Lead (Pb) Emissions from Wildland Fires

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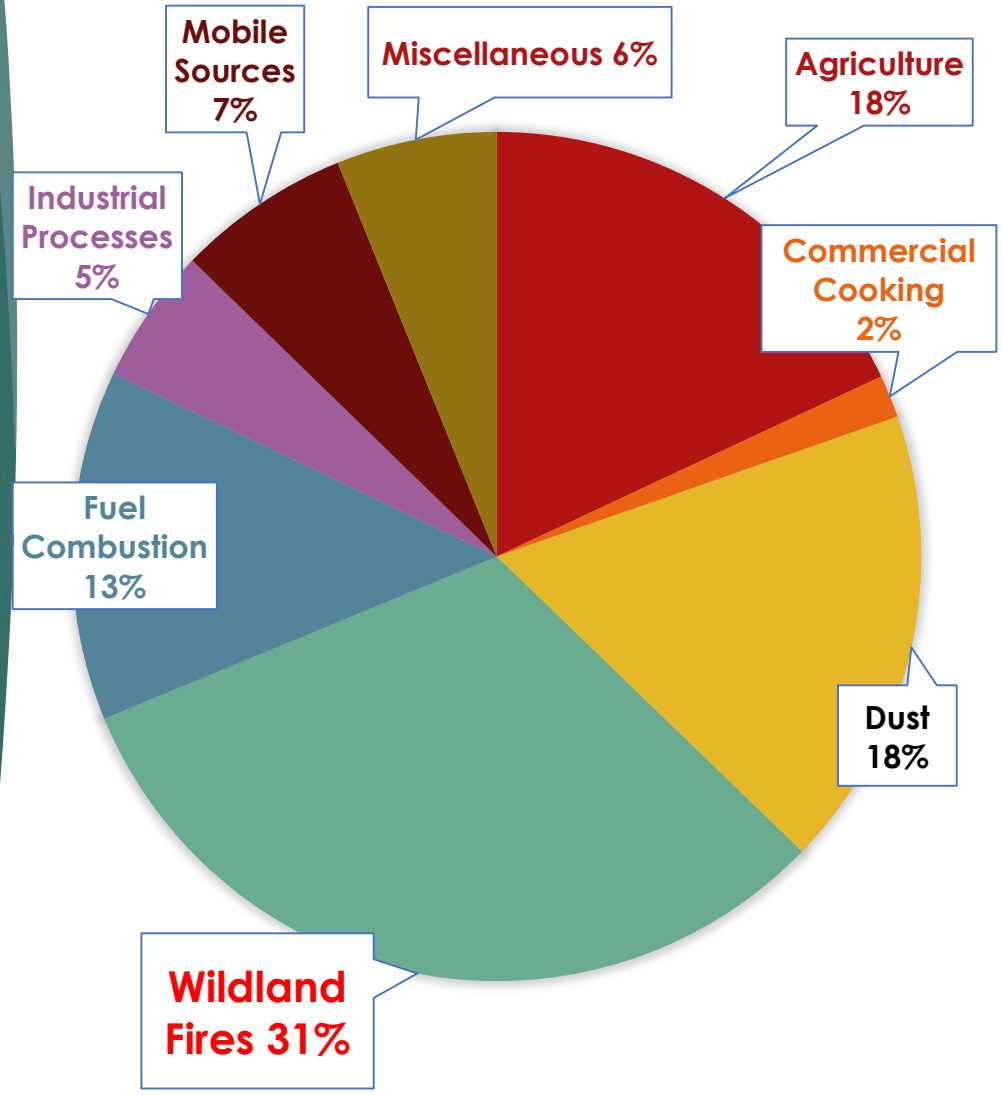
Why are Pb emissions from fires important?

- Pb is an EPA criteria air pollutant with numerous health risks
- Fires are the largest source of fine particulate matter ($PM_{2.5}$ or PM) in US
- PM from fires are primarily carbonaceous, but contain many other elements at low concentrations, including Pb
- Given significant PM emissions from numerous fires, these trace level elements may be emitted in substantial concentrations, in aggregate
- We have never inventoried Pb from fires, but the risk assessment research community requested more information

PM2.5 emissions in the 2014 NEI



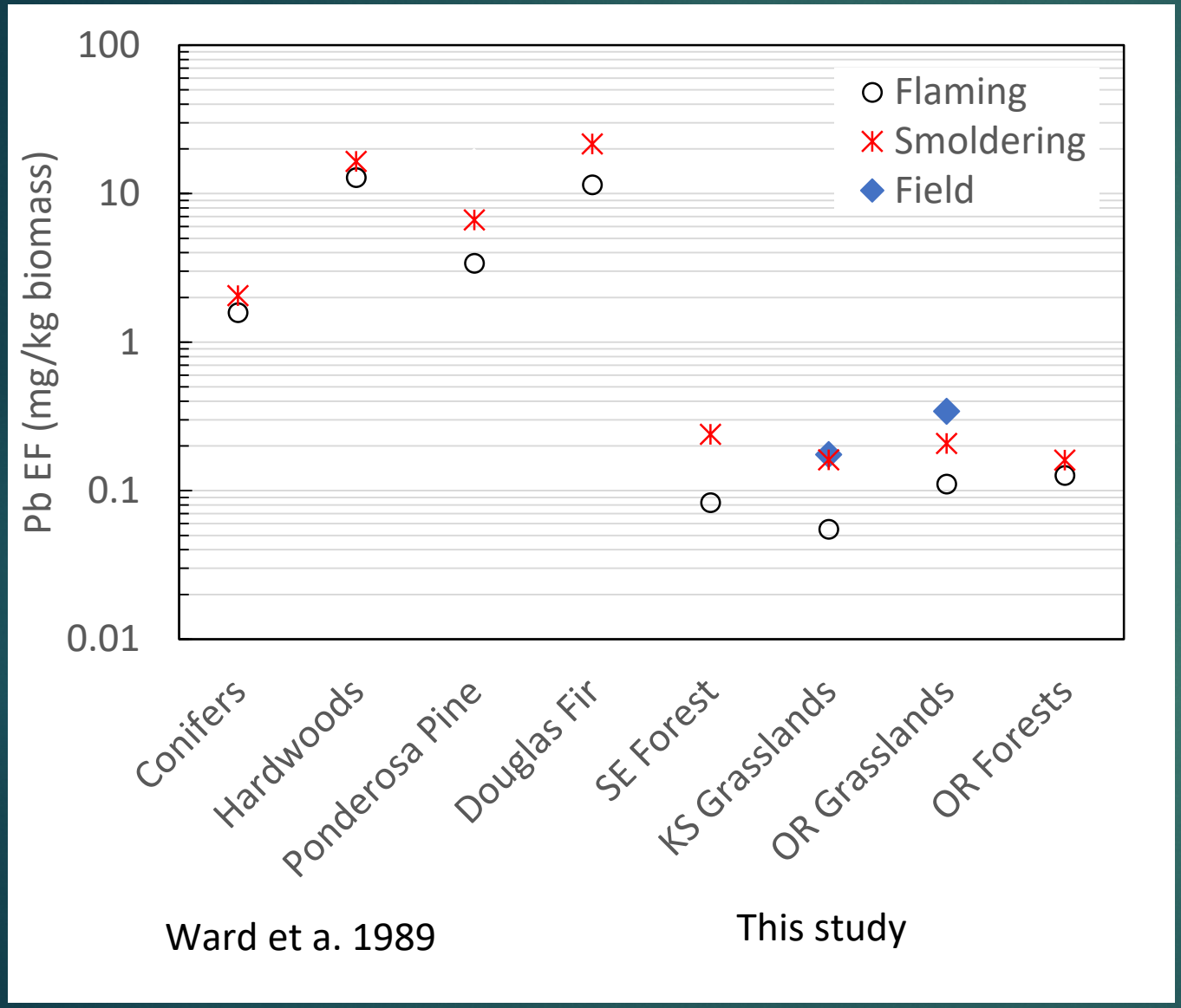
Measuring Pb Emission Factors (EFs) from fires

- PM sampled from a series of prescribed (Rx) fires and laboratory simulations
- Increased sample mass and analytical sensitivity to optimize Pb limit of detection
- More robust and complete results coming from inductively coupled plasma – mass spectroscopy soon
- More samples from wider geographic areas are still needed to capture the variability of Pb in the environment

Biomass Type	Fire Type	Location
Tallgrass Prairie	Rx	Flint Hills, KS
Grassland	Rx	Sycan Marsh, OR
Loblolly Pine/Hardwood	Lab	RTP, NC
Lodgepole/Ponderosa Pine	Lab	Missoula, MT
Moss/Peat	Lab	Boundary Waters, MN

Preliminary results from X-Ray fluorescence spectroscopy on a limited number of samples are shown on next slide

Draft Results and comparison with literature



Pb emissions factors above the detection limit ranged from 0.003 to 10.2 mg/kg biomass and are substantially lower than previously reported values in the literature

Overall, Pb emission factors vary over ~ 4 orders of magnitude

Smoldering combustion emits more Pb and was comparable to values observed in the field

The lower Pb emission factors may be due to the lower levels of Pb in the environment due to the phase out of leaded fuel

Impacts and next steps

- Back of the envelope calculations based on these new/draft EFs and draft 2017 wildland fire activity result in ~ 500 tons of Pb from WLFs
- As such, fires would be the leading inventoried source of Pb emissions in US, supplanting piston-engine aircraft as largest source
- Vetting and review will be required before we include Pb emissions for fires in the NEI
- EPA will evaluate for the 2020 NEI cycle

2014 NEI Pb Emissions

SECTOR	Pb Emissions (Tons)
Mobile - Aircraft	456
Industrial Processes - Ferrous Metals	52
Industrial Processes - NEC	50
Fuel Comb - Electric Generation - Coal	41
Industrial Processes - Non-ferrous Metals	29
Fuel Comb - Industrial Boilers, ICEs - Oil	17
Waste Disposal	14
Fuel Comb - Industrial Boilers, ICEs - Coal	11
Fires	0
Total Pb Emissions in the 2014 NEI	730