WRITTEN SUBMITTAL
TO

Congress of the United States

House of Representatives

[PRELIMINARY DRAFT]

CONGRESSIONAL PANEL: INITIAL ATTACK ON THE STATION FIRE

OCTOBER 12, 2010
Pasadena, CA

WILDFIRE RESEARCH NETWORK

ABOUT WILDFIRE RESEARCH NETWORK

Wildfire Research Network is a 501 c (3) non-profit, public safety, research and education organization, created to improve wildfire suppression capability throughout the United States.

The objectives of the organization are:

- Research phenomena and promote improved methods to control wildfires.
- Provide information and recommendations to the public, private enterprise and all levels of government.
- Explore innovative partnerships and financial strategies to accelerate improvements.
- Facilitate establishment of a new top level federal wildfire agency to bring final resolution to the nation's wildfire control issues.

Wildfire Research Network
P.O. Box 342
Pacific Palisades, CA 90272
(310) 455-0798 office
(310) 774-1696 cell

E-mail: wildfireresearch@yahoo.com

Website: http://www.wildfireresearch.org

WILDFIRE RESEARCH NETWORK
SUBMITTAL TO
CONGRESSIONAL PANEL: INITIAL ATTACK ON THE STATION FIRE
PASADENA, CA – OCTOBER 2010

INTRODUCTION

Wildfire Research Network is a citizen based non-profit public safety research organization created to advance improvements to wildfire suppression capability throughout the U.S.

In California alone, nearly 11,000 structures (mostly homes) have been lost due to runaway wildfires in the last 10 years. This is significantly more than the 6,500 lost in the preceding three decades! See **Figure 1**.

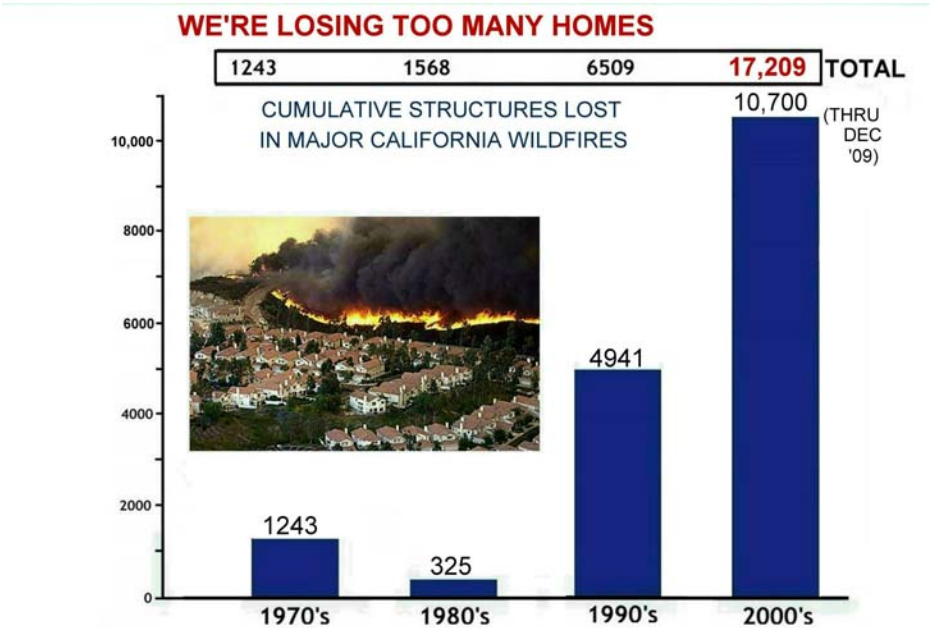


Figure 1. CUMULATIVE STRUCTURES LOST IN MAJOR CALIFORNIA WILDFIRES

This is due to the increasing number of "mega" fires, like the Station Fire that escape Initial Attack. Trends like these bode ill unless changes are implemented.

Figure 2 presents a qualitative summary of what many professional firefighters accept as a reasonable explanation for what is happening: More and more people are moving into the wildland urban interface (WUI) areas and global warming is increasing vegetation temperatures and dryness. Diligent efforts by the fire agencies to put out upwards of 95% of the fires is allowing surviving vegetation to grow older and become capable of even more intense fires with each passing year. The number and intensity of the fires are both increasing. Contemporary equipment has been falling behind in ability to deal with the higher intensity fires. The airtanker fleet, over the past four decades, has been practically limited to aircraft with 3,000 gallon capacity or less. Only recently, private ventures have begun to offer large-capacity airtankers with coverage capability significantly above 3,000 gallons. For example, tanker versions of the C-130J, Martin Mars, DC-10, IL-76 and 747 are being offered.

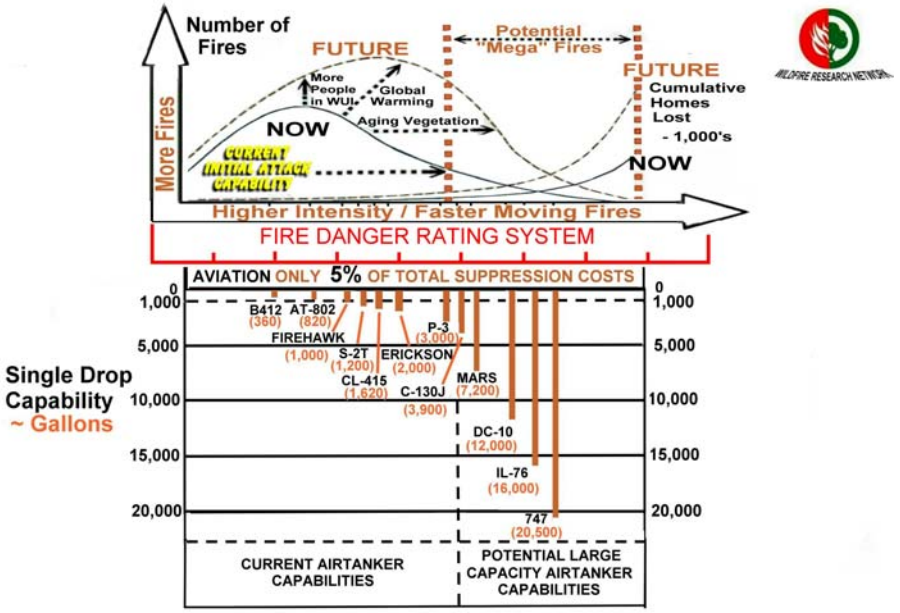
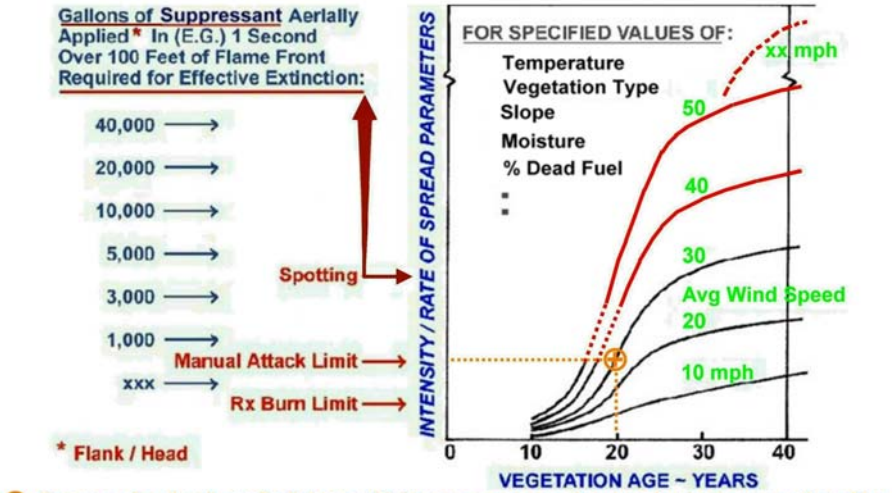


Figure 2. DANGEROUS FUTURE TRENDS

The potential significance of these new, large-capacity airtankers can be seen by considering the information of **Figure 3.** It shows the general relationship of how much water or other suppressant must be delivered on a wildfire of known intensity based on the type and age of the vegetation, temperature, humidity, terrain, and wind speed to cause extinction. Complete data of this type does not exist because significant research in this area stopped more than 30 years ago. But what is easily inferred from observations on the firelines is that it takes more suppressant to put out a hotter fire than a cooler one! Also, if you don't put enough down at one time, the fire just "eats it up" and keeps on going! This means that if our fires are getting hotter, we need to lay down more suppressant… quicker if we want to stop the fires. The current fleets and the manner in which they are employed is not keeping up with the aggressive fires we now face. The future does not look good if we don't implement changes.



⊕ Because of radiant heat, firefighters with hoses cannot stop fires burning in dry vegetation older than 20 years with winds above 30 mph. To save homes, there must be defensible space adequate for radiant heat protection and firefighters to continuously douse flying embers caused by the wind-driven spotting. As wind speed and vegetation age increases the embers are larger, more numerous, and travel farther. To stop these fires, systems capable of effectively applying much larger quantities of suppressant over very short periods of time are required.

Figure 3. NOTIONAL FIRE EXTINCTION CRITERIA

THE CHALLENGES AND SUGGESTIONS FOR SOLUTION

WRN accepts that our wildfire fighting agencies are doing their best to protect us with the resources and systems now available to them. However, there are a select group of stubborn technical challenges that, historically, have been limiting the effectiveness of all our wildfire fighting forces (local, state, and national).

Five fundamental technical challenges have been identified, that must be addressed to gain ability to stop the most intense/fast moving fires quicker. See **Figure 4**.

1. **Potential big fires are not attacked soon enough with effective resources**
2. **Current air tankers do not carry enough suppressant to attack the heads of the big fires**
3. **Airborne firefighting assets do not fight fires at night**
4. **Current firefighting systems have limited effectiveness in high winds**
5. **The fire services do not have an active, viable research & development program to identify appropriate technical resolutions**

Figure 4. WILDFIRE FIGHTING FUNDAMENTAL TECHNICAL CHALLENGES

FIRES ARE NOT ATTACKED SOON ENOUGH WITH EFFECTIVE RESOURCES

Current fire detection, assessment and initial attack responses, for the most part, give the really dangerous fires too much time to get out of control before effective resources are brought to bear. The most serious fires usually have flame fronts that advance faster than one mile per hour. See **Figure 5**. The 1978 Kanan Fire, in Los Angeles County, averaged 4 mph in its romp from the inland 101 freeway to the ocean. The Cedar fire, in 2003 in San Diego County, averaged almost 2 mph but during one of the early hours, it covered 7 miles in 1 hour! The Station Fire, however, was not wind driven and initially moved deceptively slowly causing it to be underestimated.

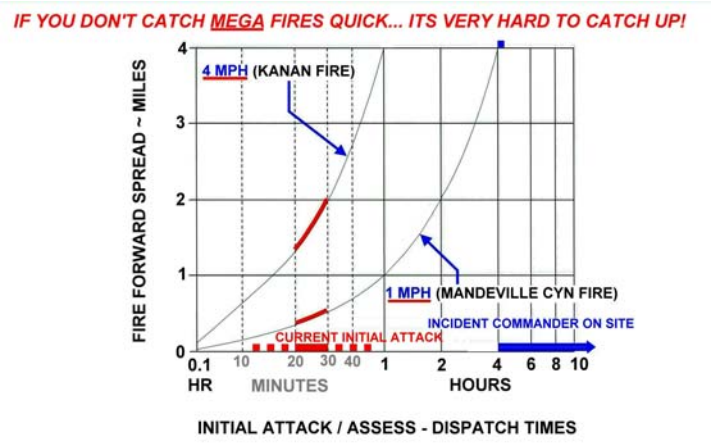


FIGURE 5. TYPICAL SERIOUS WILDFIRE SPREAD RATES

WRN has identified a series of procedures, tactics and equipment changes to provide quicker, more effective Initial Attacks. They are aimed at stopping these fires when they are small – wind-driven or not.

IMMEDIATE SCRAMBLING OF ALL INITIAL ATTACK FORCES

When an ignition is detected in a **Red Flag** area, all ground and air assets with potential arrival times [of (say) one-half to one hour] should be immediately dispatched to the fire with pre-assigned radio frequency assignments allowing first-in elements to communicate coordination factors to and from the first arriving Incident Commander.

On Day One, the Station Fire moved only 1/3 of a mile in about four hours. The 12,000 gallon DC-10 and the 7,200 gallon Martin Mars heavy tanker assets were contractually available and on call during the whole first day of the fire. They could have made drops within one hour or less after being called.

Figure 6 shows an aerial photo of the terrain surrounding the origin. **Figure 7** is a presentation of the same area showing the first day perimeter superimposed on the terrain. **Figure 8** presents WRN estimated progression contours for the first day of this slope-drive fire versus time with a superimposed drop pattern for the DC-10 applying coverage Level 8. Coverage Level 8 is the highest coverage level usually used on heavy brush. The DC-10 could have covered the entire width of the Station Fire footprint at any time during the first day (i.e. within the four hours after the start at 3:24 in the afternoon until dusk).

Figure 6. AERIAL VIEW OF STATION FIRE TERRAIN SURROUNDING THE ORIGIN

Figure 7. ALTERNATIVE VIEW OF FIRST DAY PERIMETER SUPERIMPOSED ON TERRAIN

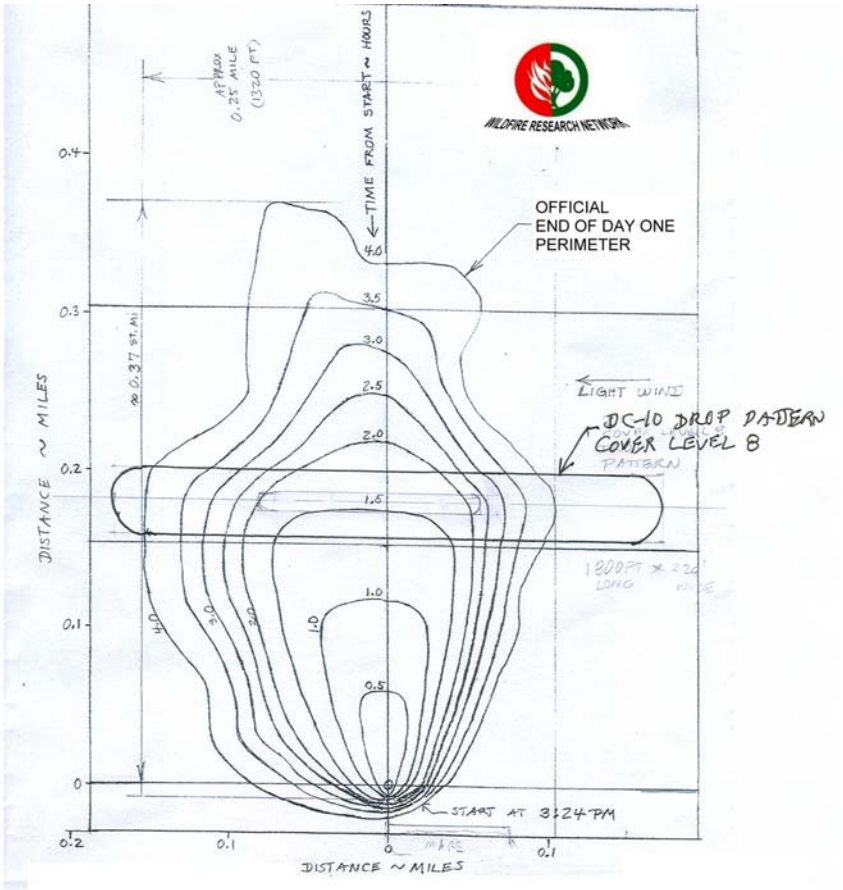


Figure 8. STATION FIRE DAY ONE ESTIMATED PROGRESSION VS TIME

A PRE-DESIGNATED INCIDENT COMMAND SYSTEM

In the Station Fire, as on many past mega fires, a broad/highly experienced TYPE 1 Incident Commander has not been available until days after fire start!

Each season, each high risk geographic area should have Type 1 Incident Commanders pre-assigned so when **Red Flag** conditions approach, the designated IC can be immediately accessible to a first-arriving (de facto) Incident Commander. Special electronic hookups and transportation provisions can allow the IC, within minutes, to advise arriving Initial Attack forces, start accelerated evacuations or call additional forces.

Selected other critical staff functions can also be on call. The special needs for air support are addressed separately below.

INITIAL ATTACK AIR RECONNAISSANCE

To provide the Incident Commanders with real time direct-view, 360-degree fire information in the shortest possible time, … a specialized helicopter or fixed-wing aircraft should be mobile based at the nearest practical base to potential high risk ignition zone(s) evolving as **Red Flag** conditions transit the landscape. **Figure 9** illustrates the size-up task imposed on the first arriving (de facto) Incident Commander.

The aircraft can to reach fire areas in 20 to 45 minutes time frames from fire start alert. Pictorial results of the initial and periodic sweeps around the fire can be sent real time by Internet to pre-designated recipients -- like the IC's and their highest ranking Air Advisors. Example available aircraft that can be configured for this role

include: **(1)** USFS Cobra helicopter , now based in Lancaster CA (170 mph capability) **(2)** Coulson Flying Tankers S-76B Firewatch helicopter (180 mph), see **Figure 10**, or **(3)** a fixed wing Turbo Air Commander aircraft (290 mph), see **Figure 11**.

These aircraft can also perform air traffic control of air assets converging on the fire if an Air Tactical Supervisor is aboard. However, their most important function is to support rapid/proper marshalling of <u>all</u> available initial attack forces to stop a potentially big fire while it is still small.

NOTE: THE LONGER IT TAKES TO GET THE ANSWERS, THE LESS LIKELY THE FIRE WILL BE STOPPED QUICKLY AND LOSSES MINIMIZED.

1. What is going on here.....?
2. What direction is it going.....?
3. How fast is it going.....?
4. How many homes or other critical facilities are in its path.....?
5. Do we need evacuation efforts and other emergency support.....?
6. What kind of resources should be applied to stop it and/or minimize losses.....?
7. Where are these resources.....?
8. How long will it take for them to get into position to be effective.....?
9. Where should I tell them to go .....?
10. Etc, Etc as an ongoing cycle until resolution....

An aerial 360 view is much faster & more effective than a ground point-by-point survey.

Figure 9. WHAT THE INCIDENT COMMANDER NEEDS TO SEE & KNOW FAST

- **MARTIN MARS WATER SCOOPING AIRTANKER**
  - **WITH ATIS (AIR TANKER INFORMATION SYSTEM)**
    - Record / broadcast air tanker location on Google Earth topographical map - - available real-time to fire management officers
    - Shows location & time of all drops
    - Tells how much suppressant dropped
    - Records real-time temperature/humidity
    - Allows <u>real time tracking</u> of air tanker performance in terms <u>of cost per gallon of suppressant being delivered on the fire</u>

WILDFIRE RESEARCH NETWORK

- **<u>SUPPORT RECONNAISANCE AIRCRAFT (SRA)</u> - -**
  (With In-Air Information Flow Capabilities)
  - Onboard Thermal Imaging capability
  - Maps fire and exports information live to Incident Commander, Dispatcher, and Fire Forecaster located in Sacramento
  - Provides information every 30 minutes instead of current practice of one mapping per day (at dusk)

S-76 FIREWATCH HELICOPTER

- SYSTEM PROVIDES REAL-TIME INPUT TO FIRE MANAGEMENT THROUGHOUT DAY AND PROVIDES HARD PERFORMANCE DATA OF AIR ASSETS EQUIPPED WITH ATIS ELECTRONIC RECORDER/TRANSMITTER

Figure 10. SUPPORT RECONNAISSANCE AIRCRAFT FLIGHT DEMONSTRATION PROGRAM

Figure 11. TURBO AIR COMMANDER RECONNAISSANCE AIRCRAFT

INTEGRATED HELICOPTER SUPPORT OF FIXED WIND OPERATIONS

At times, because of local terrain or fuel distribution anomalies, a fixed wind air drop may leave an area of thin or missing coverage. If ground crews cannot be employed to complete the line, (as in the early Station Fire), coordinated helicopter follow ups can treat the under-covered areas to allow building suppressive or defensive lines earlier in the fire cycle.

HIGHER LEVEL AVIATION COUNSEL

WRN believes that because very specialized knowledge is required of numerous helicopter and fixed-wing aerial assets, their speeds, the variety of bases available, and their exact location, crew status, etc. --- a senior "**Air Coordinating Officer**" must also be pre-assigned and available simultaneously with the Type I Incident Commander to advise on availability and capability of air assets to influence success of the Initial Attack.

USE OF NIGHT VISION GOGGLE TECHNOLOGY

Currently the aerial wildfire fighting assets in this county, with few exceptions, don't fight wildfires at night. This is unfortunate because many fires are more manageable at night due to lower temperatures, moderation of wind speeds, and shifting of wind directions that occur as day transitions to night in a local area.

Many wildfires, including the October 2003 Cedar and Paradise fires in Southern California (responsible for 25 deaths and 2420 homes destroyed) started after nightfall (5:37 P.M. and 1:30 A.M. respectively) and were raging out of control for several hours before aerial assets could be deployed to stall the fire's advance toward homes. Ten of the twenty fires in the October 2007 Southern California fire storm were started between dusk and dawn. See **Figure 12**.

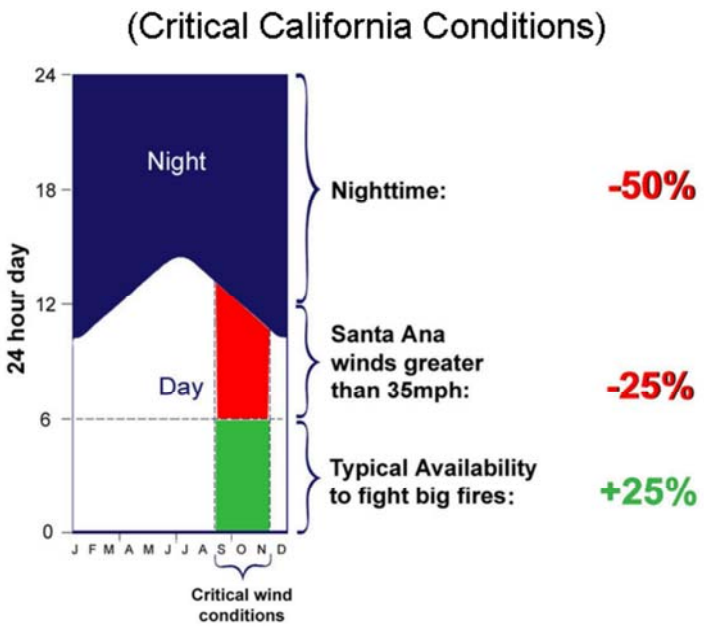


Figure 12. AIRTANKER DAILY AVAILABILITY

With expensive and capable aerial assets grounded and not in use 50% of the time that wildfires are burning, there is an unnecessary loss of critical firefighting capability! Equipping helicopter or fixed wing air tankers with night vision goggles (NVG) capability can now be achieved at a fraction of the cost of buying another tanker of the same type. By adding NVG capability, aerial firefighting fleets can increase their availability by almost 100% for an increased investment of less than 2% of the initial purchase price -- including cost of equipment, cockpit modifications and the required initial pilot training. San Diego City Fire and Rescue and the Los Angeles County Fire Department helicopter operations, with the only fully capable night firefighting operations in the country, are pioneering the way. Others now have two successful operational models to follow. The Kern County Fire Department also has an active Generation III NVG EMS helicopter program.

The U.S. Air Force fixed wing transport (C-17) and fighter (F-15, A-10) pilots use Generation III NVG to carry out their night missions.

It is time for the U.S. civil wildfire fighting helicopters and fixed wing aircraft to be equipped and certified to use NVG for night operations. More than 600 commercial helicopter pilots in the U.S. have been certified for use of the Generation III NVG to enhance safety and effectiveness of their night operations.

To get the best and more effective usage of our current fleet, an effort needs to be made to quantify how much more effectiveness can be obtained if current helicopter and fixed wing aircraft are certified for night operations where wind speeds reduce and fire intensity drops due to lowered temperature, etc. If the wind speed drops sufficiently over enough area we would get more use of our current fleets and stop fires sooner.

MULTIPLE AIRCRAFT TACTICS

The BLM have been getting more effectiveness from their 800-gallon Single Engine Air Tanker (SEAT) aircraft by employing them in multiples up to four in tandem and dropping on the same target fire with the equivalent impact of a 3,200-gallon aircraft. Use of this tactic with larger tankers can be a way to get the high volumes of suppressant delivered at one time to make successful direct attacks on the heads of some of the intensely burning fires.

LA County uses their leased two CL-415 Super Scoopers in this mode to get the punch of 3,200-gallon capacity from their 1,600-gallon Scoopers.

Italy uses the same Scoopers with four in tandem to get 6,400-gallon effectiveness when they need it.

It takes a little practice and coordination, but the users say it works fine. There could be good payoffs to look into using this technique more broadly in our wildfire operations.

USE OF CLOSE-IN TEMPORARY BASING

One way to get to a fire faster or to get more gallons per hour on a fire is to operate from a base closer to the fire. Moving wind and heat weather patterns that often determine the roving **Red Flag** conditions tend to dynamically define what geographic areas have the highest fire risk. Ideally, we would like to have our aircraft as close as possible to the highest risk ignition zones. The majority of our wildfire air assets operate from a limited number of bases prepared with facilities to support them. BLM and others occasionally use airstrips not normally used by bringing in temporary mobile support. More broad use of this operating concept should be investigated to increase the efficiency of our airborne fleets. **Figure 13** shows how gallons per hour productivity changes for select firefighting aircraft as a function of the distance from the operating base to the fire.

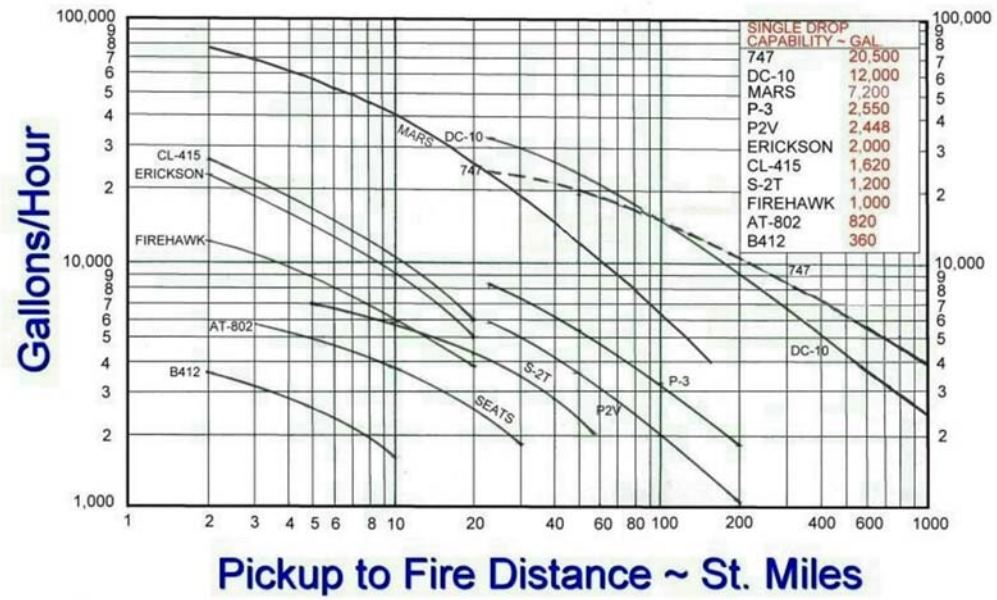


Figure 13. Aerial Asset Basic Productivity Comparison

It is important to note that getting closer to the fire is a form of **force multiplier**. Often, by getting closer, one aircraft of a type can perform two or three times as effective as the same aircraft operating from a base farther from the fire!

Getting basing closer to emerging **Red Flag** risk areas or active fires may involve getting more conditional use agreements from existing airfields, provisioning more mobile wildfire support equipment and crews, building or improving airfields in critical areas or buying or equipping aircraft to provide capability to use softer or unprepared airstrips like some military aircraft. There may be favorable trades of some up-front money spent to get a quicker-acting force multiplier when the bell goes off.

DEVELOP TECHNOLOGY FOR EFFECTIVE AIR DROPS IN HIGH WINDS

Current airborne firefighting systems have limited capability in high winds. A current rule of thumb, flexibly applied to cover unusual circumstances, sends most of the airborne fleet home when surface winds move into the 35 mph range for flight safety reasons. Only a few helicopters and a few aircraft (e.g. Canadair CL- 415) can continue fighting fires with winds in the 55 to 60 mph range. This is most unfortunate, since high winds cause fast moving, intense fires with the most potential for doing cultural damage.

Another critical aspect of firefighting performance affected by high winds and accompanying gusts is the effectiveness of the drops. If a strong wind or mischievous gust comes blowing 90 degrees to the path of the aircraft during and after release, the load will be blown laterally away from the pilot's intended path for the drop. The net effect of this is that for any given aircraft, tank design and wind conditions, there is a band of useable, effective drop speeds and altitudes that will work and others won't.

As wind speeds increase, the range of useable drop altitudes is reduced and there is a limiting wind/gust speed for each aircraft tank and suppressant medium (water, retardant, gel or whatever) where drops are no longer effective or the operation is unsafe for either the aircraft, persons or structures on the ground.

There is concern that (a) since the majority of fixed wing air tankers cannot be operated safely and effectively when local winds exceed 35 mph and (b) many Santa Ana wind driven fires reach and exceed these speeds for portions of the events — adding more such aircraft to the wildfire fighting fleets would not be good policy. There is considerable merit to the sentiment expressed by the concern. However, the concern assumes the wind conditions are uniformly above safe/effective limits over at least the majority of the operational area affected by the Santa Ana condition. The concern also assumes the duration of the event with wind speeds less than 35 mph are of less significance to total overall fire control than the period where wind exceeds 35 mph. Only persons in possession of the full wind database made available by weather experts and the details of the particular incidents can make these judgments. It's a matter of what percentage of the total fire cycle time and area affected are unserviceable because of the winds.

Ultimately, we need aircraft capable of effective use during higher wind conditions and/or systems that will allow suppression mediums to be delivered by aircraft without the loss of effectiveness currently experienced in high winds. One such concept is currently in development by a private venture called **P**recision **C**ontainer **A**ir **D**elivery **S**ystem (PCADS) which drops disposable containers of suppressant out the back of rear loading ramp transport aircraft that open at significant distances below the aircraft before dispensing into the fire. See **Figure 14**.

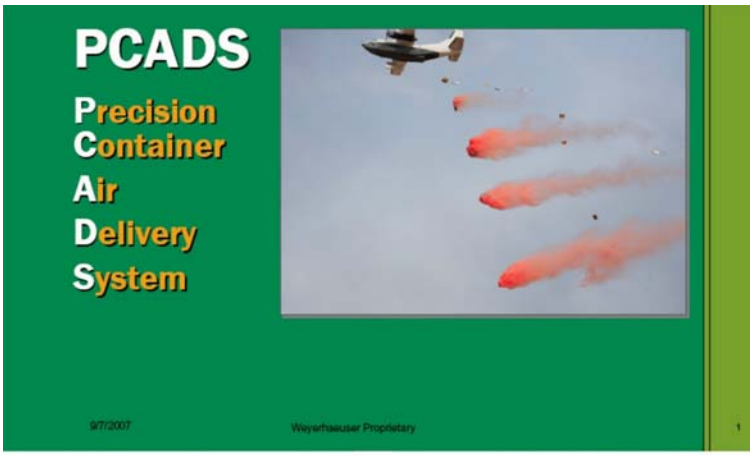


Figure 14. PRECISION CONTAINER AIR DELIVERY SYSTEM CONCEPT

The Army has been involved with the originators and has supported some early testing and development work using a C-130 aircraft. Tight money in the government has delayed decisions to move forward on this project.

This technology can probably be further developed to allow water or another suppression medium to be dropped at higher altitudes and speeds in a way that will preclude premature blooming and disintegration and also arrive at a previously designated spot regardless of gusts and turbulence. The system would keep the suppression medium protected from dispersal until it reaches an optimum altitude and speed relative to the fire such that there will be maximum suppression effect. See **Figure 15.** A well designed system of this type would make it unnecessary to provide any unusual amount of high wind capability in the air tanker and it could reduce the level of night capability required as well.

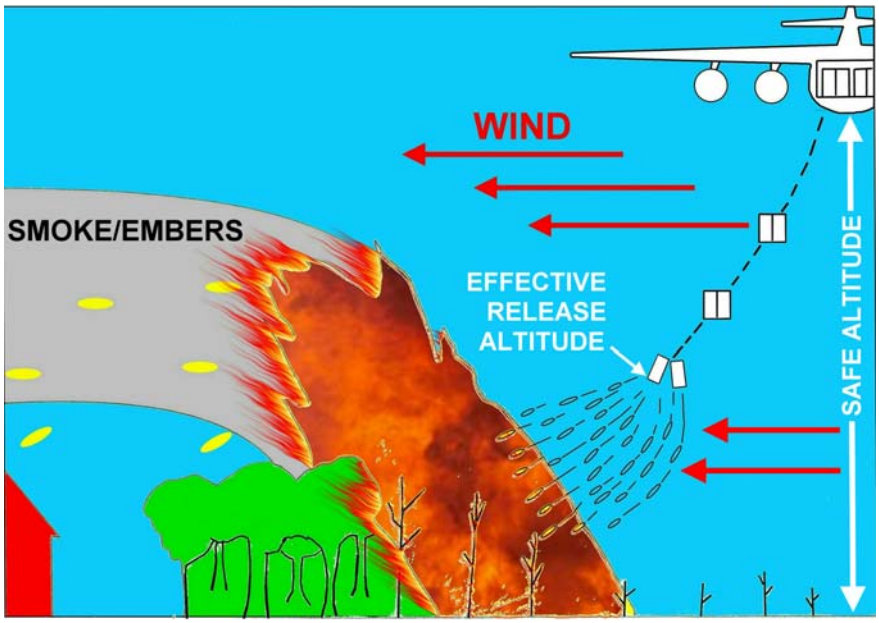


Figure 15. PCADS POTENTIAL EFFECTIVENESS IN HIGH WINDS

MORE VERY LARGE AIRTANKERS

The majority of current wildfire fighting assets are seriously disadvantaged relative to suppression of the hotter, fast-moving, wind-driven fires that become “mega fires”. The only hopes currently available are the very few Very Large Air Tankers (VLAT) that have been offered to the agencies by private companies (DC-10, Martin Mars, and 747).

Figure 3 on page 2 shows qualitatively that we must find a way to get more suppressant on the heads of these fires quicker to stop them. Only air assets can move quickly over long distances and place large volumes of suppressant in seconds that, if large enough, can extinguish a section of the fire. Currently, we do not have enough of these assets to decisively deal with every fire.

The system does not yet know how to get the best use of these aircraft and ultimately further improvements of such assets will be required. The aircraft must be made safe to operate at night and during high winds by such means as were noted on page 4 (NVG technology) and page 9 and following (PCADS).

Current agencies do not have the budgets or expertise to efficiently implement the development programs required. Unanimous acknowledgement of the need would be a good first step. However, higher level political forces must be cultivated to raise wildfire control higher on the list of national priorities.

A NEW TOP LEVEL WILDFIRE AGENCY

Our fire agencies are doing an excellent job of handling 95% or more of the wildfires that occur. Unfortunately, it is the very small percentage of fires that escape initial attack that cause most of our cultural losses.

Figure 16 presents the unfortunate administrative reality that there is no one in our country with overall responsibility, authority, and budget to adequately address the growing wildfire problem. The Forest Service, which has the most money, is 3 levels down in the Department of Agriculture (DOA). The DOA organization doesn't even have wildfire in its mission statement. The Forest Service gets only about 4% of the DOA total annual budget!

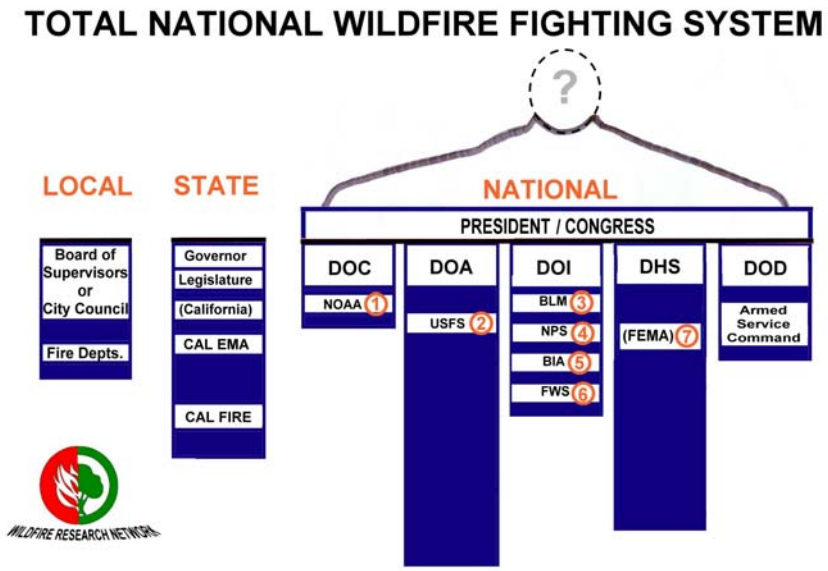


Figure 16. NATIONAL WILDFIRE FIGHTING SYSTEM ORGANIZATION

FEMA pays for most of the declared national emergencies only after the fact -- very little for prevention. Thus, the wildfire problem is being addressed with a headless and underfunded system.

Our federal partners are doing the best they can within an overall system that is not structured to provide wildfire fighting with adequate funding and the other priorities it needs to deal with the growing number of mega fires.

Figure 17 presents an overview of this overall problem for the agencies. WRN believes it will be very hard to get adequate consideration, action and budget in wildfire fighting issues until it has a high enough lead federal agency that can sit at the table when national budget priorities are being resolved.

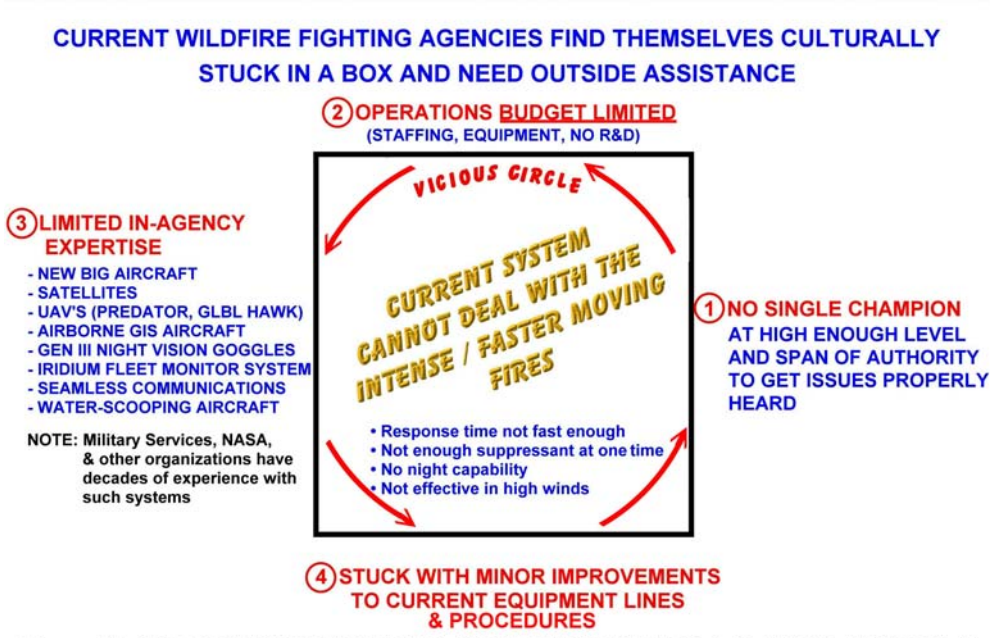


Figure 17. CURRENT WILDFIRE FIGHTING AGENCIES NEED A STRONG ADVOCATE

CONCLUSION

If there are aspects of these suggestions you don't agree with, please offer something better so we can all get together on one plan. If we don't all sing the same song we could wind up battling over the same scarce money and not make the progress we could otherwise.

CAREER HISTORY
ROBERT L. CAVAGE, WILDFIRE RESEARCH NETWORK

Mr. Cavage is a retired aeronautical systems engineer with over 38 years of professional experience with major aerospace firms.

His career began with graduation from Pennsylvania State University with an Aeronautical Engineering degree. His first four years were with General Dynamics-Convair in San Diego where he learned the practical basics of applied aerodynamics, wind tunnel operations, aircraft performance characterization and preliminary design. Aircraft types included supersonic interceptors, subsonic transports, seaplanes and several short and vertical takeoff and landing (V/STOL) fixed wing aircraft.

In 1961, Mr. Cavage joined the Advanced Design Department of North American-Rockwell (later renamed Rockwell International) in Los Angeles. Here he began a 34 year career of advancing through the Advanced Design Department ranks being given increasing scope of responsibility as his experience expanded. During this period he was in charge of all advanced engineering for Rockwell Cold War air-to-ground fighter-bomber projects. This included overseeing the operations analysis, multi-discipline design and analysis functions with full life cycle cost control responsibility.

For several years he was program manager for a Rockwell Lift-Fan V/STOL program where he directed the design and technology development for commercial V/STOL transports and Navy multi-mission carrier-based aircraft. During this period he was accepted as an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and became a member of the AIAA Technical Committee responsible for policy guidance of the institute in the area of V/STOL aircraft.

Mr. Cavage’s longest project association, and the one project he participated in through the whole evolutionary cycle from concept through production and operation, was the B-1 bomber. He was part of a core engineering team assembled in 1964 responsible to evolve the mission and design requirements for a strategic system that would have a useful combat service life of at least 20 years in an environment of constant technological evolution. The B-1 incorporated several radical new technologies never publicized because of the desire to keep their existence unknown to those who would want to copy them or find effective combat countermeasures. The system is still very active in the U.S. Air Force inventory and continues to have a quiet role in both Afghanistan and Iraq.

In 1978 an event occurred that would start Mr. Cavage, unknowingly, on a second career. An out of control wildfire burned to within a quarter mile of his recently acquired new home, which was saved only because the wind changed direction! In 1980 he devoted eight months of his personal time to a comprehensive evaluation of the brush fire problem in his community. This

study concluded that helicopters and appropriate fixed wing aircraft could significantly improve the brush fire suppression capabilities locally available at that time.

A few years after his aerospace retirement, in the year 2001, he joined the parent organization of Wildfire Research Network to dedicate a significant portion of his energies to helping find truly effective and affordable means to significantly reduce or eliminate the destructive losses now being suffered by so many people because of runaway wildfires.

Currently he is president of Wildfire Research Network, a non-profit corporation dedicated to improving wildfire suppression and control throughout California and the United States.

CAREER HISTORY
TONY MORRIS, WILDFIRE RESEARCH NETWORK

After nearly losing his home in the 1993 Topanga/Malibu wildfire in California, Tony Morris began researching wildfires and firefighting aircraft. In 2004, Mr. Morris founded Wildfire Research Network (WRN), a non-profit public safety research foundation dedicated to improving wildfire fighting capability and firefighting aircraft. In 2004 Mr. Morris testified at the California Governor's Blue Ribbon Fire Commission established to find ways to avoid a repeat of the 2003 wildfire siege in Southern California.

In March 2006, Mr. Morris testified for WRN before the California State Resources Budget Committee in support of state funding for Tanker 910, a 12,000 gallon capacity firefighting aircraft. In December 2007 Mr. Morris testified at a field hearing of the U.S. House of Representatives Subcommittee on Domestic Policy of the Oversight and Government Reform Committee examining the readiness of local, county, state and federal firefighting agencies during the 2007 Southern California wildfire siege.

In May 2008 Mr. Morris appeared before the San Diego County Board of Supervisors to provide information in support of funding to lease two CL-415 air tankers from the Province of Quebec for the 2008 wildfire season.

From 2004 to 2010 Mr. Morris has served as Communications Director and principal fundraiser for WRN.

Mr. Morris is a Contributing Editor for VERTICAL 911 a publication which covers emergency medical and aerial firefighting operations of the helicopter industry. As a freelance writer he has authored thirty articles about rotary and fixed wing firefighting aircraft. Mr. Morris is also a frequent observer at Los Angeles County Fire Department Air Operations.

Mr. Morris was a writer/producer with the MONTAGE Documentary Unit of NBC-TV and has been involved in the production of 40 documentary films. He was a Project Manager with Kajima International Construction, responsible for managing construction of a number of large-scale commercial projects in Southern California. Mr. Morris is a graduate of Yale University, attended the USC Masters Program in Cinema and has a Master of Architecture degree from the Southern California Institute of Architecture.

TABLE OF CONTENTS

WRN SUBMITTAL TO CONGRESS OF THE UNITED STATES
CONGRESSIONAL PANEL: INITIAL ATTACK ON THE STATION FIRE