfires in those types of counties were relatively few in our sample (seven, seven, and five, respectively), making our confidence in the statistical relationship relatively low.

Taking again a fire with the median contracting expenditure of $1.34 million and with the average number of vendors (38), our model predicts differing levels of local contract capture between counties with different types of economic specialization (see Table 2, page 7). Of all the specializations, farming-specialized counties would receive the least amount of local spending, followed by manufacturing, service, and then government-specialized counties.

Total contract spending, the number of vendors, and economic specialization together accounted for 62 percent of the variance in local capture (see Table 3, page 7). Our research suggests that although there are other factors at play, the underlying economic structure and a history of contractors active with the federal government are important predictors of how local economies experience large wildfires.

Figure 4 Large wildfires and county economic specialization[1]



1 Economic specialization based on USDA Economic Research Service designations.

Table 2 Fire occurrence and model-predicted local capture[1] of contract spending by county economic specializations[2]

County type	Number of fires	Percent of sample (%)	Local capture ($)	Percent of total (%)
Unspecialized	58	43	168,610	12
Government-specialized	30	22	88,022	6
Service-specialized	28	21	73,522	5
Farming-specialized[3]	7	5	54,467	4
Manufacturing-specialized[3]	7	5	66,526	5
Mining-specialized[3]	5	4	104,333	7
All counties	135	100	112,360	8

1 Results are for a fire with $1.34 million in total contract expenditures in a county with the average number of vendors (38).
2 Economic specialization based on USDA Economic Research Service designations.
3 Farming, mining, and manufacturing economic specializations have relatively few observations and therefore model predictions should be taken with caution.

Table 3 Ordinary least squares regression model of local contract spending during large wildfires

		Coefficient	Significance[1]
Intercept		11.26	***
Total contract expenditure (logged)		0.82	***
Number of vendors		0.01	***
Economic specialization (compared to unspecialized)			
Government-specialized		-0.65	**
Service-specialized		-0.83	**
Farming-specialized		-1.13	*
Manufacturing-specialized		-0.93	#
Mining-specialized		-0.48	
	Model F-statistic	26.80	***
	R2	0.62	

1 Significance levels: # p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Zero-capture counties

For twelve wildfires, no suppression contract costs occurred in the county of the wildfire. These fires cost between $1.1 and $7.7 million each. We examined these wildfires separately because our initial analysis suggested these counties and fires were statistically different than those that captured at least some spending.

First, we found that fires with no local capture had lower contract expenditures than other fires. For these fires, an average of 25 percent of the total cost was allocated to contract expenditures, compared to 33 percent on average for all other fires. These fires also cost less overall, $2.7 million versus $9.4 million each, on average. Together, this resulted in contract expenditures that averaged just $0.7 million, as opposed to $3.7 million per fire.

Second, fires with zero local capture were significantly less likely to occur in unspecialized counties than in counties with narrower economic specializations.[8] And third, fires with zero local capture occurred in counties with significantly fewer vendors.[9] There were 17 vendors, on average, in zero-capture counties, versus 40 in counties that had at least some local capture.

Discussion

The economic impact of large wildfires on nearby communities is influenced by the amount of money that is spent locally. Contracts for direct suppression work and support services present an opportunity for communities to capture some of that spending locally. Our results provide a greater understanding of local contract capture in two ways: (1) by lending insight into the variability in local contract capture that occurs between fires, and (2) by identifying factors that influence local capture of wildfire suppression contracts in the western United States.

Variability in local suppression contract capture

Our results suggest that across wildfire events, different scenarios of local capture of suppression contracts occur. The difference between high and low local contract capture was considerable, with some counties capturing no contract spending and others capturing the majority of contract spending. Overall, there was more local spending for contracted suppression services than there was for federal personnel, state cooperative agreements, flying contracts, supplies, and other expense categories. However, the variability in local contract capture was one-and-one-half times as great as the variability in total local spending during wildfires. With just 12 percent local capture across all fires, the large majority of suppression contract dollars in our study still went to nonlocal vendors.

The distribution of contract spending from our sample of wildfires across the West suggests that capacity for local capture is greater in some counties than others. Large wildfire suppression events did not always translate to broad local participation in suppression contracting, suggesting that capacity for local capture does not always coincide with local fire risk. Furthermore, some regions appear to be particularly specialized in capturing suppression contracts, regardless of a fire's location. This apparent specialization could be due to the types of existing businesses in these counties, long-term agreements between contractors and the Forest Service for suppression services in specific counties, or a deliberate business development strategy for wildfire suppression that is not well understood.

Influences on local capture

Our results also suggest two measures that are important for predicting the amount of local capture that is likely when a large wildfire occurs. The economic specialization of a county and the number of vendors that are active in wildfire contracting both influenced the local capture of contract spending and can be seen as measures of local contracting capacity. The ERS local economic specialization indicators reflect the types of businesses present in the county. Many suppression-related businesses interfacing with the federal government reflects a

history of resources for federal suppression work that can be employed during a wildfire.

It is important to note that the number of suppression-related vendors that interface with the federal government may not be the same thing as the number of vendors in a county that are capable of providing suppression-related services. In other words, local capacity to capture suppression contracts may differ from local capacity to provide wildfire suppression work overall. Federal regulations that require vendors to enroll in a contracting database to be eligible for contracts may produce institutional barriers that obscure some local capacity. In addition, the scale of large wildfire events may cause some local capacity to be overlooked.

Concurrent research in Trinity County, California, revolving around the 2008 fire season, for instance, illustrates a division between available business capacity and local contract capture. Despite local capture of contract spending that falls in line with what would be expected based on the contracting costs for the fires, the county's economic specialization, and the number of active vendors in the county, numerous local businesses stated that they were willing and able to support more work during the 2008 fire season.[10] These accounts suggest that typical levels of local contract capture may not utilize total local capacity.

Accounts from Trinity County also suggest, however, that the scale of large wildfire events may make full utilization of local capacity difficult. Untapped capacity may not match the needs of large wildfire events, and may be too quickly exhausted to be useful. For instance, although local businesses may be available, willing, and capable of providing services, they may not be able to provide the scale of services necessary, such as provisioning entire base camps.

Full realization of local capacity relative to suppression needs could help Forest Service personnel better plan suppression efforts. Full utilization of local capacity could maximize benefits to wildfire-affected communities and reduce net spending by reducing the travel costs of more distant vendors.

Impacts of local contracting capture on local economies

Finally, our results suggest that by looking at both measures of local contracting capacity, a predictive model can be used to estimate local contract capture during large wildfires across the West. Local market impacts follow local spending, and economic effects on nearby communities can vary greatly depending on how much suppression spending is captured locally.[11]

When communities are able to respond to nearby large wildfires by providing suppression services through contracts with the Forest Service, the local spending spurs employment during the wildfire, and helps the communities buffer the more dramatic market shifts that wildfires may create. When local communities are not well positioned to capture suppression contracts, some of this short-term employment potential is lost. In the most extreme cases, no contract dollars are spent in the affected county, and no potential economic gain from local contract suppression spending is possible.

When large wildfires occur, suppression is the clear first priority for federal spending. However, additional funds may be allocated to burned areas after wildfires. Previous research suggests that contract spending for repair and rehabilitation services increases in counties affected by large wildfires in the year after a fire as both built infrastructure and natural systems are rebuilt.[12] The mobilization of community assets during suppression work might also be mirrored in this recovery work, increasing the benefits to affected communities after a fire. Furthermore, because fire suppression services and presuppression services are often related, the mobilization of community vendors for wildfire suppression efforts increases the likelihood that those same businesses might also participate in presuppression efforts such as hazardous fuels work or infrastructure maintenance.

Our research suggests that increasing rates of local contract capture in fire-prone counties could build greater local business capacity, with vendors who are more likely to accomplish presuppression, suppression, and postsuppression recovery work.

Conclusion

Wildfires on western public lands have increased in both size and cost, and will continue to affect the communities located near them. A large proportion of wildfire suppression costs are allocated to private vendors for contracted services to work directly on fire lines and to provide the supporting services needed to maintain the suppression effort. This research demonstrates that some counties are able to capture much more suppression contract spending than others, and that local capture is influenced by both the diversity of the local economy and the number of businesses that have contracted with the federal government for fire-related services in the past. As federal spending on suppression continues to grow, an understanding of the benefits associated with local spending and local capacity to provide suppression services may help natural resource managers, policymakers, and communities make decisions that better support local economies.

Endotes

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5 County economic classifications were created by the USDA Economic Research Service and can be found at www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps.aspx#nonrec.

6 For more information on identified activities and methods , see Ecosystem Workforce Program Working Paper #41, *Forest Service Spending on Large Wildfires in the West*.

7 Total suppression costs from 2006 to 2010 budget justifications for actual costs of prior years. www.fs.fed.us/aboutus/budget/ This total amount includes both budget-appropriated and Emergency and Supplemental Appropriations funds.

8 Chi-square test for association shows less likelihood of zero-capture counties in nonspecialized counties ($p<0.1$).

9 Welch two-sample t-test value shows zero-capture counties have significantly fewer vendors ($p<0.01$).

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