

# External Human Factors in Incident Management Team Decisionmaking and Their Effect on Large Fire Suppression Expenditures

Janie Canton-Thompson, Krista M. Gebert,  
Brooke Thompson, Greg Jones, David Calkin, and  
Geoff Donovan

## ABSTRACT

Large wildland fires are complex, costly events influenced by a vast array of physical, climatic, and social factors. Changing climate, fuel buildup due to past suppression, and increasing populations in the wildland–urban interface have all been blamed for the extreme fire seasons and rising suppression expenditures of recent years. With each high-cost year comes a multitude of fire cost reviews, suppression cost studies by federal oversight agencies, and new rules and regulations focused on containing or reducing suppression costs. However, largely ignored in many of these inquiries are the human factors and pressures outside (external to) the influence of the incident team managing a fire that are contributing to the problem. This article presents an in-depth examination of some external human factors that affect incident management team (IMT) decisionmaking and influence suppression costs. Data were collected during 2004 and 2005 through 48 in-depth interviews with IMT command and general staff members representative of each Geographic Area Coordination Center, all federal agencies, and many state agencies whose employees serve on teams. External human factors identified include risk management; interaction with agency administrators; policies, regulations, and rules; resource availability; and social–political pressure. Inattention to these factors can result in policies that adversely affect IMTs charged with managing highly volatile events in a safe, timely, and cost-efficient manner.

**Keywords:** wildland fire expenditures, wildfire, wildland fire cost containment, wildland fire decisionmaking

**F**ive of the last 8 years have seen Forest Service, USDA, wildfire suppression expenditures topping \$1 billion and total federal wildland suppression expenditures of more than \$1.8 billion. With each high-cost year comes a multitude of fire cost reviews, suppression cost studies by federal oversight agencies, and new rules and regulations focused on containing or reducing suppression costs (see, e.g., USDA/OIG 2006). However, for cost containment efforts to be successful, decisionmakers need comprehensive information on factors contributing to rising costs. On an aggregate level, research studies have pointed to changing climate, fuel buildup and increasing populations in the wildland–urban interface (WUI) as causes for extreme fire seasons and the associated high annual costs of wildfire suppression (Arno and Brown 1991, Snyder 1999, Calkin et al. 2005, Collins et al. 2006, Westerling et al. 2006). On an individual fire basis, statistical analyses of

Received September 20, 2007; accepted July 29, 2008.

Janie Canton-Thompson ([jcantonthompson@fs.fed.us](mailto:jcantonthompson@fs.fed.us)) is social scientist, and Krista M. Gebert ([kgebert@fs.fed.us](mailto:kgebert@fs.fed.us)) is economist, US Forest Service, Rocky Mountain Research Station, Missoula, MT 59801. Brooke Thompson ([brookethompson@fs.fed.us](mailto:brookethompson@fs.fed.us)) is technical analyst, Management and Engineering Technologies, International, Inc. (METI), Missoula, MT 59801. Greg Jones ([gjones@fs.fed.us](mailto:gjones@fs.fed.us)) is research forester, and David Calkin ([decalkin@fs.fed.us](mailto:decalkin@fs.fed.us)) is research forester, US Forest Service, Rocky Mountain Research Station, Missoula, MT 59801. Geoff Donovan ([gdonovan@fs.fed.us](mailto:gdonovan@fs.fed.us)) is research forester, US Forest Service, Pacific Northwest Research Station, Portland, OR. The authors thank the 48 study participants who gave generously of their knowledge, expertise, and time. Jon Driessen Research Social Scientist, Missoula Technology Development Center (MTDC) and Professor Emeritus, Department of Sociology, University of Montana, provided invaluable help during the study as did John Seidel, Qualis Research, Colorado Springs, Colorado. This article was written and prepared by US government employees on official time; therefore, it is in the public domain and not subject to copyright.

suppression costs focusing on climatic, demographic, and physical characteristics of the fire area (Liang et al. in press, Donovan et al. 2004, Gebert et al. 2007) leave approximately one-half or more of the expenditure variation unexplained. Fires that from the outside appear quite similar in characteristics such as proximity to communities, fire behavior, topography, and so on often have widely varying costs. This variation may be caused by other, less quantifiable, human factors that are influencing costs.

In an attempt to flesh out some of these influences, we interviewed 48 Incident Management Team (IMT) command and general staff members to get their views on decisionmaking relative to fire suppression and the factors that influence suppression costs. We chose to interview IMTs because they are responsible for conducting the suppression efforts on large fires, under the general direction of the local agency administrator. We thought it would be valuable to get the perspective of people who have lived the experience of managing large wildland fires. Therefore, this article discusses factors affecting fire cost containment from the vantage point of the IMTs.

Structure and Role of IMTs

Fire protection responsibilities typically reside with local jurisdictions. When wild-fire suppression needs exceed local capabilities, the responsible agency administrator can request an IMT to manage further suppression actions. IMTs are designated as “type 1” (national) teams and “type 2” (area) teams. National IMTs are usually assigned to incidents of greater potential complexity and significance.

All federal type 1 and type 2 IMTs are “interagency” in composition. Team members are selected at the start of each fire season from various natural resource and wild-land firefighting agencies at the federal, state, and local levels. IMTs are organized by staff positions under the leadership of an Incident Commander (IC). An IMT “command staff” typically includes individuals in the safety, information, and liaison functions. “General staff” positions are those in the planning, logistics, finance, and operations sections. All IMTs use the Incident Command System, a highly structured management framework designed for complex emergency situations like wildfire suppression.

On arrival, the incoming IMT receives a detailed incident briefing from the lead ad-

ministrator of the requesting (hosting) agency. In the US Forest Service, this is typically a Forest Supervisor or District Ranger. The team receives a Wildland Fire Situation Analysis (an analysis used to evaluate alternative suppression strategies) and Delegation of Authority (statement given to the IC by an agency administrator delegating him/her authority and assigning responsibility that can include priorities and constraints). Together, these provide specific suppression objectives and restrictions for use in formulating suppression strategies and tactics. They are given access to documents that express local agency plans, policies, and regulations governing suppression actions. They may also be assigned one or more local advisors to assist them in their suppression effort. Thus, informed, guided, and constrained, the IMT conducts suppression management actions that often require rapid, complex decisionmaking. Suppression expenditures are affected accordingly.

Methodological Approach

We used a qualitative inquiry approach (Glaser and Strauss 1967, Gold 1997, Creswell 1998, and Strauss and Corbin 1998) to obtain firsthand knowledge about decision-making and suppression costs from IMT members. This highly inductive approach offers the best means of obtaining an in-depth description and understanding of the human factors affecting suppression costs. It allows the team members to express their perceptions, their real-life fire management experiences, and their interpretations (meanings) of firefighting management and cost-effectiveness.

Sociological (“snowball” or purposive) sampling guided interviewee selection. This technique assumes that study group members “are the very best source of information on how to put together an empirically grounded, representative sample of that society . . .” (Gold 1997, p. 390). Interviewees were asked to identify others known to be good representatives of the IMT positions, experiences, and points of view pertinent to our research. This enabled us to obtain a wide range of perspectives on suppression costs (see also Patton 1980, Guba and Lincoln 1989).

We used a written interview guide to direct and focus conversations on topics pertinent to suppression costs. This guide covered the general areas of IMT structure, function, and decisionmaking as a framework for getting at the phenomenon of sup-

Table 1. Number of interviewees by Geographic Area Coordination Center (GACC).

| GACC                         | No. of interviewees |
|------------------------------|---------------------|
| Northern Rockies             | 12                  |
| Rocky Mountain               | 3                   |
| Southwest                    | 5                   |
| Great Basin                  | 8                   |
| (Both East and West Zones)   |                     |
| Pacific Southwest            | 6                   |
| (Both North and South Zones) |                     |
| Pacific Northwest            | 8                   |
| Southeast                    | 3                   |
| Alaska                       | 3                   |

pression costs. Our guide was a “living document,” updated after each interview to include new information and more narrowly focus our discussions on cost issues (Guba and Lincoln 1989). As we moved from interview to interview, we asked current interviewees to validate and clarify information given to us by previous interviewees.

During 2004 and 2005, we conducted 48 in-depth, unstructured, tape-recorded interviews nationwide. Interviews were confidential, open-ended, conversational style discussions, lasting between 3 and 7 hours. This allowed us to accurately represent distinctive features of factors affecting IMT decisionmaking without imposing a priori assumptions or schemes of interpretation on these team members’ social reality. It also enabled us to discover team members’ definitions of the situation—their perceptions and interpretations of factors influencing fire suppression costs and their own roles in these costs.

Interviewees represented teams from each Geographic Area Coordination Center (GACC; Table 1), all federal and many state agencies whose employees serve on teams, and positions in the command and general staff organization of either national (type 1), area (type 2), or state IMTs (Table 2). At the time of the study, there were 17 type 1 teams and 35 type 2 teams available for use throughout the country.

Tape-recorded interviews were professionally transcribed verbatim. Interviewees’ confidentiality was protected through the use of identification codes. Using an inductive analysis process, we carefully studied the transcribed interviews, coding the written text in terms of content categories and their distinctive features (i.e., properties or characteristics) and identifying more general themes. We used ordinal scale descriptors—

**Table 2. Number of interviewees by incident management team (IMT) position.**

| IMT position                              | No. of interviewees |
|-------------------------------------------|---------------------|
| Incident Commander (or Deputy)            | 22                  |
| Operations Section Chief                  | 8                   |
| Planning Section Chief                    | 5                   |
| Finance Section Chief                     | 5                   |
| Logistics section Chief                   | 3                   |
| Safety Officer                            | 2                   |
| Information Officer                       | 1                   |
| Liaison Officer                           | 1                   |
| Air Support Group Supervisor <sup>a</sup> | 1                   |

<sup>a</sup> Position not officially considered command/general staff on IMTs but used as such by some, especially in incidents requiring a large number of aviation resources.

viz., “some,” “many,” “most,” and “virtually all”—to capture a general sense of what proportion of interviewees identified a particular experience/perception/impression. We confirmed the themes and categories we discovered by sending interviewees draft copies of this article and asking them to respond with corrections and comments. They verified that the suppression cost-related themes, categories, and features presented in it accurately captured the essence of what they said in the interviews.

**Results**

This section presents the IMT perspective on factors affecting fire suppression decisions and expenditures. The interview process uncovered an overwhelming amount of information on these topics. In this article, we focus on some of the factors that IMT members see as outside their direct influence. We entered the interview process thinking IMTs have substantial control over a fire’s cost. Indeed, all interviewees indicated that cost-effectiveness is a major objective documented in team operating plans, team meetings, and Wildland Fire Situation Analysis development. However, interviewees reported that a team’s decision space/ability to influence costs is substantially limited by factors outside their control—external factors that can have a large influence on firefighting decisions, and thereby, on costs. Many expressed concern that these factors may not be adequately recognized in fire suppression cost containment discussions.

We focus on the more important of the external factors as seen from the IMT viewpoint: (1) risk management; (2) interaction with agency administrators; (3) policies, regulations, and rules; (4) resource availability;

and (5) social–political pressures. Influence of many of the factors is multifaceted, affecting decisionmaking and cost containment in various ways; therefore, elements of each factor may be discussed in more than one section. Topics discussed represent central themes voiced by virtually all of those interviewed. The quotations we use were chosen because they are representative of themes identified and illustrate relevant experiences interviewees encountered. In qualitative research, quotations are “data” and not merely interesting artifacts that are ancillary to the results. We present selected quotes as such in this article to support our findings.

**Risk Management.** One major constraint on IMT decision space voiced by interviewees is an increasing tendency toward risk aversion. In general, they felt that persons attracted to the IC position tend to view themselves as risk takers and that IMTs tend to assume their respective IC’s personality. However, interviewees stated that growing numbers of ICs and other team members are becoming increasingly risk averse regarding fire suppression decisions. Reasons given for this change included (1) increasing agency safety concerns, (2) perceived lack of agency support if something was to go wrong with concomitant increased risk of personal liability, and (3) excessive rules and regulations (see the “Policies, Regulations, and Rules” section for a discussion of item 3).

Tragedies associated with fires such as South Canyon (1994), Thirty-Mile (2001), and Cramer (2003) have, in the opinion of those interviewed, led to a heavy but appropriate emphasis on safety. This is seen, however, as adding to costs. Interviewees generally stated that increasing safety and lowering costs is an oxymoron, unless the decision is to not suppress the fire at all. Said interviewee 45, “Well, it’s almost like they’re telling us, ‘Save money and, oh by the way, be safe if you can’. . . . That’s where we’re going to get into trouble.” The most cost-effective suppression strategy may not be the safest and vice versa.

Risk aversion is also seen as increasing because of a perceived lack of agency support and an increased risk of personal liability if things go wrong. A downside of using costly, but potentially ineffective, suppression resources might be a cost containment review when the fire season ends. However, the upside of using these same resources, perhaps unnecessarily, is the avoidance of possible negative consequences. If an IMT decides to

restrict resources on a fire and subsequently that fire becomes catastrophic, interviewees viewed the consequences as potentially disastrous from both safety and legal standpoints. With growing populations in the WUI, lives and properties are often at stake. Moreover, IMT members believe they are not only putting their jobs in jeopardy but risking personal financial and potential criminal liability if the fire causes private property loss, personal injuries, or fatalities.

They’re just going to say, “I feel better getting hollered at for spending a little too much and not having something like that happen than being hollered at for . . . losing lives and property on an incident.” It’s a very, very difficult question for both the line officer and the fire manager, and the incident commander. . . . Well, the Cramer incident, there was such an increased amount of accountability toward line officers and incident commanders that the level of risk they may have accepted as little as two years ago, they’re probably less willing to accept now. There are probably less individuals willing to be incident commanders following that incident than there may have otherwise been. . . . There is mention lately of serious accountability in civil and criminal arenas. So to deal with that and then turn-around and say, “Perhaps we need to take a few more risks,” is pretty mutually exclusive. (Interviewee 8)

**Agency Administrators.** Those interviewed stated that an overriding constraint on IMTs’ ability to curb costs is their interaction with the agency administrator of the local unit where the fire is occurring. IMTs work for this local agency administrator, and it is the agency administrator who sets fire policy strategy, objectives, and cost parameters through the Wildland Fire Situation Analysis, Delegation of Authority, and interactions occurring over the duration of a large fire. According to most team members interviewed, “The biggest cost issue is the decision by the agency administrator—what [policy] strategy he selects. That is the number one driver of costs” (interviewee 19). Even though firefighting objectives are subject to daily review and negotiation between an IC and an agency administrator, the agency administrator makes the final overall decision on suppression objectives, including expenditures. As another interviewee explained,

You know as a team . . . we don’t have the control everybody thinks. If they [teams] come in and the line officer . . . comes in and goes, “. . . [IC], I don’t want that done that way,” that decision is taken out of your hands, so consequently any option that you had to make a cost-effective decision is gone. You’ve got to live with that and what-

ever the consequences of that may be. (Interviewee 42)

Interviewees explained that fire suppression, historically, was considered part of most federal land management agency employees' jobs, particularly within the US Forest Service. Increasingly, teams are encountering agency administrators with little or no suppression background or experience with fire. Those interviewed stated that this can escalate costs because agency administrators without fire experience tend to be more risk averse and want to use more resources than perhaps necessary to avoid possible bad outcomes. Examples given were agency administrators ordering a type 1 team or costly air resources when complexity analyses indicated a type 2 team or less costly ground resources might be more appropriate. It was felt that an agency administrator can somewhat overcome this limitation in experience if he or she is willing to rely on a trusted/experienced fire management/staff officer or another very fire-seasoned agency administrator. Additionally, interviewees stated that, similar to the IMTs, some agency administrators, regardless of experience, are becoming extremely risk averse given recent catastrophic fires. They seem to place low priority on cost to maximize safety or limit fire spread.

A very seasoned line officer that's been through this . . . will give us a little more room, have a little bit more comfort level with the possibility of the fire getting larger if there's not a lot of resource value, homes, lives, et cetera in front of the fire. So we can be a little bit more . . . cost efficient. . . . [B]ut if we get kind of an unseasoned line officer . . . and because of things like the Cramer fire . . . [they] are just absolutely cautious and worried about what could happen . . . there's more of a sense of urgency like "Get this thing out as fast as you can at all costs." So it's hard to really strategize in a more cost efficient careful manner with line officers that are unfamiliar [with fire]. (Interviewee 8)

Not all agency administrators placed a low priority on costs, but even when they did focus on containing costs, it could ironically result in larger costs in the longer run, according to interviewees. They noted that some agency administrators are so committed to cost containment they order a type 2 instead of type 1 team, regardless of complexity analysis, or they release teams too soon.

I have given you an example of a fire . . . where an agency administrator decided that he wanted to save money. . . . So he released . . . [the] team early and members of . . .

[the] team . . . tried to tell this guy, "This fire is not safe, and we don't think that we should turn it back to the Forest yet. We don't think that you have the resources to manage this fire." And he said that he was willing to take that chance, and, unfortunately, he guessed wrong. Within two days, a dry cold front pushed through there and pushed that fire all over the mountains. He lost thousands of acres and they had to bring in a Type One team to suppress it. . . . So that guy guessed wrong. . . . If he had guessed right, he probably would have been given accolades for saving a lot of money. As it turns out, things didn't go well for him. (Interviewee 1)

Many interviewees felt teams are often given unrealistic marching orders by an agency administrator, thereby hampering a team's ability to fight the wildfire effectively. As explained earlier, these marching orders are given through the Wildland Fire Situation Analysis or Delegation of Authority. Those interviewed stated that frequently these documents are hurriedly prepared, poorly done, not done at all, and/or impractical. This is largely because the host unit is overwhelmed with fire activity and its local fire organization is already fully committed, exhausted, and without reinforcements.

Interviewees believed that an agency administrators' influence on fire costs can also flow from insufficient prefire planning. Some of those interviewed suggested that many land management plans and fire management plans do not adequately address suppression cost issues.

The land management plans defer large fire costs to the WFSA process, so the lack of it—the LMPs lack the analysis of a "no action" [alternative]. A large fire is [a likely occurrence in] a "no action" alternative. In other words, we don't want to do anything, but we're not analyzing [what the effects of a] large fire [would be]. (Interviewee 22)

Interviewees also stated that land and fire management plans' suppression management components have not been tested for ease of implementation or may be out of date with current policies such as cost containment, wildland fire use, resource availability limitations, and hazardous fuel reduction.

**Policies, Regulations, and Rules.** Another factor that interviewees felt limits their decision space is the difficulty of keeping up with ever increasing rules, regulations, and policy changes. Team members interviewed acknowledge a need for policies and rules to guide their decisionmaking and realize there are legitimate safety and cost issues. However, they believe there are just too many rules to keep track of, with the number in-

creasing every year. Interviewee 27 exclaimed, "The rules are dictating everything. They're taking commonsense and management ability away from the people. I guess with that if there's a problem, fix the problem. Don't make a rule."

Many mandates are seen as confusing, overlapping, or even contradictory. Team members interviewed explained how the large amount of analysis—which some termed "analysis paralysis"—required by these extensive rules actually tends to decrease safety and cost-effectiveness by inhibiting an individual team member's ability to act quickly and decisively for fear of inadvertently violating a rule.

Given that IMT activities are but one part of team members' jobs (their main job is with their home unit), many interviewees explained how keeping up with rule/regulation/policy changes is daunting, if not impossible. This leads to reliance on subordinate staff to stay abreast, but they, too, already have plenty on their plates with both decreasing budgets and workforces. Some team members interviewed said they plan to quit team membership (or have quit), citing this issue as the real, but not necessarily stated, reason behind their decision.

There's so much out there—so much information, so many regulations, so much policy—that it's really difficult to be aware of everything that you need to know to be safe and working within policy. I also feel that there [is] . . . so much of that policy sometimes that the normal human being cannot possibly keep up with it. It's a stressful thing because you try to be aware of everything and you realize that if you miss something, or if somebody that's working for you misses something that you should have been aware of, that you feel that you may be a target in an investigation. . . . That adds stress and it makes you wonder if you need or want to be part of the effort. Frankly, that's a big part of it for me. That's a big part of why I'm not on a team right now. (Interviewee 3)

Interviewees identified a number of ways that rules and regulations often fail to achieve their intended purpose because of their "one size fits all" character, which allows little discretion to IMTs. Team members interviewed think some situations can be better dealt with by mitigating their unacceptable consequences rather than formulating additional rules applicable to all IMTs. Examples given include the 14-day assignment limitation, strict work/rest ratio, nationally imposed limits on team size, and resource contracting that have escalated costs, according to interviewees. For in-

stance, the 14-day assignment limit forces more frequent team transitions on an incident, sharply increasing resource mobilization/demobilization and transportation costs, decreasing incident management continuity, and increasing safety risks.

Sometimes we get these mega events . . . like the Biscuit Fire. . . . There were twenty four transitions of teams on that fire. You know, there were days there when you actually had teams overlapping for two days. So you had two days coming in, two days going out, so basically, you're double staffed for four days of each. You probably don't want to know what the cost of that is. Safety wise, transition is the spookiest time on a fire. . . . There's a lot of hazards and stuff that can fall through the cracks. (Interviewee 13)

In contrast to the general response of too many rules and regulations, those interviewed noted that they have been given no consistent cost containment standards. Varying "cost containment" commitment seems bound to occur in the absence of guidelines on what is meant by the concept. Interviewees suggested cost containment training, including criteria that will enable them to assess whether they are meeting the mark.

There's no real performance measure of what cost containment is. . . . It's totally subjective on the part of the agency or person taking a look at it. I don't believe that the focus should be on the word "containment." I believe the focus should be on effectiveness. I don't view cost containment as a strategy. I view it as a result of cost-effective operations. . . . Now what are some benchmarks of what success looks like? How can we communicate that to people in our business? . . . If we can, they'll live up to that expectation. (Interviewee 19)

**Resource Availability.** Limited availability of qualified team members and other firefighting resources was mentioned by virtually all interviewees as a significant cost-contributing factor. Inadequate resources can constrain an IMT's ability to meet assigned objectives. Team members interviewed discussed the influence of outside priorities and decisions beyond IMT control, such as those established by dispatch organizations, Multiagency Coordination Groups, and Area Commands. These all can constrain receipt of appropriate, cost-effective resources. Interviewees reported numerous other reasons for the decreased ability to fill team positions, staff large fires with qualified people, or obtain other needed resources. These reasons include (1) centralization of agency functions and competitive

sourcing, (2) change in societal and agency culture, and (3) increased use of contractors.

**Centralization of Agency Functions and Competitive Sourcing.** Team members interviewed felt that centralization of US Forest Service employees involved in agency finance functions has left teams with unfilled finance positions and great uncertainty in the very function they rely on for help in tracking costs.

You've probably heard about them centralizing our fiscal operations out of Albuquerque. It's a huge impact, because . . . for one thing, a lot of people that support incident management teams came from the fiscal side in [the] Forest. . . . So we've lost that pool of people . . . but then also when we go to a Forest, we've always had that contact at the Forest on a fiscal basis [but now they have also gone to Albuquerque]. (Interviewee 17)

Likewise, US Forest Service competitive sourcing has, according to interviewees, produced uncertainty and insufficient qualified staffing for team technology support, fire crews, and other positions.

**Change in Societal and Agency Culture.** Other changes are seen as occurring not because of the pressures of agency reorganization but because of cultural changes happening in society at large and in the agency. Such changes include increasing societal threats of litigation against IMT members (as mentioned previously), the shifts in cultural values, and changing agency cultural practices, including its shift from resource generalists to specialists. Team members interviewed stated that these changes have strongly impacted employees' willingness to serve on teams.

Many interviewees explained that shifts in cultural values have meant that newer agency employees are more likely to focus on family, physical comfort, speed, and technology over the sacrificial service and physical work required to accomplish tasks such as firefighting. Some of those interviewed have experienced postbaby boomer employees routinely questioning their respective agency's basis for making specific job assignments. These employees seek clearly defined rational and incentives before they accept duties assigned and/or available to them.

It's a cultural thing. Generation "Y" says, "Why do I have to go?" Their motivational factors are different. With the baby boomers you did your duty and were patriotic without demanding an explanation. The new generation requires a lot of explanation. They want information to decide if they should do what they are told to or not. Baby boomers need to communicate fully

with generation "Why" or "Why" won't go on fires. When I came on board, my motivators were the same as my bosses. Bosses now have employees with different motivators than baby boomers did." (Interviewee 33)

Federal natural resource agencies, particularly the US Forest Service, previously considered fire suppression a part of every employee's job, which neither supervisors nor employees questioned. Interviewees felt, however, that this is no longer the case. Home unit supervisors are reluctant to release employees for team assignments because of shortages of personnel for accomplishing necessary work and meeting their own performance targets.

Some would tell you, "Yeah, they let me go, but grudgingly. Then when . . . [I] get back they're mad at me because of the work they didn't get done. Then next year they tell me I can't go because we didn't get our targets done, and that's still what they get judged by, being line officers." (Interviewee 8)

Likewise, the US Forest Service is no longer perceived as taking care of its own the way it used to and its employees are not viewed as devoted to their agency the way past employees were. Interviewees remarked at length on the features of this agency-employee cultural shift. For example,

This is what I'm hearing people say. "Why would I want the headache [of a command and general staff position] when I can make just as much money and have just as much of a rewarding experience doing something else, some other part of the team?" . . . I think we're also seeing that there is a shift in some of the workplace values—that people are choosing to spend their time with their families, or . . . they value their time off more than pursuing the four hundred to five hundred hours of overtime and time away from your family that it means to be on an incident management team. (Interviewee 9)

Interviewees have observed that as the US Forest Service and other agencies have transitioned from resource generalists to specialists, many employees turn down fire assignments because of disinterest, shortage of fire-related knowledge, or lack of incentive.

In my early years as a ranger everybody helped. Then starting maybe in the "eighties," something changed, and we started hiring a lot of different disciplines, which there's nothing wrong with that, but when we hire those disciplines, whether it's a botanist or a biologist, when we hire those individuals what we have lost is making sure those people know "You will work in fire." So now we've got an element of people that don't think that's their job. (Interviewee 45)

Shortages in the available firefighter resource pool, whether for societal or agency cultural reasons, are seen as likely to have major ramifications in the years to come. Most command and general staff team members are nearing the end of their careers, with some beyond retirement age. The pipeline of replacement employees is viewed as less than full (except in one GACC), and employee morale (particularly in the case of the US Forest Service) is usually reported to be low. Furthermore, shrinking resource pools mean, at best, a longer wait or, at worst, an “unable to fill” response from dispatch. As many interviewees explained, “Time is value.” The longer an IMT operates without necessary resources, the larger an incident becomes, the more damage potential exists, and the higher the costs.

“They have a perception that you are going into a more complex, larger situation that’s more politically and socially charged with fewer assets at your disposal to do a bigger job—that doesn’t make sense to me—because they think it’s going to save money, and it won’t.” (Interviewee 40)

Many interviewees predicted that as federal agencies increasingly lose their fire suppression capabilities, costs will increase, and once lost, suppression capabilities may be difficult or impossible to restore.

**Increased Use of Contractors.** Added to resource availability problems are issues seen to be associated with contracting. Issues include cost and quality of contract resources, along with the concomitant loss of agency fire management personnel.

Increased use of contract resources was seen by IMT members interviewed as affecting costs in several ways. (See also Donovan 2005, 2006 for a discussion of the costs of contract crews versus agency crews.) First, contract firefighter resources are paid solely out of suppression funds. Many interviewees thought that increased reliance on contracted resources is contributing to a perceived rise in wildfire suppression costs, because agencies have shifted funding from presuppression to suppression expenditures.

All the costs of those contract crews shift to suppression. . . . It is not that we’re fighting fire differently. I think that we’ve reduced what we use to fight fires. . . . We’ve gotten oversight, and we’re getting good at determining when there’s waste and inappropriate expenditures. . . . What is different is this concept of charges. . . . So everything gets charged to fire suppression. . . . But it didn’t used to be that way. We had a presuppression budget. We got to take and hire our own crews, and it cost us two million to do that. But now it’s costing us fifteen mil-

lion for this crew, but we charge it all to the fire. (Interviewee 21)

Second, contract resources are seen as typically more costly per hour or per unit than agency resources. Interviewee 42 stated, “For the dollars you pay a contract crew you could have an entire hotshot crew of [GS] elevens and nines and it would still be cheaper. There’s something wrong with that.” Finally, those interviewed noted that some contractors are sophisticated in working the system for maximum financial gain and provide substandard, overpriced (at times) contract equipment. “You may order an engine and get a contract engine. It may physically fit the type that you ordered, but it might be some guy’s beat-up pickup with a plastic tank in the back of it, and you’re paying him a fortune,” stated interviewee 42. Furthermore, returning unsatisfactory contract resources (especially hand crews) to their home base increases transportation costs, necessitates additional time and expense to order replacements, and prolongs suppression activities.

Many interviewees reported that many contract crews are poorly trained, unqualified, and unmotivated. Training and experience requirements that apply to government employees are reduced, nonexistent, or not enforced (because of agency overseer shortages) for contractors hired to do similar work. For example, interviewee 21 reported,

So we say, “Well, when did you take the training?” He says, “Oh, I had the class last week.” “The engine boss class last week? So this is your first fire ever, and you just had the engine boss class; yet your red card says you’re a firefighter two and fully qualified.” So we yank him off, and the other kid’s the same way. He said, “Well, it’s my first fire as well.” He was like a firefighter two or something. It was something that takes a couple years at least to get the qualification. So we’re dealing with these contractors, and some of them weren’t even engaging because they were afraid to fight the fire. These are hand crews.

Contract crews are also viewed as more likely to cause supervision, behavioral, and safety problems, some of which relate to cultural and language barriers. Those interviewed said that remedying such issues can result in higher costs. There were also numerous accounts from interviewees where agency administrators, responding to local political pressure, insisted IMTs retain or hire local contract resources despite their being unnecessary, unqualified, or overly costly. As an example,

. . . [The agency administrator] says in no uncertain terms, “You are going to keep my contractors working until the bitter end because we owe that to them.” So these more expensive, much less productive—they were horribly—they were terrible, I’ll just say that. . . . We were instructed by our agency administrator . . . that we would keep . . . [the local] contractors working at all costs until the bitter end and let all the state and federal resources go home, the people that . . . cost less and would be much more efficient. I’ll say that in front of the Congress. I was so angry. (Interviewee 31)

IMT members interviewed said that shifting to contracted suppression resources has implications for agency fire staffing levels. It means both fewer agency resources left for initial or extended attack and a smaller personnel pool to train for future fire management positions.

If we don’t continue to put crews out—the more we contract and we have less internal Forest Service crews—where do we produce that line leadership for the future? . . . The more contracting we do, it seems like it just begins to break that development of people from that lowest level on up through leadership to the command teams. (Interviewee 43)

Although several interviewees reported good experiences with firefighting contractors, most discussed problems associated with both contract resource cost and quality. Interviewee 23 summed up many other team members’ experiences with contract crews and contract engines: “They’re generally more expensive. They take more oversight. They take more of everything.” Yet, as some interviewees noted, there is a shortage of US Forest Service contracting officers and contracting officer representatives to oversee contractor operations.

#### **Social–Political Pressure.**

The only thing that even came into my mind was the whole social–political aspect of it—that most of the things that make large fires costly are out of our control. It’s that original decision, and that expectation when it comes to protecting communities [is] we’re going to bring to bear all the resources we can get to do that; and cost doesn’t influence that. It doesn’t influence that original decision to do that. (Interviewee 15)

Virtually all team members interviewed explained that an increasing population in the WUI has exerted greater demands on suppression organizations. Interviewees believe that many of these residents neither understand rural culture and its physical environment nor the complexity of managing fire in the WUI. Interface residents are seen as expecting and exerting political pressure

to obtain urban amenities and services, including full fire suppression. Many interviewees noted that such expectations lead to higher costs.

You have houses strung all over the country and in some of the most terrible places. You can hardly drive a pickup truck into them . . . and then people wonder why their house burns down. They don't do the fuels abatement work, and they don't do anything to protect their house. (Interviewee 7)

According to those interviewed, political considerations can often be the driving force behind some decisions made on large fires, with "political smokes" having major cost implications. "Political smokes" is a phrase used by some team members to describe cases where politics pressured them to use resources, strategies, or tactics they would not normally have used and, which in many cases, they knew would be ineffective. Examples include marginally effective retardant drops on a fire smoking out a community or taking action to suppress interior islands of fire posing negligible escape potential when upset community members harangue the agency administrator or their political representatives to "go put it out." These political smokes often require aviation resources, which add greatly to an incident's costs.

They [local landowners] would come out to the helibase, because we had a good view of the fire, and watch the fire. She came out one day and looked at this area and said, "Why are you not putting it out? It's been burning for days." [What] I'll explain to her is, ". . . There's people . . . who have got a line in, and all that fire is doing now is burning out . . . [an interior]. It's not a priority for us to put it out," which, of course, she hit the ceiling over because she could see that area out of her front window. . . . That's how political pressure develops, where she would go to the IC or . . . to the local political person and try to put pressure on [them] to make those adjustments. (Interviewee 3)

Interviewees discussed several instances of costly "political meddling" that resulted in huge increases in suppression costs. For example, on one fire the Land Management Plan prescriptions dictated limited suppression, but a powerful political figure dictated full suppression instead.

VIP visits to an incident are also seen as costly. They impact team members' time and job responsibilities, not to mention requiring extra security measures and coping with media attention. The entourage has

been charged to incidents, thereby increasing costs.

I got four rapid phone calls in succession on each of those visits. "Oh, why did you invite them? Why are they coming? What are they going to say?" Look, they're elected officials. It's an election year. I didn't invite them. I don't know what they're going to say. They're elected officials. . . . It's like "Leave me alone and let me do my job." (Interviewee 40)

A key issue mentioned by team members interviewed, although not strictly political in nature, is that of multijurisdictional fires. These fires can be particularly challenging with respective jurisdiction objectives being widely diverse. For example, one forest may expect full suppression to protect a valuable timber stand while an adjacent forest may have a wildland fire use objective intended to accomplish fuel reduction just across the boundary.

It comes down to objectives, what the line officer wants done. . . . I'll give you an example . . . where we spent probably an extra two weeks on . . . [a] fire, which, in all respect to the line officer and everybody else making the decisions, a lot of people felt that we were late in the season, there was nothing behind that fire that was threatening, and the fire would do nothing but good in that area. But yet, because of the . . . objectives that were laid out, we spent a lot of time and money in very difficult terrain, at risk to people, safety, to meet the objectives. . . . [But if] . . . something happened to where fire went over on the . . . [other Forest] who also has an input on the objectives . . . —[the other Forest] . . . pretty much said, "We don't want any fire in there"—[we would have been in trouble]. (Interviewee 3)

Many times the interviewees vented their frustrations with the politics of cost containment. For example, interviewee 40 stated, "If you don't have any confidence in me, then pull me out of there. But, if you put me in the game and ask me to chase rabbits, don't ask me why I jumped over the log." Interviewee 6, too, described the impacts of a perceived unreasonable cost containment effort:

I don't know, politically . . . where we're going with it. I was on an incident this summer that we could not order a mouse for a laptop because we could use—they said, "Use the little red ball that's on a laptop . . ." [to save money]. Yeah, so my response was, "Tell them to get their sweet [expletive] down here, work in this [expletive] hot building for fifteen hours a day without a mouse. That is absurd." So I don't know where we're going with the cost consciousness thing.

Interviewees described how they receive political pressures to suppress fires "at all costs" while the fires are burning intensely. However, once the fire is over, they said they are subject to opposite political pressures. At that point, the rest of the country, including government oversight agencies, now want to know why so much money was spent and why more was not done to contain costs.

## Discussion

Mandates to reduce suppression costs in the context of more frequent and intense wildland fires near a growing WUI, together with experiencing increasing restrictions on their decision space, have frustrated many IMT members. They feel pulled in multiple directions by a complex web of interacting external factors that are not always compatible with cost reduction and at times actually increase costs. Agency administrators, often in response to socio-political pressures from their constituents, assign multiple incident management objectives that are not compatible with reducing fire suppression costs. Increasingly complex policies/rules/regulations developed by the US Forest Service to improve firefighter safety, reduce suppression costs, and encourage use of alternative strategies to full perimeter suppression (fire use, point protection, and so forth) have exacerbated the complexity of decisionmaking during often politically charged incidents. Moreover, team members are concerned about a lack of agency support in coping with fire-related lawsuits and potential litigation initiated in response to decisions made under pressure to (1) contain costs, (2) select less than full suppression strategies, and (3) adhere to complex rules and regulations. Because they feel reduced agency support, some team members have grown increasingly risk averse, while others are considering leaving or have already left IMTs.

Sociologist W.I. Thomas wrote, "If men define things as real, they are real in their consequences" (as cited by McHugh 1968, p. 7). Because perceptions are reality in a person's mind, decisions are made based on those perceptions. This means a tendency toward risk aversion and a shrinking pool of midlevel fire managers may continue, as will increasing costs, unless the perception is changed. Until team members regain the feeling of agency support while managing complex incidents within exceedingly complex constraints, IMTs may become increas-

ingly risk-averse organizations with low morale.

The inhibiting effect of the perceived increased restriction on IMTs' decision space identified by our interviewees is consistent with a growing body of research concerning management of unexpected events such as wildland fire. When organizations establish extensive rules and procedures aimed at covering all situations in unexpected events, the result is often diminished flexibility in making decisions with a consequent loss of efficiency and effectiveness. Two of the five processes that produce mindfulness [1] (Weick and Sutcliffe 2001, p. 42) and the ability to achieve reliable and excellent performance in managing unexpected events (Weick and Sutcliffe 2001, p. 51) are an organizations' reluctance to simplify interpretations of happenings and their deference to expertise, wherever and in whomever that may lie. Each new formalized regulation and procedure makes management more difficult, and "... people lose flexibility in the face of extensive rules and procedures" (Weick and Sutcliffe 2001, p. 68). "... [Y]ou cannot write procedures to anticipate all the situations and conditions that shape people's work" (Weick and Sutcliffe 2001, p. 69). IMT members interviewed stated they are experiencing many more mandated procedures that interfere with one another and restrict team members' discretion to practice expertise-based thinking and cost-effective decisionmaking.

Growing fire resource unavailability was often mentioned as a problem and is viewed by virtually all interviewees as a significant cost-contributing factor. Three factors were identified as contributing to firefighting resource shortages. First, recent centralization of US Forest Service finance functions at one national service center has left finance positions on IMTs unfilled. Second, shifting social-cultural values have made many US Forest Service employees less willing to accept fire duty, largely because of its multiple, complex demands, including sacrificial service. Third, cultural shifts within the agency are contributing to the resource shortage. In the past, firefighting was considered part of a US Forest Service employee's job and those who served were celebrated. Now, nonfire staff supervisors are increasingly discouraging or outright forbidding their employees from accepting fire duty, fearing regular targets will not be accomplished. Negative feedback to employees returning from fire duty is com-

mon practice, whether at the supervisory or peer employee level. Shortages of qualified and available agency firefighter and equipment resources, together with mandates to employ more contract resources, have promoted heavier reliance on contract firefighters and equipment by the agency than previously. Not only are contract resources experienced as more costly to suppression efforts and posing more serious safety hazards, but they are also viewed by IMTs as significant contributors to the declining number of agency fire managers in the pipeline. Although there are team members who are coping well with the decision constraint factors we have discussed, many more US Forest Service employees are opting to either bail out of IMTs, hang on until they retire, or choose to not accept fire assignments.

Federal land management agencies are already taking steps to address some of the issues discussed in this article. Mentoring and certification programs have been instituted for agency administrators who lack sufficient wildland fire experience to establish realistic incident management objectives. The Chief's Principal Representative Program has been developed and was implemented for the first time during the 2007 fire season. Objectives include (1) offering risk sharing and decision support to agency administrators and IMTs in managing the socio-political tradeoffs of cost containment efforts, (2) improving national oversight of certain fires, (3) encouraging effective allocation of resources during the wildfire season, and (4) increasing application of a national perspective on resource allocation to incidents. Through the agency's development of a foundational doctrine for fire suppression, steps are also being taken to simplify the sets of rules and regulations firefighters are expected to adhere to. [2]

To be sure, great challenges are facing the interagency wildland fire management organization. However, understanding the external human factors influencing IMT decisionmaking can inform attempts to mitigate costly suppression expenditures while reducing the likelihood of severe unintended consequences that may stem from cost control efforts. This article discusses these issues from the vantage point of the IMTs. To obtain a more complete picture of decisionmaking and cost implications for wildfire suppression, we hope to conduct similar interviews with agency administrators.

## Endnotes

- [1] Mindfulness, according to Weick and Sutcliffe, is "the combination of ongoing scrutiny of existing expectations, continuous refinement and differentiation of expectations based on newer experiences, willingness and capability to invent new expectations that make sense of unprecedented events, a more nuanced appreciation of context and ways to deal with it, and identification of new dimensions of context that improve foresight and current functioning" (Weick and Sutcliffe 2001, p. 42).
- [2] In 2005, interagency participants at the inaugural Pulaski Conference developed a foundational doctrine for fire suppression. "Doctrine is the body of principles (not rules) that guides an organization's activities and actions" (Smith 2005). Pulaski Conference participants recognized that current firefighters' ability to react to increasingly complex and dangerous incidents is ever more compromised by burgeoning rules and regulations associated with safety and cost containment objectives. The group intended its doctrine to be "definitive enough to guide specific operation, yet adaptable enough to address [the] diverse and varied situations" (Smith 2005) characteristic of wildland firefighting. For updated information on doctrine development (US Forest Service, Fire and Aviation Management, 2007).

## Literature Cited

- ARNO, S.F., AND J.K. BROWN. 1991. Overcoming the paradox in managing wildland fire. *West. Wildl.* 17(1):40-46.
- CALKIN, D.E., K.M. GEBERT, J.G. JONES, AND R.P. NEILSON. 2005. Forest service large fire area burned and suppression expenditure trends, 1970-2002. *J. For.* 103(4):179-183.
- COLLINS, B.M., P.N. OMI, AND P.L. CHAPMAN. 2006. Regional relationships between climate and wildfire-burned area in the Interior West, USA. *Can. J. For. Res.* 36(3):699-709.
- CRESWELL, J.W. 1998. *Qualitative inquiry and research design: Choosing among five traditions*. Sage Publications, Thousand Oaks, CA. 403 p.
- DONOVAN, G. 2005. A comparison of the costs of forest service and contract fire crews in the Pacific Northwest. *West. J. Appl. For.* 20(4):233-239.
- DONOVAN, G. 2006. Determining the optimal mix of federal and contract fire crews: A case study from the Pacific Northwest. *Ecol. Model.* 194:372-378.
- DONOVAN, G., P. NOORDIJK, AND V. RADELOFF. 2004. Estimating the impact of proximity of houses on wildfire suppression costs in Oregon and Washington. In *Proc. of 2nd symp. on Fire economics, planning and policy: A global view*, Cordoba, Spain, Apr. 19-22, 2004. González-Cabán, A. (Ed.). US For. Serv. Pacific Southwest Res. Stn. (CD Rom).

- GEBERT, K.M., D.E. CALKIN, AND J. YODER. 2007. Estimating suppression expenditures for individual large wildland fires. *West. J. Appl. For.* 22(3):188–196.
- GLASER, B.G., AND A.L. STRAUSS. 1967. *The discovery of grounded theory: Strategies for qualitative research*. Aldine Publishing Company, Chicago, IL. 271 p.
- GOLD, R.L. 1997. The ethnographic method in sociology. *Qual. Inquiry* 3(4):388–402.
- GUBA, E.G., AND Y.S. LINCOLN. 1989. *Fourth generation evaluation*. Sage Publications, Newbury Park, CA. 294 p.
- LIANG, J., D.E. CALKIN, K.M. GEBERT, T.J. VENN, AND R.P. SILVERSTEIN. Spatial factors influencing large wildland fire suppression expenditures. *Int. J. Wildl. Fire* (in press).
- McHUGH, P. 1968. *Defining the situation: The organization of meaning in social interaction*. Bobbs-Merrill Co., Indianapolis, IN. 143 p.
- PATTON, M.Q. 1980. *Qualitative evaluation methods*. Sage Publications, Beverly Hills, CA. 381 p.
- SMITH, M. 2005. P. 1 in *Fire suppression: Foundational doctrine*, Pulaski Conference participants, E.D. Hollenshead, M. Smith, F.O. Carroll, and P. Keller, Pulaski Conf., Alta, UT, June 6. 21 p.
- SNYDER, G. 1999. Strategic holistic integrated planning for the future: Fire protection in the urban/rural/wildland interface (URWIN). P. 159–170 in *Proc. of symp. on Fire economics, planning, and policy: Bottom lines*, González-Cabán, A., and P.N. Omi (eds.). US For. Serv. Gen. Tech. Rep. PSW-173.
- STRAUSS, A., AND J. CORBIN. 1998. *Basics of qualitative research: Techniques and procedures for developing grounded theory*, 2nd Ed. Sage Publications, Thousand Oaks, CA. 312 p.
- US DEPARTMENT OF AGRICULTURE, OFFICE OF INSPECTOR GENERAL (USDA/OIG). 2006. *Audit Report: Forest Service large fire suppression costs*. Rep. No. 08601-44-SF. 47 p.
- US FOREST SERVICE, FIRE AND AVIATION MANAGEMENT. 2007. *Doctrine*. Available online at [www.fs.fed.us/fire/doctrine/](http://www.fs.fed.us/fire/doctrine/); last accessed June 21, 2007.
- WEICK, K.E., AND K.M. SUTCLIFFE. 2001. *Managing the unexpected: Assuring high performance in an age of complexity*. Jossey-Bass, San Francisco, CA. 200 p.
- WESTERLING, A.L., H.G. HIDALGO, D.R. CAYAN, AND T.W. SWETNAM. 2006. Warming and earlier spring increase western U.S. forest wildfire activity. *Science* 313(5789):940–943.