

Wildland fire behavior prediction is both science and art

by Doug Newbould

Predicting wildland fire behavior is somewhat like predicting the behavior of a wild animal. Wildlife biologists or behavioral scientists may study a species or observe the individual activities of an animal over a period of time, and become somewhat proficient at predicting behavior.

Likewise, a wildland fire behavior analyst is skilled at gathering fuels and topographic information, collecting fire and weather observations, and then using mathematical models to make predictions about how a wildfire is going to act.

My dictionary defines 'behavior' for both humans and animals as 'observable activity' or as 'the aggregate of responses to internal and external stimuli.' A more general definition of behavior is 'the action or reaction of any material under given circumstances.' Similarly, wildland fire behavior may be simply defined as the responses of a fire to its environment.

What is missing from all of these definitions is the element of unpredictability that is inherent in anything classified as 'wild.' We all know or should know that wildlife and wildfires, by nature, are somewhat unruly and unpredictable. Wildness is the reason why a tourist in Denali or Yellowstone should never smear honey all over their child's face—to entice the cute bear to kiss the kid for that one, unforgettable photograph. And wildness is why wildland fire behavior prediction is as much an art as it is a science.

Wildland fire science is well established in America, both in our university system and within the national wildland fire management community. Colorado State University (my alma mater) and the University of Montana are two of several major universities with renowned fire science/research programs. There are also a number of federal fire research facilities and programs including the fire science laboratory at Missoula and the USDA Forest Service, Pacific Northwest Research Station in Seattle. At these facilities and others in the United States and Canada, the science of wildland fire behavior analysis and prediction is constantly advancing.

But where is the ART of fire behavior prediction taught? The answer to that question is the School of Hard Knocks. To be qualified for the position of

Fire Behavior Analyst (FBAN), one must successfully complete a series of wildland fire behavior training courses developed by the National Wildfire Coordinating Group (NWCG), complete a number of trainee assignments to gain experience, and be fully qualified as a Division Group Supervisor (DIVS). A fully-qualified DIVS is someone who has graduated from the School of Hard Knocks—having received years of formal training and wildland fire experience on large wildfires.

Division Group Supervisor is a leadership position in the Operations section of an incident (wildfire) management organization. A DIVS is responsible for making tactical decisions about the safe use of firefighting resources during wildland fire suppression. So, you could say the Fire Behavior Analyst must possess both brawn and brains, since an FBAN must be trained and qualified to fight fire as a DIVS (brawn) and be able to use mathematical models to predict fire behavior (brains). But, again, how does the FBAN become an artist?

Interpretation and calibration are the tools of the trade for the FBAN artist. A good FBAN must be able to understand how fire reacts to different fuels, weather and topography, collect accurate information for input to predictive models, interpret the outputs/results from those models, then calibrate or adjust the models using real-time fire behavior and weather observations. As you may have guessed, often the most challenging and unpredictable element of fire behavior prediction is the weather. And that is why most FBANS are also budding meteorologists, again with beaucoup experience in the School of Hard Knocks.

I began learning about the fire environment and the fire behavior triangle (fuels, weather and topography) in 1976, when I attended fire school (basic wildland firefighter training) in Jackson, Wyoming. There I completed S-190, an Introduction to Wildland Fire Behavior course. After many years of wildland firefighting throughout the western U.S., I completed the Intermediate Fire Behavior (S-390) course in Montrose, Colorado in 1988. There I first learned to use mathematical models to make simple fire behavior predictions.

After many more years of firefighting and pre-

scribed fire experience I attended Prescribed Fire Planning and Implementation in Mandan, North Dakota (1998). There I learned to work backwards from a set of desired outcomes or objectives, and using fire behavior modeling tools—develop prescriptive parameters and a prescribed fire plan that would accomplish those objectives. That course qualified me as a trainee prescribed fire burn boss. Many more years of prescribed and wildfire experience and training brought me to my current qualifications of Type 2 Burn Boss (RXB2) and Task Force Leader (TFLD).

Last week, Dianne MacLean (the Refuge's Assistant Fire Management Officer) and I successfully completed S-490, Advanced Wildland Fire Behavior Calculations in Fairbanks. It was by far the most challenging (and rewarding) NWCG training I have ever attended.

But, Dianne and I still have a couple more rungs to climb on the ladder to be an FBAN: we would have to pass the S-590 course (Advanced Fire Behavior Interpretation) and achieve full qualifications as Division Group Supervisors.

In my mind, I think I have the brawn and brains to be a Fire Behavior Analyst. But I know in my heart I still need to develop the artistic abilities necessary to interpret and calibrate fire behavior models. I'm just not there yet. I guess I'll have to go back to my old school—Hard Knocks, for some post-graduate pounding.

Doug Newbould has been the Fire Management Officer at the Kenai National Wildlife Refuge since 1999. Previous Refuge Notebook columns can be viewed on the Web at <http://www.fws.gov/refuge/kenai/>.