

# Agricultural Burning in NE Arkansas – What it's Costing Us



# Introductions



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# Outline

- I Introductions
- II The Problem
  - What is happening? Why it's happening and what it's costing.
- III The Solutions
  - What should the goals be? What are the possibilities?
- IV Next Steps

# The Problem

- WHAT is happening?
- We live in farm country!
- Wheat, soy beans, cotton, corn, peanuts, and rice crops surround us.
- Approximately 70,000 acres planted in rice in Craighead Co. 100,000 acres in Poinsett Co.
- More than 1 million acres of rice in Arkansas.



# The Problem

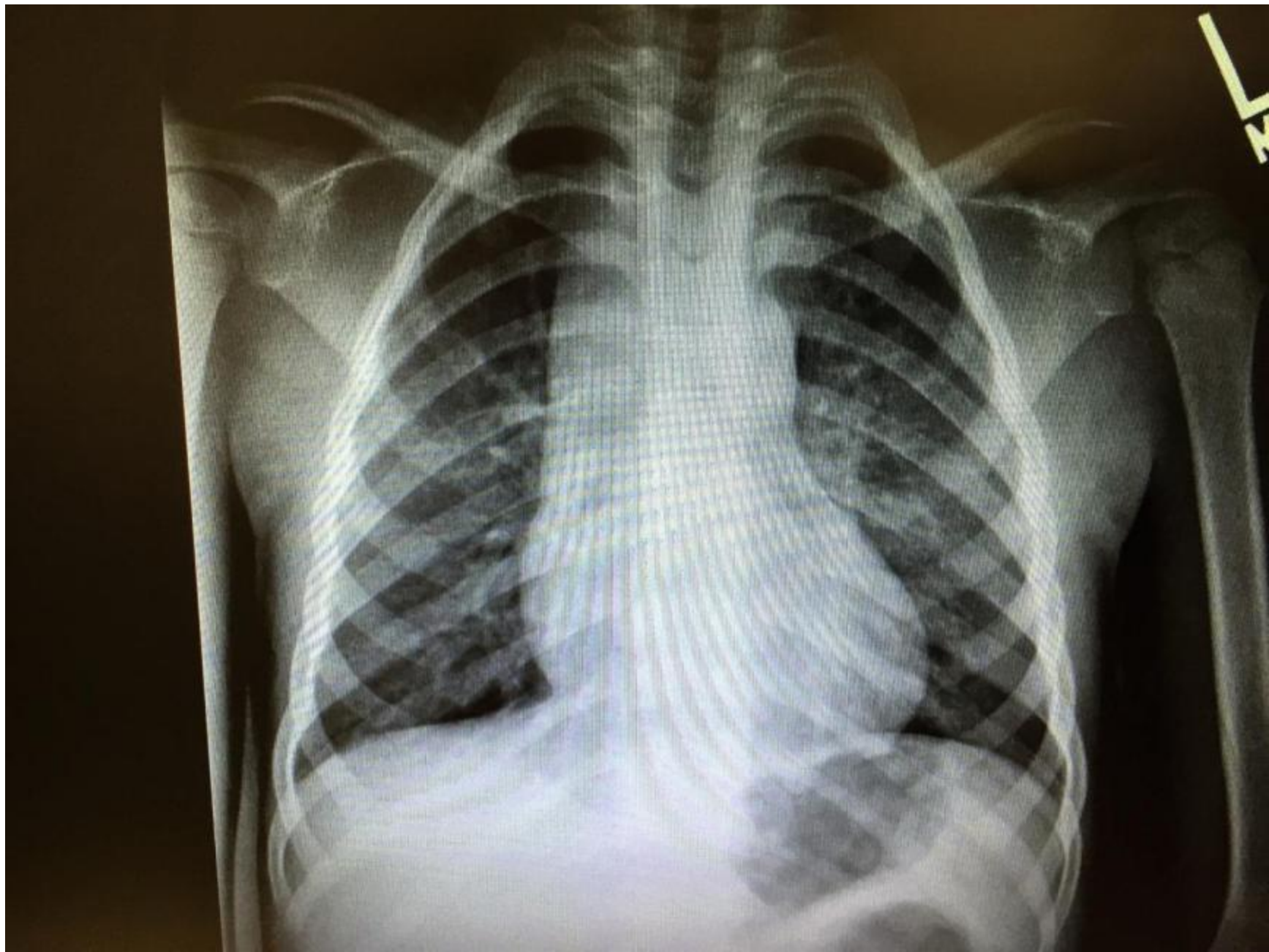
- After harvest: rice stubble – it's good for nothing.
- Each Fall, the majority of rice stubble is burned.
- The burning is essentially unregulated and unmonitored.
- The cumulative smoke cloud is presenting a significant health risk to NE Arkansas residents.











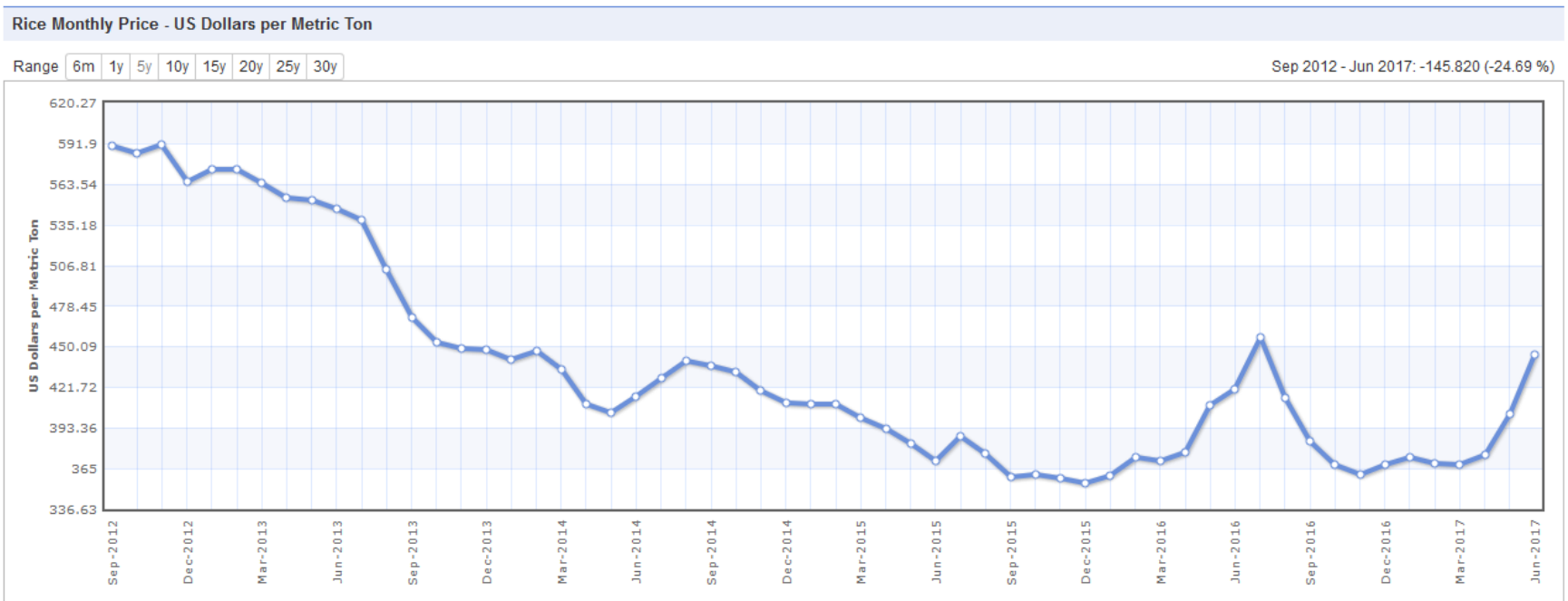
# The Problem

- The Options: (Brannon Theisse, Jim Grisham)
- Burn it – cheapest by far
- Till (disk) it under- \$15/acre; takes 2-5 passes
  - Dry Fall favors burning
  - Hybrid rice is more resistant to degradation
  - Sometimes both are necessary.
  - Crop rotation..
  - Commercial use for stubble =0

# The Problem

- Farmers are under financial stress..
- 96% of domestic rice is exported, and the world market price has decreased significantly over past 5 years.
- Mr. Theisse (May 2017) – The one million acres estimated to be planted in rice this year is the lowest figure in 30 years.

# Price of Rice (Last 60 Months)



Source: index mundi



# The Problem

- Current **regulations** on burning are almost non-existent
- Womack, Phelps & McNeill – 2011:
  - ADEQ monitors but has no enforcement powers on agricultural burning.
  - County sheriffs have some regulatory power relating to highway safety. Farmers are asked to notify their office prior to burning
  - Burn bans do not apply to farmers!
  - No fees, no disincentives, no regulation relating to public health.

# The Problem

- The COSTS:
- Medical experience – every Fall, area providers see an increase in asthma, bronchitis, sinusitis, worsening COPD, and other respiratory conditions.
- Happening for years – more pronounced over past few seasons

# The Problem

- What's in agricultural smoke?
- Carbon monoxide, nitrous oxides, ammonia, ozone, sulfur dioxide, methane, particulate carbon (PM 2.5 – PM 10) + ?
- These are toxins! Agricultural smoke is not just a nuisance.
- What does it do to us? Just look at **particulate carbon**:
- Worsens breathing effort, decreases oxygen in adults with COPD/emphysema

# The Problem

- Increases frequency/severity of respiratory infections
- Exacerbates wheezing in asthmatics
- PM 2.5's enter the blood stream and increase the risk of heart attacks
- How do we know?
- EPA, multiple independent studies, AND our own experiences. These are the very things we see in our patients.

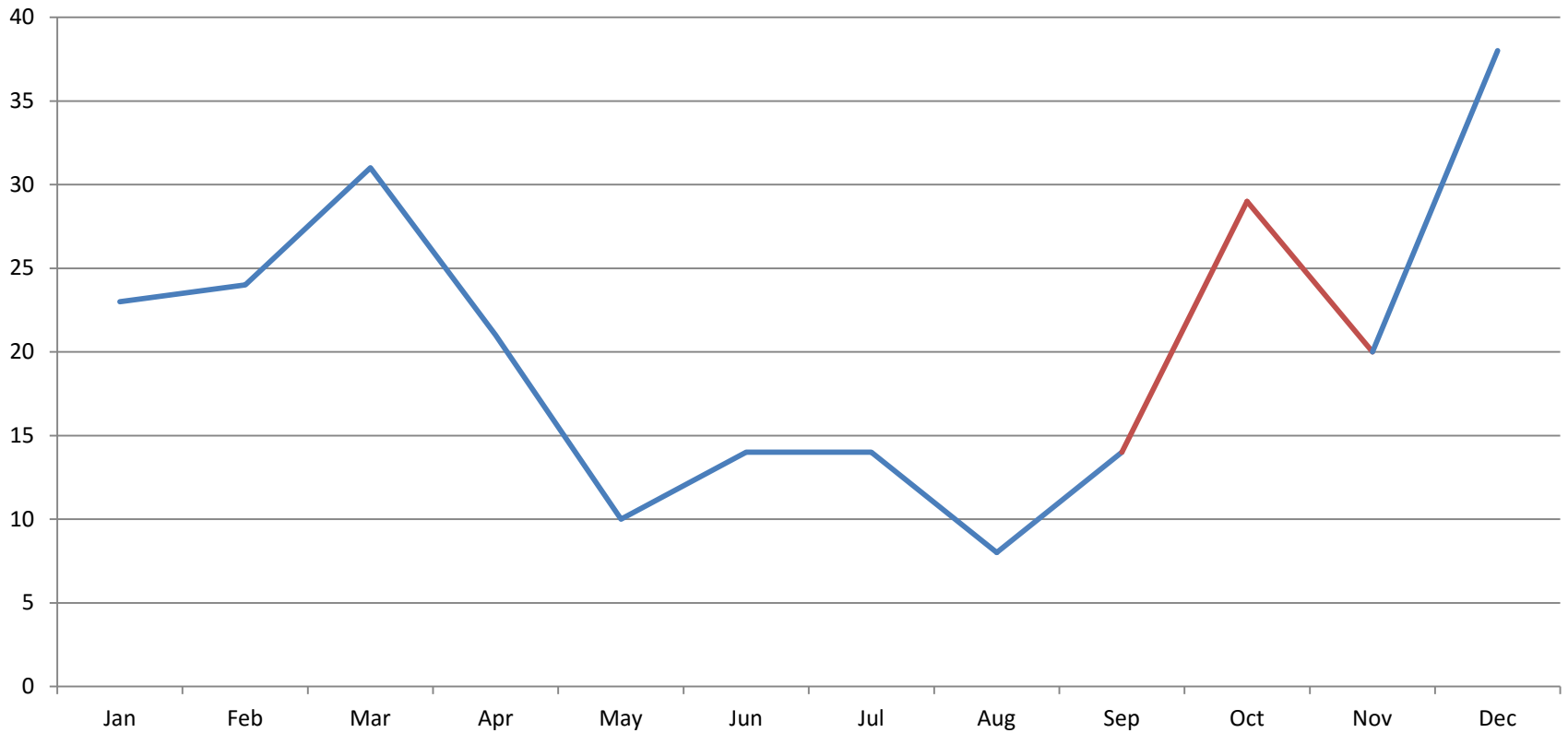


# The Problem

- For each 10 microns per cubic meter increase in the chronic daily concentration of small particulate carbon, there is a 3% increase in COPD hospitalizations (EPA) and a 7% increase in mortality for older Americans (NEJM).
- Moderately high (PM<sub>2.5</sub> of 30 ug/m<sup>3</sup>) intermittent exposures cause asthma flair-ups in children that can last for days (Epidem.)
- Small particulate carbon is a serious health hazard!

# The Problem

**Claims Data for Respiratory Illnesses - SHARP  
2014 - 2016**



# From the mother of a family of eight living near Jonesboro:

“Harvest season is fiercely dreaded by my family.”

“There are days that the air quality near our home is so bad that just walking outside to our automobile will result in an asthma attack for one or more of us.” “During the burning of the harvested fields, there are many days my children must spend their recess inside as a result of the smoke from the surrounding burning fields.” “I believe the farming practice of burning harvested fields is a risk asthmatics should not have to endure.”

The undersigned physicians of Northeast Arkansas would like to express an urgent concern about the adverse health effects of agricultural burning in our area. Each Fall, the air we breathe is repeatedly contaminated with smoke from the burning of crop residue. That smoke contains toxins including particulate carbon, nitrogen oxide, sulfur dioxide, ammonia, and carbon monoxide, and presents a significant health risk to the citizens of N.E. Arkansas, especially those with underlying medical conditions. We would encourage the State of Arkansas to adopt any means necessary to reduce this hazard. (Drafted 8/29/16)

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# The Problem

- How do we measure it?
- ADEQ has monitoring stations at Newport and Marion that record 24 hour averages for carbon and other toxins
- No capacity for spot measurements or more monitoring stations
- Doesn't capture the random and localized nature of agricultural burning

# The Problem

- If you want something done right....
- EPA Air Sensor Guidebook – Aerocet 831 Aerosol Mass Monitor
- I & my staff took daily afternoon readings from Sept. 1 through Nov. 30, 2016 in downtown Jonesboro (Church & Matthews)
- We've resumed recording June 1, 2017.



**PM 2.5 levels:** Good = 0-12.5 ug/m<sup>3</sup>; Moderate = 12.6-35.4 ug/m<sup>3</sup>

Unhealthy for Sensitive Groups = 35.5—55.6 ug/m<sup>3</sup>; Unhealthy for Everyone = 55.5-150.4 ug/m<sup>3</sup>

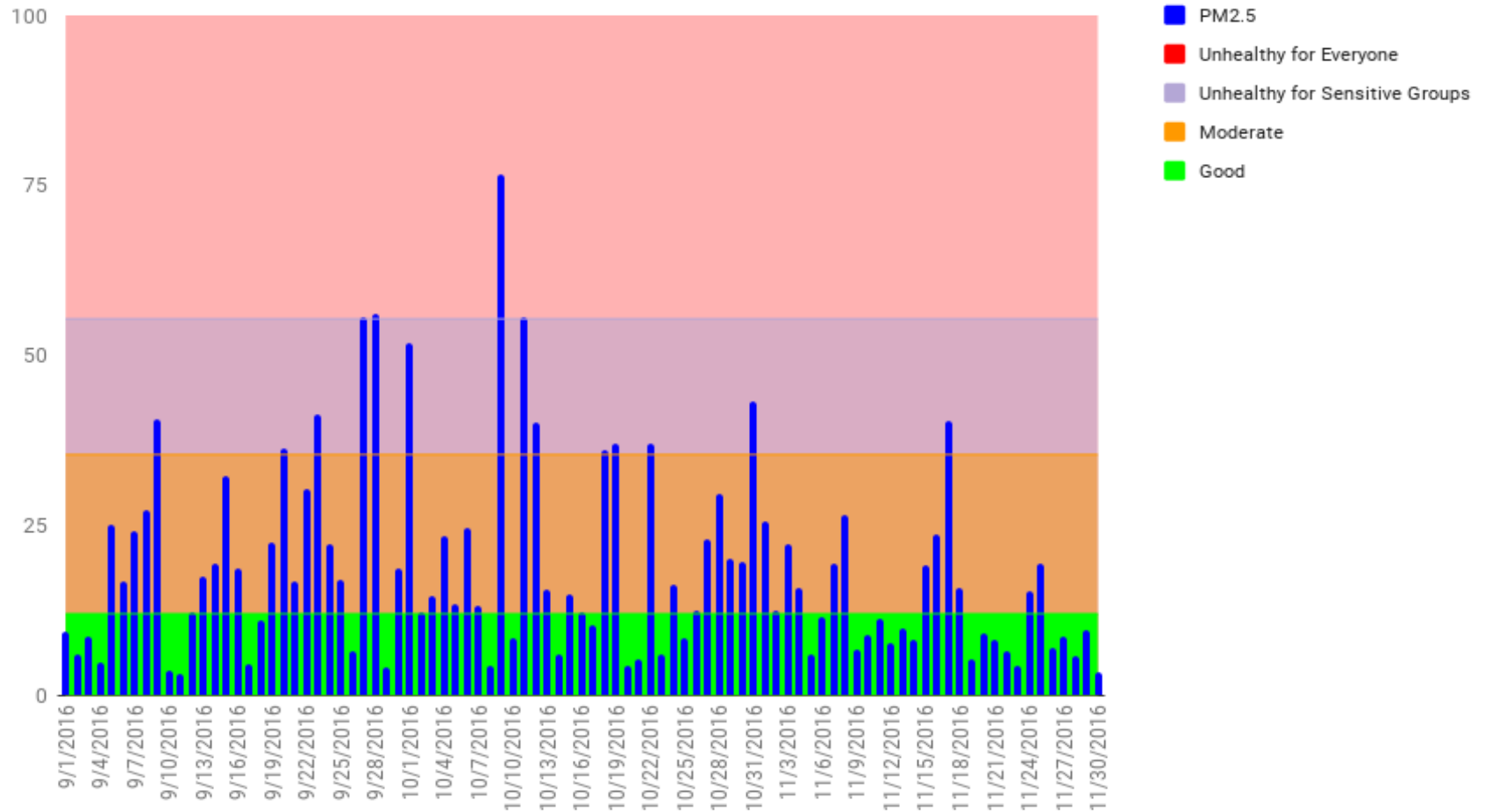
## Air Quality Guide for Particle Pollution

Harmful particle pollution is one of our nation's most common air pollutants. Use the chart below to help reduce your exposure and protect your health. For your local air quality forecast, visit [www.airnow.gov](http://www.airnow.gov)

Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good (0-50)		It's a great day to be active outside.
Moderate (51-100)	Some people who may be unusually sensitive to particle pollution.	<b>Unusually sensitive people:</b> Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier. <b>Everyone else:</b> It's a good day to be active outside.
Unhealthy for Sensitive Groups (101-150)	Sensitive groups include <b>people with heart or lung disease, older adults, children and teenagers.</b>	<b>Sensitive groups:</b> Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. <b>People with asthma</b> should follow their asthma action plans and keep quick relief medicine handy. <b>If you have heart disease:</b> Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.
Unhealthy (151-200)	<b>Everyone</b>	<b>Sensitive groups:</b> Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling. <b>Everyone else:</b> Reduce prolonged or heavy exertion. Take more breaks during outdoor activities.
Very Unhealthy (201-300)	<b>Everyone</b>	<b>Sensitive groups:</b> Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better. <b>Everyone else:</b> Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.
Hazardous (301-500)	<b>Everyone</b>	<b>Everyone:</b> Avoid all physical activity outdoors. <b>Sensitive groups:</b> Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.

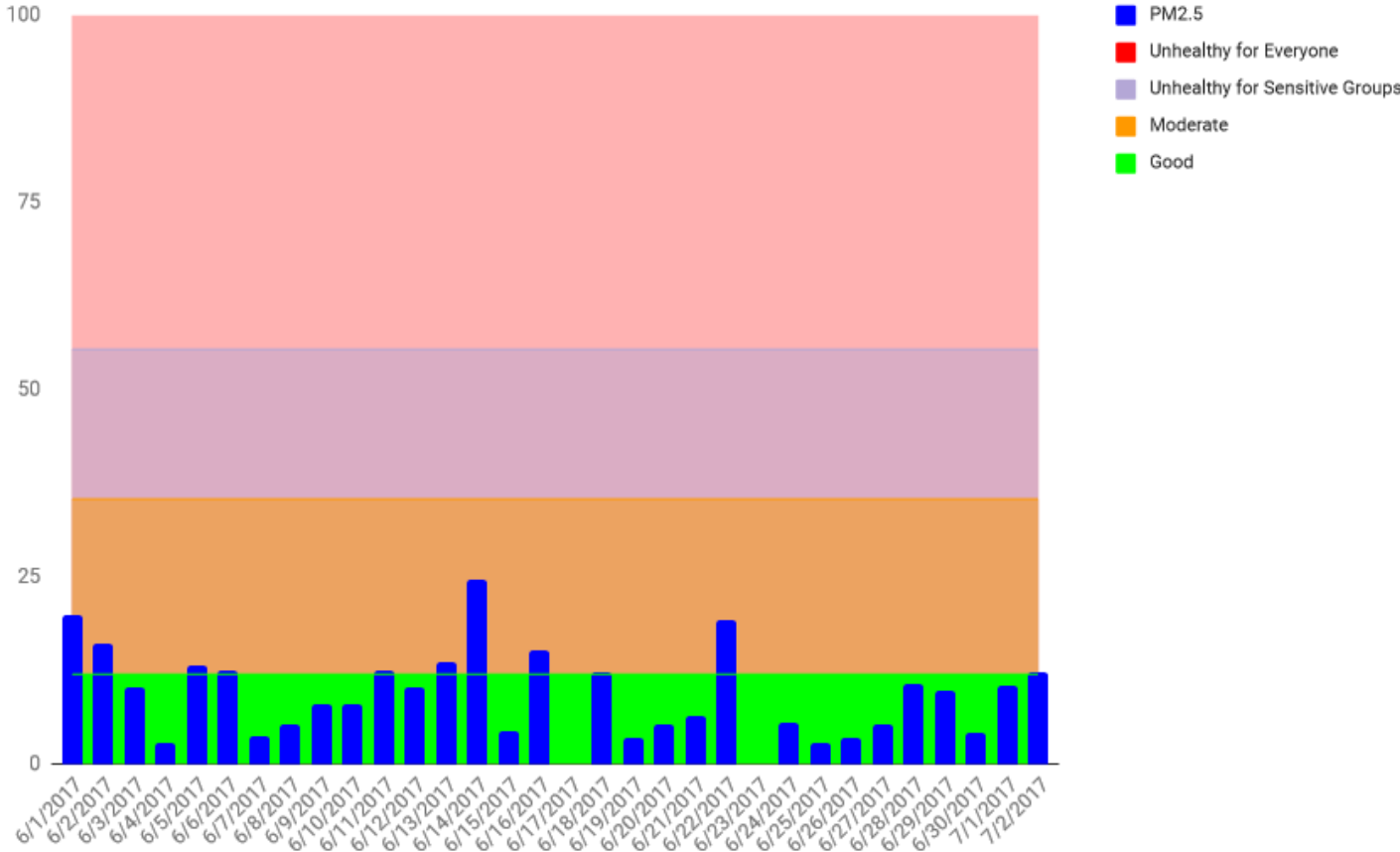
# Small particulate Carbon -Fall 2016

PM2.5  $\mu\text{g}/\text{m}^3$

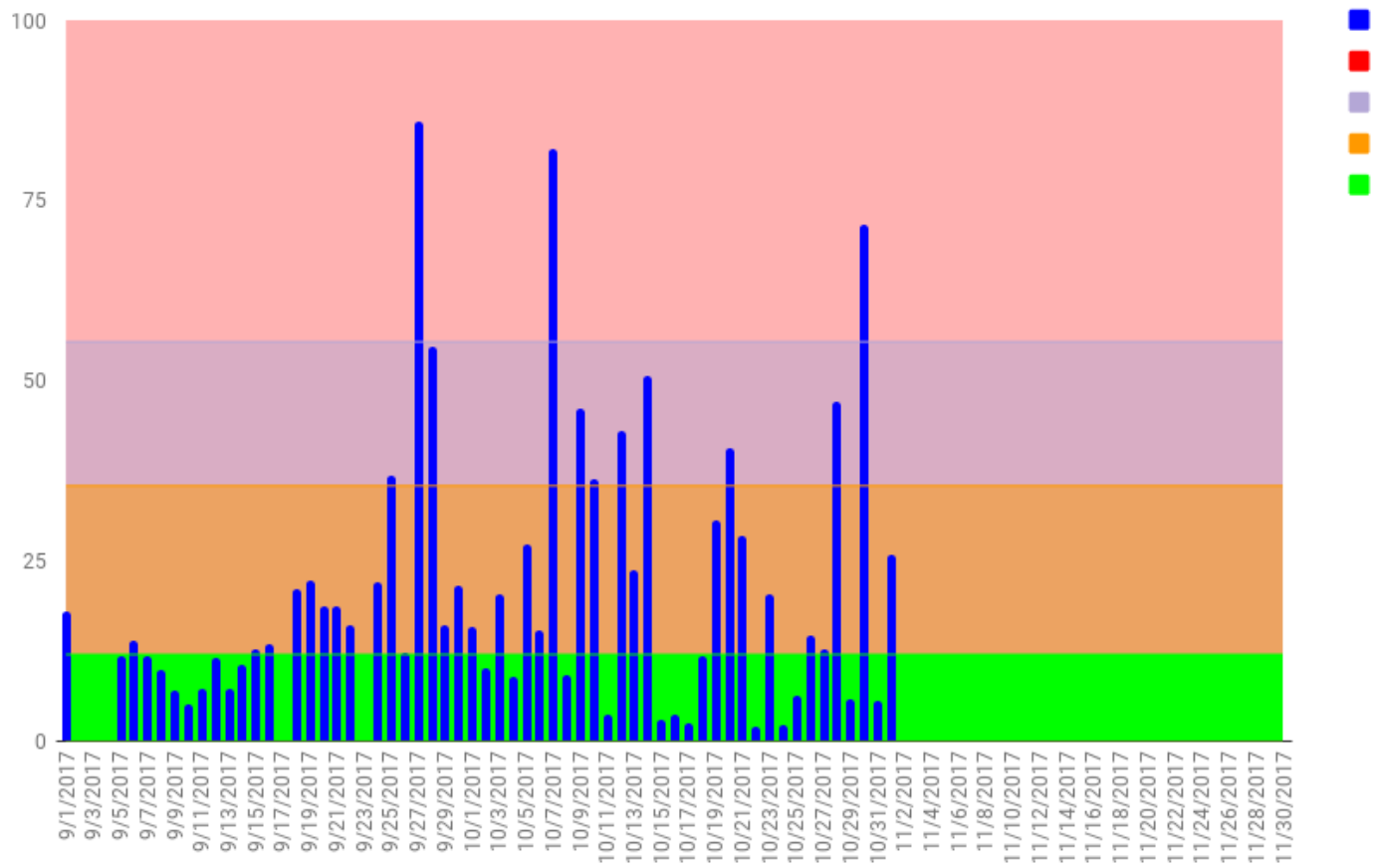




### PM2.5 $\mu\text{g}/\text{m}^3$ Summer 2017



### PM2.5 $\mu\text{g}/\text{m}^3$ Fall 2017



# The Solution

- What should the **goals** be?
- Decrease in total burning
- Eliminate the spikes over population centers
- Least pain for farmers or taxpayers
- **Ultimate goal = to reduce a significant health burden that now exists**

# The Solution

- Three elements will likely be required:
- **Monitor**
- **Innovate**
- **Regulate**
- Monitor:
  1. There are too many gaps in air quality monitoring. We're not measuring the problem.



# The Solution

- ADEQ needs more funding and a clear mandate to enhance their surveillance throughout our regional population centers, to include spot checking capability
  - And we need a mechanism for real-time public advisories when levels present a hazard
2. We need a more robust analysis of hospital, ED, and insurance claims information to better clarify the health effects of agri. burning

# The Solution

## Innovate:

- Our Arkansas research and educational institutions (Schools of Ag/Coop. Ext. Service) need to be encouraged to consider public health in their best practice recommendations
- More research is needed in areas that include:  
improved options for cost effective management of crop residue, broader viable choices for crop rotation, and a more comprehensive look at burn patterns in the Fall.
- Dr. Jared Hardke and Yi Liang have made a start....  
Such efforts need to be strongly supported.

# The Solution

- Regulate:
- Our state's legislators have an important part to play in this issue; this is one – can't be done county by county
- The current bar for regulation of burning is not very high
- What are other states doing?

State	Crop Residue Burning Regulations
California	<ul style="list-style-type: none"> <li>• Requires a burning permit;</li> <li>• Burning only on burn days determined by local Air Districts in consultation with the California Air Resource Board;</li> <li>• Residues required to be shredded and piled when possible (CARB, 2006).</li> </ul>
Florida	<ul style="list-style-type: none"> <li>• Sugar cane farmers initiated burning oversight with Florida Department of Forestry (FLDOF) in 2004;</li> <li>• FLDOF issues burn permits between November and March (FLDOF, 2005).</li> </ul>
Louisiana	<ul style="list-style-type: none"> <li>• Farmers can burn during the daytime and are required to have certified Burn Managers at the burn (LSU Ag Center, 2000).</li> </ul>
Oregon	<ul style="list-style-type: none"> <li>• In 1991, House Bill 3343 established an open field burning acreage phase-down, propane flaming limitation, and residue burn permitting issued by the Oregon Department of Agriculture (ODA) for the Willamette Valley;</li> <li>• 102,500 acres of grass seed and cereal residues can be burned per year, which is enforced through aerial and ground surveys;</li> <li>• ODA has the right to fine growers that burn on no-burn days (ODA, 2007).</li> </ul>
Washington	<ul style="list-style-type: none"> <li>• Washington Department of Ecology (DOE) under the 1991 Clean Air Act of Washington issues all burning permits and determines burn days based on atmospheric conditions and U.S. Forest Service fire danger ratings;</li> <li>• Cost of permits are \$2.00 per acre to be paid by the farmers;</li> <li>• DOE can fine farmers \$10,000 for any illegal crop residue burning;</li> <li>• DOE uses aerial photography, tip hotline, and remote sensing for enforcement (WA DOE, 2005).</li> </ul>

Table 1. State-level regulations for crop residue burning in California, Florida, Louisiana, Oregon, and Washington.

# The Solution

- What will work for Arkansas?
- A permit system with oversight and enforcement? With a mechanism for alerting residents within the air shed? (note the Smoke Management Program in use by our state foresters)
- Burning fee vs tax credit for non-burning alternatives – graduated phase in?
- Grants and mandates to fund more and better research and more extensive monitoring?

# Arkansas Voluntary Smoke Management Guidelines



Arkansas  
Forestry  
Commission

[forestry.arkansas.gov](http://forestry.arkansas.gov)



**GUIDELINES FOR WHEN TO BURN  
AND HOW TO MANAGE SMOKE**

**BEFORE YOU BURN, CALL 1-800-830-8015**



# The solution

- Next Steps:
- Expand the dialogue – with relevant agencies, committees, farmers, medical caregivers, other stakeholders including area residents. Many have urgent concerns.
- We need your involvement – to establish consensus on a few specific goals and a roadmap to achieve them.
- There is more to learn, but we know enough to take action.





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**THANK YOU!**

# Sources

- Joseph Bates MD, Gary Wheeler MD, and Richard McMullen PhD - Arkansas Dept. of Health
- Mark McCorkle – Air Quality Division, Arkansas Dept. of Environmental Quality
- Brannon Theisse – Craighead Co. Extension Agent
- Jim Grisham – Farm Management Service, Jonesboro AR

# Sources

- Yi Liang, PhD – Asst. Professor – Air Quality; University of Arkansas Div. of Agriculture
- SHARP-PHO; Quality Assurance Division
- EPA – Office of Air Quality Planning and Standards:

Air Sensor Guidebook

Air Quality Guide for Particle Pollution

Quantitative Health Risk for Particle Matter

# Sources

- Air Pollution and Mortality in the Medicare Population; Qian et.al.; NEJM; June 29, 2017
- Don McBride, Assistant State Forester – Resource Protection
- American Academy of Pediatrics: Pediatric Environmental Health – 3<sup>rd</sup> Edition; Chapter 21 – Air Pollutants, Outdoor

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- Effects of Agriculture Crop Residue Burning on Children and Young; PFT's in N.W. India; Science of the Total Environment; Amit Awastie et.al; July 2010
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