

# WILDLAND FIRE RADIO COMMUNICATION – COMMON MYTHS AND BEST PRACTICES



## Research Brief 5 | September 2018

Since effective risk management relies on effective communication, paying attention to how we talk can help us become more effective risk managers.

Radios are the primary organizationally-sanctioned communication tool for remote, non-co-located incident personnel. Use of the radio – as opposed to cell phones – is encouraged because it enables widespread sharing of site-specific information. Such sharing is required for successful sensemaking because it helps incident personnel develop a broad, comprehensive picture of what is happening - and may be emerging - on the incident. Collective sensemaking is critical for safe and effective wildland fire management.

This Research Brief summarizes findings of a Joint Fire Science Program project focused on understanding radio communications as part of risk communication and sensemaking in wildland fire operations (Black et al 2016, Fox et al 2017). Through observation of live and simulated radio conversations, analysis of training materials, and interviews with incident personnel, it became apparent that the current perception of radio communications – from training model to training curricula – vastly oversimplifies the complexity of communicating in actual work conditions. This brief first describes these simplifications, then presents a series of concrete, immediately useful ideas and practices drawn from the data that could be used to update current training and practice.

## Methods

The research team used data methods typically employed for the study of organizational cultures. These included:

- interviews with 27 wildland fire personnel of varying levels of experience (novice, mid-career, highly experienced), operational realm (air, ground, dispatch), and operational role (dispatchers, Assistant/Zone Fire Management Officers, fixed wing pilots, trainers, on-the-ground radio operators, communications specialists, engine crew members, dozer operators);
- participant observation of required beginning wildland fire 'guard school' courses (S-130, S-190, and L-180), an advanced incident management training course simulation (S-580), and an active Type 3 wildland fire incident; and

## Key Research Findings

- **There is a significant mismatch between how radio communication is characterized in training – simple and straight-forward – and in the actual work environment, which can be complex and anxiety-producing.**
- **This creates a training and practice gap in which supervisors and radio users must improvise locally and in isolation and hope that their practices are sufficient.**
- **Adopting a more robust training model and providing practice time (during trainings and off-line and during low-consequence activities) is essential for building critical experience, comfort, and confidence.**

- analysis of organizational texts and training manuals.

Interviews were guided by a series of open-ended questions, including: “How are risk perceptions communicated over the radio?”; “What does competent language sound like?”; “What are the most common misinterpretations that happen over the radio?”; and “Describe your training in radio communication”.

## Results and Discussion

The study revealed a mismatch between guidance and training, and what it takes to practice effective radio communication in the actual work environment.

While guidance and training materials convey radio communication as a simple transfer of information, wildland fire personnel describe an extremely complex communication environment. When asked to recall their classroom training in radio communication, interviewees reported that training does not include enough experiential learning in the classroom or opportunities to practice, particularly outside of a fire or crisis. Additionally, there is insufficient acknowledgment by fire overhead and trainers of the anxiety rookies and other wildland fire personnel feel when communicating on the public stage that is the radio. Consequently, practitioners develop their own best practices. These are developed and implemented locally, by isolated individuals; yet many of these practices seem worthy of wider adoption or integration into training.

## Common Myths and Simplifications

Interviewees described a series of common ‘simplifications’ or myths about radio use in their complex work environment. As in most simplifications, they reflect some aspect of reality, yet skim over potentially valuable nuance. Embedded in these simplifications are hints of how training could more effectively reflect actual conditions and challenges. This brief describes each simplification and relates specific suggestions offered by interviewees.

**Communication is straight-forward and simple.** There was little evidence to suggest that current training captures the complexities of communicating in the actual communication environment.

Current training in radio communication appears guided by the assumption that communication is easy and that information sent is information received. This is reflected in the communication model used to teach radio use and communication: the Sender-Receiver model (Figure 1a):

The Sender-Receiver communication model (Shannon and Weaver 1949), also known as the information transfer model, equates communication with transmission. That is, it assumes that the meaning of the message lies entirely with the sender, and the receiver will understand this with 100% fidelity 100% of the time. There are a number of reasons why this isn’t the case.

Although the Sender-Receiver model may help communicators understand the *mechanics* of communication, it does not help understand how *meanings* are created (*i.e.*, sensemaking - Weick 1993; Weick and Sutcliffe 2007), such as what the receiver understands of the sender’s message, and whether and how this differs from what the sender intended. Verbally communicating *meaning* is, of course, essential. This is particularly the case in communication environments where participants are not in visual contact with each other, when communicating among

speakers who have different goals or operating environments, and when various degrees of power and authority occur (such as between fire-line, aviation, dispatch and line-officer/decision-making personnel; Figure 1b). The Sender-Receiver model does not account for the influence past interactions (both on- and off-duty, both positive and negative) have on emotions, attitude, and expectations, or how these might result in the receiver framing an entirely different meaning than intended by the sender (Gabor 2015). Nor does it acknowledge that the most valuable meaning may be a synergy of two or more perspectives: *i.e.*, that the safest, most effective next operational step might well emerge from synthesis of the unique and partial information that each speaker holds.

Consider the ‘size-up’ of an incident in which the initial attack Incident Commander communicates her/his understanding of field conditions, access routes, hazards, necessary additional resources, and probability of success of initial attack efforts. That report is influenced by the experience, emotions, and linguistic skill of the speaker and past interactions with the receiving individual(s). Effective *transmission* includes consideration of the word choice, tone and cadence used by the speaker in addition to the physical location of the radio, the quality of connection, and successful operation of the physical radio. *Meaning*, however, is co-constructed: it emerges from the combination of physical, mental, and emotional condition, experience and

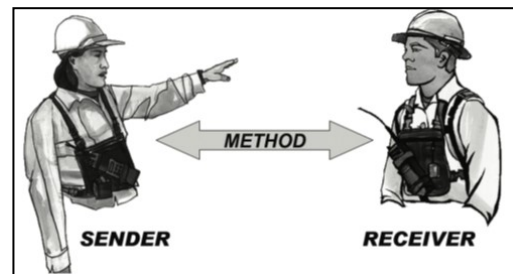


Figure 1a. Radio communication as taught (Shannon and Weaver 1948).

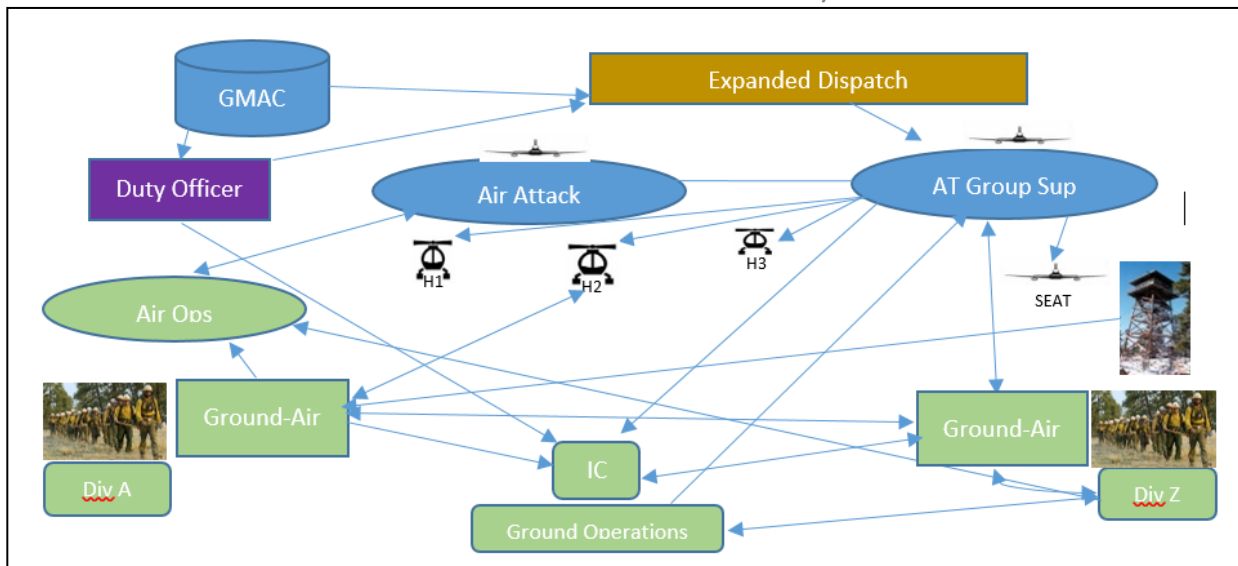


Figure 1b. Radio communication as experienced (Fox et al. 2017).

communication skills of the speaker, and their prior interactions with the receiving role and individual. It also emerges from the physical, mental, and emotional condition, experience and linguistic skill of the listener and their prior interactions with the speaker and others in that role (Campos 2007).



Two firefighters track and maintain radios on a fire incident (photo courtesy NPS).

**There is a standard way to communicate across all roles.**

Related to this, interviewees noted that what constitutes ‘good’ communication differs by role. Radio dispatchers, wildland fire personnel on-the-line, aircraft pilots, and incident commanders all function in different physical, psychological, and relational environments that require different communication styles. Lack of familiarity with the work environment and constraints of other positions leads to diminished ability to ‘speak in order to be understood’.

**Effective messages are brief and declarative.** There are significant reasons *not* to engage in sensemaking or reflective thinking over the radio. Radio frequency bandwidth is limited; and there are times when multiple people need to use the radio at the same time. However, sensemaking requires open inquiry, acknowledgement of partial knowledge, and sharing of tentative interpretations, all of which take time (Vidal and Roberts 2014). Discouraging lengthy deliberations over the radio seems necessary. Radio frequencies are also monitored by incident operations and local emergency management services, and sometimes by random, private citizens. Some conversations justifiably should not be shared that widely. For these reasons, there is a widespread perception – supported by training and culture - that all “good” messages are brief, direct, and declarative.

However, declarative, conclusive statements are difficult to challenge, particularly when speaking to other levels of a hierarchy and without raising defensiveness. A value placed on short, concise, concrete, declarations tends to lead to the interpretation of sensemaking inquiry and proposal of tentative conclusions as due to a speaker’s lack of confidence and/or competence, which leads to dismissal of the speaker and the value of the perspective shared. Ironically, following the current definition of ‘good’ communication stymies the very types of conversations that enable sensemaking, which

is open, tentative, and inquiring.

The conundrum for the wildland fire community is when, where, and how does a non-co-located group successfully conduct the sometimes lengthy, sometimes contentious discussions that characterize healthy and successful sensemaking? And what information, decisions, or rationale should be subsequently shared on the radio, and under what circumstances?

**Good communication is emotion-free.** Another widely held and trained idea is that “good” radio communication is free of emotion: that is, communicate ‘calmly and clearly’ without letting emotions cloud the message. However, under-representation or inability to communicate an appropriate sense of urgency can lead to tragedy (Gabbert 2011).

Experienced radio users readily recognize that significant – and sometimes vital – information is transmitted through *how* words are said not just *which* words are said. People who know each other are able to glean essential information from tone of voice, cadence, and other emotional cues; in fact, sometimes this carries the most valuable messages.

Interviewees reflected that, although wildland fire personnel are trained to *speak without* emotion, they *listen for* emotion. One Assistant Fire Management Officer shared: “We rely upon tone and inflection to give us ‘the rest of the story’.” Currently, there are no training exercises designed to help build expertise in this area, for speaker or listener.

**A word is a word: it means the same thing to everyone.**

Wildland fire operations used to use the 10-codes: standard numeric codes to refer to common phrases, such as ‘10-4’ to mean ‘ok’, ‘understood’, or ‘copy’. Discontinuation of these, in favor of ‘common’ language, may have inadvertently led to a false sense that day-to-day language *is common* - or used the same way to mean the same thing everywhere. It is fairly typical for a group of people (in an organization, role or geographic area) to assign a single meaning to a word that actually can have multiple meanings, or appropriate a word for a specific purpose – for instance, use of the word ‘deploy’ has specific and very different meanings within different wildland fire organizations. In one, it conveys an emergency signal whereas in another, a quite routine action. Local jargon often works well, until outsiders are integrated into the operation.

Every conversation is also about more than just the topic at hand. Social, cultural, and political status and position are constantly negotiated and/or adjusted as groups talk – not only by the active participants, but as the participants are evaluated and judged by the passive listening audience. The language used (particularly jargon) and the tone used can convey identity issues (Who am I? Do I want to or need to be in this situation/interaction?) and relational goals (What do we represent to each other in this interaction?). In any given exchange, one or more of these might be of priority, in

contention, or misunderstood. In non-emergency situations, arguably these social outcomes may be as important, if not more important, than the topic at hand.

**Using a radio is easy and straightforward.** It is often assumed that the proper use of channels, frequencies, and repeaters are understood and experienced similarly by all involved. However, programming a radio or changing a channel/frequency can be both physically difficult and anxiety-producing, especially for new wildland fire personnel. Gloves can get in the way. An insufficient knowledge of “which channel does what” can lead to confusion. Each time a channel is changed, the audience changes in size and type and, with that, the stakes of the interaction change, too. The appropriate use of different radio channels (e.g., Command, Crew, Dispatch, Air-to-Ground) for the different functions of fire management are often not clearly discussed in the basic training courses. Deliberately providing practice time—during trainings, off-line, and during low consequence activities—is essential for building critical experience, comfort and confidence.

## Conclusion

Wildland fire personnel work in an extremely complex communication environment. Current radio training does not reflect this complexity. Moreover, the processes of communication articulated by interviewees are more complex than the current training model is able to accommodate. Using a model of communication that captures the complexities of human interactions and co-creation of meaning would more effectively guide new radio users.

Adopting a communication model that reflects the realities of wildland fire management would encourage attention to influences on communication – both visible and invisible, positive and negative; provide a more complete frame for building effective trainings and practice routines; and expose more of the influences and skills that create or inhibit effective communication. This would be expected to lead to a safer, more effective work environment.

In addition to highlighting the need for an updated conceptual framework (model) of communication, experienced practitioners and newcomers alike offered a variety of options for improving training (see Appendix 1 for ideas and descriptions). These include:

- Incorporating experiential learning opportunities in the classroom such as providing an opportunity for each student to practice with an actual radio in class;
- Assessing students’ confidence in their radio skills at the beginning *and* end of the course to identify priorities for their continued practice;
- Using existing radio dispatch recordings as a teaching tool or visiting an active dispatch office.



Radio silence (photo courtesy of CBC.ca)

## Additional Reading & Information

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The Northern Rockies Fire Science Network (NRFSN) serves as a go-to resource for managers and scientists involved in fire and fuels management in the Northern Rockies. The NRFSN facilitates knowledge exchange by bringing people together to strengthen collaborations, synthesize science, and enhance science application around critical management issues.



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**Appendix 1. Tactical Ideas for Improving Radio Communication Training:** Recommendations for redesigning radio communication training for beginner firefighters fell into three sets of skills: speaking, listening, and trouble shooting.

Developing Radio Speaking Skills	Developing Radio Listening Skills	Developing Technical Skills
<p>Use <i>experiential</i> activities, such as exercises that require students to:</p> <ul style="list-style-type: none"> <li>• identify themselves,</li> <li>• provide a size-up (including ordering resources),</li> <li>• listen to and provide feedback, and</li> <li>• sign off properly</li> <li>• prepare message before keying the radio.</li> </ul> <p>Practice communicating typical types of messages including the taken-for-granted skills of ‘creating a picture’ to communicate common wildland fire operations:</p> <ul style="list-style-type: none"> <li>• describing fire behavior and/or topography and fuels</li> <li>• giving directions</li> <li>• reporting location or position</li> <li>• reporting weather,</li> <li>• providing space and time information.</li> </ul> <p>Start developing a radio ‘vocabulary’ to identify:</p> <ul style="list-style-type: none"> <li>• terminology that might be only local in nature and might not be understood by incoming resources,</li> <li>• regional and cultural differences,</li> <li>• which words are best to use,</li> <li>• and learn how certain words can be misused (e.g. “tanker”; “deploy”; “spot”).</li> </ul> <p>Practice communicating under pressure (with background noise, increasing fire complexity, managing uncertainty, etc.) while maintaining a calm vocal tone.</p> <p>Practice talking on the radio where a serious problem is occurring when emotions might be high.</p> <p>Practice managing rate, pitch and volume by delivering ‘difficult’ messages and receiving feedback during training.</p>	<p>Visit a dispatch office and listen to the radio communication</p> <p>Invite representative from Dispatch, Air Attack, Ground (dozer operators, hot-shots) to describe how radio communication is influenced by their work environment (or have their testimonies recorded).</p> <p>Spend time in another’s work environment to develop understanding for the communication challenges they face.</p> <p>Start to develop a radio ‘ear’:</p> <ul style="list-style-type: none"> <li>• Keep a radio in the room to listen to communication on an active fire.</li> <li>• Listen to the radio while it is in ‘scan’ mode, then figure out what is going on, who is saying what, and which channel to tune to if you need to receive or send a message</li> <li>• During off-season use a dispatch recording to familiarize students with the sound of fire.</li> </ul> <p>Learn to interpret the presence and absence of emotion in radio transmissions.</p> <p>Learn different regional language variations, slangs and accents.</p>	<p>Demonstrate technical features of the radios with actual radios used by the fire organization:</p> <ul style="list-style-type: none"> <li>• tune the radio to the specified channel,</li> <li>• use squelch feature</li> <li>• familiarity with clicking <i>then</i> talking</li> <li>• describe different types of frequencies and their uses (squirrel channels, command channel, air-to-ground, etc.).</li> </ul> <p>Learn how to troubleshoot technical challenges – batteries, cloning radios, programming frequencies.</p> <p>Learn the location of local repeaters; locate them on a map; and discuss how reliable they are; what alternatives are, and the pros and cons of working with other types of repeaters that might be used on a large wildland fire incident.</p> <p>Discuss use of cell phones or other communication modalities, and how they might complement or conflict with the radio to develop and maintain incident effectiveness – cultivating or preventing collective understanding and sense-making.</p> <p>Practice the mechanics of sending messages, such as learning to accommodate physical challenges, like:</p> <ul style="list-style-type: none"> <li>• getting used to using a radio while wearing gloves.</li> <li>• accommodating for noise in your background environment,</li> <li>• finding and maintaining proper distance from microphone.</li> </ul>

Developing Radio Speaking Skills	Developing Radio Listening Skills	Developing Technical Skills
<p>Learn the value of diction exercises, breathing exercises, and tongue twisters to improve radio communication performance.</p> <p>Learn to write down messages while listening to radio communication.</p> <p>Practice communicating with different people up and down the chain of command and know what may be important to them (the “how” for a rookie; the “why” for dispatch or supervisor).</p> <p>Role-play being a human repeater. De-brief with all to gain sensitivity for message shifts, and how to correct. For instance, have lower level employees practice talking to higher level employees. With backs turned, or in different locations, practice a ‘telephone’ – Firefighter to Division Supervisor to Team Operations; compare messages and discuss implications and possible strategies to minimize ‘drift’.</p> <p>Practice previewing messages by saying things like ‘I will be sending you this message in three parts’ and using transition language like ‘I’m moving into the second part of this list’ to provide the opportunity for the listener to keep up with the message being sent.</p>		