

What does a well-founded risk decision look like?

By Mark Smith, Mission-Centered Solutions

This paper is the result of an ongoing dialog around risk I've had within the post-Yarnell Honor the Fallen group. One member posed the rhetorical but critical question: "Should we be risking lives for suppression efforts or not?" That prompted my response in The Big Lie essay on the levels of risk I think wildland firefighters operate in routinely, and how we could be more intelligently accepting that risk.

The difficult truth is that wildland firefighting is a high risk-endeavor. Consider the policy that all firefighters on the line carry fire shelters. It is an overt acknowledgment that each time firefighters directly participate in a wildland fire suppression or management activity, their lives are at risk. Moreover, the wildland fire environment is exponentially increasing in complexity, magnifying the risks. What is not keeping pace, however, is our sophistication to plan, operate and support within that complex risk-filled environment. Our tools fall farther behind each fire season.

In an attempt to address this challenge, leaders often make declarations like *"No structure is worth a life!"* While true, the statement lacks any meaningful guidance. In contrast, it is the job of any risk professional to determine exactly what risk level the structure *is* worth. And while that assertion may appear straightforward, applying the concept continues to confound senior wildland fire managers.

Where does a well-founded risk decision start? First, it must always start with clearly identified and prioritized values at risk (VaR). It is the *"outcome"* in *"does the outcome justify the risk?"* It is the *"gain"* in *"risk vs gain."* It is the *"purpose"* in the *"task, purpose, end state"* of leader's intent.

If the prioritized values at risk are not clearly considered, articulated and displayed for all to see, all subsequent risk decisions will be deeply flawed. They must be specifically discussed in the agency administrator (AA) briefing, and reconsidered during every subsequent objectives, strategy, and tactics meetings.

Second, we must conduct a meaningful assessment of the risks firefighters might encounter. The current risk analysis (ICS Form 215a) on the NWCG website reflects a 1970's approach to risk. One lists the risks and then mitigations for those risks. It does not quantify the risk in any way, nor is there any discussion of the risk level after mitigation and whether that residual risk is acceptable.

Given what we know about the flaws of that form, it's continued use will come to be seen as negligence and opens the agencies and their practitioners to increased liability as time goes on..

In order to see the truth of the risk levels wildland firefighters operate within and evolution required to make the best risk decisions, first consider the two axis, probability/severity model. Most incident management teams (IMTs) now use a modified risk analysis (215a) incorporating this model.

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		Severity			
		Negligible	Marginal	Critical	Catastrophic
Likelihood/Probability	Frequent	Yellow	Yellow	Red	Red (HIGH)
	Probable	Green	Yellow	Red	Red
	Occasional	Green	Yellow (MEDIUM)	Yellow	Red
	Remote	Green	Yellow	Yellow	Red
	Improbable	Green (LOW)	Green	Yellow	Yellow

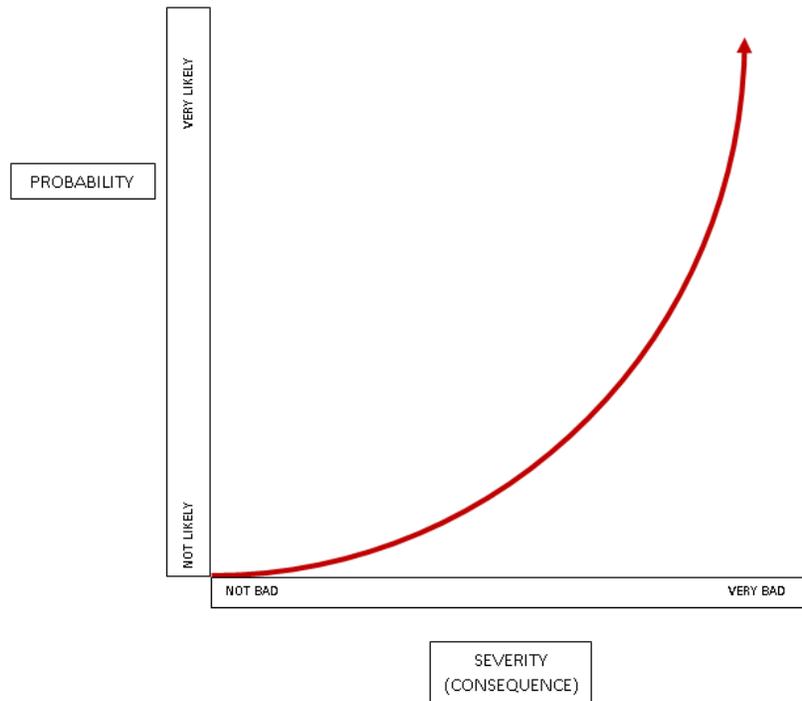
The attraction to this model is the simplicity of its Green/Amber/Red “*traffic light*” appeal. Unfortunately, it is not nuanced enough for the wildland fire environment. When you really do a solid risk assessment, so much falls in places like the “low end of high” or “medium-high”. It also lacks the sophistication of accounting for exposure, such as the number of operational periods, number of fuel cycles, number of people, and so forth.

It also fails to factor in the compounding cumulative effects such as multiple hazards added upon each other. For example, Division A is in high risk because of snags and falling objects, but also because of road conditions and aviation operations. That’s not just high risk, it’s now HighRisk³.

In the exposure curve on the next page, the mathematical reality of just how harshly the odds change as you move up that probability axis is alarming. When you compound risks or factor in exposure, such as being fatigued AND being in steep rocky terrain AND being on Day 12 of an assignment, the percentages increase exponentially.

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A key step forward would be adopting a more sophisticated probability/severity matrix that takes these additional factors into account and more accurately depicts the risk spectrum in the wildland fire environment.

Probability	Severity				
	Insignificant	Minor	Moderate	Significant	Catastrophic
Certain	MEDIUM	HIGH	EXTREME	EXTREME	EXTREME
Likely	MEDIUM	HIGH	HIGH	EXTREME	EXTREME
Possible	LOW	MEDIUM	HIGH	EXTREME	EXTREME
Unlikely	LOW	LOW	MEDIUM	HIGH	EXTREME
Remote	LOW	LOW	MEDIUM	HIGH	HIGH

On the severity axis - You can do a few things on the mitigation side that might influence severity. A jumper's Kevlar suit, for example, will help when smacking into a tree, but there is good chance the jumper will still break some bones. Similarly, a fire shelter might move the consequences from being a fatality to just being a burn victim, but nonetheless, a significant risk remains.

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Given the inherent *dangers* in the wildland fire environment, severity is always going to be high if things go bad. Given the likely *consequences*, most of the operations on the fireline are going to be Medium or High risk. It is extremely rare to find a fire where all operations are in the Low risk category.

So most of the decisions concerning risk have to focus on the probability axis. For good risk decisions, a model like this should be part of the AA Briefing and on the wall next to the 215A for discussion. *“Should we knowingly risk lives?”* – would more appropriately be re-phrased to *“Should we put people where the likelihood of something bad happening is elevated?”* You can see on the matrix how quickly risk escalates when you move from *Remote* to *Unlikely* to *Possible*.

One of the inherent challenges in risk management is, as humans, we can't *feel* when the odds go from 1 in 1,000,000 to 1 in 1,000. But the universe tracks all that perfectly in real time. This is the discussion that should be happening in front of the 215A. Not just listing the threats and mitigations of rocks, snakes and lightning, but having the dialog and knowing that the real risk is somewhere halfway between the most probable fire and the worst-case fire. Judging how likely it is for an operation to encounter that next elevated risk level and considering the conditions that might precipitate it become essential.

When things move from *Unlikely* to *Possible* that's a big jump, and leaders must reconsider that risk/gain calculus. Unless there's a cabin in the woods full of babies, puppies and kittens, then the answer is clearly: *No, we should not be putting firefighters in a place where the likelihood is moving into the upper end of Possible and the resulting risk Extreme.*

Within the wildland fire environment, risk levels are routinely going to be medium or high risk. There probably isn't anything humans can do to avoid that. We should have very high expectations of our AA and IMT decision makers in terms of critical thinking and their sophistication in making acceptable risk decisions, which means we need tools worthy of the actual risks that firefighters are taking in the current suppression paradigm. Under that current model, we are risking lives and consequently, we have a duty to make sure it's being done intelligently.

In military special operations, a risk must be determined as necessary during the planning process in order to accomplish an objective. *“If we do this, here's the necessary risk we're going to have to take.”* At that point, the question gets asked *“Does the outcome justify that risk?”* if so – that becomes the acceptable risk. If not, then you try and mitigate risk down to the acceptable level. If you can't get it there, it's not acceptable and military operators look for another way to accomplish that objective with lower risk. In some cases, the objective must be abandoned all together because the risk is too high relative to the outcome.

The difference in special operations is that the small unit (i.e. crew) is heavily involved in the mission planning and the risk decisions. That's not true in wildland fire – an echo of why we still have Great Depression/chain-gang era terms like *Crew Bosses* in wildland fire job descriptions. In wildland fire, risk planning, mitigation and decision-making often occur absent those who will directly encounter the risk. This places a significant responsibility on the AA and IMT staff to discuss strategic and operational risks at the Common Operating Picture (COP) meeting each day, in reviewing the planned end state, and creating (or validating) objectives based on VaR. These strategic and operational risks must be further validated and refined at the strategy and tactics meetings, where the staff flesh out the necessary risks.

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Once articulated on the 215A, it is incumbent among every member of the staff to ask the question “*Are the residual risks we’re left with - post-mitigation - justifiable?*”

“*No tree is worth a life*” only tells you what a tree is not worth. But what is it worth? What is the acceptable risk around protecting a tree? A structure? A subdivision? Clearly, the leadership’s responsibility is to make and communicate that decision, but absent a meaningful way to make the acceptable decision, operators are often left to interpret this ambiguous intent on their own.

The shortcoming isn’t a result of the absence of concern, desire or intent, but rather the lack of the necessary tools for wildland firefighters to make any kind of objective decisions about acceptable risk. And that’s because there is nothing that maps the priority of values at risk to the acceptable risks to protect them. We want that to be very clear. Very simple.

Below is an example of what that mapping might look like. As with many examples, things are missing and you may not agree with how the VaR have been prioritized, but that’s intentional. A finished, interagency version should be clear enough so that there is no misunderstanding or disagreement. It is part of the pre-determined playbook. Pending a “Red Book” version, this is an AA and an IMT responsibility to develop and communicate to all:

EXAMPLE of Acceptable Risk Guidelines	
Risk Level	Type of Value at Risk (VaR)
Extreme Risk	Viable and save-able human life in imminent danger
High Risk	Human life in potential danger; endangered species; critical infrastructure affecting human health; regional scale centers of employment; cultural or historic values of national significance
Medium Risk	Domesticated animals; critical watersheds; schools and worship centers; primary transmission power lines; at risk species; values supporting human livelihood; neighborhoods; cultural or historic values of regional or lesser significance
Low Risk	Recreation values; road networks; power distribution lines; undesignated public land

This matrix provides clear acceptable risk guidelines for a category of VaR. Incident commanders would be able to make exceptions using the same authority they have now to adjust work/rest and other guidelines, but this removes the “*What is a tree worth?*” ambiguity.

The challenge remains, however, that without some metrics to assign to an identified risk, the assessment is still subjective. “*Hmmm... It will take 2.5 hours to get someone from Division C to the hospital if they get hurt. How do you think that effects the risk level?*”

Some IMTs are starting to assign some numerical values to each of the hazards and risks identified. Example: “*Under 1 hour medevac to a hospital is low risk, 1-1.5 hours + is medium, 1.5 + is high.*”

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As a decision maker during my previous career in the military, I was introduced to a standard risk analysis/risk decision process in the mid 80's. This example card below was used just for training events, which is why you do not see categories for *Enemy Strength*, *Enemy Cohesion*, etc. Imagine that being added to the card as projected *incident* behavior.

This card is a distillation of the probability/severity matrix, listing the routine variables encountered in training soldiers. This is a "Big Army" tool, so there's no *underwater/night diving* type categories, just a plain vanilla tool to help quantify the discussion and get leaders a common operating picture around risk. In Special Forces, we had more sophisticated versions, taking into account such arcane factors as infrared crossover times, moon phase and illumination, solar flare activity, etc. Think 1000-hour fuel moistures and Haines Index.

Once you include the variables of fire weather and fire behavior, and adapt to other common wildland variables you could now have a probability/severity matrix in the AA briefings or tactics meetings and come up with some actual number values to plug into a modified 215A.

RISK ASSESSMENT WORKSHEET OPERATION _____

SIDE A Planning

Circle One **RISK VALUE** Score _____

Guidance	PREPARATORY TIME		
	Optimum	Adequate	Minimal
FRAGO	3	4	5
OPORD	2	3	4
OPLAN/LOI	1	2	3

Mission Control

Circle One **RISK VALUE** Score _____

Task Organization	TRAINING EVENT		
	Support Nontactical/Garrison	Day Tactical	Night Tactical
OPCON	3	4	5
Attached	2	3	4
Organic	1	2	3

Soldier Endurance

Circle One **RISK VALUE** Score _____

Environmental Preparation	SOLDIER PREPARATION		
	Optimum	Adequate	Minimal
Nonacclimated	3	4	5
Partially Acclimated	2	3	4
Acclimated	1	2	3

Soldier Selection

Circle One **RISK VALUE** Score _____

Task	SOLDIER EXPERIENCE		
	Highly Qualified	MOS Qualified	Untrained
Complex	3	4	5
Routine	2	3	4
Simple	1	2	3

SIDE A SUBTOTAL _____

Front

SIDE B Weather

Circle One **RISK VALUE** Score _____

Temperature °F	VISIBILITY/MOISTURE		
	Clear/Dry	Fog/Humid/Drizzle	Rain/Snow/Ice/Dust
<31° or >80°	3	4	5
32° -59°	2	3	5
60° -79°	1	2	5

Terrain

Circle One **RISK VALUE** Score _____

Type Terrain	TRAFFICABILITY		
	Improved	Secondary	Trail/Cross Country
Mountain	3	4	5
Desert/Jungle Hills	2	3	4
Flat/Rolling	1	2	3

Sustainability

Circle One **RISK VALUE** Score _____

Percentage Personnel Fill	TYPE SYSTEM		
	Wheel	Track	Crew Served
0 - 65%	4	5	5
66 - 79%	2	4	4
80 - 100%	1	2	2

Subtotal Side B _____ Subtotal Side A _____ Total _____

0 TO 12 LOW RISK	13 TO 23 CAUTION	*24 TO 35 HIGH RISK
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*High risk operations assigned a value of 24-35 require coordination, before executing the mission, with the next higher level of command external to the organization making the assessment. When two or more areas are assigned a risk factor of 5, the overall rating is HIGH RISK.

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This would provide a more quantifiable approach. Inevitably, there will always be situations that despite well-planned mitigations, we'll still have a residual risk score of high risk. Let's say a 25 using the above laminated card. This is when we must circle back to the beginning--the values at risk, the "*purpose*" in leader's intent. By looking at the acceptable risk table example, you'd see that High risk is just not an acceptable risk to save three chicken coops and a hillside of PJ.

Now what? If we cannot lower the risk through alternate tactics, then we'll need to back up to the previous C&GS meeting - Strategy. We'll have to find an alternate strategy to lower that risk and still accomplish the objective. If we can't create an alternate strategy to lower the residual risk to acceptable, then we need to back up even more and relook the objective the strategy was meant to accomplish. This process would force decision makers to become way more strategic on suppression actions – continue the evolution in engagement thinking that moves towards the *best* ridge versus the *next* ridge.

The problem with this kind of thoroughness is that it requires time. If an artificial deadline such as IAP production due to copier availability or other factor is driving the quality of our risk analysis, then the tail is wagging the dog.

The question remains, what if we have to accept high risk? Let's use our earlier example – "*OK, we've planned all these mitigations and we still have a residual risk score of 25, high risk*" – but this time, let's use a different value at risk and the same acceptable risk guidelines. "*The VaR is one of the primary transmission lines of electricity to Phoenix and it's 114 degrees. High risk is acceptable because if that power shuts off some at-risk people are going to die.*" That's probably a very appropriate risk level.

Finally, in order to have a well-founded risk decision, it is essential to share the risk. Shared risk has been a recent buzzword in wildland fire, but it's important to truly understand what it means. Shared risk means national leaders create the acceptable risk guidelines based on values at risk, such as the example table. This means they've shared the accountability and the risk of putting firefighters to protect the powerline in the example above. It means AA's and IC's make the prioritization of the values at risk part of the delegation and dialogue. This increases the quality of fire management interactions with line officers in pre-planning and once fires start.

The net result of this is that everyone involved—national leaders, agency administrators, incident commanders—share in the accountability. It means IMT's conduct risk assessments with proper tools for the gravity of the job, use more objective criteria, and create leader's intent with task, *purpose* and end state. By tying *purpose* back to a specific VaR, and making the decision on whether the risk is acceptable, now they share in the accountability.

But shared risk means it is also shared down to the operator level. This is way more than having a simple turndown protocol. In the current system, the turndown consideration is completely subjective. "*I just don't feel comfortable.*" When operators receive a Division Assignment Sheet (ICS 204), they have no way of knowing what risk level they've been asked to accept, so they have no start point to go through the risk management process at their tactical level. A quality 204 would include this: *Special Instructions: Risk Level - HIGH – due to increased density of snags in Division A.*

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If we routinely included the task, purpose, end state on a 204, then each DIVS and crew leader would also understand the VaR they're being asked to protect. If we included *Low, Medium, High*, etc. on the 204 then they would know the risk level the IMT decided was acceptable for that VaR. If the acceptable risk guideline table was in the IAP, then they would have all the required ingredients for their own "*Does the outcome justify the risk?*" assessment at their level and - most importantly - to judge acceptable risks as conditions change throughout the shift. Even in a string of mop up shifts, low risk yesterday could be high risk today because of a wind event overnight. Now crew leaders and sub leaders too, are accountable for risk decisions. That's what shared risk truly looks like.

Current tools and practices are lagging farther and farther behind the increasing complexity of the wildland fire environment. The growing gap means that more and more, we are relying on luck for success. The worldwide gaming industry's \$90 billion dollars of annual revenue is made possible by one universal truth: "*Luck Runs Out.*"

The evolution and use of a few simple tools could have a significant impact on the worthy goal of "*significantly increasing the odds of everyone going home*" at the end of the next fire season. Let's move wildland fire's risk management process from the 70's and 90's to the 21st Century.