



**SOUTHERN
Fire Exchange**

Uniting Fire Science and Natural Resource Management



SFE 10 Minutes 2014-1

10 Minutes with the Southern Fire Exchange: Gary Curcio

10 Minutes is an interview series where the Southern Fire Exchange talks with experts, leaders, and sages in southern wildland fire management and research. In this interview, the SFE speaks with Gary Curcio, a North Carolina based smoke and fire behavior expert with IPA Fire Environment Specialists, LLC.

What are the unique smoke and emissions issues that face southern burn managers?

“From my perspective, unique smoke, and emission issues are:

1. Prescribed fire takes place within complex air sheds where fuels, weather, topography, and human demographics need to be assessed daily for Go / No-go decisions to burn.
2. In the South, the human demographic is a very important issue when evaluating wildland fire smoke impacts. These can be from a nuisance, health standpoint or safety threat posed to transportation corridors. It is the potential impact of wildland fire smoke to smoke sensitive areas (SSA) that requires evaluation and therefore, is an important criterion that drives prescribed or wildfire decisions. With the impacts to SSA being either a nuisance, health or safety concern, all surface and ground fuels need to be sized up as to ignitability. Unfortunately, compared to many surface fuels, less attention is paid to, and information is known about, ground fuels such as deep mountainous duffs or the organic soils of the Atlantic or Gulf Coastal Plains. Yet, these ground fuels can produce impacts that are 20 to 30 times more potent for emission contributions than normal surface fuels. How, many fire practitioners utilize the [National Fire Danger Rating System](#) as a tool to access what surface fuels will ignite?”

How well do you think southern prescribed fire managers are managing their smoke and emissions? In what areas do you see room for improvement?

“Fire managers are trying to be responsible when managing their smoke. However, our only option is to elevate our game, to learn and improve our skill level in managing wildland fire smoke better.

There is a sense of frustration that burning days are being missed by overly conservative smoke management programs. Smoke managers need to recognize the “Burning Window” and adhere to its time frames. These time frames are well identified from accurate fire weather intelligence provided by National Weather Service (NWS) Fire Weather or Spot Forecasts. As fire research provides answers, tools, and new information, access to this new operational intelligence needs to be made readily available so fire managers can readily train, assimilate and apply the new knowledge. There is a tremendous time lag from research development to operational use by fire managers in the field. This delay needs to be reduced and fire managers need to understand the information which would then aid in its use.”

Gary Curcio

Fire Environment Lead Forester

IPA Fire Environment Specialists, LLC

After earning a Master of Forestry from the Duke University School of Forestry, Gary was employed by the NC Forest Service where he eventually became the Fire Environment Branch Head while serving on several wildland fire committees. After retiring from the NCFS, his current work with IPA Fire Environment Specialists, LLC. emphasizes the enhancement of fire environment disciplines including prescribed fire, wildland smoke, fire weather, and fire research on sustained ignition in organic soils.



Where would you direct novice or even experienced burners to learn more about wildland fire smoke and emissions and how to project their dispersion?

“Review the literature and learn how to use simple smoke assessment tools as well as atmospheric dispersion models.

Every burner needs to be continuously developing their own prescribed fire / smoke management library and therefore elevating their knowledge base. Listed below are basic smoke publications that need to be included in any library:

- a. [Guide to Monitoring Smoke Exposure of Wildland Firefighters](#)
- b. [Managing Smoke at the Wildland Urban Interface](#)
- c. [Use of General Weather and Dispersion Index to Minimize the Impact of Smoke on Highway Visibility](#). This publication, along with the [NWS Fire Weather Point Matrix Product](#) that is enhanced for assessing smoke dispersion and superfog events, can go a long way towards understanding how smoke from prescribed fires or wildfires will impact SSAs or transportation corridors. These same enhancements are available for the NWS Weather Activity Planner, Hourly Graphical Weather or Area Forecast Matrix Products. If your state NWS office does not have these enhancements you can request that they add them in their Annual Operating Plan.

For more advanced fire practitioners, current dispersion models (VSMOKE, HYSPLIT, and PB-Piedmont) as well as the use of Blue Sky can be very beneficial in assisting smoke managers in assessing impacts of smoke plumes.”

What are some smoke and emissions questions or issues that you would like to see addressed by fire science researchers?

- a. “Expand the study of using the NFDRS Burning Index as a means to automate the estimation of emissions from prescribed fires. Expand to all fuel models as well as surface and ground fuels as well as to wildfires.
- b. Use the NASA SMAP satellite to estimate the availability of mountainous deep duffs and organic soils.
- c. The use of aerosol optical density as a means to estimate current surface PM 2.5.
- d. Real technical transfer and most importantly real technical support of new research information when it goes into field operations.
- e. An operational tool whereby ground fuels can be remotely assessed to determine availability to burn.”

Finally what is one ‘must-hear’ smoke or emissions related message that you would like to share with fire managers in the South?

“In the South there is a real concern of placing smoke on the highway (especially at night) and the potential fatal outcome it can cause through a superfog event. Smoke induced fog formation by prescribed fire or a wildfire can be assessed provided that NWS forecast products are equipped to generate the information and smoke managers or fire practitioners understand how to use the fire weather intelligence that is provided by the NWS. Our knowledge base needs to understand the “Burn Window” (its restrictive timeframe) and the weather elements that initiate natural fog formation. Also, we need to understand common indices (Atmospheric Dispersion Index and Low Visibility Occurrence Risk Index) and Turner Stability Class which can further substantiate the intelligence collected from the weather elements on how wildland fire smoke is expected to disperse. For the South, the worst case scenario for any fire practitioner is smoke induced fog from a prescribed fire or wildfire that produces a superfog event (where visibility is less than 10 ft.).”

Special thanks to Gary Curcio for sharing his perspectives and for being part of our 10 Minutes interview.

Do you have something to say? The SFE Discussion Forum is the perfect place to build on Gary’s responses and share your comments, questions, and ideas with the southern fire community.

For more information on the Southern Fire Exchange, visit www.southernfireexchange.org.



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