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Southern California 2003



Lesson Learned –
 An innovative approach or work practice that is captured and shared to promote repeat application. A lesson learned may also be an adverse work practice or experience that is captured or shared to avoid recurrence.

Best Practice – A process, technique, or innovative use of resources, technology, or equipment that has a proven record of success in providing significant improvement to an organization.

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Fire Behavior and Fuels

The Fall and Winter editions will feature excerpts from the Lessons Learned Information Collection Team (ICT) interviews in Southern California. To view the full report go to:
<http://www.wildfirelessons.net/ICTs.htm>

During the last week of October and the first week of November, 2003, thirteen major wildfires occurred throughout Southern California. These wildfires created a disaster on such a scale that they may redefine the concept of the wildland urban interface.

“Firestorm 2003,” as the media is calling it, was unprecedented in scope and impact. The statistics to date are staggering: 12,000 firefighters, 750,000 acres burned, billions of dollars in damage, more than \$120 million in suppression costs, 4000 homes destroyed, 22 human lives lost.

A six-person ICT from the Wildland Fire Lessons Learned Center (LLC) assembled in Southern California and spent a week interviewing 107 people from 43

different fire and ICS positions, representing at least 12 different city, county, state, and federal agencies. The team sought to capture the experiences of those who fought these fires, capture the important lessons learned by them, and learn how these events affected the firefighting strategy, tactics, techniques, and decision making of those involved.

Fire Behavior and Fuels

This section outlines lessons learned regarding fire behavior as described by interviewees.

Extreme Fire Behavior

“ I’ve seen a once-in-a-lifetime fire three times now.”

- 30 year Engine Company Captain

Respondents felt it was important to communicate to the wildland community



that the Southern California fires were much more than typical wind-driven events. The Santa Ana influence was typical, with winds rarely stronger than 30 to 40 mph. The extreme fire behavior during this event resulted from a convergence of extended drought, fuel conditions, hot and dry weather, and wind.

After extending into the urban environment, these fires often split into multiple heads and spread along paths defined by the available fuel sources. Fires spread over and around barrier after barrier.

The fires moved far more quickly than anyone had anticipated or prepared for. One fire grew from 500 to 31,000 acres in four hours. Sudden wind shifts and huge fire whirls threw embers and flaming debris far ahead of the main fire. Wildland fires nearing urban areas spotted ½ to ¾ of a mile past the interface and into the urban environment.

The majority of respondents indicated that they did not recognize early on the need to significantly adapt strategy to the extreme fire behavior. They felt they pursued perimeter control strategies too long before shifting their thinking defensively and enacting appropriate tactics until the weather provided an opportunity to go back on the offensive. All indicated that when this mental shift occurred, they were more successful in saving neighborhoods.

Summary of Lessons Learned — Extreme Fire Behavior

The extreme fire behavior during this event resulted from a convergence of extended drought, fuel conditions, hot and dry weather, and wind. Respondents felt conditions that led to these fires are common in other areas throughout the western U.S.

The extreme nature of the fire behavior surprised most firefighters. Most did not initially recognize the need to adapt strategy and tactics to the extreme fire behavior. They said adopting an initial protect-and-defend strategy before attempting perimeter control would have been more effective.

Transition to an Urban Conflagration

“Normally we go after it.
This time it went after us!”

- *City Battalion Chief*

These fires burned beyond the wildland-urban interface (WUI) into urban environs with little or no wildland fuels. In this environment, fires spread from structure to structure — an urban conflagration.

When fires initially entered urban zones, embers from the main fire ignited spot fires in the urban zones. There, ornamental vegetation, such as palms, ignited producing intense ember showers and more spotting. Winds often carried these ember showers into attic vents

and eave spaces of neighboring houses. Consequently, unlike most structures destroyed by wildland fire, these urban houses burned from the inside out.

In some cases, the requirements of urban firefighting and the intense heat generated by multiple structure fires demanded that firefighters abandon traditional “bump and run tactics” in favor of flowing large quantities of water to involved structures that threatened whole blocks.

Summary of Lessons Learned — Transition to an Urban Conflagration

Fires crossed the traditional interface into purely urban areas. Structures became another fuel type to carry the fire deeper into cities.

Ornamental vegetation created an unpredictable and significant fuel source that blew into attic vents and eaves and spread through neighborhoods by torching, crowning, or throwing embers. Structures became involved from ember attack from the inside out rather than flame impingement.

Firefighters found heat control the primary factor for preventing fire from spreading to other structures once fire entered denser urban areas.

Respondents believed similar events will happen in the future and reiterated the need to put even more effort into pre-incident planning.

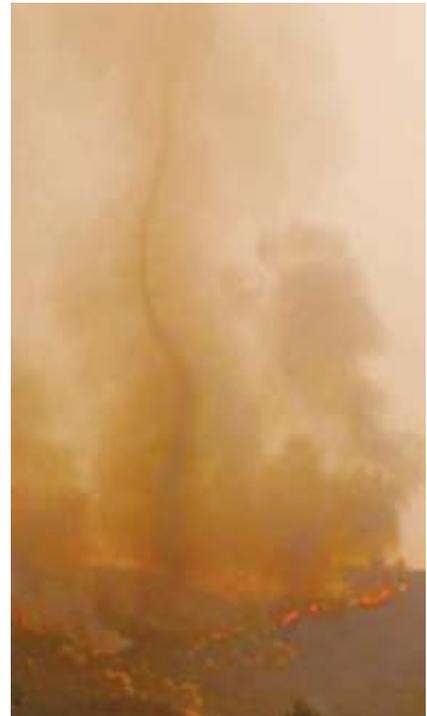
Fire Whirls

“What we were expecting to see were fire whirls 4’ to 6’ tall, what we actually saw were true fire tornadoes. The fire researchers kept telling us what we were seeing was impossible and never seen before.

After three days of discussion, the fire researchers started to understand that what they were expecting and what was happening was not jiving.”

- *Division Supervisor*

Respondents reported unusual numbers of fire whirls that ranged from several yards wide up to a ½ mile wide. *Destructive fire whirls*, those causing structural damage unrelated to fire, also were reported.





Summary of Lessons Learned — Fire Whirls

Observed fire whirl behavior was both unexpected and extreme in these fires, catching many firefighters by surprise and significantly contributing to spotting up to ¾ mile.

180-degree wind shifts preceded fire whirls by 45 seconds to a minute. These wind shifts became a warningsign/trigger point to some firefighters, allowing time to pull crews out to a safer area.

Wind Shifts

“It does not matter how much experience you have, the urban interface fire will surprise you.

I never expected the fire to move so fast against the wind and wouldn't have believed it if someone told me about it.”

- Municipal Department Fire Chief

Wind shifts produced fire behavior, including fire whirls. Once recognized crews developed contingency actions (including moving to safety zones) that they implemented when they detected sudden wind shifts. Strategically, the shifts from the easterly Santa Anas to the prevailing westerly winds offered opportunities to take the initiative and gain ground on perimeter control.



Summary of Lessons Learned — Wind Shifts

Wind shifts were trigger points indicating the potential for fire whirls and other dangerous fire behavior. Leaders developed contingency plans to implement when wind shifts occurred. Larger predicted wind shifts were used to set strategic trigger points to take advantage of wind shifts as the opportunity to move from a defensive strategy to an offensive one.



Fuels

“The fire hit us so hard; the houses became just another fuel type.”

- Engine Company Captain

In higher elevations, extensive tree mortality resulting from pine beetle infestation provided abundant fuel to carry

the fire. Light, flashy fuels, and decadent chaparral fueled the fire at lower elevations. Witnesses reported mass ignition in grassy fuels ahead of the fire — the result of dry winds, high temperatures, low humidity, and low fuel moistures.

As the fire transitioned from the WUI into the urban environment, heat emanating from fully involved structures allowed the fire to spread to neighboring structures by direct flame impingement, radiant heat, and embers emanating from palm fronds and other ornamental foliage.

Palm trees provided an unusual and significant fuel source, carrying the fire rapidly across streets and through neighborhoods both through torching and by fronds creating a spotting source.

Dense ornamental foliage proved a significant problem in older neighborhoods. Other highly flammable fuels included Eucalyptus (especially when in groves), olive trees, and Italian Cypress. Dense accumulations of Italian Cypress needles threw embers in all directions once ignited.

Belts of natural “open space” in WUI neighborhoods (versus greenbelts) helped spread the fire by carrying it along roads or helping fire to jump a road.



Summary of Lessons Learned — Fuels

Fire moved very quickly through trees killed by bugs and chaparral. Mass ignitions were reported in light, grassy fuels.

Ornamental vegetation created an unpredictable and significant fuel source that blew into attic vents and eaves and spread through neighborhoods by torching, crowning, or throwing embers.

Natural open space areas contributed to fire spread. Greenbelts were effective barriers.

Effects of Fuels Programs and Fuel Treatments

Respondents reported that fuel treatments resulting from quality hazard abatement programs influenced fire behavior—in some cases dramatically. Areas with more effective prevention and fuels hazard abatement programs fared better than those without.

Fewer homes were lost in communities where local government actively supported and enforced hazard abatement programs, and firefighter safety presented less of a concern. However, the normal 30' abatement limit was not sufficient in most cases to prevent flame impingement and ember-driven fires from starting. Some WUI areas had 100' abatement limits, and those were extremely effective.

In wildland areas, it proved critical for natural resource agencies to focus their limited resources on priority projects. The National Forests have hundreds of thousands of acres of dead trees and accumulated fuels. Treating the whole area is unrealistic given the resources available to the agencies. ★

Editor's Note: The Winter 2004 Scratchline will continue with Lessons Learned in Strategy and Tactics from the Southern California fires.

SMOKEJUMPERS

Smokejumpers from bases located in Idaho, Alaska, and California were interviewed during the summer and fall of 2003 regarding their successes, challenges, and training recommendations from recent seasons. These interviews, formatted after the After Action Review (AAR) Rollup, supported numerous established principles in wildland fire. Special thanks is extended to Smokejumpers Mike Tupper, Lisa Allen, Tom Roach, Zuri Betz, Josh Mathiesen, and Bob Bente for sharing their lessons learned and best practices with the wildland fire community.

Lessons Learned – Achieved Successes

Rookie Training

Smokejumpers consider their first year rookie training as a significant *source* of the overall lessons they have learned. In looking back to when they were rookie smoke-jumpers, they all noted that maintaining professional relationships and trusting the trainer were key factors in achieving their eventual training success.

Field Camp is the terminology used for the first week of rookie smokejumper training. It is extremely stressful and demanding, both mentally and physically. Field Camp activities include hiking, cutting fireline, carrying full gear including cubitainers and saws, climbing trees, using crosscut saws, building helispots, setting up pumps, and laying hose.

During Field Camp practical situational scenarios are set up as a series of round robin stations, and candidates must use GPS coordinates to find a given scenario site, sling load site, and fire observation station. Trainees also participate in spot fire and emergency medical incident scenarios to focus and reinforce firefighting and first aid skills. After the four days of Field Camp, smokejumper trainees must complete a 23-mile field marathon run. Their trainers run with the rookies every step of the way. Only after this do the candidates begin to learn jump counts and the history of smokejumping.

The second and third weeks of rookie training consist of parachute training; studying smokejumper manuals, performing tower jumps, practicing on-board aircraft procedures, parachute landing falls, malfunction procedures, and other aspects of parachuting. The candidates are given a pass/fail test covering everything they must know up to this point before they may start parachute jumping.

The fourth and fifth weeks focus entirely on parachute jumping. This training phase starts with easy jumps onto flat terrain and culminates with difficult

jumps in higher wind conditions. Topographic features and trees add to the degree of difficulty. Candidates complete a minimum of 15, and up to 25 precision jumps. They must demonstrate that they are both comfortable with and proficient at parachute jumping.

Two smokejumpers recounted their own success stories and the lessons they learned.

After the season, one rookie from that year's rookie class is selected to be one of next year's rookie trainers. Base smokejumper management selects the individual who is to fill this role. As a trainer, this person then works with all of the next year's candidates. They provide support, and help with secrets and "tricks of the trade" such as tree climbing techniques and what to carry in a personal gear bag. This sophomore year **trainer must also strike a delicate balance** between showing rookies an easier way and allowing them to struggle and learn the hard way. While the trainer-rookie relationship must be maintained at all times, being in the unique position of the sophomore rookie trainer was the most rewarding job assignment for one smokejumper.

All through rookie training, **trust is continually emphasized**. As a trainee, you must learn to trust your trainers completely. This second season smokejumper related how it was easy to second-guess procedures after having worked in organizations that appeared to frequently change the rules. The trainee came to learn that in parachuting every step has a purpose, is time proven, and every single thing counts. Therefore, it is important for rookies not to second-guess any aspect of the procedures taught in smokejumping.

Seizing Opportunity

Successes can occur when one takes the opportunity to move into a leadership role. One smokejumper explained how accepting a leadership opportunity during the second year as a Boise smokejumper helped build confidence and strengthen leadership abilities.

An experience became a defining and pivotal moment during a standard mission in the Great Basin of Nevada. The first person in the plane door is typically the Jumper In Charge (JIC) of the incident. This dispatch was a 500 acre fire, growing steadily, and far more complex than any previous fire on which this smokejumper had been an Incident Commander (IC).

The spotter offered the IC position to this second year jumper. The smokejumper was nervous about being the IC on a smokejumper fire of this size for the first time. Due to

SMOKEJUMPERS IN SOUTHERN CALIFORNIA

A combination of Redding and McCall smokejumpers out of the Redding Smokejumper Base in California were working as a hand crew on fuels projects when the Southern California Fires started in October 2003. They were then dispatched to the Grand Prix Fire during the initial attack phase. There they fought fire in an urban interface environment for 12 operational periods. What follows are a few of their urban interface lessons learned.

The smokejumper crew worked night shifts when some of the most significant fire runs occurred. The crew learned to recon the interface neighborhood prior to the fire front arriving. After the flame front had passed through the neighborhood, the crew split-up into two and three person teams and assisted engine crews with saving structures.

Radio communications were non-existent with adjoining resources so the crew regrouped three to four times per shift to reevaluate and redeploy as needed. Smokejumpers are trained in small group leadership and found this regrouping technique a very effective substitute in a firestorm situation where they lacked the normal means of radio communication.

The smokejumper crew also lacked good intelligence and fire maps presenting big challenges to situational awareness. When the crew was able to obtain a fire map, it was out of date almost immediately due to the fast moving fire front. They overcame this challenge by engaging in continual area reconnaissance. This recon had to be conducted in areas not seen in daylight, beginning immediately after coming on shift and concluding with a debriefing with the day shift whenever possible. The smokejumper crew also found themselves in different subdivisions every shift, often three to four miles away from where they worked the previous night. The jumpers recognized this problem and knew that recon was essential to both operations and safety throughout every operational period.

The smokejumper crew learned not to become overly attached to a single structure that they were trying to save because it was easy to experience tunnel vision. They had to maintain overall perspective in order to stay safe. This required the crew to step-back and look at the big picture. This conscious effort to look at the surroundings on a neighborhood scale was critical in maintaining situational awareness during the interface firestorm. ★



the complexity of this fire, the spotter was reconsidering the offer and was going to give the IC assignment to a more experienced smokejumper. The second year jumper felt he **had to rise to this challenge** or it would be that much more intimidating the next time he was “first in the door”. He told the spotter he wanted the fire, and jumped it as IC with a more experienced smokejumper acting as the shadow. The fire was controlled three days later at 600 acres with 69 firefighters on the line. The defining moment was accepting the opportunity and challenge. From that assignment onward, the jumper related continuing to gain confidence based on this experience. The jumper related the importance of recognizing an opportunity when it emerges. If you have prepared, take advantage of it and grow from the experience gained.

Trainer Responsibilities and Influence

Trainers must comprehend the importance and influence their job as trainers have on others. Trainers need to recall the supervisors who positively influenced them, and how the supervisors used key influential concepts. Then take these concepts and incorporate them to become a better trainer and supervisor.

Become an example. One needs to “live and breathe” the training and become totally immersed in it. Do the things that you expect the trainees to do and really lead by your example. Meeting with other staff to prepare for the next day and spending time with the rookies who have questions after hours, demonstrates your commitment to success.

One smokejumper, having been a training supervisor for the past three years, said that the job involves an **incredible amount of responsibility**. Rookie training lasts seven weeks at one smokejumper base. In three seasons, the jumper related that 43 rookies completed the training. Having watched the rookies through these seasons, and bearing witness their successes and failures, you recognize that it is a long journey. The jumper also noted how many emotions surface for the trainees during this time and as a training supervisor you have to help rookies resolve these emotions if they are to succeed.

Smokejumping is full of transitions - from a rookie to first year, first year to second year, and so on. A defining moment for one smokejumper came in the **transition to becoming the leader**. The jumper had in the past looked to others for leadership and guidance, and now after a few seasons, others began to look at this person for leadership and decisions. This transition to leadership was very exhilarating, but the jumper also found it to be a bit scary. However, by the fourth or fifth season, the jumper said they were able to comfortably “lead the charge” by getting a full load of smokejumpers and their cargo safely down to the fire.

Lessons Learned – Overcoming a Challenge

Often the lesson learned from overcoming a challenge or obstacle can set the stage for significant career

enhancements. Smokejumpers describe perseverance, correcting mistakes, self-initiative, effective decision-making, and recognizing the abilities of others as challenges that eventually propelled them forward.

Raising the Bar

Smokejumpers generally come from a firefighting crew environment before they join a smokejumping program. A smokejumper trainee comes to an organization that is comprised of extremely talented individuals and early on it is hard for a trainee not to wonder if they really belong in this organization. Once the raised bar is confronted, trainees learn to persevere and constantly challenge themselves. A trainee smokejumper must recognize that they will make mistakes, but they are to **learn from the mistakes** and not continue to dwell on them.

Becoming a Leader

One smokejumper described the hardest part of leadership is having the courage to confront peers when they are making a mistake, taking the responsibility to correct them, and not turn the other way and ignore the situation. Smokejumper supervisors make clear to the rookies from the first day “it is your program”. You can lead from anywhere. **Leadership can be very simple acts** like being on time or five minutes early, having your equipment ready, and not complaining about an assigned project. Other examples could be explaining Lookouts, Communications, Escape Routes, Safety Zones (LCES) to other firefighters. Good leadership starts with being a good follower.

Incentive From Others

One second year smokejumper reflected on how peers were invaluable in helping meet the constant physical challenges of rookie training:

The most difficult challenges for this smokejumper involved getting past the physical demands and maintaining self-confidence during rookie training. Rookie counterparts really gave each other **the incentive to work harder**. If it had not been for the comradery between rookies, this smokejumper felt they would not have made it through the five weeks. The jumper stated it was important to take it one step and one day at a time, so that you do not allow yourself to get overwhelmed by the entire training curriculum. When you are constantly undergoing physically demanding training (exercising, running, lifting weights) it is important not to overtrain. Allow your body time to rest, and remember to take a day off to allow your muscles to rebuild.

Making Good Decisions

Dealing with the different personalities and skill

levels on fires presents a constant challenge. **Do what is right**, instead of trying to please everyone. Mistakes can be made when your focus is distracted by thoughts of what others might think. What others think may not even align with the mission. In smoke-jumping, it is important to hear other opinions, but the supervisor must make the final decision based on the mission.

Recognizing Abilities

One smokejumper spotter recognized a new set of responsibilities as part of their lesson learned:

This smokejumper has been qualified as a spotter for three years. The spotter flies in the jumper aircraft, makes mission decisions, uses streamers to mark the intended jump spot, acts as a pre-jump communication link with both the host agency and the smokejumpers, and then directs the jumpers from the aircraft to the fire. Lastly, the spotter kicks the cargo out of the plane and returns to the smoke-jumper base with the pilot. The spotter, by directing personnel to the jump spot, must take into account the **individual experience level** of the jumpers in the aircraft and their overall skills and abilities. This spotter has come to realize that individual capabilities are very important. Ultimately the spotter’s job is to give the jumper the best chance to arrive safely on the ground, and then transit to the fire location. Smokejumpers steer their parachutes where a spotter directs them, so the spotter’s job is taken very seriously. While smokejumpers have the final say, maintaining their confidence is a key component of the spotter’s position. All jumpers must also have confidence in their spotter or the jump success can be compromised.

Training Curriculum Recommendations

The Smokejumper community has embraced the leadership training curriculum and incorporates it into the way they conduct training and learn as an organization. This section examines how they apply leadership training and styles of leadership.

Applicability of Leadership Training

Overall, the National Wildfire Coordinating Group (NWCG) training curriculum includes a lot of good information. However, smokejumpers have identified a problem that lies in the delivery of this material. In many circumstances, curriculum delivery is of poor quality, relying solely on classroom lectures and slide presentations. Smokejumpers have found the recent emphasis on the **dynamic leadership training curriculum, particularly the field practicals and sand table exercises**, as a very positive change.

From the perspective of an experienced smokejumper, the Fireline Leadership course challenges you to think about leadership in new ways. Individuals who have

already had extensive leadership opportunities and real life experiences present the training. The methodology promotes that **effective leadership is a bottomless toolbox** of ideas and methods. Any given situation may be properly handled in a variety of ways. Effective leaders are those open to new challenges and to approaching old challenges in new ways. No leader has the ultimate answer to every situation, but can always learn from peers and subordinates. Smokejumpers have identified a broad range of useful approaches and techniques to improve situations, understand other's personalities and implement self-improvement that are all addressed in the latest version of the Fireline Leadership course (L-380).

Smokejumpers use a style similar to the Fireline Leadership course in delivery of their own Smokejumper training. The fifth week illustrates this with "in the woods" training, when the rookies parachute jump into a simulated small fire and spend a week in an active training scenario environment. The rookies climb trees, fight the simulated fire, and all rookies have the chance to be a leader. At the end of the week, they pack out all their gear. This fifth week is a very profound one for most trainees. This kind of practical, hands-on training **encourages bonding and skills development** and it also encourages a **respect and appreciation for the forest** that cannot be achieved in a static classroom setting.

AARs Improve Training Curriculum

Both trainers and trainees conduct an After Action Review (AAR) at the end of each day of smokejumper rookie training. After reviewing what was planned, what actually happened, and why it happened, the training team determines what they are going to sustain and what facets will need to be improved. After instituting the AAR process, the leadership at the Boise Smokejumper Base recognized and made 89 changes to their training guide that first year, 39 in the second year, and 29 changes during the third training season in which they incorporated the AAR process.

Every day, during the rookie training, a new rookie leader performs as a crew boss. The crew boss leads an AAR at the end of each day. Following the AAR, the trainees elect

the next day's crew boss. Trainers stay in the background, providing guidance and pointers only as necessary. By the second or third time the trainees conduct the AAR, they show noticeable improvement in their facilitation skills and ability to lead. It is important to **give everyone a chance to lead**, whether talking on a radio, or making a simple decision like where and when to deliver lunches for the crew. The wildland fire community is in the business of developing people as much, or more so, than it is in the business of developing their firefighting skills.

Leadership Styles and Philosophies

Leadership philosophies used at some of the smokejumper bases were illustrated by a smokejumper crew supervisor:

This crew supervisor incorporates two philosophies of leadership into the smokejumper training and the way the smokejumpers conduct everyday business. The first one is **small group leadership**, as practiced by the Navy Seals and Special Forces. The second was used and put into practice by Jack Welch, former CEO of General Electric. Welch's method said that to be an effective leader you must hire the best, train 365 days per year, recruit every day, and then stay out of their way. Endeavors generally succeed or fail because of the people involved, not the mission itself.

Summary

In these lessons learned interviews, smokejumpers highlighted several established principles that everyone involved in wildland fire can use:

- 1) Maintain professional relationships
- 2) Trust the trainer as you learn
- 3) Continually challenge yourself
- 4) Accept new opportunities to build your confidence level
- 5) Practice leading from anywhere
- 6) Truly lead by example
- 7) Recognize individual abilities
- 8) Peers provide excellent incentive and motivation
- 9) Remember the mission when making a decision ★



For more information go to: <http://www.fs.fed.us/fire/people/smokejumpers/>