



Take 5@2

June 30 – July 6, 2015



New Research on Safety Zones

[If you have computer or smart phone access, [please watch the video for this subject](#) using the link or QR code...Otherwise, read on Old School...]



First, a Fire Behavior 101 refresher: You can warm yourself around the sides of a campfire for quite some time; that's **radiant heat**. If you hold your hands over the top of the fire, you'll get burned relatively quickly; that's **convective heat**.

Basically, wind or slope can tip the flames over, so that the convective heat is no longer going straight up, but is now aimed more along the ground, sending the heat and hot gasses much further ahead. This causes pre heating of the fuels, faster fire spread and greater fire intensities. You'll need a larger Safety Zone if that fire is coming towards you.

The current equation for safety zone size in the IRPG (page 8) is:

$$4 \times \text{Flame Height} = \text{Safe Separation Distance}$$

To make estimations of flame height though, you either have to use past fire behavior observations or use your experience to guess what the fire may do in the future. After a decade of research, Bret Butler, at the Missoula Technology and Development Center, suggests removing the uncertainty and guesswork that comes with estimating flame height by taking the general rule of thumb: Flame Height = 2 x Vegetation Height

...and substituting that Flame Height equation into the original IRPG equation, to give:

$$4 \times 2 \times \text{Vegetation Height} = \text{Safe Separation Distance, which simplified is:}$$
$$8 \times \text{Vegetation Height} = \text{Safe Separation Distance}$$

But remember, that's still for **radiant heat** only, on flat ground, with no wind. To take into account the **convective heat** from slope or wind, Butler's research suggests that a "Slope Wind Factor" is needed in the equation:

$$8 \times \text{Vegetation Height} \times \text{Slope Wind Factor} = \text{Safe Separation Distance}$$

But what is the Slope Wind Factor? Current research is indicating that the Slope Wind Factor is between 1 and 10; with Butler arguing it may be closer to between 1 and 5. Butler's ongoing research is focused on answering that question by gathering sensor data on fires, running computer simulations, and refining the models...Stay tuned.

In the meantime, utilize the calculations on page 8 of your IRGP to help you determine a bare minimum size for your safety zone with the understanding that slope and wind need to be considered in your decision making.

But remember, a safety zone is only good if you can get there...join us tomorrow for some thoughts on Escape Routes.