



***Communicating Fire Weather
Information and Assessing
Societal Response
A Critical Connection to Save
Lives and Property***

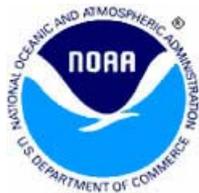
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Overview of Presentation



- **Peak at NWS Social Science program**
- **S&T Roadmap for Fire Weather**
- **Assessing Fire Weather Info...What is the Intent?**
- **Interactions for Major Fire Events**
 - Australia Fires of Feb 2009
 - Blackhorse Fire near Roanoke VA Feb 2007
 - Esperanza Fire in Oct 2006
- **Perspective on Building Trust**
- **Examples of Firefighter-Community interaction**
- **Conclusion**



NWS Social Science Program



- **Important Driving Documents:**

- NOAA Science Advisory Board Social Science Working Group
 - Report: *“Integrating Social Science into NOAA Planning, Evaluation and Decision Making: A Review of Implementation to Date and Recommendations for Improving Effectiveness”* (March 2009 and previous 2003 report)
- NOAA Next Generation Strategic Plan - Includes social science and decision support components
- NWS Strategic Plan - Includes social science and decision support components
- NWS Science & Technology Roadmap – Social Science Roadmap
- NWS Services 2020 – Includes social science and decision support components



S&T Roadmap Fire Weather Vision/Outputs/Impacts



- **Team Vision:**

- High-resolution fire weather information and services, in close collaboration with agency partners, focused on providing impact-oriented, integrated improvements of fire danger and behavior predictions that save lives and reduce impact to property

- **Benefits/Outputs:**

- Improved resolution and accuracy of coupled fire weather/behavior forecasts
- Improved decision support systems and tools
- Extended lead time of high threat areas
- Extension of lead time and resolution of Red Flag Warning capability
- Efficient evacuation of threatened communities
- Reduced risk of escaped prescribed burns
- Improved public safety (evacuations) due to reduced smoke impacts

Key Information Gaps

Large Gaps

Outline

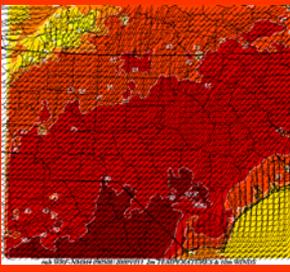
- 1) Limited observations and measurements near fires
- 2) Real-time detection of fires
- 3) Improved high-res model forecast guidance
- 4) Fine-scale coupled model (sub 1-km, hourly)
- 5) Improved Red Flag ID, lead time, indexing
- 6) No coupled smoke behavior prediction less than 4 km res
- 7) Intra-seasonal prediction of fires
- 8) IMET capability improvements (training, customer interface)
- 9) Tool for debris flow prediction
- 10) **Social science evaluation**

Larger, Numerous Fires





Improved Obs/Support



High Res Wx Guidance



Improved DSS Tools and information



Assessing Fire Weather Info

What is the Intent?



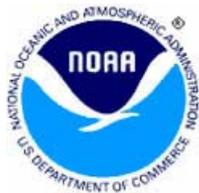
- **Two major objectives:**
 - Explore/assess user awareness and understanding concerning fire weather services/available information...Do our users know how to apply forecasts to manage risk and make decisions?
 - Assess whether NWS should develop new fire weather informational approaches to improve communication and decision-making with respect to fire behavior and risk
- **Before we dive into sample analysis of 3 fire events, we need to understand how IMETs interact with firefighters**



Assessing Fire Weather Info



- Operational briefings to crews begin and end each day
- Several briefings to command staff, aviation interests and even the public are provided.
- All elements of the Command Staff have access to the IMET 24 hours a day, seven days a week during a wildfire event... **there are very serious interactions taking place**



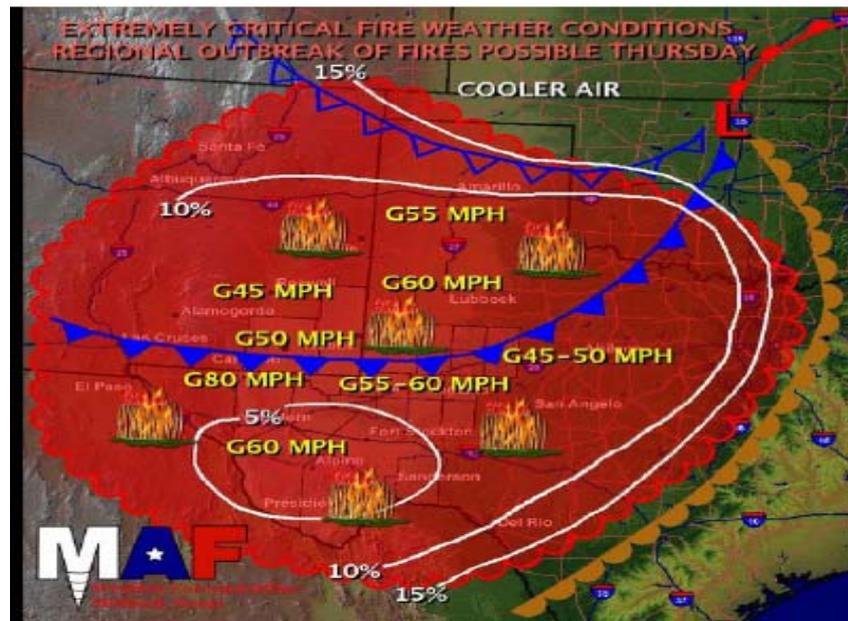
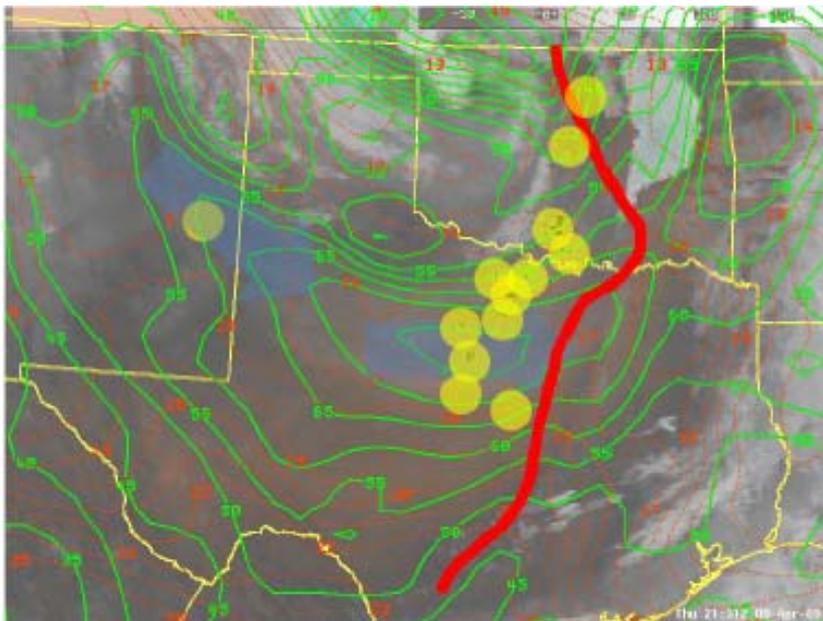
Assessing Fire Weather Info



IMETs and Fire Behavior Analysts (FBANs) observing a firing operation near Alpine, AZ in May 2004.

Many interactions on the tactical level as firefighters are very aware of the danger of sudden weather changes and prolonged periods of conditions above thresholds

Assessing Fire Weather Info



IMETs often build slides that show, for example:
The extent of dry air for area of fire danger (left)
as well as the severity associated with wind gusts (right)

Images associated with Texas/Oklahoma fire outbreaks of April 2009
(Overview of the April 9, 2009 North Central Texas Wildfire Outbreak)



Case Studies: Interactions at Major Fires



- **Three major fires looked into**
 - Australian Black Saturday Bushfires
 - Blackhorse VA Fire
 - Esperanza CA Fire
- **Questions asked:**
 - How do you ask users what they need?
 - Is there an independent study completed for product interpretation?
 - What was your role in production/transmission of forecasts for this fire?
 - Did you feel that products were completely understandable?
 - Is there any reason to doubt public interpretation of products?
 - Are there several dissemination processes? Confusion?
 - Does customer fully understand how weather drives fire danger?
 - What would you do differently?

Case in Point

Australia Fires Feb 2009

- Known as Black Saturday Bushfires, killed 173 people, injured 414...1.1 million acres burned

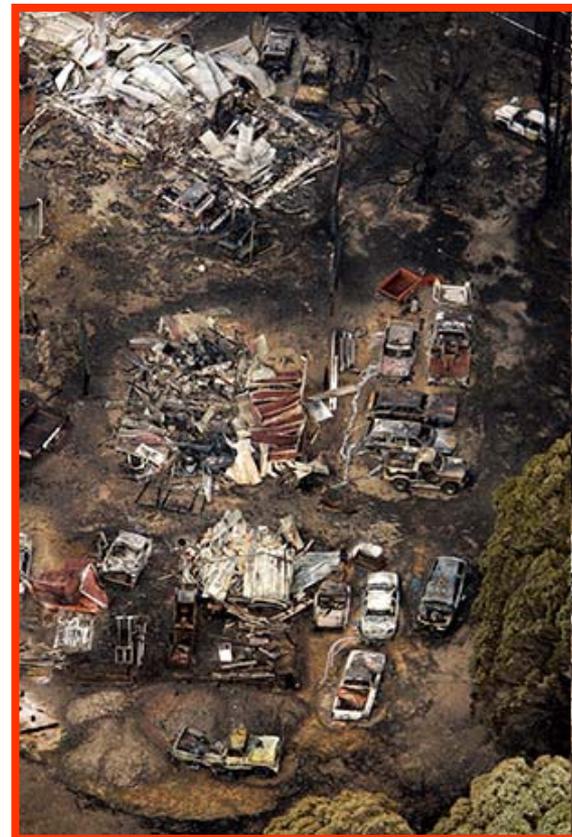


Dead horse...among many animals trapped by flames



Take a guess what this used to be

Ruins of buildings and cars,
NE of Melbourne, 2/8/09



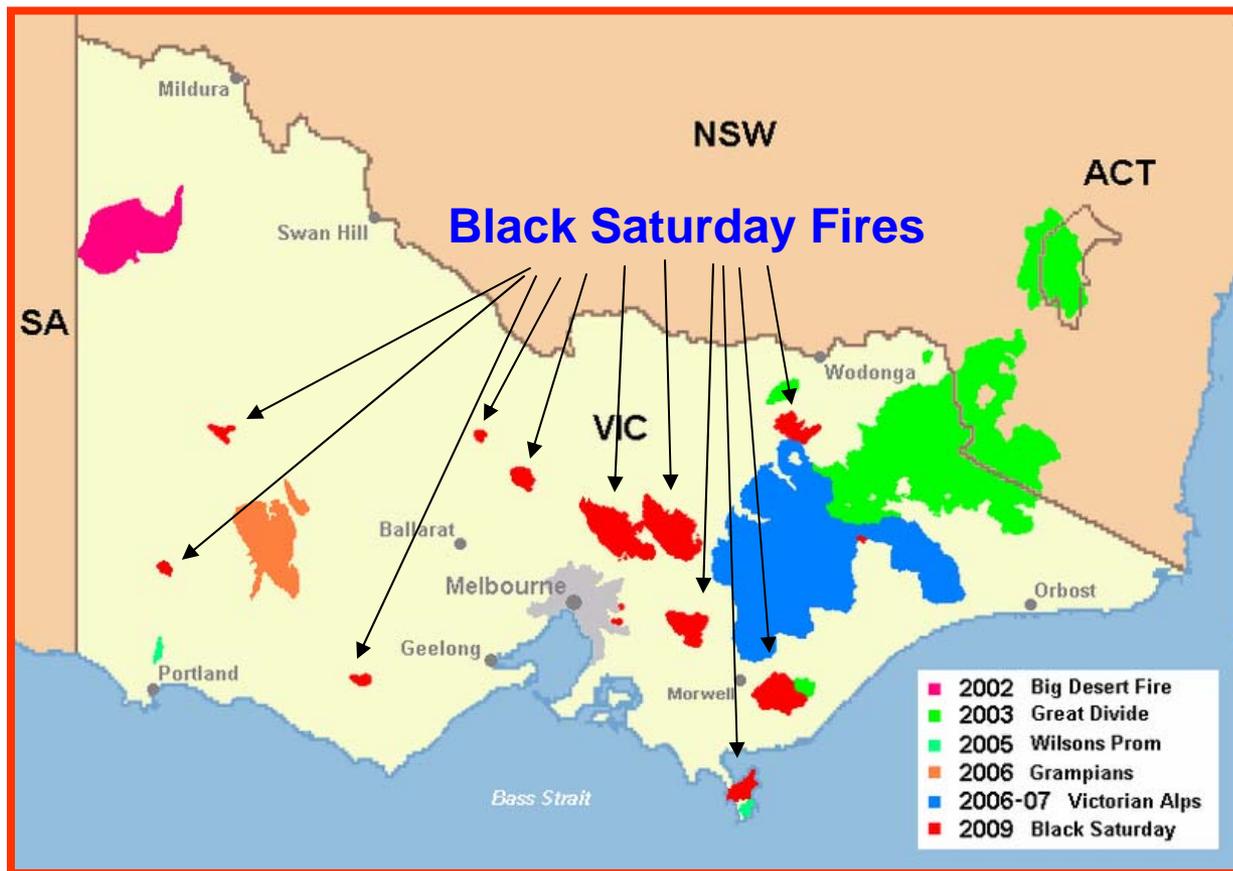


Case in Point

Australia Fires Feb 2009



- This shows 2009 bushfires versus others since 2000; fires burned over 2030 houses, affecting 78 townships





Case Studies: Black Saturday Fire ?s



- **Interviewee(s):** Robin Hicks and Kevin Parkyn, Australian Bureau of Meteorology. Kevin is an expert with interagency Australian customer relations and a fire weather forecaster
- **Answers to Questions:**
 - **Process/Information:** Fire agencies interaction at State level, national level between National Fire Wx Services Mgr and AFAC.
 - **Independent study:** BOM engages external survey providers to monitor public perception of wx forecasts (not just fire wx). High approval from public.
 - **Role in forecasts:** The BOM determines level and standards of service to Victoria fire agencies. Mets were active at State Control Centre.
 - **Product clarity:** Fire wx products understood; understanding of fire behavior needs work
 - **Interpretation:** Weather parameters of heat, humidity and wind well understood. Underestimation with reference to associated fuel.
 - **Links/Dissemination:** Wx info on BOM website. IC can always contact fire wx forecaster directly. Spot forecasts answered in 30 min.



Case Studies: Black Saturday Fire ?s

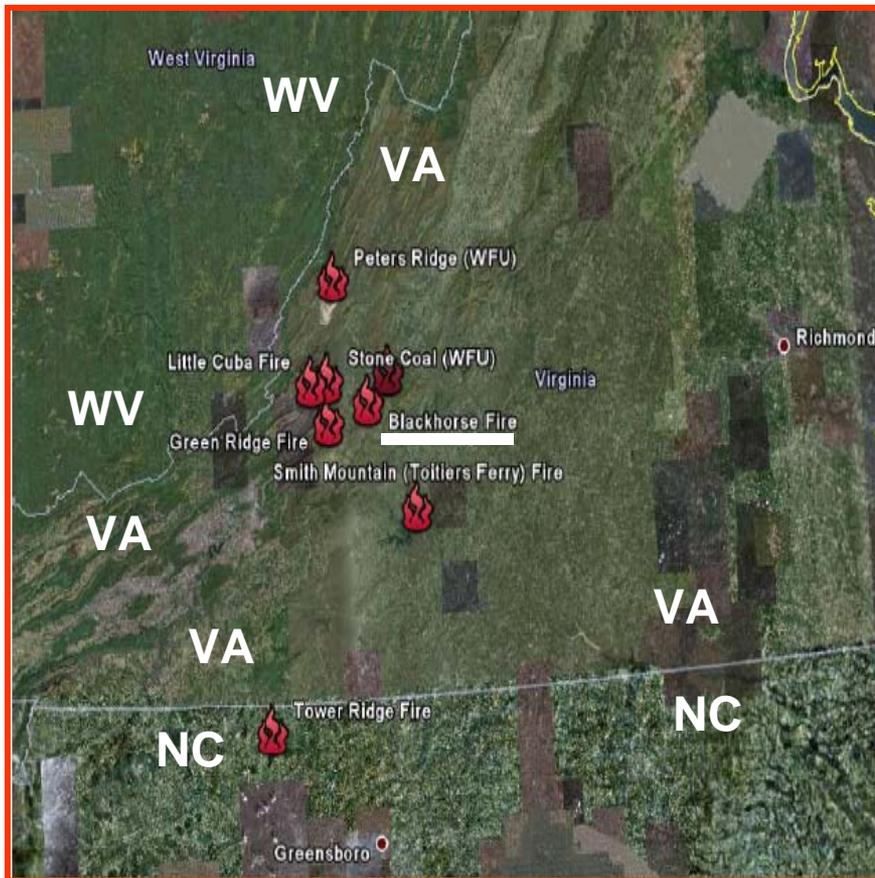


- **Interviewee(s):** Robin Hicks and Kevin Parkyn, Australian Bureau of Meteorology. Kevin is an expert with interagency Australian customer relations and a fire weather forecaster
- **Answers to Questions:**
 - **Product Improvement:** Integration of GFE will help BOM provide an alternative to fixed location/single time of day forecast of fire danger to spatial estimates at frequent intervals. Continuous Haines Index to anticipate behavior. More interaction with FBANs to assist in making most of GFE grids.
 - **Role of BOM:** BOM will help fire agencies to communicate relative fire risk to public via call-to-action statements. Goal should be to emphasize hours above a “danger” threshold not just max values that are not understood.



Case in Point

Blackhorse VA Fire Feb 2007



Blackhorse Fire just northeast of Roanoke VA, adjacent to Blue Ridge Parkway and many homes



Case in Point

Blackhorse VA Fire Feb 2007



- Drought conditions from early 2007 to winter months of 2008
- High wind event on Feb. 10...25 to 40 mph, gusts to 60-70 mph for 8 hrs
- Blackhorse Fire one of 387 fires
 - Burned 1488 acres, many evacuations
 - Command Post set up in Montvale ES
 - IC: “This was the first fire in the eastern United States that I’d had ever seen folks standing on their rooftops trying to save their homes with water hoses”
 - IC: “This sort of fire outbreak (referencing the February 2008 VA fires) is something you would expect to see in California, not Virginia”





Case Studies: Blackhorse Fire ?s



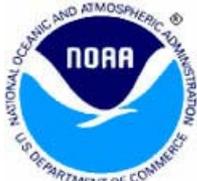
- Interviewee(s): Phil Manuel, IMET, Blacksburg VA WFO
- Answers to Questions:
 - **Process/Information:** Ask plans chief and FBAN about specific wx info needed. Works with customer on any wx-related changes in behavior
 - **Independent study:** None. After Action Review revealed need for access to wx information external to incident/need for consistency
 - **Role in forecasts:** IMET was sole provider. Ensured consistency with forecasts coming from local WFO for surrounding area
 - **Product clarity:** Products understood, but have to be present to answer any questions for “complete” understanding
 - **Interpretation:** Probabilities can cause problems. Customer likes binary info for emergencies; more uncertainty means more contingencies
 - **Links/Dissemination:** Few links to the customer. Products typed and included in Incident Action Plan...no room for misinterpretation



Case Studies: Blackhorse Fire ?s

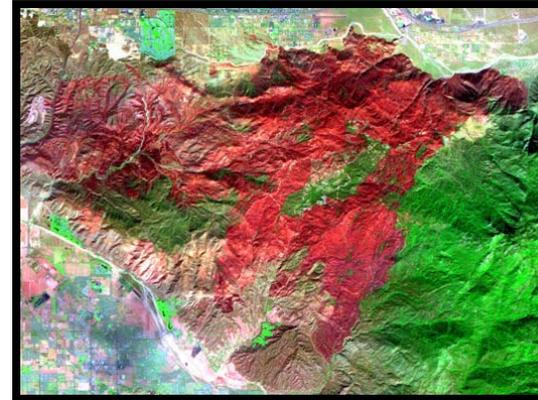
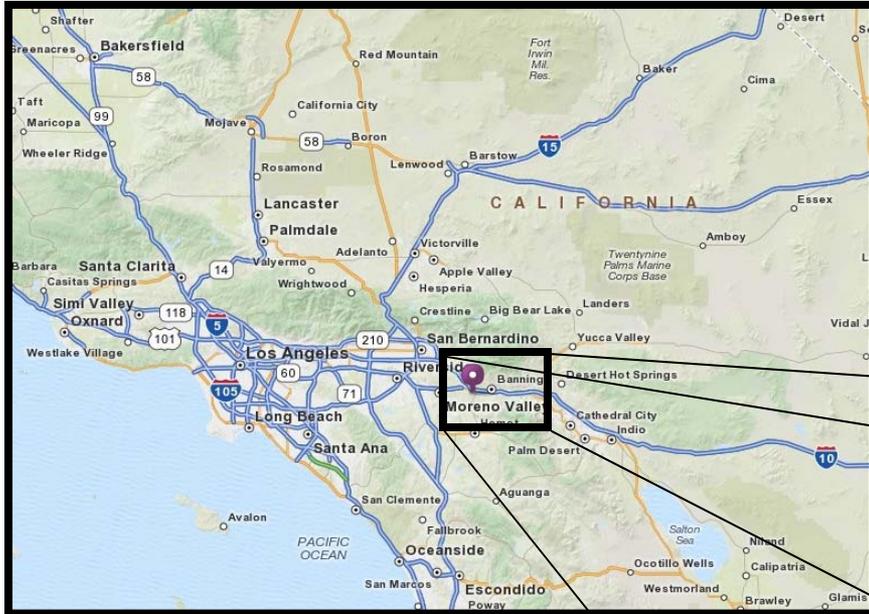


- Interviewee(s): Phil Manuel, IMET, Blacksburg VA WFO
- Answers to Questions:
 - **Customer Understanding:** Worked directly with FBAN, who applied wx info to fire behavior and danger...FBAN answered questions at briefings
 - **SOP Changes:** Very little to change. Must emphasize importance of IMET on site where high cost (life/property) at stake. No room for misinterpretation, and access to internet/outside world paramount.



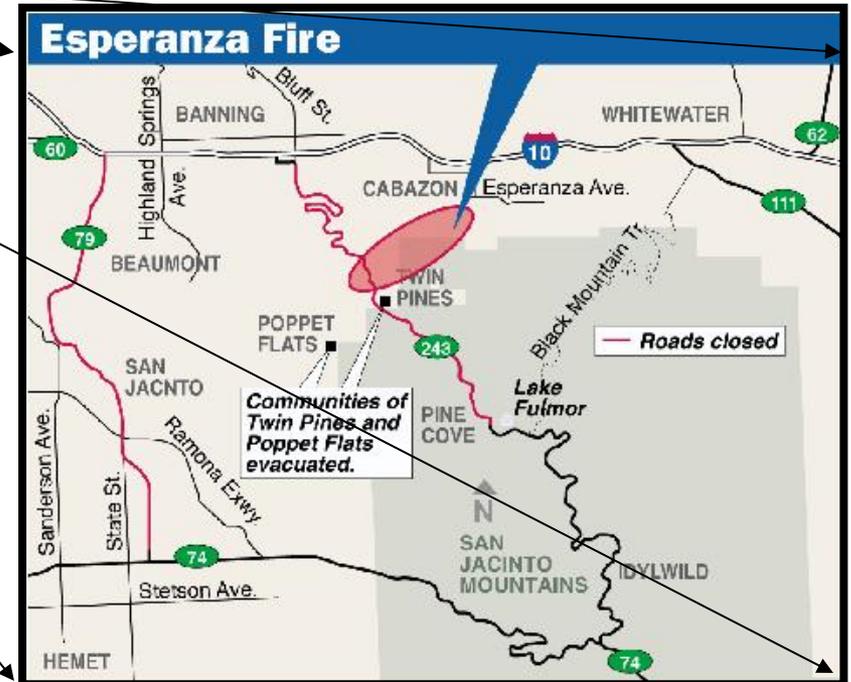
Case in Point

Esperanza CA Fire Oct 2006



NASA Image of fire-scorched area

Esperanza Fire occurred on the northwest edge of the San Jacinto Mountains, about 55 miles east of Los Angeles



Case in Point

Esperanza CA Fire Oct 2006



- Rough terrain; arson was cause
- Strong Santa Ana winds, gusting to 50-60 mph; direction changes
- 500 structures burned; 400 evacuated
- Burned over 42,000 acres
 - Killed 5 firefighters, briefed less than one hour before incident
 - Firefighters trying to protect own community

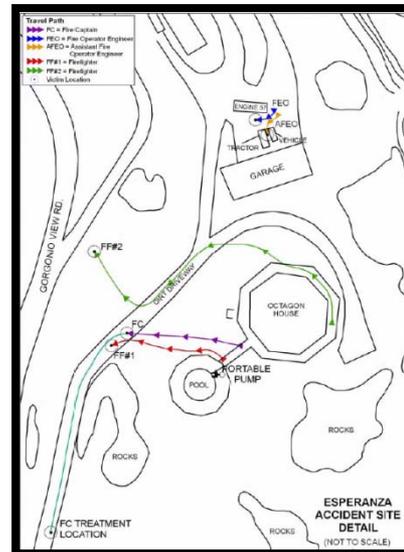
Firefighters fight flames nr Beaumont

Fires near Idylwood along Route 243

- Interesting quote from International Association of Wildfire
 - “Too often we look at weather, fuels and fire behavior, but we don't look at human factors...I'd let a house burn down in some instances. But put me in my own community, and that might change things. That's a human factor to be considered.”



Members of Engine 57 killed/injured



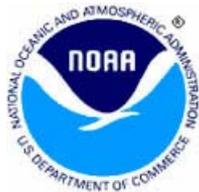
Map of Accident Area



Case Studies: Esperanza Fire ?s



- Interviewee(s): Paul Flatt, Meteorologist at Boise ID WFO
- Answers to Questions:
 - Process/Information: Customers received normal Red Flag warning products and briefing at onset of each shift
 - Independent study: None
 - Role in forecasts: None. Evaluator after fire.
 - Product clarity: Products understood. Possibility of extreme danger well outside experience and out of range of potential
 - Interpretation: No problems
 - Links/Dissemination: At most 3 links between forecaster and end customer. Information not muddled, easy to transmit



Case Studies: Esperanza Fire ?s



- Interviewee(s): Paul Flatt, Meteorologist at Boise ID WFO
- Answers to Questions:
 - Customer Understanding: Not in terms of extreme events
 - SOP Changes: Decisions in general have to be rethought, on a persistent basis, especially in light of the relative danger and the property being protected. If factors point to danger, some structures are not worth it



Perspective on Trust



- **When an IMET arrives...to an unfamiliar place...communicating with people they do not know. Trust and credibility are paramount**
- **Need to build expertise...local forecast office...talk with firefighters...learn from locals**
- **Examples:**
 - IMETs from a different area of the country, now forecasting in a different environment, where deep cultural beliefs may exist. “We want somebody from our own back yard.”.
 - At briefings, you may have firefighters, members of incident command team, or local political authorities that may have pre-conceived thoughts on weather. How do you gain their trust?



Examples of Firefighter-Community Interaction



- **CWA Initiative (WFO Riverton WY):**
 - CWA = Community Wildfire Awareness
 - Grass roots pilot project started in 2008
 - Designed in parallel with established Storm-Ready program
 - Should be considered for national use



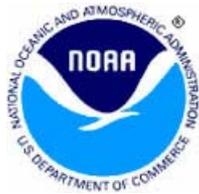
Conclusion



Goal is the creation of a stronger, more distributed, and coordinated social science capability for fire weather support that is integrated with programs and decision systems in support of improved decision-making



Saving Lives and Reducing Property Losses



Potential Topic NSWW 2012

Use of Future Satellite Data



- **Introduction of Future Satellite Data to IMETs**
 - IMET Workshop, week of Mar. 21, 2011
 - 3 hour session with 10 IMETs, one group with current satellite data, one with future GOES-R (simulated) products
- **Looking to Expand for Testbeds**
 - Working with proper agencies, must be proactive in integrating ABI and JPSS data into observations/fire detection