

COMPARING THE COSTS OF AGENCY AND CONTRACT FIRE CREWS



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Has the increasing use of contract fire crews (20-person type 2 fire crews) by our public land management agencies over the past 5 years contributed to these agencies' rising fire suppression costs? (See table 1.)

A superficial comparison of the wage rates of agency and contract firefighters would seem to indicate that contract crews are more expensive. Such a comparison, however, is misleading for two main reasons:

- The wage rate of a contract crew includes a number of costs not included in agency crew wage rates, such as training and equipment expenses.
- Contract crews are only called on—and paid—when needed. An agency crew is paid irrespective of whether actual fire suppression work is available, although agency crews often do other work, such as fuel management, when not engaged in actual fire suppression.

To provide managers with better information about the relative cost of contract and agency fire crews, I have synthesized the results of two recent studies. The first study compared the cost of Forest Service and contract fire crews that were dispatched in Oregon and Washington (The Pacific Northwest Region) during the 2003 fire season (Donovan 2005). The second study,

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The results of two recent studies were combined to provide managers with better information about the relative costs of contract and agency fire crews.

Important Caveat

One key assumption of the studies summarized in this article needs to be noted.

The author assumed that all 20-person type 2 fire crews are equally productive. Conversations with managers by this article's author, however, suggest that this is not the case. Some contract crews are just as productive as agency crews; whereas, others are not.

"However," explains Geoffrey Donovan, the article's author, "nobody was able to suggest a simple way to determine a crew's productivity in advance."

Donovan continues: "Less costly contract crews were not necessarily less productive than more expensive crews. Nonetheless, as long as systematic differences in productivity exist, extra care should be taken when interpreting the results presented here."

In addition, Donovan said that the modeling approach he outlines in this article could also be used in other regions of the country for comparing other types of resources such as engines and aerial resources.

Table 1 – Total Federal wildfire suppression costs and the number of private fire crews under contract in the Pacific Northwest from 1999 through 2004.

Year	Total Federal suppression costs	Number of crews under contract in PNW
1999	\$523,468,000	78
2000	\$1,362,367,000	117
2001	\$917,800,000	207
2002	\$1,661,314,000	264
2003	\$1,326,138,000	297
2004	\$890,233,000	298

which built on the first, developed a model to identify the optimal mix of agency and contract fire crews for an upcoming fire season (Donovan 2006).

Forest Service Fire Crew Costs

To correctly estimate the price tag of an agency fire crew, a variety of costs besides wages must be considered, including:

- Retirement,
- Healthcare,
- Social Security,
- Workers' compensation—the Forest Service is self-insured for workers' compensation claims,
- Human resource support,
- Training,
- Vacation,
- Unemployment,
- Equipment, and
- Transportation.

The most significant of these costs are retirement, healthcare, and Social Security. When combined, these three expenses add 26 percent to the base cost of a permanent firefighter and 8 percent to the cost of a temporary firefighter.

Table 2 shows the contribution of the other cost categories. All costs were estimated based on a 14-hour workday with a total of 90 workdays in a fire season. These costs were calculated for a sample of 33 crews dispatched in the Pacific Northwest Region during the 2003 fire season. Several simplifying assumptions were also made. (For a complete discussion of how these costs were estimated, see Donovan 2005.) Overall, the data in this table provide insight into the general magnitude of these costs.

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Other Cost Factors

Other factors that significantly affect costs are overtime and hazard pay. Government scale (GS) firefighters receive an additional 50 percent in pay for all hours over a normal 8-hour workday. Furthermore, all GS firefighters receive an additional 25 percent increase in pay if their assigned fire is categorized as "uncontrolled." (For this study, an assumption was made that 80 percent of hours were on uncontrolled fires.)

Combining all these categories of costs provided a mean daily cost (14-hour day) of \$5,539. For comparison, just considering the base wage rate of crew members (with no overtime or hazard pay) results in a daily cost of \$3,023.

The majority of this study's 33 crews reflected a daily cost of between \$5,200 and \$5,700. Four crews, however, had a daily cost that exceeded \$5,700. One crew's daily cost was \$7,500.

This variation was due to differences in the crew members' pay grade. The more expensive crews were

typically ad hoc crews whose members had permanent nonfirefighting jobs within the agency.

In contrast, dedicated fire crews, comprised mainly of temporary employees, tended to be less costly. Although there might be good reasons for including higher grade employees on a fire crew, managers should be aware that doing so can significantly increase a crew's cost.

Contract Crew Costs

In contrast to agency crews, most of the cost of hiring a contract crew is included in its wage rate. Similar to agency crews, contract crew costs vary significantly.

In the Pacific Northwest Region, these private fire crews sign contracts with any one of 13 dispatch centers, agreeing on the price and number of crews to be provided. When a fire occurs, dispatch responsibility goes to the closest dispatch center. Agency (Federal and State) crews are dispatched first.

Should insufficient agency crews be available, the dispatch center calls

Table 2 – *The contribution of vacation, training, equipment, workers' compensation, unemployment, human resource support, and transportation to the daily cost of a Forest Service 20-person type 2 fire crew.*

Cost category	Daily cost
Vacation and training	\$163
Equipment	\$154
Workers' compensation and unemployment	\$197
Human resource support	\$67
Transportation	\$121

on contract crews—dispatching the least costly crews first. Thus, as more of these crews are dispatched, the cost of contract crews increases.

During the 2003 fire season, the Forest Service's Pacific Northwest Region used 2,831 contract crew days. The daily cost of one of these private crews ranged from \$6,970 to \$11,270 (roughly \$25 to \$40 per hour per person) with an average of \$7,791 for a 14-hour workday.

Comparing Agency and Contract Crew Costs

A comparison of the average daily cost of agency and contract fire crews reveals that the cost of an agency crew is just over 70 percent of the cost of a contract crew. This should not imply, however, that contract crews should never be used.

This finding indicates that if agency crews have continuous work, they are less costly. Contract crews can be laid off when work is not available. Agency crews must continue to be paid, although they are typically paid less on nonsuppression days.

To illustrate this point, consider a crew that is engaged in fire suppression on only half of a season's possible workdays. In addition, we initially make the assumption that the crew does no work on nonsuppression days but still receives 8 hours of nonhazard pay. (We address the more realistic case of a crew that does other work on nonsuppression days next.) Using the same assumptions as utilized in the previous analysis, the cost of an 8-hour day was therefore calculated to be \$2,819.

The cost of the agency fire crew engaged in fire suppression must now include the wage costs from the days it does not work. Therefore, the daily cost of an agency fire crew is \$8,358—more costly than the average cost of a contract fire crew.

Fire crews seldom do nothing when they are not engaged in fire suppression. They could conduct prescribed burns or perform trail maintenance, for example. If the cost of completing the work that crews do on nonsuppression days is similar to their wage rate, then the

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crew's wages on these nonsuppression days do not need to be added to the cost of operating the crew while engaged in fire suppression. However, sometimes the value of the work that crews do on nonsuppression days is less than their wage rate.

A colleague refers to all such work as "painting outhouses." In such cases, some portion of a crew's wage rate on nonsuppression days should be added to the cost of operating the crew while engaged in fire suppression.

Finding an Optimal Mix

The results outlined above suggest that it would be cost effective to hire agency crews, as long as managers believe an upcoming fire season will provide close to continuous

work—or that work of equal value can be provided on nonsuppression days.

The challenge, of course, is for managers to actually apply this principle in practice. This was the goal of the second of the two papers summarized in this article. Rather than describe the model in detail here, I have:

- Outlined its general modeling approach,
- Presented some of the model's results, and
- Suggested other ways in which the model can be applied.

The model divides the fire season in the Pacific Northwest into seven 2-week periods. There is a demand for fire crews during each period. The model identifies the mix of agency and contract fire crews that meets this demand at least cost.

The Model Used

This demand for fire crews was estimated by using CHEETAH 2 software, which has data on all fires that have burned on Federal lands from 1980 to 2002. The user is prompted to enter data on the number of crews sent to different sized fires and the length of time that the crews stay in fire status.

These data were obtained from the Northwest Interagency Coordination Center in Portland, OR. For example, between 2001 and 2003, 12.6 type 2 crews were typically dispatched to class-F fires. On average, these crews stayed on these fire assignments a total of 10.4 days.

Given data on fire suppression demand and the cost of agency and contract fire crews, the model can

therefore determine the optimal number of agency crews to hire before the start of a fire season. Any demand that cannot be met by these agency crews is met by contract crews.

Problem Solving

Unfortunately, managers do not know in advance what the demand for fire crews will be throughout a fire season. Therefore, a solution based on knowing crew demand in advance is of limited use. However, the model can accommodate uncertain demand by solving for a range of possible fire crew demands.

For example, managers often have forecasts for the overall severity of an upcoming fire season. Given such a severity forecast, a manager might be able to estimate crew demand in reference to previous fire seasons. For instance, a manager might believe that an upcoming fire season is going to be more severe than normal. The four most severe fire seasons out of the last 10 approximate the range of variability for that estimate.

In this case, running the model by using crew demand data from these past four most severe fire seasons would be reasonably representative of the manager's decision process.

Comparing the average daily cost of agency and contract fire crews reveals that the cost of an agency crew is just over 70 percent of the cost of a contract crew. This should not imply that contract crews should never be used.

As one would expect, the optimal number of agency crews increases as the expected severity of an upcoming fire season increases. What might be less intuitive is that the optimal number of agency crews is not very sensitive to periods of high demand. Rather—because peaks in demand tend to be met by contract crews—it is the periods of low demand that influence this solution.

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During periods of low demand, work of similar value to an agency crew's wage might not be available and the optimal number of agency crews is sensitive to these nonsuppression day costs.

Conclusions

Even though contract crews have a higher daily cost than agency

crews, because of their greater flexibility, their use has the potential to reduce overall suppression costs.

The key to achieving this cost reduction is to use the most efficient mix of agency and contract crews. To do this, managers could use the model I have outlined.

Less formally, managers might be able to reduce the combined cost of agency and contract fire crews by ensuring that close to continuous work—either fire or nonfire suppression-related—is available for agency crews. If this work is non-suppression work, then the value of that work should be comparable to the wage costs of the crew.

References

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