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Forest Service spending on large wildfires in the West

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Since the 1970s, federal spending on wildfire suppression in the United States has grown, reaching $1 billion annually over the past decade.[1] The USDA Forest Service has also increasingly used private contractors to conduct fire suppression. As with all activities that the Forest Service performs, the agency can employ staff directly, contract with outside businesses, or enter into agreements with nonprofit and other government entities to perform fire suppression. Historically, the Forest Service primarily used agency personnel for much of its suppression activities. However, with the decline of Forest Service personnel in the 1990s, the agency turned to contractors more frequently.[2] Despite these growing costs and the larger role of private businesses in fire suppression, relatively little is known outside the land management agencies about what these funds are spent on, how they are spent, which activities are contracted out, and where this spending occurs. Yet, the choices that the Forest Service makes in wildfire suppression spending affect communities and economies near wildfires. In particular, local and regional capture of suppression contracts and local employment of agency staff can help mediate the negative economic impacts of a wildfire.

The purpose of this report is to shed light on fire suppression spending as a starting point for understanding the economic impacts of large fires. In this paper, we examined Forest Service suppression spending during and after large wildfire events to explore: (1) what the Forest Service spends money on during and after a wildfire; (2) the kinds of entities and personnel that perform that work; and (3) where funds went.

Approach

We examined Forest Service suppression spending data from the National Interagency Fire Management Integrated Database (NIFMID) and Forest Services' Foundation Financial Information System (FFIS). From the 346 wildfires in Forest Service regions 1–6 that cost the Forest Service more than $1 million between 2004–8, we collected suppression expenses and contracting data for a subsample of 135. The sample was random and stratified for Forest Service regions and metro/non-metro counties. We examined the transactions to determine the distribution of costs among the fires, the breakdown of spending among object codes, the distribution of payments among vendors, and the top vendors. To determine how much suppression spending went to local and regional recipients, we coded vendors and the payments they received based on the county of their address. We defined local spending as spending that went to recipients located in the same county as the wildfire, and regional spending as spending that went to recipients in counties adjacent to the wildfire. We examined the local and regional distribution of spending for both total suppression costs and contracting spending.

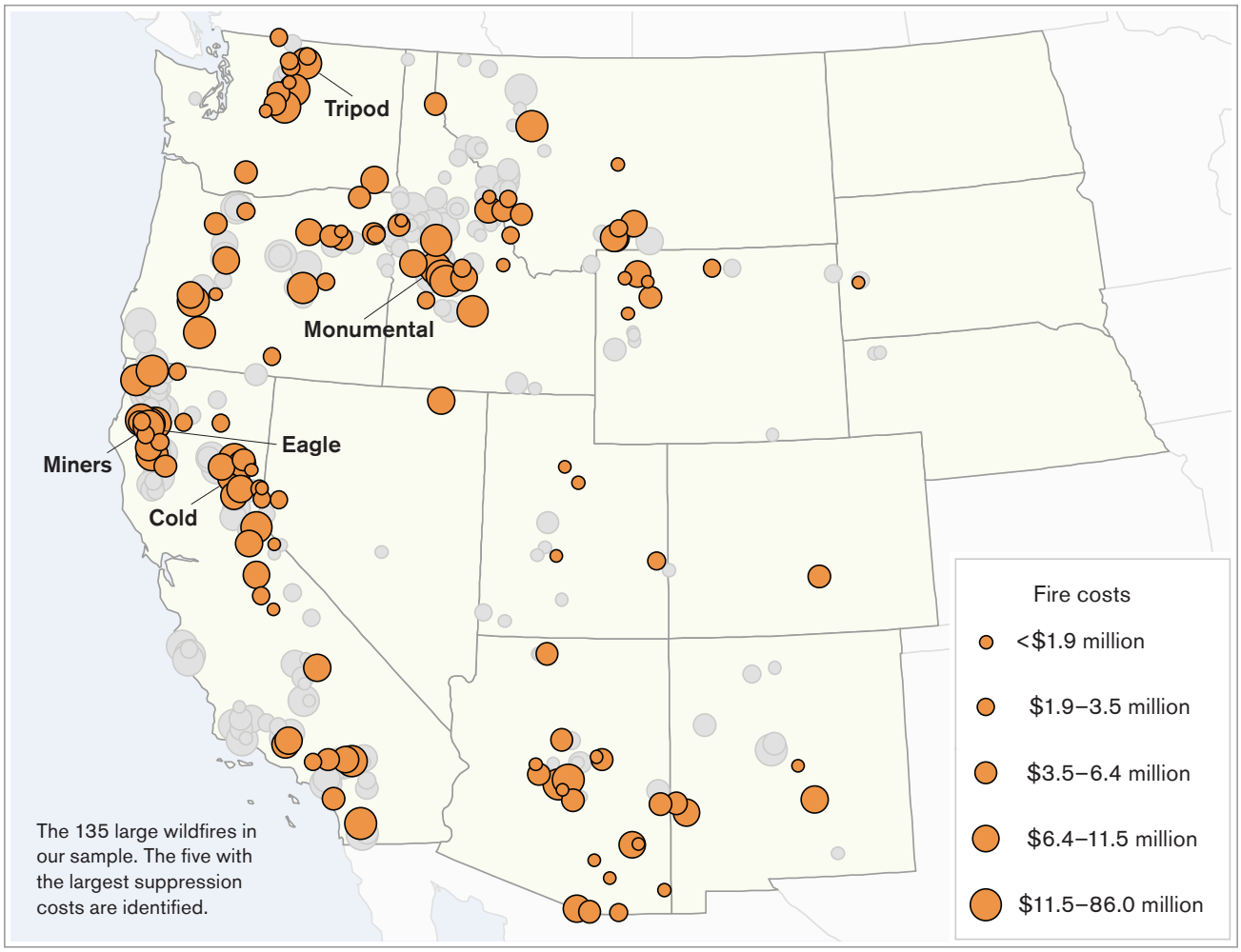
To further examine the kinds of work contracted during and after wildfires, we queried the Federal Procurement Data Procurement (FPDS) for Forest Service contracts in rural counties that experienced a large wildfire during the study period (n=96). The FDPS includes service codes for contract actions and amounts of funds obligated, but does not attribute contracts to individual events such as wildfires or to specific payments. We divided contracting actions into two groups based on the date of the contract action: those that occurred in a county during the quarter of a large wildfire or three quarters after it (a fire-year), and those years that did not have fires (non-fire periods). We compared the two groups of contract actions to determine which types of services were contracted more frequently and with more funding during and following a large wildfire. However, many types of fire suppression contracting are not well represented in FPDS. As a result, this analysis provides a window into the type of fire-related services the agency likely contracts for after a wildfire, but it does not describe all fire suppression spending.

Findings

Spending on large wildfires

From 2004 through 2008, the Forest Service spent a net of $2.25 billion on suppression of the 360 wildfires that individually cost more than $1 million in western United States. This represents 37.5 percent of the total Forest Service fire suppression spending during this period, which was just over $6 billion.[3] The 135 large wildfires examined in our subsample (see Figure 1, page 3) represent $1.19 billion, or nearly 20 percent, of the total suppression spending from 2004–8. The Forest Service spent between $1.1 million and $85.6 million on each wildfire in our subsample (see Figure 2, page 5). The largest 20 percent of fires in the subsample accounted for 66 percent of all expenditures in this sample.

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



The Forest Service spent fire suppression funds on a variety of goods and services. The "Miscellaneous contractual services" was the largest group (39 percent of total expenditures), followed by a variety of personnel compensation categories such as wages, benefits, and overtime and hazard pay (26 percent), flying contracts (16 percent), and agreements with state agencies (11 percent) (see Figure 3, page 5). Smaller portions were spent on travel, supplies, and a variety of other expenses.

The Forest Service paid state agencies a total of $359 million to provide services to the Forest Service. However, the Forest Service was reimbursed primarily from state agencies for more than $878 million for a variety of services including contracts, personnel, and flying contracts. This implies that the Forest Service provides more services to state agencies than it does seek assistance from other agencies (see Table 1, below).

Use of contracting during wildfires

The amount of each wildfire's cost that went to contractors varied by year and location, but made up a sizeable portion of total suppression spending. Overall, just under $463 million of the $1.19 billion total suppression spending on the sample wildfires went to miscellaneous contracted services, which range from direct suppression work to support services and consultation work. This amount varied between years, from a low of 27 percent in 2005 to a high of 41 percent in 2008. Flying contracts, which represented 16 percent of the suppression spending in our sample, are a separate category and not included in miscellaneous contracted services.

Several factors influenced the portion of suppression spending that went to contracts on any given fire. First, as the expense of a wildfire increased, the proportion of the total expense that went to contractors also increased. Second, after we controlled for the total cost of a fire through a multiple linear regression model (see Table 2, page 6), we found that the proportion of the costs that went to contractors varied based on geography. Proportionally, the further north and west the fire was, the larger proportion of the fire spending went to contractors (see Figure 4, page 6). Finally, as the total suppression dollars being spent at any given time across the West increased, the proportion of contractors receiving money also increased.

Table 1 Expenses, reimbursements, and net costs by by expenditure categories

Expense category	Gross expenses ($)	Reimbursements ($)	Net expenses ($)	Percent of net expenses
Contractual services	876,507,112	413,602,959	462,904,153	39
Federal personnel	359,637,832	51,940,557	307,697,276	26
Flying contracts	339,632,395	148,509,973	191,122,421	16
Agreements with states	359,127,854	232,390,395	126,737,458	11
Supplies and materials	61,033,982	24,716,947	36,317,035	3
Other expenses	77,000,870	7,169,817	69,831,053	6
Overall	2,072,940,045	878,330,648	1,194,609,396	100

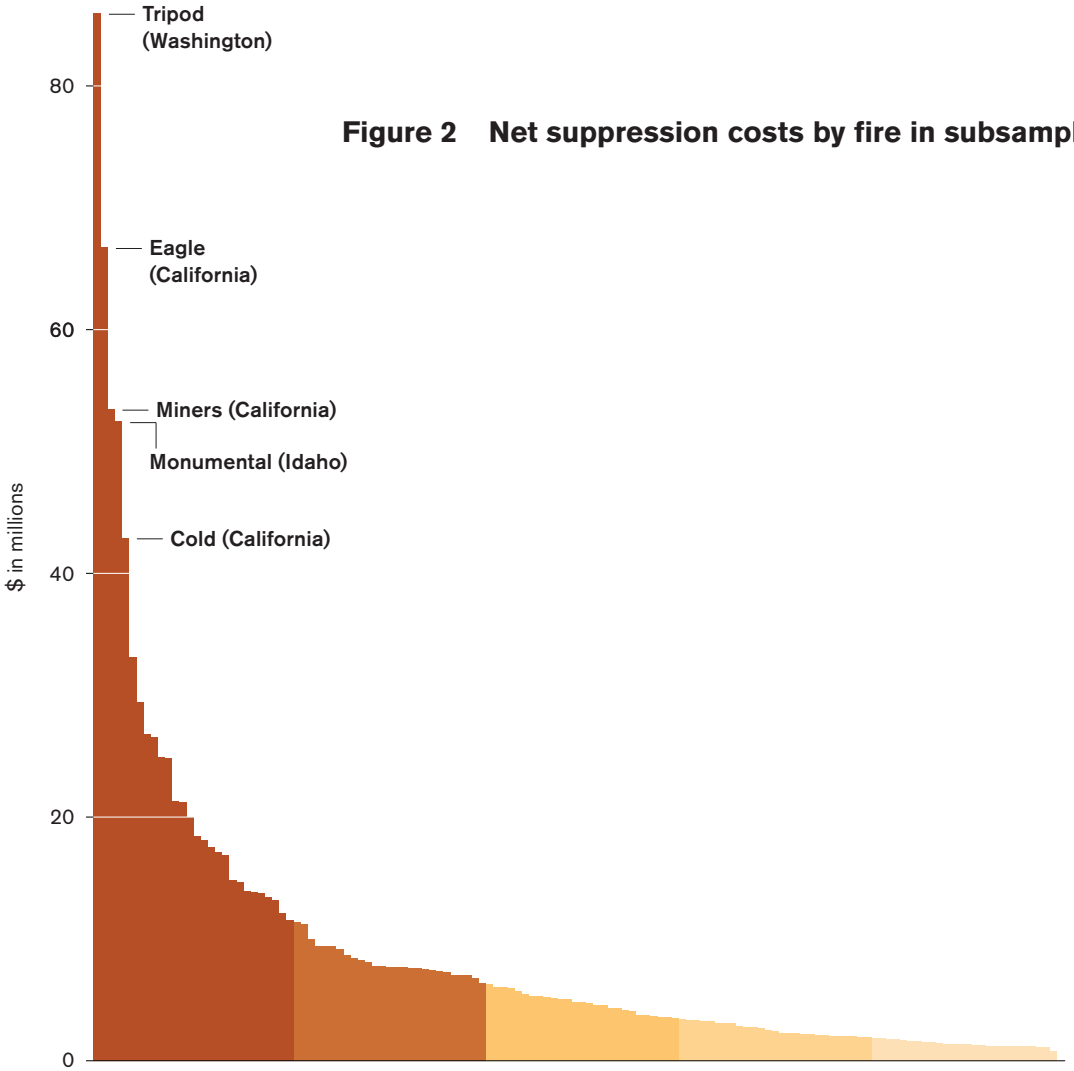


Figure 2 Net suppression costs by fire in subsample

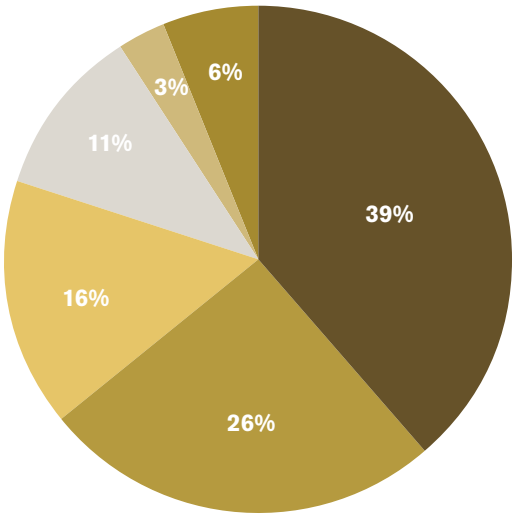


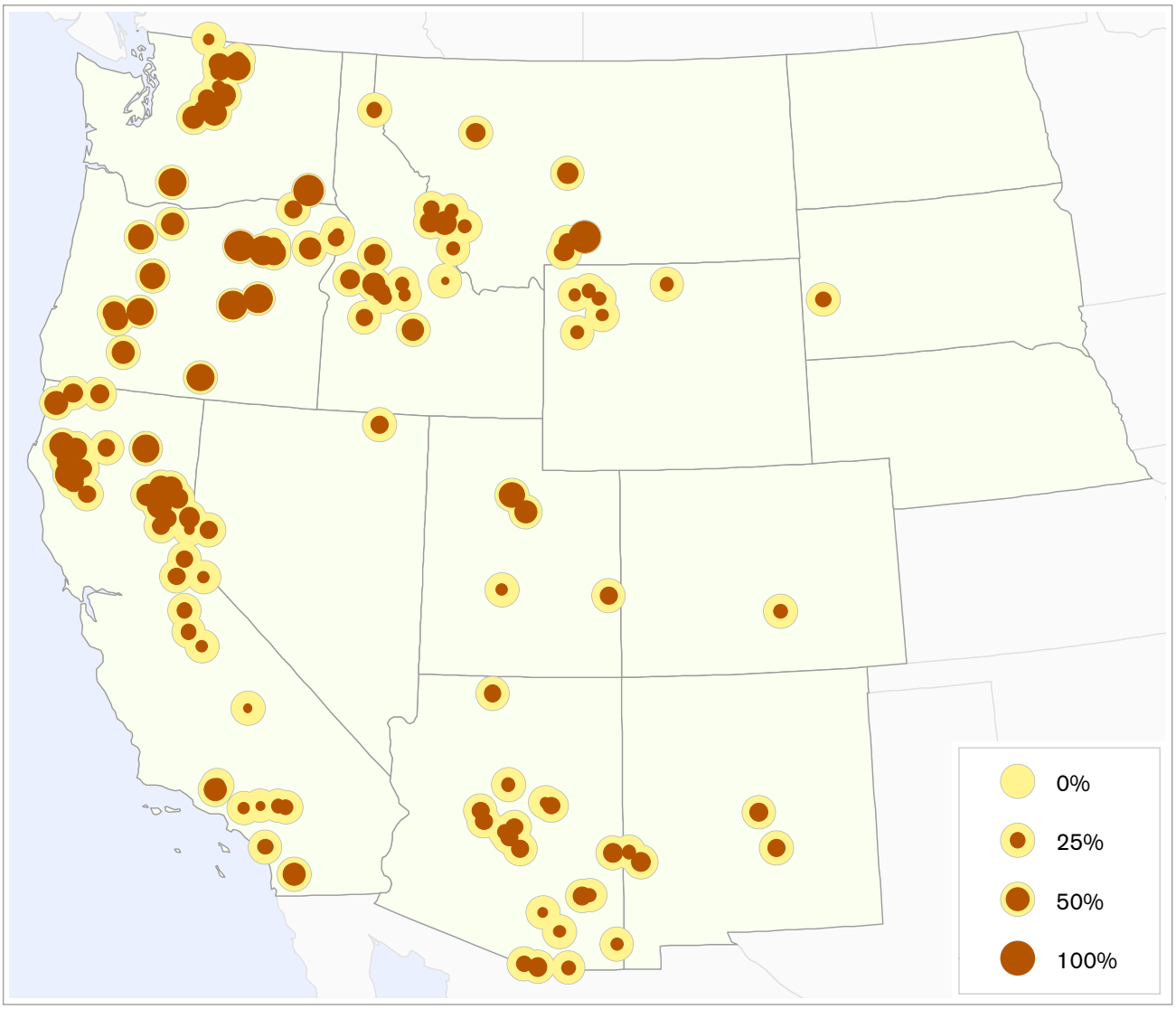
Figure 3 Net fire suppression expenses by budget category

- Contractual services
- Federal personnel
- Flying contracts
- Agreements with states
- Supplies and materials
- Other expenses

Table 2 Predictors of Forest Service use of fire suppression contractors

Dependent variable: percent of wildfire expenditures in budget object code miscellaneous contracted services		
Independent variables	Coefficient	Significance
Longitude of fire	-0.0064	0.0260
Latitude of fire	0.0059	0.0630
Metro/non-metro counties (non-metro = 0)	0.0122	0.6920
Log of the total costs of the fire	0.0388	0.0060
Total Forest Service funds spent across the West on large fires in the quarter of the fire	0.0002	0.0680
Intercept	-0.7731	0.0140
Adjusted r-squared	0.2200	

Figure 4 Fire suppression spending to private contractors



Types of businesses engaged in wildfire suppression services

Because the FFIS transaction data we had access to do not provide detailed information about types of activities being contracted, we conducted Internet searches of the highest paid contract vendors to obtain further information about the services they offer.

We found that the highest paid vendor was a company that provided fire retardant chemicals, among other products. Another of the top 50 provided similar products. We also found that some of the top contractors provided forestry services or heavy equipment associated with direct wildfire suppression work. For instance, six of the 50 top-paid vendors were forestry or timber organizations that specialize in wildland fires. These vendors offered a variety of contracted services that range from suppression crews, to heavy equipment such as fire engines and helicopters, to post-fire clean-up and reforestation work. In addition to these, three vendors provided contracted firefighter crews, three offered helicopter services, and one provided aircraft parts. Top contractors also included two general construction businesses, along with one excavation, and one railroad construction business.

Other vendors offered a range of support services to fire suppression work. Seven of the top 50 vendors provided food or food catering services; one food vendor was the third highest paid vendor among our sample of fires, receiving $8.5 million in suppression contract funds from 2004–8. Other support services included sanitary and water services. Two more vendors provided a suite of support services that included portable shelters, handwash stations, laundry services, and basecamp setup. Another provided contracted medics and EMTs that specialize in fire incidents, one was a car rental company, and one provided office electronics such as phones and faxes.

Further, some of the contractors provided environmental planning and ecosystem management work. The seventh highest-paid vendor was an environmental management consulting firm, and two of the top 50 offered ecosystem health and rehabilitation services such as erosion control, cleanup, and reseeding.

Service contract changes after large wildfires

Looking at the kinds of service contracting activities that have increased spending after fire events can also help illuminate the kinds of work associated with wildfires. We used FPDS service contracting information to find service codes wherein the Forest Service increased spending in the year during and after a wildfire.

Our analysis found 15 service codes (of 98) that changed significantly between fire and non-fire years (see Table 3, page 8). Eleven of the changes were increases in average spending, and four were decreases in the average spending during fire years. Although it is not immediately apparent why this would be the case, the largest increase both proportionally and in total spending was for repair of dams, which increased over seven-fold and went from being the fifth to second greatest service contract expenditure during fire years. The second largest increase was for the construction of restoration of real property, which includes "all actions necessary to restore, rehabilitate, or reclaim property subsequent to an accident, incident, construction,

test, dumping, waste storage, natural disaster, act of war, Government action, or direction by a court of competent jurisdiction." Spending on this service code increased more than five-fold on average during fire years. It represents the fourth greatest expenditure on service contracts during fire years and the twenty-first greatest expenditure during non-fire years. Together, the increased spending for construction and repair contracts accounted for 81 percent of the increased spending observed. In addition, we found increases in obligated dollars for some natural resources services (F codes), and many housekeeping services (S2 codes), including food, janitorial, and trash collection services.

We also considered whether a contract action was more likely to occur in fire years versus non-fire periods. Contract actions include activities such as initial contract awards, amendments, changing end dates, additional funding and work added to a contract, and the like. We found that for 48 of the 98 service codes, contracts were more likely to occur in the year following a wildfire (see Appendix A, Table A1, page 13). Again, many of these service codes were for onstruction, repair, and housekeeping and utility services. Eight other service areas were less likely to have contract actions during a year with a large wildfire, several of which were activities associated with forest planting and rehabilitation.

Table 3 Significant changes in contract spending during years with wildfires

Service code	Description of service	Average annual spending in non-fire periods ($)	Rank during non-fire periods	Average annual spending during fire years ($)	Rank in fire years	Ratio of change
Increases						
Z211	Repair of dams	80,221	5	593,000	2	7.39
Y300	Construction of restoration of real property (public or private)	37,124	21	188,905	4	5.09
Y219	Construction of other conservation and development	27,561	12	170,823	6	6.2
F021	Site preparation	29,180	30	94,631	9	3.24
F018	Other range or forest improvements services (non-construction)	31,877	27	81,286	11	2.55
C122	Highways, roads, streets, bridges, and railways	24,101	41	63,825	17	2.65
S206	Guard services	38,000	19	64,650	16	1.7
Z299	Repair of other non-building facilities	24,953	36	46,350	23	1.86
S203	Food services	9,077	86	15,000	67	1.65
S205	Trash and garbage collection services—including portable sanitation services	12,100	69	17,372	61	1.44
X299	Rental of other non-building facilities	5,705	95	8,890	80	1.56
Decreases						
B533	Water quality studies	10,841	76	4,150	95	0.38
F020	Fisheries resources management services	18,216	52	7,900	86	0.43
F999	Other environmental services, studies, and analytics	32,216	25	20,400	51	0.63
R421	Technical assistance	20,000	48	7,227	87	0.36

All changes significant to .10 p-value or less

Distribution of fire suppression spending contracts

Examining the number and size of contracts that vendors received can help illuminate the scale and distribution of opportunities for businesses to perform suppression work. According to FFIS, the Forest Service paid a total of 4,107 individual vendors for miscellaneous contracts on the 135 large wildfires in our subsample. Vendors received a total of between ten dollars and $11.5 million each over the course of the study period. Half of the vendors were paid less than $18,948. The top 25 percent of vendors made more than $64,848 each; the top 16 percent received more than $100,000 each. The greatest number of fires participated in was 82.

Looking at the local and regional capture of contracts also helps show where the economic benefits of suppression spending may flow. Most suppression spending did not go to businesses located in the county where the fire occurred or in adjacent counties. Of the total $1.19 billion spent in our study sample, a total of nine percent ($106 million) went to recipients local to the county of the fire, and 14 percent ($165 million) went to recipients in counties adjacent (regional) to the fire county. Seventy-seven percent of the total suppression spending went to recipients that were based in counties neither within or adjacent to the fire (see Table 4, below). Businesses also often did not work "at home." Using the FFIS transaction data, we found that that vendors worked outside of the county where their business was located a majority (76 percent) of the time. The majority (57 percent) participated in just one wildfire during the study period, while 25 percent participated in three or more. The distribution of spending that went locally, regionally (to adjacent counties), and elsewhere varied considerably between fires (see Figure 5, page 10).

Some expenditure categories had much greater local and regional spending than others. The most local capture (12 percent) occurred for miscellaneous contracting services. Agreements with state agencies and federal personnel expenses had similar local capture rates of 11 and 10 percent respectively. One percent of flying contract spending was allocated locally. Local capture was also lower for materials and supplies, and other expense categories.

Summary

Trends in suppression spending

To better understand trends in wildfire suppression spending, we examined a subsample of 135 large wildfires that totaled $1.19 billion in suppression spending from 2004–8. First, we found that the Forest Service spent a plurality (just under $463 million) on contracted services with private businesses. Total expense of a wildfire and geography influenced the portion of suppression spending that went to contracts on any given fire. More money went per fire went to contractors when fires occurred in the northwestern part of our study area than in the southeastern part (recall Figure 4, page 6).

Second, we analyzed the range of fire suppression activities that the Forest Service contracts, and found that, in addition to direct fire attack services such as contracted fire crews, there were consider-

Table 4 Percent local and regional capture of fire suppression by expenditure categories

Expense category	Amount awarded locally ($)	Percent awarded locally	Amount awarded regionally ($)	Percent awarded regionally	Percent other	Total ($)	Total percent
Contractual services	56,622,365	12	100,448,555	22	66	462,904,153	100
Federal personnel	31,907,423	10	39,093,179	13	77	307,697,276	100
Flying contracts	1,350,863	1	7,598,061	4	95	191,122,421	100
Agreements with states	13,543,887	11	14,055,116	11	78	126,737,458	100
Supplies and materials	725,080	2	827,743	2	96	36,317,035	100
Other expenses	1,608,968	2	2,783,473	4	94	69,831,053	100
Overall	105,758,586	9	164,806,126	14	77	1,194,609,396	100

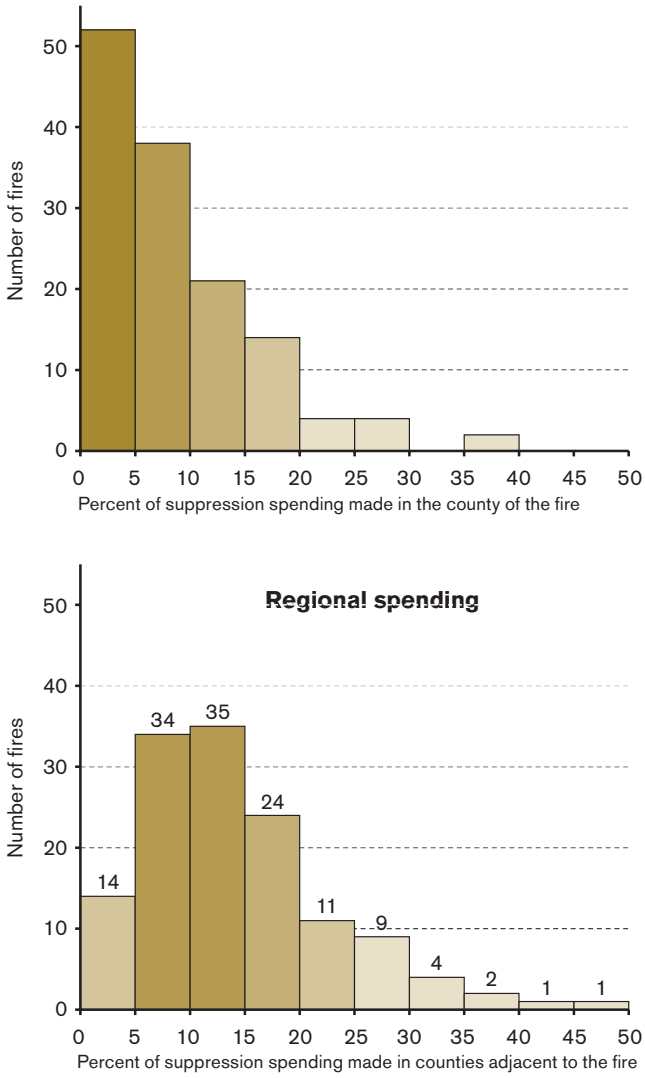
able investments in support services for fire-camp setup and operation. These included janitorial services, temporary medical personnel, and portable shelters, laundry, and shower facilities. Although these types of support services might not be the first kind of activities thought of when considering suppression expenditures, our research suggests that such services represent some of the greatest suppression contract expenditures.

Third, we looked at changes in amount and frequency of contract spending on different kinds of services, and found that wildfires may result in considerable increases in service contracts after the fire has been put out. For example, the greatest increases in contract spending in the year after large wildfires were for the construction and repair of structures and facilities. This suggests that substantial increases in contract spending are associated with large wildfires, occurring after the fire in association with recovery.

Distribution of fire suppression spending contracts

We also examined the geographic distribution of suppression spending to better understand where the economic impacts of wildfire suppression may be felt. We found that the portion of the total $1.19 billion spent locally and regionally was generally low (9 and 14 percent, respectively), but varied considerably between fires (recall Figure 5, above). One reason for this variance might be the local capacity to provide the types of work associated with wildfires. The resources required to manage large wildfire events might quickly outpace a community's capacity to provide the services in some cases. In other cases, fires might occur near major vendors for some of the required services, allowing more contracts to be made locally. Understanding the causes of variation in local capture requires additional research, and is addressed more comprehensively in a forthcoming coming EWP working paper.

Figure 5 Local and regional county share of wildfire suppression spending



The variation of local and regional capture between transaction categories indicates that some types of suppression spending are more likely to be captured locally and regionally than others. Transactions categories with the highest levels of local spending also had the highest levels of regional spending, resulting in considerable differences between expenditure categories in the amount of money spent near wildfire locations.

Conclusion

This research acts as a starting point for understanding the economic impacts of Forest Service spending on large wildfire events by examining broad categories of suppression expenditures, the types of contracted work associated with wildfire events, and the distribution of spending around wildfire events. Our study sheds some light on the broad range of people and entities involved with the Forest Service as a result of large wildfire spending, and the complexity of agreements that resulted in expenditures by and reimbursements to the Forest Service. Contracted services include direct suppression work, services that support this work, and rehabilitation services that are contracted after the fire are out. The locations of the vendors who receive these contracts determine where the economic impacts are finally realized. Our data suggests that different types of suppression expenditures have different geographies of spending, and that the amount of local and regional spending can vary greatly between large wildfire events

Given the current decade-long trend of growing suppression costs and projections for further increases in the future, we might expect contract spending to play an increasingly important role in the economic impacts of wildfires. The greatest impacts from suppression spending will be on the contractors and federal employees that provide suppression services, and the economies of which they are a part.

Endotes

1 K.M. Gebert, D.E. Calkin, and J. Yoder. Estimating Suppression Expenditures for Individual Large Wildland Fires. *Western Journal of Applied Forestry* 22 (2007):188-196; J. Liang, D.E. Calkin, K.M. Gebert, T.J. Venn, and R.P. Silverstein. Factors influencing large wildland fire suppression expenditures. *International Journal of Wildland Fire* 17, no. 5 (2007):650–659; J.P. Prestemon, K. Abt, and K.M. Gebert. Suppression Cost Forecasts in Advance of Wildfire Seasons. *Forest Science* 54 (2008):381-396.

2 Government Accountability Office, Biscuit Fire: Analysis of fire response, resource availability, and personnel certification standards (Washington, D.C.: Government Accountability Office, 2004).

3 Total suppression costs from 2006–10 budget justifications for actual costs of prior years. http://www.fs.fed.us/aboutus/budget/. This total amount includes both budget-appropriated and Emergency and Supplemental Appropriations.

Appendix A

Table A1 Significant changes in contract actions during years with wildfires

Services with increased contracting actions during fire periods	
AD21	Services—basic research
B510	Environment studies and assessments
B525	Natural resource studies
B533	Water quality studies
B534	Wildlife studies
C122	Highways, roads, streets, bridges, and railways
C214	A&e management engineering services
F003	Forest and range fire suppression and presuppression services
F103	Water quality support services
F108	Hazardous substance removal, cleanup, and disposal
J023	Equipment repair: ground effect vehicles, motor vehicles, trailers, and cycles
J025	Equipment repair: vehicular equipment components
J099	Equipment repair: miscellaneous
Q999	Other medical services
R404	Land surveys, cadastral services (non-construction)
R419	Educational services
R425	Engineering and technical services
R499	Other professional services
S111	Gas services
S113	Telephone and communications services
S201	Custodial janitorial services
S202	Fire protection services
S203	Food services
S205	Trash and garbage collection services—including portable sanitation services
S206	Guard services
S222	Waste treatment and storage
W038	Equipment rental: construction, mining, excavating
W074	Equipment rental: office machines, text processing
W099	Equipment rental: miscellaneous
X299	Rental of other non-building facilities
Y111	Construction of office buildings
Y119	Construction of other administrative facilities and service buildings
Y199	Construction of miscellaneous buildings
Y249	Construction of other utilities
Z111	Repair of office buildings
Z119	Repair of other administrative facilities and service buildings
Z161	Repair of family housing facilities
Z211	Repair of dams
Z219	Repair of other conservation and development facilities
Z222	Repair of highways, roads, streets, bridges, and railroads
Z244	Repair of sewage and waste facilities
Z245	Repair of water supply facilities
Services with decreased contracting actions during fire periods	
F004	Forest and range fire rehabilitation services (non-construction)
F005	Forest tree planting services
F009	Seed collection and production services
F019	Other wildlife management services
S299	Other housekeeping services
V121	Air charter for things
Z199	Repair of miscellaneous buildings
Z212	Repair of canals

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