International Association of Wildland Fire

Chuck Bushey

***IAWF* President**

On the Fireline - Past, Present and Some Emerging Trends

Wildland Fire Canada 2010

To gain a better understand where we are currently at on the "Fireline" around the world we need to take a few moments to examine from where we came.

The younger firefighter's in the audience frequently are unaware of how far we have come in some of our current fire technology – how the world has changed in a relatively short period of time. The last 100 years especially, really only since your grandfathers. We use to measure progress in thousands of years, times have changed significantly.

It is a natural tendency to accept the present and forget the shoulders we stand upon from the past. It will be you whose job it will be to carry fire management into the future with the new "Fireline" tools being developed as we speak - and ones we can only begin to imagine.

For the older audience – well this might just make you feel older! But it is good to gain some perspective; where we have been and where we might be going.

I plan on hitting only a few highlights – my time is limited and I will key into "communications," a factor mentioned in just about all ground and some aerial wildland fire fatality incident investigations. There is no way today's speakers can touch on all advances in fire management, and one subject frequently leads into a whole new discussion in itself.

As with nature, our fire management community in now thoroughly interconnected via an underlying global trend joining technology and global communications driven by a compelling human factor of international cooperation.

It took us awhile to get here, and we aren't finished yet.

Communications – Do you remember when?

- **Have you ever used a mimeograph machine? These were a common feature of all schools and offices for literally "cranking out" reports.**

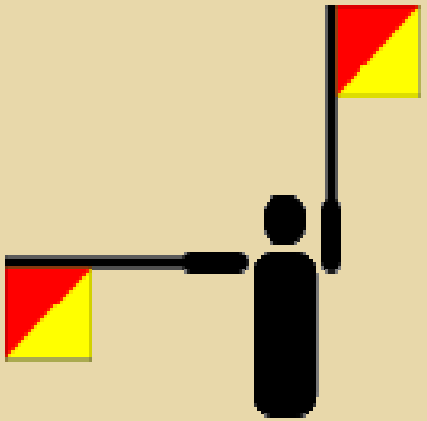
- **Do you remember when they first rolled in a "Xerox" photocopier? Paper became a valuable commodity.**

- **Were you one of the first people to carry a "cell" phone on your hip? This was a fire "status" symbol for a short time!**

OK we have separate the age groups, lets move on!

Communications – Semaphore

- **Semaphore was initiated for maritime communication in the early 1800's.**
- **Semaphore signals were occasionally used as a method of communication in mountainous regions between "flag stations."**
- **This information could then be hand carried, telegraphed or telephoned into local District Offices.**
- **Only usable during the day and good weather.**



Two flag semaphore for the letter "P"

Communications – Electrical Telegraph

- **1836 – invented by Samuel Morse (artist), Joseph Henry (physicist) and Alfred Vail.**
- **1844 – Telegraphy first used making indentations on a moving tape.**
- **1848 – Fredrick Gerke creates "Modern International Morse Code."**

A typical "straight key" transmitter

Communications – Electrical Telegraph

- **Morse Code allowed operators to translate tape indentations into text messages.**
- **They soon learned to translate clicks directly into dots/dashes and write down by hand making the tape unnecessary.**

A typical "straight key" transmitter

Communications – Electrical Telegraph

- **Infrastructure development during the 1850, wide usage by the late 1860's following the US Civil War.**
- **Use limited to where lines had been strung, mostly along RR's tying major communities**
- **Lines easily cut or broken, trees and poles burned.**

A typical "straight key" transmitter

Communications – Telephone

- **1844 – First concept of a speaking telegraph.**
- **1876 – Alexander Bell's patent approved and also the first successful transmission of clear speech occurs.**
- **Early 20th Century –locally powered, single wire with ground return "networks" similar to telegraph.**

Early hand cranked telephone with self powered generator

Communications – Telephone

- **Allowed for use away from RR's and communities, we start to see rudimentary networks for private use over short distances such as between District Offices, and later permanent Fire Lookouts.**
- **If more than two users there could be cross talk and strong hum.**

Candlestick phone in use, circa 1915

Communications – Telephone

- **Private telephones were soon hooked into a local "manual service exchange" (switchboards).**
- **One local line "off the hook" could disrupt an entire system until located one-at-a-time at which time the operator would ask that the phone be hung up!**

Manual Service Exchange, PBX Switchboard, circa 1924

Communications – Telephone

- **By the early 1900's some major "trunks" had developed "dial exchanges." These were connected in a hierarchical manner until towns, major cities and finally across ocean calls were achieved.**
- **This system expanded but essentially remained unchanged until the 1950's.**

A rural telephone digital exchange building in Australia

Communications – Telephone

- **During the 1980's computerized switching stations became available.**
- **The telephone exchange concept has been adapted for use by internet exchanges. Voice over IP (VoIP) may pass through both exchanges.**

A modern computerized digital exchange used by an operator for local and long-distance calls in France.

Communications – Satellite Phones

- **1962 - Telstar was the first artificial two-way communication satellite.**
- **1998 - First low earth orbit network begun by Globalstar LP and later joined by Iridium and Teledesic offering commercial telecommunications.**
- **Good for very remote locations and covers large geographic areas.**
- **Requires a large network of satellites and expensive subscriptions.**

A Qualcomm satellite phone

Communications – Mobil/Cell Phones

- **An electronic device used for full duplex two-way radio telecommunications over a cellular network or base stations known as cell sites through the public telephone network Radiophones used by military in WWII and in civil service in the 1950's.**

An evolution of mobile phones

Communications – Mobil/Cell Phones

- **First "mobile" call made from a car in 1946.**
- **1973– first demonstrated use by Motorola using a handset weighing in at 2 kilos.**
- **1990 – 12.4 million users worldwide had subscriptions.**
- **2009 – 4.6 billion users.**
- **Have a limited range through a single base station attached to a fixed land line.**
- **Support many different tools and service applications which are being adapted to wildland fire use such as email, internet, camera, video, weather, GPS, texting (first in 1992).**

A Toshiba TG01 with touchscreen

Communications – Social Media

- **Uses web based technology to turn communications into interactive dialogues (user-generated context). It is a new blend of social interaction (communicating) with technology.**
- **Some have defined the current time period as the "Attention Age."**
- **Many different forms of "Social Media" communication – internet forums, weblogs, social blogs, microblogging, wikis, podcasts, and social networking to name just a few. Each have their own variations of software.**

Communications – Social Media

- **<u>Concern; Fear of the Unknown</u> – Who is the "Social Authority" providing information? If you are not part of the interactive dialogues you can not battle rumor and define yourself as the "expert" on a particular topic. You will not even know what the rumors are or where they come from. You will be out of the "social loop."**
  - **Public officials are still learning what "social media" is and how to use it.**
  - **Agencies have been slow to adapt, sometimes access is blocked because government networks hide these sites behind firewalls.**
  - **Attitude that dismisses information that doesn't come from government sources. Government generally distrusts outside information, i.e. the public. The sheer volume of similar information from many different sources tends to make it reliable.**

Communications – Social Media

- **<u>Opportunity; Engage the Public</u> – millions are using social media every day.**
  - **We have an unprecedented opportunity to lead some of the conversations concerning land/fire management, and ongoing incidents via Face Book, Twitter and mobile apps expanding ways to communicate in real time with large groups of constituents.**
  - **Can provide real time situational awareness before responders can even get to the incident from onsite witnesses. GPS experts are taking information from social media outlets and providing data input onto maps for responders.**

Communications – Social Media

- **<u>Opportunity; Engage the Public</u> – millions are using social media every day.**
  - **Learn to use "digital volunteers" who aren't waiting for the government to get on board. These web-savvy volunteers leap into action when they see an incident, gathering and sharing information over social media websites.**
    - **The recent wildland fires near Boulder, Colorado on Sept. 6 which destroyed more than 160 homes are a good example. People were looking for information and where they could get help. Individuals – even from Canada - saw this and starting posting the information from online government sources. People posted pictures and videos of the fires to CNN iReport along with stories minutes after the fires started – some of the first images of the fires.**

Communications – Social Media

- **<u>Opportunity; Engage the Public</u> – millions are using social media every day.**
  - **The "Fathers Day" tornado in Billings, Montana is another example. Private citizens used cell phone cameras to video the incident while it was happening. Within 15 minutes some of these videos had been downloaded via social media outlets by the "Weather Channel" and shown nationally. The Yellowstone County EOC used this information to evaluate the accuracy of incoming information and the scope of the disaster for first responders in route.**

Communications – Social Media

- **<u>Opportunity; Engage the Public</u> – millions are using social media every day.**
  - **A world wide network of these volunteers is developing, bringing information to those that need it and in an innovative format they know how to use.**
  - **Others are emerging to harness and organize these volunteers.**

Communications – Social Media

- **<u>Problem; Learning Curve and Time Dedicated</u>**

  – To do this properly someone knowledgeable in using social media needs to provide correct information and harness the information flow. Someone has to be dedicated to posting, monitoring and responding to social media rapidly.

Communications – Fire Weather

- **The need for good weather information on fires was recognized early on as a safety factor for firefighters and for making rudimentary fire prediction forecasts. The early decades of the 1900s saw numerous severe fire seasons in the N. American west.**
- **1914 - First NWS Fire Weather Forecast, Paducah, KY.**
- **1916 - First "mobile" Fire Weather Forecast "center" to support Firefighter's.**
- **1920's - saw the regular issue of Fire Weather Forecasts.**

Earliest known photograph of a US Fire Weather Meteorologist – now called an IMET - and his Fire Weather Mobile Unit, circa 1920. NOAA

Communications – Fire Weather

- **Travel methods improved but the horse trails stayed rough in the backcountry as data near ongoing incidents was collected and passed back to the District Office and Headquarters via hand written messages, phone, or early "wireless" radio.**
- **1930's – First introduction of specially equipped vans.**
- **1935 (?) saw the regular issuance of Canadian Fire Weather Forecasts out of Toronto by Canadian Meteorological Services HQ for Ontario, Quebec, and New Brunswick.**

US Fire Weather Meteorologists preparing a forecast for a wildland fire incident next to their Fire Weather Mobile Unit, circa 1930. NOAA

Communications – Fire Weather

- **1960s - Mobile campers provided forecasters some comfort as well as storage space for equipment and radio communication gear. This allowed them to operate out of organized fire camps, interact with the "Fire Boss" and crews as well as relay forecast information to and from the 16 special NWS FWF offices across the western US.**

- **1965 - Boise Interagency Fire Center est. to better coordinate firefighting efforts in the Great Basin area, and shortly after the NWS joined the USFS and BLM and created a "Staff Meteorologist" position for decision support and to streamline fire weather support nationwide.**

Fire Weather Meteorologist, Chuck Syverson, works on a fire weather forecast in the "Fire Weather Mobile Unit," circa 1962. NOAA

Communications – Fire Weather

- **1980's – Because only a few Fire Weather vans available and increasing demand there was seen a need for better ways for the NWS to support fire incidents. Compact camper units could be towed - or just barely flown by helicopters. These "Air Transportable Meteorological Units" (ATMU's) were filled with needed equipment and supplies that also included one of the first uses of personal portable computers for storing and analyzing weather data in the field.**

First generation "Air Transportable Mobile Unit" (ATMU), circa 1983. NOAA

Communications – Fire Weather

- **1980's – Extensive use of satellite imagery in FW forecasting, lighting detection system built and in place by 1984. Extensive use of RAW's units across the western US.**
- **Early 1990's – Development of 7 compact cases, only 390 lbs, to carry all FW equipment including the first use of 2-way satellite communications and laptop computers. These were cached nationwide allowing Incident Meteorologists (IMETs) to travel nearly anywhere that a vehicle or helicopter could carry them.**

IMET Chuck Redman from NOAA NWS forecast office in Boise, ID, setting up the FireRAWS near a wildland fire.

Communications – Fire Weather

- **2002 – New ATMU's – now called the "Atmospheric Theodolite Meteorological Unit" – now fits in one case and allows IMETs to take upper air observations at an incident.**
- **2007 – Satellite communications were upgraded to use a 2-way system about the size of a laptop with a receiver and transmitter allowing weather data to be downloaded anywhere in the world. The new All Hazard Meteorological Response System (AMRS) now weighs 50 lbs.**

NOAA/NWS forecaster Troy Lindquist of Grand Junction, Colorado, uses a theodolite to align the angle a weather balloon takes after being launched. NOAA

Communications – Fire Weather

- **The Future is Happening Now – Fine grids of data embedded in larger NWS forecast grids will provide greater forecast detail.**

- **Program will continue to evolve as improving technology and communications allows IMETS to deliver information to responders of all types quickly. The role of IMETs responding to all hazards will only increase.**

A weather briefing at Fire Camp. NOAA

Long Term Trend Gaining Momentum

In the 2007 issue of IAWF's "Wildfire" magazine my "Presidents Desk" column addressed major historical developments in US wildland fire policy as defined by Steve Pyne in his book "Tending Fire." Steve described these historical policy trends as "waves" which occurred in 20-30 year cycles.

1910-1940, implemented a program of systematic wildland fire protection.

1940-1970, doctrine of universal, unconditional fire suppression.

1970-2000, policy of restoration largely through the use of prescribed fire.

2000-?, policy appears destined to focus on modifying landscape fuel.

Long Term Trend Gaining Momentum

Of particular interest to me was the fourth "wave" of modifying landscape scale fuels and how this was now being defined in a global context of changing demographics, climate, and large fires.

Periodically I get asked what I think the next big wave in wildland fire will be; what will drive US and global wildland fire policy?

I don't see that big wave on the horizon yet, but I believe that I do see a development that has been building quietly for decades. It doesn't neatly fit the "wave" concept – maybe a rising tide of policy issues, debate, and implementation. It is our discovering the need to communicate and cooperate and has resulted in the growing interconnection between all levels of fire organizations from the very local to across international boundaries.

"Firing from Road" Photo by Terry Tompkins

Long Term Trend Gaining Momentum

Over the last four decades I have observed within our US fire community increased communication and cooperation being driven by both necessity and decree. In more recent decade's similar trends have taken place around the world including the development of international agreements between nations for the emergency exchange of firefighting personnel and resources.

I would like to think this increased fire community communication and cooperation has been a natural evolution, but if so it has been a hard one for people to adapt to between both fire organizations and nations.

Long Term Trend Gaining Momentum

I have seen "interagency cooperation" go from a crazy idea, to differing agencies sharing office space but not necessarily talking to each other, to eventually actual cooperation. Imagine multiple agencies sharing the same Fire Dispatch Centers and geographic areas of responsibility and personnel! At one time this was really a radical idea. Now interagency is slowing becoming international as we share teams to learn each others methods, position liaison personnel, and help with suppression actions.

The slow, building trend is definitely there and I am pleased to see it spreading as trust grows that we are can be on the same team of protecting natural resources and the public. You might even call it contagious as other nations look for partners to cooperate with, learn from, and share with.

Long Term Trend Gaining Momentum

In our most recent issue of Wildfire magazine the featured article concerned the Missoula Fire Sciences Laboratory. That facility is only part of an expanding global fire science research partnership. In many respects we can point to fire science as often leading the way in cooperation and communication in our fire community. Because of the long established concept of the free exchange of scientific thought and ideas fire scientists have always actively worked with international partners. Good fire science leads to good fire management – and good fire management means learning and sharing with partners from around the world. This is a tide that will lead our discussions and policies into the future.

2010 IAWF Scholarship (1 of 2 Recipients)

- *Carissa Brown*, a PhD. student at the Dept. of Biology, University of Saskatchewan, Saskatoon, Canada

  Carissa investigates how the successional trajectory of black spruce stands may change if they are burned too frequently to produce seed and self-replace, as well as how changes to the fire regime affect carbon dynamics. She conducts her research at the northern range of the boreal forest in the Yukon, a region where summer temperatures have increased over the past several decades, and where fires are predicted to occur more frequently with warming.