

ASSESSING HIGH RELIABILITY PRACTICES IN THE WILDLAND FIRE COMMUNITY



Anne Black, Kathleen Sutcliffe, Michelle Barton, Deirdre Dether

The Office of Inspector General's 2006 audit of Forest Service fire management operations added yet another voice to the growing chorus calling on the Federal wildland fire community to get more fire on the ground (OIG 2006).

The 1995 National Fire Plan and the 2001 Implementation Plan identify the critical role of wildland fire use in reducing hazardous fuels conditions, reducing risk to property and natural resources, and reducing costs. Yet, meeting these goals poses significant organizational challenges, particularly when it comes to fire management's capacity to safely manage fire on the landscape.

The search for improving effectiveness of wildland fire management is not new. In 1914, California Regional Forester Coert duBois launched the Forest Service's first systematic approach to fire management with then state-of-the-art management science. The Incident Command System was developed

Anne Black is an interdisciplinary ecologist for the Aldo Leopold Wilderness Research Institute, Forest Service, Rocky Mountain Research Station in Missoula, MT; Michelle Barton is a PhD student at the University of Michigan, Ross School of Business, Ann Arbor, MI; Kathleen Sutcliffe is an associate dean for Faculty Development and Research and a professor of Business Administration and Management and Organizations, University of Michigan, Ross School of Business, Ann Arbor, MI; and Deirdre Dether is a fuels planner, Boise National Forest, Boise, ID.

to meet organizational challenges posed by complex fire situations.

Fire managers since have sought continual improvement of fire knowledge, tools, and equipment. The Incident Command System, for example, was developed to meet organizational challenges posed by complex fire situations. Attention has also focused on human factors—the way units are structured and how people interact—as well (e.g., Putnam 1996, IAWF 2005).

Many key concepts under-girding organizational effectiveness are captured in the theory of high reliability (Weick and Roberts 1993, Weick and Sutcliffe 2001, DeGrosky and other articles in this issue). Simplistically, a High Reliability

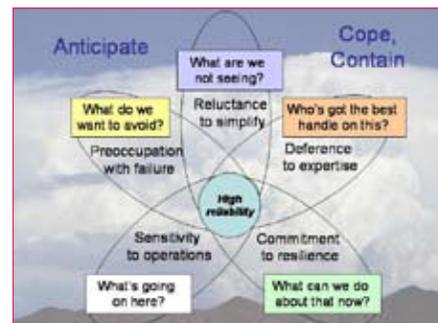


Figure 1. The Principles of High Reliability Organizing.

Organization (HRO) is one that consistently produces the results in a dynamic, often unpredictable environment in which the consequences of errors are catastrophic. Accordingly, the error rate of an HRO is substantially lower than other businesses in the same field. Traditionally, there have been two main approaches to reliability. One

The most successful organizations spend more time than their counterparts considering the following factors:

- **Preoccupation with failure**—detecting weak signals and examining failures or unexpected events in order to understand the health of their system.
- **Reluctance to simplify**—resisting the urge to simplify assumptions about the world.
- **Sensitivity to operations**—having the “big picture” or the “bubble” of what’s going on.
- **Commitment to resilience**—developing the ability to bounce back and improvise after weak signals are caught.
- **Deference to expertise**—locating local expertise and creating a set of flexible decision structures and operating dynamics that take advantage of those experts (fig 1).

Consolidating and improving reliability requires understanding where we are today—our strengths and our weaknesses.

seeks to anticipate events that must not happen, identify all possible precursor events or conditions, and then create a set of procedures necessary to guard against the undesired outcome. Anticipation focuses on picking up weak signals before they can incubate into larger, more catastrophic events.

The second approach to high reliability considers anticipation. In this view, reliability is finding ways to cope with and contain undesired events as they occur—and before their effects escalate.

Over the past decade, researchers have realized that the most successful organizations use *both* strategies.

Many units of wildland fire management seem to fit the definition of high reliability. Recent doctrine discussions, safety dialogues, peer reviews of incidents, the creation of the Wildland Fire Lessons Learned Center, and the sponsorship of the Managing the Unexpected Workshop series (Keller 2004) are clearly in support of the Forest Service's efforts to improve safety and effectiveness.

Ideally, these activities result not only in greater capacity to safely meet suppression needs but also meets the growing demand to manage *desirable* fires—prescribed and Wildland Fire Use fires.

Can We Build Upon This Base?

Consolidating and improving reliability requires understanding where we are today—our strengths and weaknesses. The University of Michigan's Ross School of Business, the Interagency Aldo Leopold Wilderness Research Institute, and the interagency Wildland Fire Lessons Learned Center have collaborated in a three-phase study to assess reliability in the fire community. We hope to discover how the wildland fire community thinks and talks about managing in an unpredictable environment, assess the breadth and depth of HRO awareness and behaviors, and better understand how new ideas diffuse through the wildland fire community. This effort will assist in creating an internal benchmark, identify examples of exemplary behavior, and feed important information into our training programs.

Building the HRO Image

The first phase, conducted in the late fall of 2006, sought to build an image of what High Reliability Organizing practices look like in the fire community (this article presents some of these findings). The second phase (Fall 2007) asked how common were these behaviors across fire organizations? The final phase seeks to identify key mechanisms of diffusion and adoption of High Reliability Organizing ideas.

To build our baseline understanding, we interviewed 19 qualified individuals from three broad levels of the fire organization (crewmembers, middle managers, and decisionmakers) within the Forest Service, Bureau of Land Management, and National Park Service.

We asked each to describe an event that went well and another that didn't go well—letting each

individual determine what “well” meant. While this information was primarily used to refine our quantitative survey, comparing these descriptions with the five principles of HRO also allows us to build an initial understanding of how members of the fire community think about reliability.

We found examples reflecting each of the principles, but not every aspect of each principle. Table 1 provides illustrative quotes of how the fire community embodies aspects of high reliability. In the second phase, we hope this snapshot will resolve into a clearer picture.

Some High Reliability Organizing behaviors are so mundane that people might overlook their value. Managing emergencies or accidents as “incidents within incidents” seems an intuitive way to organize and exemplifies a commitment to resiliency. Doing so ensures that the majority of the organization's energy remains focused on its primary objective (such as supporting a wildland fire incident), while making sure that the emergency is adequately addressed as well.

On the other hand, simply acknowledging the build-up of unexpected events—late supplies, late people, higher than expected winds, etc.—is insufficient to ensure reliability, and it is how individuals and the organization choose to use this information that influences the outcome.

We heard several examples of the situation:

“It's already 10 o'clock in the morning, there are no supplies out there, and all the people haven't arrived.” In some of these cases, recognition

Table 1—Comparison of fire intervals for each forest community based on dominant understory.

HRO Principles and primary aspects ¹	Example quotes
<p>Preoccupation with Failure</p> <ul style="list-style-type: none"> • Articulating mistakes that we don't want to make • Treating lapses as signals • Encouraging error reporting • Learning from near misses and errors • Being wary of complacency 	<p><i>"Hey, you know, you really want to be careful in here 'cause the winds are really funneling through. This is a point of concern. You don't want people in there at this point...and during this time of day."</i></p>
<p>Reluctance to Simplify</p> <ul style="list-style-type: none"> • Acquiring diverse perspectives • Taking deliberate steps to question assumptions • Being skeptical of received wisdom • Reconciling differences while maintaining nuances 	<p><i>"I wanted to get input from the other people too, to see if there were any different views ... because you have a wealth of experience there, so I like to use it all."</i></p>
<p>Sensitivity to Operations</p> <ul style="list-style-type: none"> • Puzzling through publicly • Paying attention to the front-line • Having situational awareness • Noticing accumulating deviations, update • Being sensitive to relationships 	<p><i>"It's already 10 o'clock in the morning, no supplies out there, all the people weren't even out there, winds were slated to come up in the afternoon."</i></p> <p><i>Continual status checking throughout the day.</i></p> <p><i>"Where you at? How's it going?</i></p> <p><i>I guess...more than anything getting the feedback back from the crews. Is this going to happen? Is this is not going to happen? What kind of problems are you encountering?"</i></p>
<p>Commitment to Resilience</p> <ul style="list-style-type: none"> • Knowing errors don't disable • Detecting, containing, and bouncing back from the inevitable • Improvising with fantasy/simulations • Gaining a deep knowledge of system 	<p><i>"We wanted to witness how our resources worked together...so we... had ...a run ... to see how everybody worked. That was really critical...to put everybody in play in a reasonably complex burn but not one that had values at risk such that if the burn were to get out of control, there would be critical losses."</i></p>
<p>Deference to Expertise</p> <ul style="list-style-type: none"> • Having flexible decision authorities 	<p><i>"You rely on those folks with that local knowledge wherever you go."</i></p>

¹The first column is adapted from Weick and Sutcliffe. 2007. *Managing the Unexpected: resilient performance in an age of uncertainty*. 2nd Ed. John Wiley and Sons, Inc.

triggered contingency plans and the task either moved ahead successfully or was postponed. In others, recognition seemed to increase the desire to proceed with the task—in the case reported, resulting in less than desirable outcomes.

Valuing Good Communications

The organizational science literature contains numerous references to the value of leadership, trust, honesty, and respect among members; and speaking up, and communication in achieving high performance and reliability (e.g., Argyris 1990; Detert and Edmondson 2006; Vogus 2005; Weick and Sutcliffe 2001).

Those interviewed also established communication as an invariable component to success and failure—what went well, and what didn't go well—prompting inclusion of these issues in our quantitative survey phase.

Communications was one of the most often cited indicators that a situation is not going well, “[If] there's no communication; people are all over the place. You just don't know what's going on.” “Communication...needs to be a two-way system...if it isn't, then things go to heck in a hand-basket and you got bigger problems.”

Many people remarked on the distinctions between their experiences with various types of fire assignments (such as prescribed, suppression, and Wildland Fire Use). The following quote, referring to when a prescribed fire transitions to a suppression fire, describes this distinction well:

“It was a weird transition of having to go from maybe marginal success

to complete total utter failure [as a prescribed burn], to suddenly it's like “oh, it's no big deal anymore [once the conversion occurred].”

We also heard multiple accounts of how an organization lost the benefit of observation because a person did not feel able or comfortable speaking up:

“It was a classic case of falling into a bad decision trap because nobody was willing to speak up...I didn't feel comfortable about it, but...I had the least experience of any of the permanent staff in those fuels, in that area, in that topography. So I was like it doesn't look great, but what do I know? I'm really pretty ignorant here.”

The interviewees often described a balance between confidence and humility—having the confidence to make a move in a risky environment, yet maintaining a humility that allows them to listen to quiet voices of dissent or dissonance.

Those interviewed provide the foundational information for further quantifying and validating high reliability behaviors in the wildland fire community. They underscore the value of communication and leadership skills in helping an organization take full advantage of the information and observation of its diverse membership.

Special Acknowledgement

This study was supported with funding from the National Fire Plan, University of Michigan, and Wildland Fire Lessons Learned Center, and has benefited from discussions with Jim Saveland, Dave Thomas, Karl Weick, and the HRO Community of Practice.

Some High Reliability Organizing behaviors are so mundane that people might overlook their value.

References

- Argyris, C. 1990. Overcoming organizational defenses: facilitating organizational learning. Prentice Hall. 169 p.
- Detert, J.; Edmondson, A. 2006. Everyday failures in organizational learning: Explaining the high threshold for speaking up at work. University Park, PA: Penn State University. 1-60.
- International Association of Wildland Fire. 2005. 8th Wildland fire safety summit. 26-28 April. Missoula, MT: Proceedings on-line at: <<http://www.iawfonline.org/summit/2005.php>>. <<http://www.iawfonline.org/summit/2005.php>>.
- Keller, P. (tech ed). 2004. Managing the unexpected in prescribed fire and fire use operations: a workshop on the high reliability organization. 10-13 May, Santa Fe, NM. Fort Collins, CO: RMRS-GTR-137.
- National Wildfire Coordinating Group. 1995. 1995 Federal wildland fire management policy and program review. Boise, ID: National Interagency Fire Center.
- National Wildfire Coordinating Group. 2001. Review and update of the 1995 Federal wildland fire management policy. Boise, ID: National Interagency Fire Center. Available online: <http://www.nifc.gov/fire_policy/history/index.htm>. <http://www.nifc.gov/fire_policy/history/index.htm>.
- Putnam, T. 1996. Findings from the wildland firefighters human factors workshop. 12-16 June, 1995. Missoula, MT: 9551-2855-MTDC, updated July 1996.
- USDA, Office of Inspector General. 2006. Audit Report: Forest Service, Large Fire Suppression Costs. Report No 08601-44-SF. Washington, DC.
- Weick, K. E.; Sutcliffe, K.M. 2001. Managing the unexpected: Assuring high performance in an age of complexity. San Francisco, CA: Jossey-Bass Publishing.
- Weick, K.E.; Roberts, K.H. 1993. Collective mind in organizations: heedful interrelating on flight decks. Administrative Science Quarterly: 38:357-381. ■