COMMAND DURING CATASTROPHIC INTERFACE WILDFIRES

by: Michael S. Rohde

A recently completed study provides insight into critical decisions by command officers at some of California's most notorious wildland interface fires. Command complexities that were commonly experienced and key decisions that were made during initial command of the Old Topanga, Kinneloa, Laguna (Orange County), Paint, Tunnel/Berkeley Hills, and Harmony Fires were identified. Collectively, these six fires caused 30 fatalities, burned 4,907 structures and 52,422 acres, and occurred in or immediately adjacent to heavily urbanized areas during the 1990's. The vast majority of loss occurred during the first 12 hours in each of the fires. The study focused on the first several hours of response to the fires, a period of time when organizational development and control can be as complex as the fire itself, and state or federal incident management teams have not yet been mobilized. The Laguna Fire received additional study to fully document command and general staff experiences representative of such fires.

In addition to the specific fires, subject matter experts with exceptional interface wildfire command experience were consulted on their observations from these and other fires. These experts included: Bill Teie, Bill Clayton, Tim Sappok, John Hawkins, and Chuck Manor from the California Department of Forestry and Fire Protection (CDF), Gary Nelson from the Los Angeles County Fire Department, and Mike Warren from the Corona Fire Department, (formerly with the USDA Forest Service and CDF). The study identified a series of best command practices that might be used by incident commanders and others responsible for leadership for future catastrophic interface wildfire.

Characteristics of Catastrophic wildfire

Forty-seven factors were common among all six studied fires. These factors are suggested to be characteristic of catastrophic interface wildfire. All of the fires occurred during critical fire weather patterns, involving Santa Ana or other foehn winds. The fires generally occurred in steep mountainous terrain that had history of repetitive wind-driven wildfire and structural loss. Native chaparral fuels were abundant in the fire areas. All of the fires exhibited historically rapid rates of spread, and occurred during a seasonal drought period with critical live and dead fuel moistures. Enhancement of conflagration phenomena occurred immediately following mass structural involvement in each of the fires and included extreme burning intensity, fire whirls, long range heavy spotting, mass ignition, high energy release, and rapid rates of spread. Multiple major fires were occurring simultaneously in the surrounding region. Each of the fires began as a wildland fire and transitioned into structures. The fires occurred following a wet winter, preceded by multiple years of drought.

Community Planning and Development

Involved communities were largely constructed of non-fire resistive construction including wood shake roofs. Many structures lacked adequate fuel modification or brush clearance and some had concentrations of combustible landscaping adjacent to structures. Water systems were often unable to provide adequate fire flow or failed during the fires. Communities at risk had generally limited arterial road access and egress. Many isolated structures burned in each fire that were served by substandard or hazardous road or bridge access. Dense structural spacing aided conflagration development at some locations. Each fire occurred adjacent to large population concentrations. The presence of

threatened or endangered species was an obstacle to pre-suppression activities in each location before the fires.

Emergency Response

Each fire caused significant injury and half caused loss of life. Available regional fire resources were overwhelmed by the initial fire problem and massive structural loss occurred during each incident's first 12 hours. Firefighters practiced structural triage to select defendable homes, and a period of independent action by firefighting resources occurred at each of the fires. Regional commitments to multiple fires compromised availability of aircraft, handcrews, and dozers. Communications centers and fire radio systems were significantly overwhelmed.

Situation driven tactics compromised and elevated firefighter risk, as did the need to effect rescues and civilian evacuations. The need for evacuations compromised the ability for resources to concentrate on firefighting operations. Coordination with police agencies for traffic control and evacuation was problematic at the studied fires, as was acquiring accurate situation and resource status. Inability to provide adequate and timely logistical support including water and fuel compromised firefighting. Loss of momentum occurred in perimeter control activities as a result of concurrent structural protection demands. Effective command organizational development was hindered by lack of availability of qualified staff and the rapidly changing fire conditions.

Initial command post locations were generally inadequate, with command posts burned over in three of the six studied fires. Incident managers experienced difficulty in maintaining mobility of initially deployed resources to address new and evolving threats. Mobilization of mutual aid resources was slow and problematic despite the advanced

development of the State of California Fire and Rescue Mutual Aid System. These problems were exacerbated by over-ordering of resources at some incidents. Initial use of multiple resource ordering points complicated initial organizational and command activities. Limited communications and interaction between fires and governmental emergency operations centers contributed to confusion and support inadequacies.

Significant residual structure loss occurred in subdivisions partially stuck by fire and left within the fire's perimeter due to lack of resource availability. Evacuation of equestrians and other animals was problematic. The incidents experienced a high demand for public information and received variable quality in media public messaging.

Human Factors

Firefighters and fire officers acknowledged stress in each of the incidents associated with high risk-high consequence decision making, and as a result of their knowledge of increased operational risk, firefighter entrapments, and loss of life. Many in command organizations sensed frustration at the significant structural loss which occurred. Public fear and panic was present at each of the incidents and directly impacted firefighters. Search and accountability for missing persons, reports of trapped individuals and concern for civilian defense of personal property proved problematic. Public volunteerism and desire to assist was unmanageable for each incident concurrent with firefighting operations. Firefighters used recognition-primed decisions, for better or worse, in exercising tactics and strategy. This emphasizes the need for high quality training and experience. Demands for fire service involvement in post fire recovery and political activities exceeded all expectations of fire service agencies at each of the incidents.

Independent Action

Particularly problematic to the early periods of firefighting was the use or need for independent action by on-scene firefighting resources at each of the studied fires. Independent action occurred either through an intentional delegation by command, or through unselected organizational evolution. Clearly, this condition was driven by the early presence of overwhelming and dangerous fire conditions. The evolution of this strategy was often tied to the inability of an incipient command organization to enforce an alternate strategy upon an incident. The ability to achieve tactical benefit through independent action was driven by the training and motivation of individual crews, and is not without examples of great success. The essence of this strategy is best stated by Chief Tim Sappok, "with independent action, you get a lot of productivity, its just that as Incident Commander you may not know, or be able to direct, what that productivity is". Independent action was so prevalent among the studied fires and among other similar fires that the author felt it was characteristic of the evolution of a major interface fire.

Independent action however carries its own set of significant issues and concerns. Interestingly, all study respondents viewed this as a "strategy of last resort". Independent action was attributed to compromises in safety and efficiency and loss of organizational control and resource accountability at all of the studied incidents. During several of the studied fires, high risk-low success probability firing operations were conducted during independent action. While some of these firing operations were successful, others directly contributed to structural loss. Firefighter entrapments were common to this period, with the Old Topanga incident experiencing over 20 separate entrapment situations during independent action. Command organizations reported difficulty in mobilizing effective

deployments to new threats and in accomplishing coordinated search and evacuations. Interestingly, when the Laguna and Paint Fires selected to implement independent action strategies, the incident organizations seemed to revert to an "initial attack" from a major fire orientation. Re-institution of firmer organizational controls later in these fires was difficult.

In general, the command approach to independent action is to "make it go away" as quickly as possible by consolidating command and developing field supervisory positions. This practices however takes time and resources. Experts have identified a series of specific recommendations to mitigate some of the negative aspects of this strategy. However, the prevalence of the use of independent action, whether desired or not, emphasizes the need for specific training for such operations.

Best Practices

Command organizations at the studied fires and consulted experts identified a number of successful methods and systems that serve to reduce firefighter risk, and increase organizational efficiency and accountability during catastrophic interface wildfires. They are best utilized in a "systems fashion" which integrates multiple concepts into a command methodology.

Pre-fire Planning

Pre-planning for interface wildfire risks and in historical fire corridors was described as being critically important by experts. According to Chief Bill Clayton, "its better to expend mental energy before the fire than during the event", to conceive strategies and tactics, identify values at risk, plan deployments and evacuations, calculate resource needs, and project fire behavior and spread. Every consulted expert had developed plans

for their respective areas of responsibility and many had involved cooperating agencies including law enforcement. Some had followed up on planning with inter-agency tabletop exercises.

Branches Vs. Divisions

The majority of the experts consulted use a specific approach within the Incident Command System (ICS) for major interface fires. When these experts identify the likely development of a major fire, they will organize the incident by Branches rather than Divisions first. Branches are established for each flank of the fire and possibly for structural protection, law enforcement/evacuation, or other specific needs. Operations Branch Directors are delegated responsibility to establish Divisions or Groups within their Branches as resource availability or situational needs dictate. This has several benefits. By establishing Branches first, the entire projected fire area can be organized initially and no area of the fire is left unsupervised. This practice allows an Incident Commander (IC) to place initially responding command officers immediately into high responsibility positions, allowing for best use of their local experience and knowledge. These are also likely people with whom the IC has considerable relationship and pre-established trust, which was observed to be a key element in the studied fire organizations. This establishment of Branches mitigates many independent action concerns through provision of at least a basic or incipient command framework.

Several of the studied fires allowed highly qualified chief officers to function at the strike team leader level during early command development. This contributed to an inability to later staff Division Supervisor or Branch Director positions needed as the fire grew. This also contributed to later organizational problems such as underestimated or

unnoticed fire growth, inadequately addressed tactical and safety issues, and lack of focus on multi-dimensional needs such as concurrent perimeter control and structural protection demands. Experts recommend reassignment of qualified Strike Team Leaders to higher ICS positions whenever possible during early incident development.

Use of inexperienced staff at the Division Supervisor level was also cited as problematic. Experts cited the 1996 Calabasas firefighter burnover incident in Malibu as an example. During that fire, a minimally experienced Division Supervisor provided poor guidance that contributed to the entrapment and injury of multiple firefighters. Experience at the Division Supervisor level is particularly important when large amounts of mutual aid resources are deployed. Since many mutual aid responders come from agencies without a primary wildland firefighting mission, safety and experience is an issue for these responders during deployment and requires greater supervision. IC's and others are encouraged to utilize job-person match criteria in assigning known talents of responding fire officers.

OSC-IC Relationship

The requirement for the Operations Section Chief (OSC) and the Incident Commander (IC) to communicate on a nearly constant basis during early incident development was critical during all of the studied fires. However, a competing demand exists for the OSC to provide management and leadership of suppression and related activities. At the Laguna Fire in particular, the inability of the IC and OSC to communicate led to conflicting directions and dual assignments for a period of time during the peak structural siege. Their communications was complicated by a saturation of radio and cellular phone frequencies and the distant physical location of these

individuals. In retrospect, these individuals indicated they would have liked to have physically collocated when communications systems failed to enable maintenance of this necessary relationship.

Some experts believed that the OSC should be physically collocated with the IC during catastrophic interface fire to best facilitate incident needs, while others believed the OSC needed to be delegated enough responsibility to work independently of the IC to achieve stated objectives. One expert went so far to say that the IC needed to understand the OSC's work environment and exercise patience, allowing time for results rather than expecting constant feedback. At the Old Topanga Fire, the IC and OSC were collocated but some experts believed this was a deterrent to effective operational leadership. Experts did agree on the most reasonable solution to this concern, recommending strong delegation from the OSC to Branch Directors for operations section management. With Branch Directors responsible for managing operations, the OSC can provide less direct oversight and achieve better partnership with the IC. Also, the OSC is freer to interact in other necessary relationships and attend planning and strategy meetings as needed. Such was the case for the Harmony Fire where the OSC managed five Branches. Branch Directors assumed responsibility for a great deal of the operational leadership and the OSC focused more exclusively on coordination and mobility of resources, and for ensuring that resources were responding to what was threatened by the fire as opposed to what is already on fire.

Strategy and Tactics

Experts focus on providing both offensive perimeter control and defensive structural protection activities simultaneously, and many view the abandonment of one activity over

another as a critical command error. Abandonment of perimeter control complicates fires through unabated expansion, increasing structural risk, and difficulty of control. Experts suggest assignment of wildland firefighting resources such as crews, dozers, air tankers, and some engines to perimeter control with an expectation for these resources to conduct key control activities to limit the spread of the fire. Type 1 or 2 engines are ideally assigned for structure protection and are best supported with helicopters which have the ability to work in closer in heavier smoke conditions. Some experts viewed this allocation as somewhat situational, but emphasized that if perimeter control is abandoned for a period of time, then it must be reestablished as soon as possible. A common strategy for wildland interface fires is to "pinch the flanks" as hard as possible through perimeter control to limit the width of the fire's head as it enters structures. Perimeter control should take advantage of natural breaks, non-combustible developed areas, agriculture, old burns and the like as much as practical.

Experts suggested that IC's focus on the "big decisions" of life safety, opportunities for containment, and property protection. This was acknowledged as difficult considering the blitz of information received by the Incident Commander. Vigilance was recommended to ascertain these issues from the minutia of information received. Support of effective operations with additional resources, taking advantage of containment opportunities, and holding line you have already created are important aspects of this vigilance. Experts recommend allocation of resources to structural areas that have been hit and experienced partial loss to prevent additional loss from residual fires after the main fire has passed.

Command Post Staff

To assist in command development, most experts assign firefighters from greater alarm resources to assist in initial situation and resource status tracking, incident communications, staging, and other initial logistics functions. These personnel assist the IC in executing timely support of incident objectives until they can be relieved by fully qualified ICS staff. Chief Gary Nelson suggested that command staff development must match resource commitment or risk becoming hopelessly behind. Nelson would direct responding resources to report to one of at least two staging areas on opposite sides of the fire for assignment. He communicates potential assignments directly to the staging area manager who fills the requests through face-to-face contact with available resources and reports the action to the IC. In this manner, the IC ensures check-in of resources and reduces radio traffic. Lack of timely delivery of logistical support in the studied incidents led to lack of firefighting or drinking water, food, vehicle fuel, or delivery of needed resources to meet firefighting demands. Lack of quality resource or situation status confounded later operational period planning and resource ordering for lack of knowledge as to the extent of resource commitments or the true extent of the fire.

Ordering of Resources

Two of the studied fires drew the largest response of the State's mutual aid system to date, with one drawing over 900 engine companies. This size of deployment presents many obstacles to effective use. Of the 900 engines assigned to the Old Topanga Fire, only 20% of these resources were actually committed to an assignment. Chief Bill Teie commented that the California mutual aid system has the ability to deploy beyond the ability of human management, a finding that was emphasized by a Rand Corporation

study of the Old Topanga Fire where fire apparatus formed a miles long traffic jam on Pacific Coast Highway. Experts agreed that over-ordering has become a serious problem in California wildfires and that better resource utilization must be sought. Most experts could not visualize a California fire problem requiring in excess of 300 engines. Pre-fire planning was suggested as key to calculation of effective resource ordering and deployment needs.

In addition to the commitment of available local resources, the California mutual aid system delivered an average of 10 to 12 additional strike teams within a 2-3 hour period of request to each of the studied fires. Accordingly, experts have preplanned how they would best utilize this resource with an understanding that regardless of how many engines might be ordered, only a finite number will arrive over the next critical few hours. Chief Nelson created "blitz lists" that pre-identified resource orders to be placed when fires reached pre-planned benchmarks, relieving his conceptualization of such orders at the time of need. These benchmarks included fire projection maps with time ellipses at hourly intervals that assisted him in preplanning resource deployment and mobility. Past fire history can also guide resource needs assessment and planning.

Risk Acceptance and Mitigation

Operations involving elevated risk are allowed by experts only in situations meeting very specific criteria. Generally, such missions require a direct civilian life safety risk and must be executed with strong planning and support. Lesser risk involving structural protection values alone must be abated completely by the presence of safety zones or related factors, and life risk for strictly natural resource protection is generally not tolerated. Operational risk for other activities must be addressed on a continuing basis for

all line assignments and mitigated as much as possible. Mitigations can include aircraft support, construction or identification of safety zones, communications and lookouts, varied tactical approaches, and related factors.

Many experts suggest that medical personnel not only be pre-positioned for firefighter support, but that additional resources for technical rescue and extraction be placed at their immediate disposal. In one case in Los Angeles County, a burnover involving two crew firefighter fatalities and two serious injuries required hours for personnel extraction due to difficult terrain. Experts delegate accident scenes as "incidents within incidents" as soon as possible, providing separate command, communications, and resources. Often, the Incident Safety Officer leads such efforts. Experts will segregate involved crews either back to productive fire line activities as soon as possible or remove those that may be exposed to critical incident stress or other injury.

Unified Command

Unified command was practiced to some extent on all of the studied fires, with various degrees of implementation and timing. The most successful incidents immediately organized a unified command and ordering point. These actions were important to reducing independent action and increasing command cohesiveness, and for concentrating available firefighting resources on the most significant needs. Incidents that included law enforcement in unified command were highly successful in mounting evacuations. Despite some complexities of this law-fire relationship at the Laguna Fire, 26,000 people were evacuated from the City of Laguna Beach and surrounding area in a matter of two hours. This evacuation included planning for fire service access and

separate civilian egress. In contrast, lack of effective traffic management during the Tunnel Fire contributed directly to loss of life.

Media Relations

Studied incidents that utilized media to communicate evacuation and related fire messages were highly successful in critical message distribution. Those incidents that did not engage the media suffered dissemination of mis-information and mis-direction of civilians in the fire area. The assignment of an Information Officer to deal with media for such fires was considered essential by experts.

Catastrophic wildland interface fires are common to the California landscape and are becoming widespread across the nation. These six fires confounded the best cooperative efforts of local, state, and federal firefighters who shared responsibility for initial response. Command decisions and actions can and should be pre-planned for such events to provide for the best potential outcome, and to provide peak firefighter safety and efficiency. Decisions must be made and instituted quickly to meet the demands of these rapidly evolving incidents, often in the absence of organized management teams and with the best local capability possible. The author hopes these findings improve understanding of major interface fire characteristics and assist fire officers with recommended best practices to achieve superior leadership and command for wildland interface fire incidents.

Literature Cited:

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