

Issues in Large Wildfire Suppression Cost Reduction: An Operational Perspective¹

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Abstract

To significantly reduce the costs of fighting large wildfires, fire managers must address the most costly areas. These areas are in aviation resources; equipment, food, showers, and toilets (56.6 percent of total costs); and in personnel (31.7 percent of total costs). Because many of these costs are under the control of the Incident Command System's operations section chief, careful review could provide some opportunities for reductions. Such opportunities include pulling back resources when extreme fire behavior conditions are forecast, using natural barriers rather than constructed fireline when conditions permit, and letting the fire burn out rather than putting it out during mop-up when conditions permit.

Introduction

Wildfires are big business. Every year in the United States fires burn millions of acres. Numerous contractors, hundreds of aircraft, and tens of thousands of firefighters suppress the fires at a cost of hundreds of millions of dollars.

From June 1 to July 22, 1998, Florida experienced 2,282 wildfires that burned 499,477 acres, mostly on State-protected land. More than 10,000 firefighters from 47 states constructed more than 1,000 miles of fireline to suppress these fires. One hundred and fifty-six aircraft supported them. Suppression costs were estimated at \$160 million.

Across the United States in 1998, 81,043 wildfires burned 2,329,704 acres. This figure is based on the agencies that report their fires to the National Interagency Fire Center (NIFC) in Boise, Idaho. Suppressing these wildfires may have cost more than \$1 billion.

Large fires are not a new phenomenon in the United States. In 1910 vast areas of the country were burned over. A decade-by-decade comparison since then shows little variance in either the numbers of fires or the number of acres burned across the country.

A number of factors have been changing fire suppression methods (especially on the largest wildfires):

- The reduced Federal workforce in natural resources agencies.
- Changing forest health conditions that are often a result of previous fire exclusion practices.
- Changes in the fire camp environment to meet the needs and expectations of the 1990's workforce.
- The public's and media's expectations.
- The politics of wildfire at the local, State, and National levels. An excellent example of the involvement of politics in wildfire can be seen in the Long Island, New York, wildfire during 1995. Although it only burned 5,000 acres, it drew the attention of New York's governor and senior U.S. Senator, the director of the Federal Emergency Management Agency, the Deputy Under Secretary of Agriculture, and the personal adviser to the President.
- Large-scale climatic events such as El Nino and global warming.
- Escaped prescribed fires and prescribed natural fires in wilderness and parks.
- The public's intolerance of long-term smoke events.

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These factors often work in combination, requiring fire managers to take actions (and spend money) that may not have been needed in earlier years.

Previous Studies

The issue of fire-related expenditures, and specifically the costs of large fires, has come under increased scrutiny during the 1990's. This scrutiny may be a result of the lengthy (and costly) fires in the greater Yellowstone area during 1988. Large fires and lengthy fire seasons during the 1990's have seen the introduction of the "comptroller" position on the Incident Management Team (IMT) to advise responsible line officers on cost issues specific to a single fire. Oversight reviews and studies look at individual fires, season-long expenditures, and long-term trends in suppression costs. These studies offer important insights into large fire expenditures. Many of these fires are managed by National Incident Management Teams that spend more than \$1 million per day. USDA Forest Service fire expenditures from 1970 to 1995 were nearly \$7.9 billion. Costs increased 15.5 percent a year from 1991 to 1995.

Schuster and others (1997) looked at 171 medium and large fires. Twenty very large, expensive fires in 1994 received close scrutiny. The report showed that a significant proportion of large fire expenses were for services such as: aviation resources, equipment, food, showers, and toilets (56.6 percent of total costs); and for personnel, with most of these costs for overtime for regular employees and for hiring casual employees (31.7 percent of total costs). All other expenses for these high-cost fires represented less than 12 percent of the total costs.

Schuster and others (1997) also surveyed incident commanders to determine factors they believed resulted in significant cost increases on large 1994 wildfires. Of the 34 topic areas surveyed, the incident commanders rated only two ("weather during fire" and "access") as being very important. The incident commanders said other factors that increased costs included terrain, fuel loadings, protecting lives and structures, and fire fighter availability, quantity, and quality.

Operational Aspects of Large Wildfire Suppression

Since the mid-1980's, large wildfires in the United States have been managed under the Incident Command System (ICS), an organization structure similar to the military organization for combat. The basic structure includes command, plans, operations, logistics, finance, safety, and information. The operations section is responsible for on-the-ground implementation of strategic decisions made by the incident commander. The other sections support by providing necessary information, equipment, supplies, transportation, and personnel for suppression.

The basic components of the operations section on a large wildfire include:

- Personnel (crews, supervisors, aircraft managers, and others).
- Equipment (engines, dozers, water tenders, lowboys, etc.).
- Aircraft (air tankers, helicopters, lead planes, and air attack).

These elements of the operations section are some of the highest cost items of large wildfire expenditures in recent years.

Personnel

Personnel costs are an important part of the total fire suppression costs. Base pay, hazardous duty pay, and premium overtime are all factors in personnel costs. These factors take on greater significance on large wildfires, given the reduction of personnel available locally to most natural resource agencies. It is not uncommon to transport crews and overhead personnel across the country on large fires. These personnel may need 2 days travel when mobilizing and when

demobilizing. Large personnel costs are incurred in this mobilization process, with no effective suppression action on the fire.

Equipment

Equipment such as engines, dozers, and water tenders are also high-cost items. When equipment supplied by contractors is mobilized to a distant wildfire and placed in operational status 24 hours a day, costs can easily exceed \$1,000 per day for each piece of equipment. Other costs may include the salaries of an operator or crew that are sometimes hired under casual labor authority independent of equipment cost.

Aircraft

Aircraft are the most visible symbol of our fire suppression efforts and our single highest cost resource on a large wildfire. Agencies pay for availability guarantees and per-hour flight costs when employing aircraft. Aircraft costs may account for more than one-third of the total suppression costs on large wildfires.

Both equipment and aircraft require personnel to manage and supervise them. Those personnel and the crews assigned to the fire need three meals per day, often in a remote setting a long way from food service facilities. Daily meal costs under the 1998 fire food service contracts average \$35 to \$40 per day per firefighter.

The Future

To successfully address options to reduce costs on future fires, we must forecast conditions that will affect our expenditures.

Recent trends on large wildfires can give us a fairly accurate picture of future conditions:

- Continued reductions in natural resource agency staffing will increase the use of contractors in the areas of crews, equipment, and possibly Incident Management Teams. Because of the seasonality and uncertainty of the contract work, these resources will generally be higher priced than regular agency personnel and equipment.
- The availability and efficiency of large Type-1 helicopters will increase their use on large wildfires. With their flight rate exceeding \$100 per minute, these helicopters are very expensive.
- Modernization of the air tanker fleet by private contractors will increase costs in this program.
- As more people move into the urban-wildland interface, and as news is broadcast more and more quickly, awareness and interest in wildfires will increase for the general public, media, and politicians.
- The impact of the Federal fire policy review will affect States, counties and wildfire departments involved in large interagency wildfires.

Cost Reduction Opportunities in the Operations Section

Recent attempts to address cost savings opportunities on large wildfires have produced a long list of simplistic suggestions for saving money. These "easy answers" save a small percentage of the total fire suppression bill, but avoid the bigger cost centers and fail to produce significant savings. Such recommendations include:

- Fewer newspapers in the incident base camp.
- No bottled water-use canteens with water from large potable water trucks.

- National Guard trucks instead of school buses for crew transportation.
- No national Type-1 incident management teams; they spend too much money.
- No trainees, human resources specialists, or union representatives on large fires.

The operations section offers many opportunities for cost reductions through application of strategies and tactics. Some cost reduction opportunities include:

- The implementation of fire suppression efforts should be analyzed thoroughly during periods when extreme fire behavior conditions are forecast. If crews, equipment, and aircraft cannot take safe, effective actions during these periods, take them off-line and off-shift.
- A 20-person crew at GS-4 levels for 14 hours costs an additional \$1,900 more than for an 8-hour shift. If they are likely to be forced to retreat to a safety zone during periods when extreme fire behavior conditions are forecast, it would be better to return them to the incident base camp for additional rest, safety, and cost savings.
- It is inefficient and dangerous to fly tankers and water-dropping helicopters under extreme fire conditions. They should be left on the ground.
- Dozers, engines, and water tenders may not be functioning very effectively under conditions when extreme fire behavior is forecast and should be placed off shift.

Constructing and holding fireline is a major function of the operations section. Opportunities to reduce line costs include:

- Using natural barriers instead of constructed fireline.
- Choosing the proper fireline construction method: hand line, dozer line, or fireline explosives (FLE).
- Considering the required mop-up standards in light of the current and forecasted weather and fire behavior conditions. "Let it burnout" is often a more cost-effective alternative than "put it out."
- Considering spike camps closer to the fire work area when travel time will result in long shift times. Transporting crews is a large cost factor when travel times approach 2 to 3 hours per operational period.

Contracting equipment is another significant cost center in the operations section for a large wildfire. The need for 24-hour double shifting and round-the-clock availability of prime movers and lowboys must be carefully evaluated against production efficiency and cost per hour. Accountability for actual hours worked should be emphasized, with single resource unit leaders assigned to monitor time performance as appropriate.

Managing shift times in lanes can be an effective tool for reducing personnel costs. When a 12-hour operational period extends to 15 hours, costs increase by 24 percent. Using the 20-person GS-4 crew discussed earlier, this is an additional \$940 per crew for each operational period.

Managing aircraft flight time, both fixed and rotary wing, offers opportunities for large cost savings in the operations section:

- Using air tankers earlier in the burning period to dramatically increase their efficiency and reduce costs.
- Reducing air tanker flights ordered for public and media visibility rather than for fire suppression effectiveness.
- Ordering the right resource for the job. Large air tankers, single engine tankers (SEATS), and Type 1 and Type 2 helicopters all have unique

characteristics that maximize their effectiveness and efficiency under specific conditions.

- Using Type 1 and Type 2 helicopters as needed rather than merely to retain them. During periods when many Incident Management Teams are competing for such resources, keeping large helicopters depends largely on the daily flight time they have logged. This may result in inefficient use of helicopters, at costs that may exceed \$7,000 per hour. Incident commanders, operations section chiefs, and air operations directors must work closely with the regional and national fire coordinators to ensure that actual and projected needs determine helicopter resource assignments, not just flight hours.

Deciding to declare a fire "controlled" results in a major cost reduction because personnel no longer receive hazard pay. For the 20-person GS-4 crew working 14-hour operational periods, this is a savings of more than \$600. If 30 crews are assigned to an operational period, the savings is nearly \$19,000 per operational period. Deciding to demobilize resources, both personnel and equipment, can result in large savings in salaries and in support costs such as contracted food services.

Conclusions

Wildfires are damaging and costly under the best of conditions, but opportunities exist for significant cost savings with increased efficiency of the operations section of the ICS. To realize the savings, the agency administrator and incident commander must clearly state the objectives of cost reduction and strongly support the necessary actions.

References

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