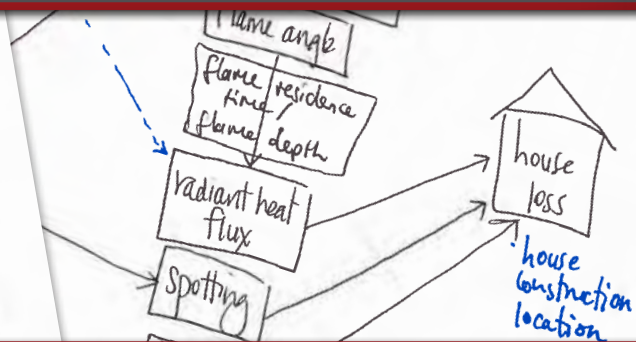


WILDFIRE

"Uniting the Global Wildland Fire Community"

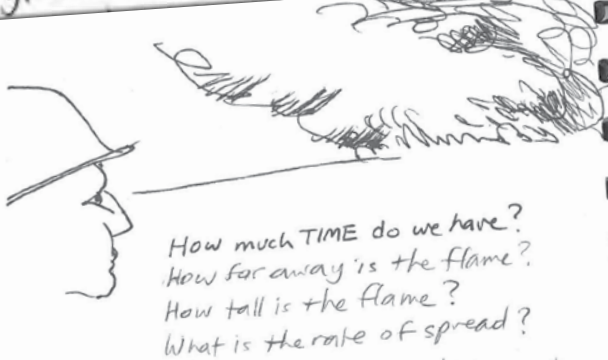
AUGUST 2014

We have to... to estimate that, using... and assumptions. How many of us DO THE MATHS? This should then be plotted on a map. How many of us plot fire spread on a map? We take precautions by placing a LOOKOUT, to provide warning. But, How far can the lookout see thru forest to a crown fire? 100 m? Typical AUSSIE BUSHFIRE spreads 1000m in 60 min.



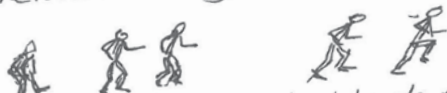
Students of Fire

Learning and sharing our fire lessons – globally

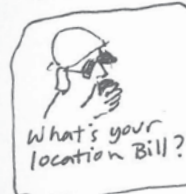


Humans tend to overestimate distance to flame, according to research.
In the absence of information, humans tend to be optimistic:— we think we have more time than we do, and we think it will all go to plan.
One idea might be to always have a plan for the WORST CASE.

What is the velocity over ground of a crew on foot? Unless this is known, the level of safety can't be determined.


crew speed is determined by slowest member

Communication of information is crucial. How good is our comms?



Do we check for understanding, every time?
— Even when we think we understand?
And would it be 'ok' if we did? That is, would everyone be happy to have their messages double checked all the time?
After all, there's plenty of room for **ERROR**.



How can we improve this?
How do other fields of endeavour manage essential comms?



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Mazda and eucalypt, char and green up. Adelaide, Australia. Photo submitted to the Wildfire Magazine Flickr photo site by Lana Adams, who is documenting the effects of fire on her landscape. See more at www.lanadams.net/the-fire-2013.



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On the Cover: Excerpts from "Students of Fire" journals. See page 30 for more about the the authors/illustrators who are launching this IAWF initiative, with input from Australia, Canada, and the United States.

Learning from Yarnell Hill

New approaches to fireline mapping and communications

Independent of the Safety Matters report, a search and rescue expert offers lessons that may be missing from the after action reports. Here's his suggestions on how to improve our communications and mapping on MAYDAY events.

By AL Studt

As we continue to reflect on after the one year anniversary when 19 wildland firefighters from the **Granite Mountain Hotshots** lost their lives while moving across unburned terrain, I read the after action reports and watching the summary videos at the Yarnell Hill (2013) website at www.wildfirelessons.net. [Editor's Note: See the online article for links.]

To better understand what follows, you should review [the last radio report](#) from the Granite Mountain crew.

After reviewing the reports and videos, it is important to note that you will **not** see any references to the following:

- (a) **That no MAYDAY was called**—MAYDAY is the standard term that all structural firefighters know and train with. It is not used in the wildland firefighting realm.
- (b) **That no position report was issued by the team in trouble.** There is an acronym for radio report content during a MAYDAY situation; it is LUNAR. Location, Unit, Name, Assignment, Resources. No one on the fireground knew exactly where the Granite Mountain Hotshots were. It took two hours to find them.
- (c) **That personally owned smart phones could act as GPS devices or weather tools** at no cost to the employers.
- (d) **That web tools could perhaps have been used to make maps** in minutes by other than GIS personnel.
- (e) **That US military operations in war require that air assets use the coordinate system of the ground operator.**
- (f) **That the coordinate system used by the military since 1949; Military Grid Reference System, (MGRS) also effectively known as US National Grid, though available, is not used by wildland firefighters.**

Additionally, readers will have seen that all maps shown are devoid of any geospatial reference systems. Quite simply, a map without a grid is just a picture. With no means to quickly identify location, there is much inefficiency in reporting

locations over the radio, as one example. Since 2011, the standard coordinate system for use during search and rescue on land is US National Grid.

The Granite Mountain team left the ridge in route to the safety zone ranch. They did not make it. When they determined that they were in serious trouble they advised on the radio that they were “deploying shelters” and not much more. By not issuing a position report, the tanker that was in the air at the time could never assist them or find them soon after they were burned over. In contrast, what if the team, and the command structure, knew their position to 100 meter precision all day long? That coordinate data could be as few as just six (6) digits.

A screenshot from a map flyover with US National Grid lines (see screenshot and online article) shows that the position of the shelter deployment site was within a 100 meter x 100 meter grid with label **362 880**. That is the minimum effective information that that could have been transmitted to identify the location to local command personnel and to the orbiting air tanker. Worldwide, that coordinate is just a few more characters: **12S UC 362 880**. If crews carried handheld GPS or smartphones with GPS, or had a map in-hand with grid lines, and were familiar with using truncated US National Grid, the radio transmission could have contained much more vital information with very little additional or even less word count.

Consider this possible radio transmission: “MAYDAY, MAYDAY, MAYDAY, Division Alpha with Granite Mountain, position three six two eight eight zero, three six two eight eight zero, deploying shelters, send air tanker to this location.”

This is just 29 words while the last actual transmission of Division Alpha was 44 words.

To be clear here, there is no blame placed on the 19 killed: they most likely were untrained regarding points (a) through (f) – or, if trained in some elements, they (and the firefighting command structures) were not able to respond rapidly to determine and share their position.

This is an example of options that exist today that also existed on June 30, 2013. And these options could be used by any future team or command organization. These are also management and leadership issues. Forestry departments (federal, state, local) and wildfire incident management teams have likely never addressed all of these items together, despite the existence of tools and functionality for years. They may remain in their comfort zone of “doing it as they have always done it” or just may be unaware of some newer capabilities that now exist. However, in 2014, after 19 deaths, should not there be some hard re-evaluation? Will the next crew in a bad spot have readily available interoperable tools with them, or will they be in the same deficit as the Granite Mountain crew? [See the online article for graphics that visually explain the coordinate system components.]

The following are recommendations related to points (a) through (f) described above.

MAYDAY: In the United States, structural firefighters have for years used this term to designate serious trouble and personal danger. Departments all over the nation have trained on how to react to MAYDAYs. Protocols exist in many departments on how to manage the actions necessary to provide emergency assistance to the troubled individual or team. The term “MAYDAY” has much history by ships or planes and is not a term used for anything else. The word “deploy” or “deploying” is far too common a term, in general, and could refer to other routine operations. Only when used in combination with “shelter” does it typically mean that wildland firefighters are in trouble. This is vague and confusing.

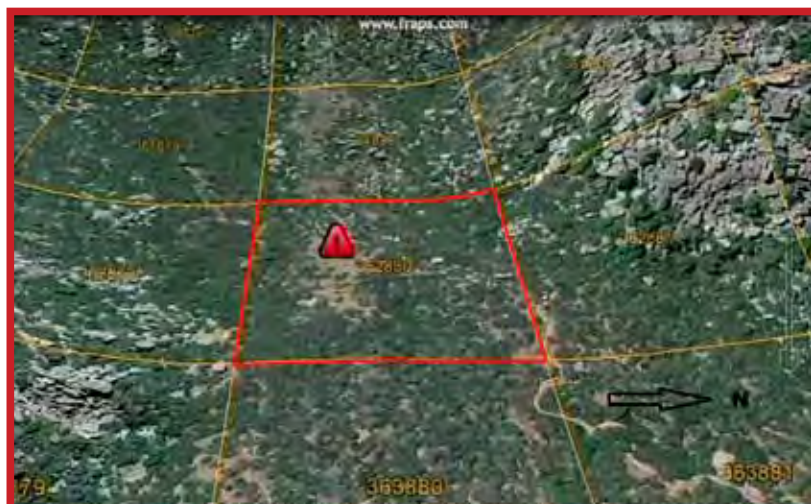
When structural firefighters operate at the wildland-urban interface they may use the term MAYDAY, and would certainly know what it meant when heard on radio nets. The strong recommendation here is that forestry / wildland fire management needs to adopt the standard term MAYDAY and train with it. Crews shall be taught about the human nature to not call it early enough. In the last radio transmission article, much prior to the “deploying shelter” words, firefighters at the site of the audio recording commented about “hearing saws running” in the radio communications as not being good. The MAYDAY call should have occurred immediately upon realizing that shelter deployment was to occur.

Position reporting: When a firefighter or crew issues a MAYDAY they absolutely must include a position report and the reason of the trouble. The standard for this report is described by LUNAR; Location, Unit ID, Name, Assignment, Resources needed. LUNAR has already been suggested to the forest fire fighting community. See the comments of this [Wildfire Today post](#). In the wildland firefighting scenario, the most detailed information would be a set of coordinates, but also could include reference to peaks, ridges, hollows, terrain etc. To be clear, the time for a team to

figure out their position for the first time is not when there is extreme danger. The culture would have to change to include coordinate and map use in routine communications.

When teams call in to report status updates, they could easily include their 100 meter grid square, at minimum. In many cases, as few as just six(6) extra words that have huge value. Command staff should plot that with a time. The use of the national standard grid system US National Grid just makes sense especially with the benefits of truncation already described. No degrees, minutes, seconds, minus or plus signs, east or west, north or south; just a simple character string that in many cases can be as few as 4 or 6 digits. US National Grid is also the land search & rescue coordinate system. Interoperability with all other agencies should be a strong consideration. When faced with extreme danger and MAYDAY situation, issuing a succinct position report and other LUNAR details must be second nature.

Smart phones: One of the investigation reports made reference to the fact that cell phones may be prohibited in the field, but that there is discussion regarding use as personal weather stations. Outside Magazine, November 2013 edition, clearly refers to the crew's cell phones as being in the vehicles (though crew members had their personal cells). Cell phones in 2014 are safety tools. They can determine the users position (no cell phone signal needed) via GPS and can assist with weather reports. Leaving them in the truck or worse being told to leave them in the truck is preposterous. How many readers use their cell phone to look at weather radar data when ominous black clouds are approaching or thunder is heard? It is routine. Should every crew member on a team have their phone on? No. In fact having them off in the wilderness is likely best. But this tool can be powered up to verify position on the map. It can also hold picture files (.PNG or .JPG) files of maps that were made prior to departure from base or that arrived since, if there is sufficient connectivity. Again the phone is another tool



The deployment zone located in the National Grid.

for the tool box. The military trains recruits over and over that knowing their position could save their life. A smart phone may assist with that, if the need arises.

Web tools: One of the investigation's findings was that the GIS team was not available to make maps. Why wait for anyone? Any user with an internet connected computer can create a hasty map in very few minutes from various sites and either print it and put it in a ziploc bag, then in their pack, or send it to their smart phone as a picture or PDF file, or email it across county. The map creator could be in an office miles or states away; all they need is the proper general area to make the map. Personnel operating on the fireground or responding to the fire scene area absolutely need an interoperable method to discuss location. One exists. [See below and a related online article for a hasty map example. Also, note that the recently released Enterprise Geospatial Platform at egp.nwcg.gov, includes a National Grid overlay – with a login and initial web access, a printable PDF of a fire locale can be created and shared in minutes, with the National Grid overlay.]

Military Grid Reference System / US National Grid: It is the language of location, designed for ground operations. With origins to a civilian committee in 1999 called the X-Y Project, US National Grid was issued in 2001. It has since been designated as the land search & rescue coordinate system by the National Search & Rescue Committee. Multiple states have adopted it. The reason the forest service (federal, state, local) needs to adopt it is quite basic; it is simple and interoperable with multiple agencies to include the US Military and even NATO. For new users, US National Grid is easy to learn and use. Military veterans, some of whom become firefighters, already know it as “grid,” in use since 1949.



A gridded map, showing the deployment zone in relation to the safety zone

It should be noted that US military directives regarding coordinates clearly state that ground units will be serviced by MGRS per Chairman of Joint Chiefs Instruction CJCSI 3900.01C, dated 30 June 2007. This is important as it mandates that air units supporting ground operations use the coordinate system of the ground operator. This has been very successful during Iraq and Afghanistan campaigns. When there is trouble, the ground personnel have no time to convert coordinates. Conversion of coordinates also induces error. If the Forest Service or the National Wildland Coordinating Group would adopt US National Grid for firefighting operations, which have similarities to combat operations, following the intent of this directive would likewise result in Wildland firefighting air assets using US National Grid too. Such interoperability will allow future orbiting air tankers to know the location of the next ground crew that is in trouble, with the least (and most effective) amount of radio traffic possible.

Lessons

Just to state it clearly, US National Grid alone, would not have saved the Granite Mountain Hotshots. The conditions that day were extraordinary and the crew did leave the black preventing constant direct visualization of the fire. However, all concepts, if implemented a few years prior to 6/30/13, may have had significant effects. The most basic land navigation tools are a map and compass; everyone knows this. To send personnel into a wide-area event to conduct operations of any kind without a map is just asking for problems. In 2014, that map could be on a smart phone as a fast alternative to traditional paper. Maps with grids allow users to quickly identify locations. Issuing a map for wilderness field use without an interoperable, easy-to-use, standard grid, specifically the US National Grid, is also asking for problems.

If radio communications included 100 meter (6 digit) locations routinely, if air assets used the same coordinate system as the ground, if all personnel had a map to look at during lunch or at base, if personnel had USNG/MGRS smart phone apps on their phones and used them routinely, then perhaps the communications on 6/30/13 would have been clearer, at least regarding where to look for the team in trouble, and might have allowed the air tanker to drop on their position.

MAYDAY, LUNAR, US National Grid, smart phones, hasty maps, air and ground asset on the same coordinate system – these are tools that are in use elsewhere; the wildland fire services need to examine these tools in detail, see the benefits, and move to implement them.

About the author

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Al Studt, CFPS, is a Lieutenant with Canaveral Fire Rescue, in Brevard County, Florida and a Communications and Structures Specialist with Task Force 4, one of Florida's USAR teams, based in Orlando.