



Missoula Air Quality and Sustainable Heat

Seeking Sustainability Lecture Series

Benjamin Schmidt

February 20, 2020



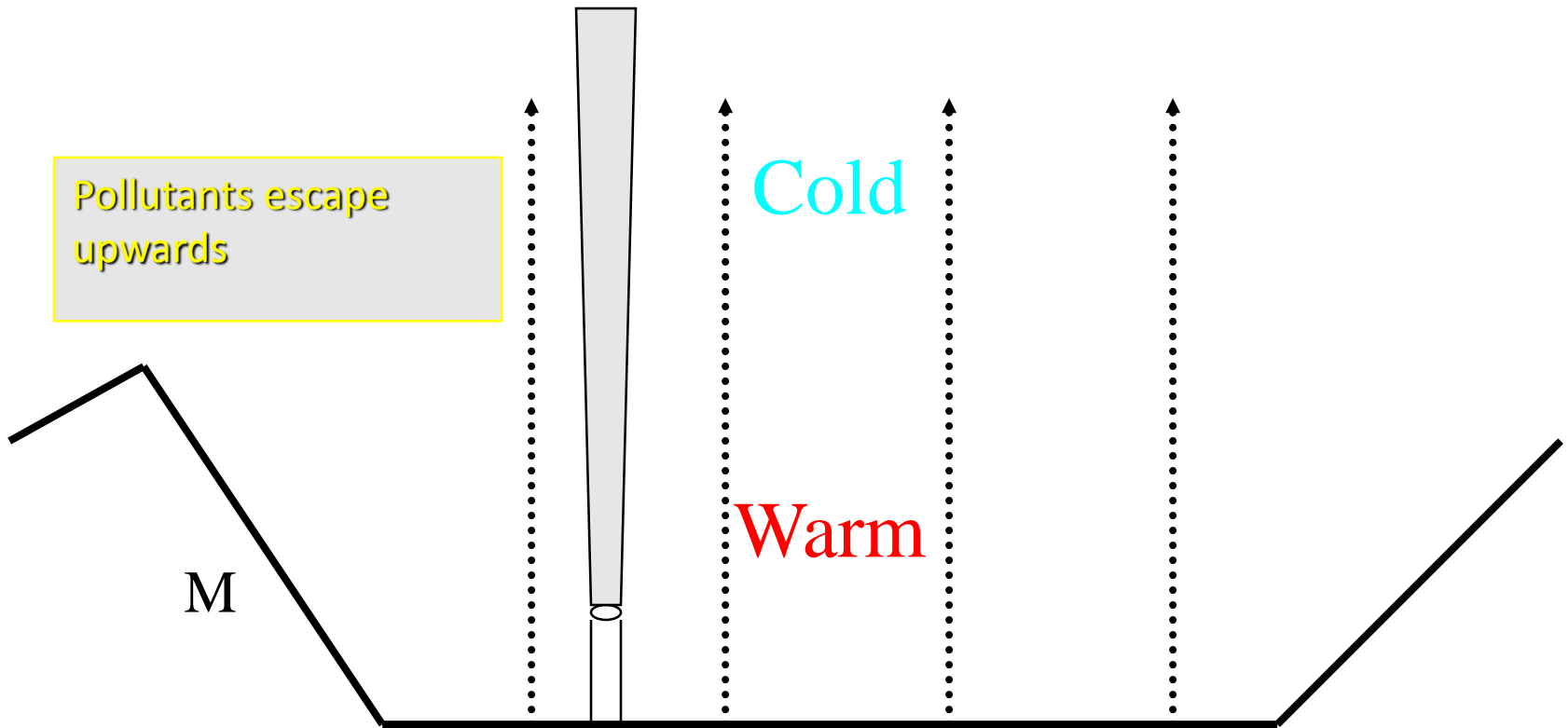
Historic Missoula Valley



Topography and Inversions Trap Air Pollutants

- Mountain Valley Topography
 - City in a Bowl
 - Strong Winter Inversions
 - Woodstoves, Motor Vehicles, Industry etc.
 - Spring and Summer Heat Outs (turn on the furnace)

Unstable Air (Good Mixing!)

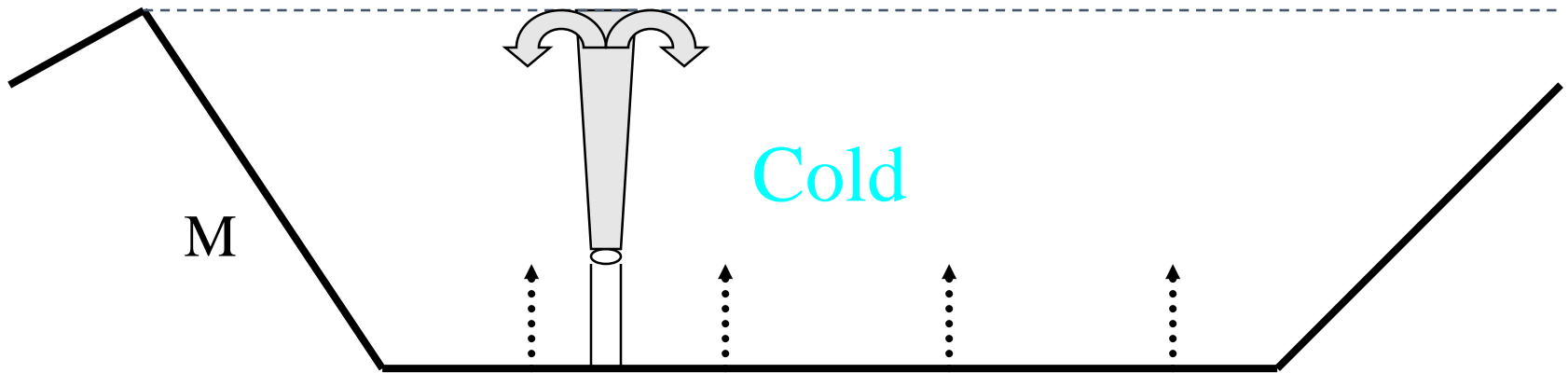


Stable Air (Inversion)

Pollutants are
trapped in the valley

Warm

Cold







What Air Pollutants?



★ Carbon monoxide (CO)



★ TSP – Total Suspended Particulate Matter
– Standard in 1970 (?) through 1987



★ PM₁₀ – Particulate Matter with diameter of 10 microns and smaller
– Standard in 1987, replaced TSP Standard
– Last violation of 24-hour PM₁₀ standard was in 1989

★ PM_{2.5} – Particulate Matter with diameter of 2.5 microns and smaller
– Became standard in 1997, revised in 2006 and revised again in 2012.

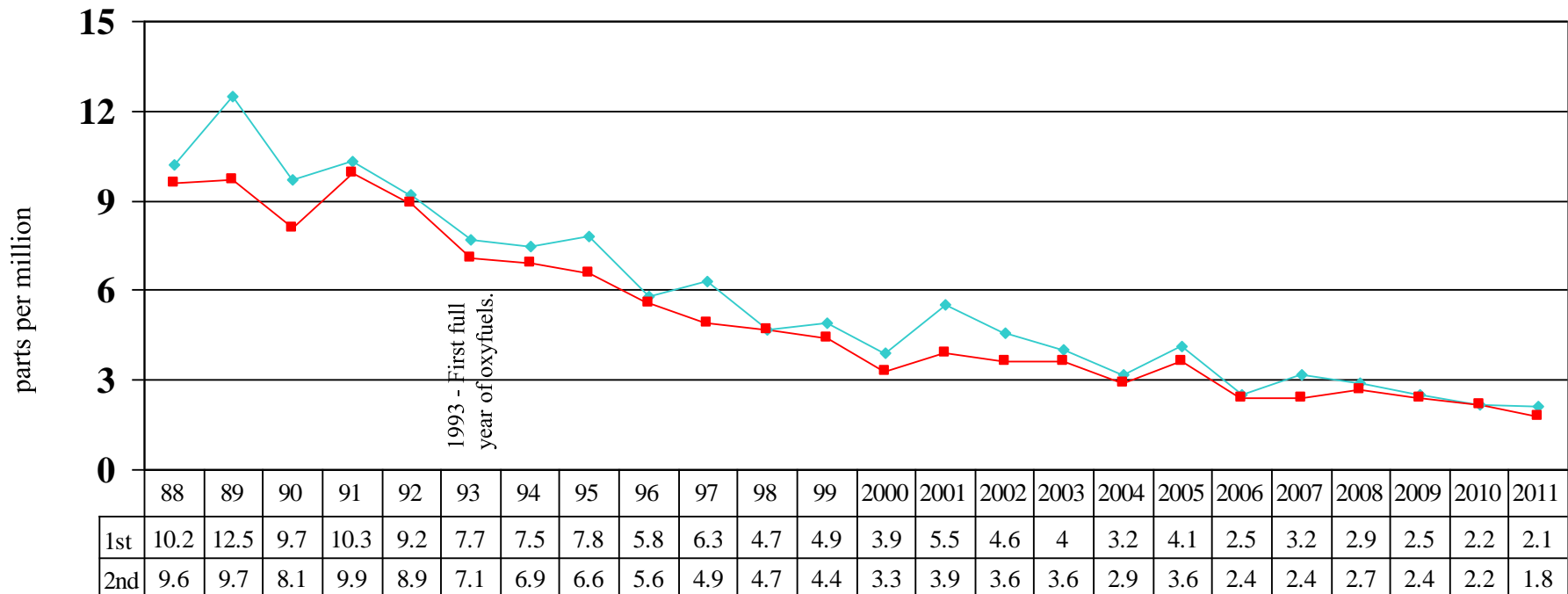


Missoula Air Pollution Sources

- ★ 1960's and 1970's, industry was largest source of air pollution
- ★ 1970's and 1980's, woodstoves were the largest source of air pollution
- ★ Woodstoves remain the largest source of pollution for PM-2.5
- ★ Motor vehicles are the largest source of carbon monoxide

Missoula Carbon Monoxide Levels

1988-2011 Malfunction Junction
1st and 2nd Highest 8-Hour Averages

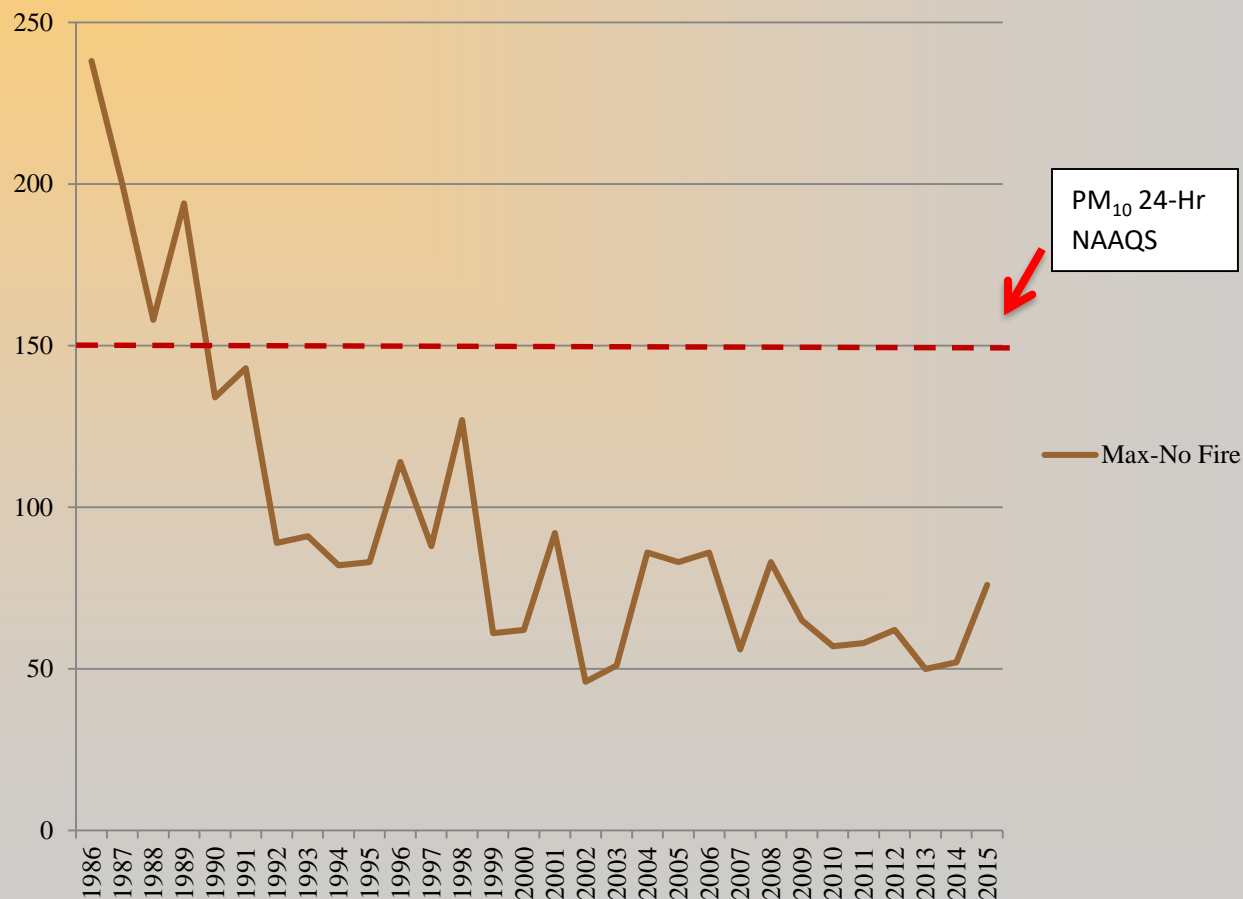


Federal 8-Hour Average Standard = 9 parts per million, not to be exceeded more than once per calendar year.

In 2006, the Malfunction Junction reconstruction was completed. CO monitoring ceased in 2011.

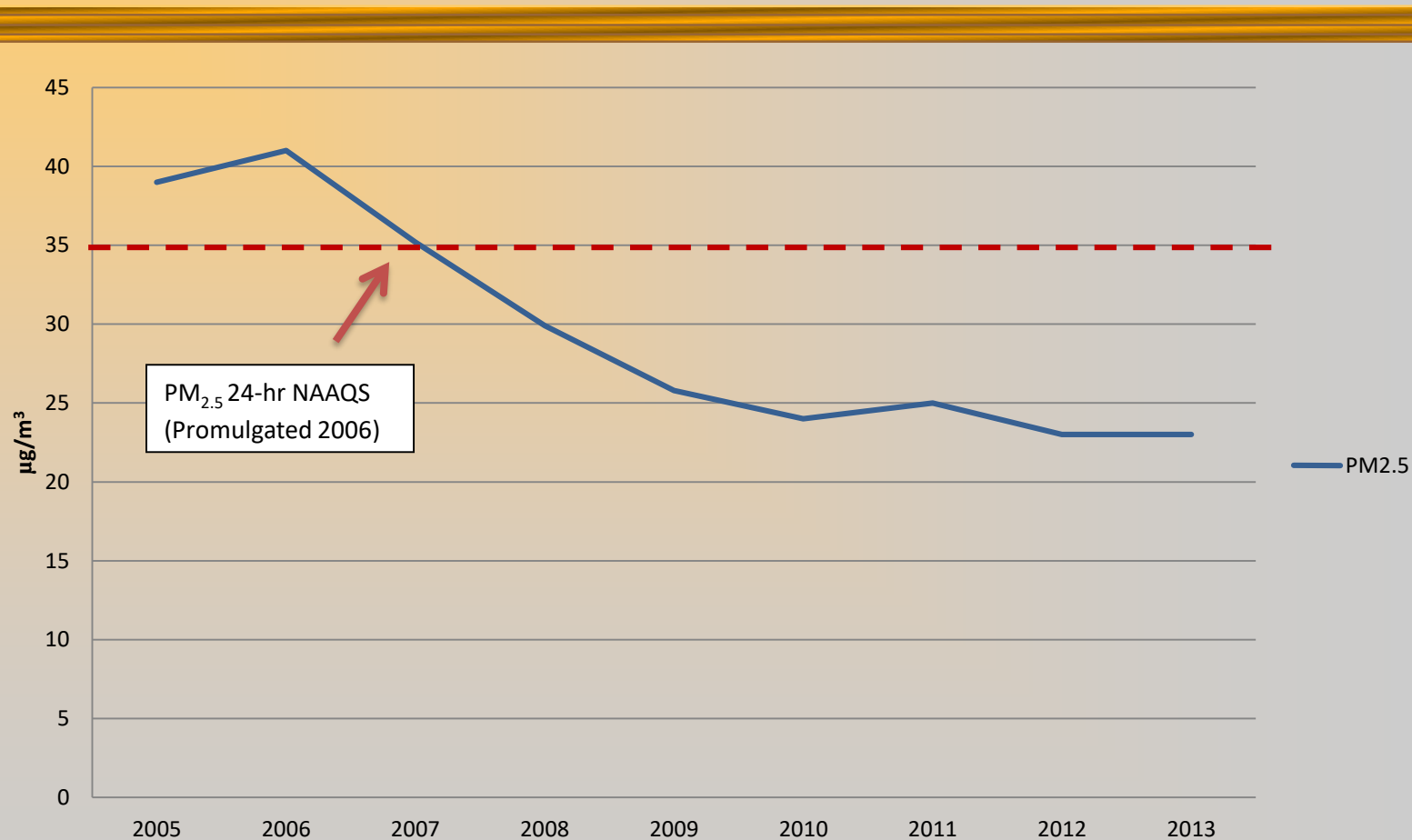


Boyd Park Maximum 24-Hour PM_{10} No Wildfire Data 1986-2015





Missoula 24-Hour $PM_{2.5}$ Design Values With Out Wildfires 2005-2013



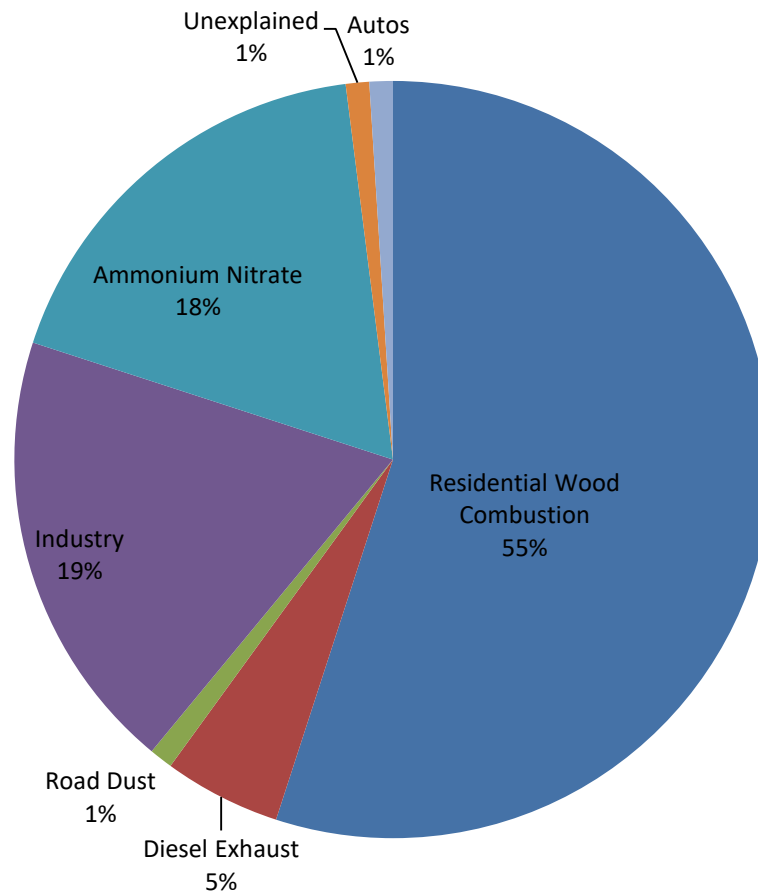


Why the Improved Particulate Matter Levels in the Air

- ★ Increased regulation and reduced emissions from industry.
- ★ More efficient woodstoves and reduced wood stove use (Stage I alerts).
- ★ Deicer replaced street sand.
- ★ Paving
- ★ More efficient/cleaner vehicles.
- ★ Outdoor burning coordination

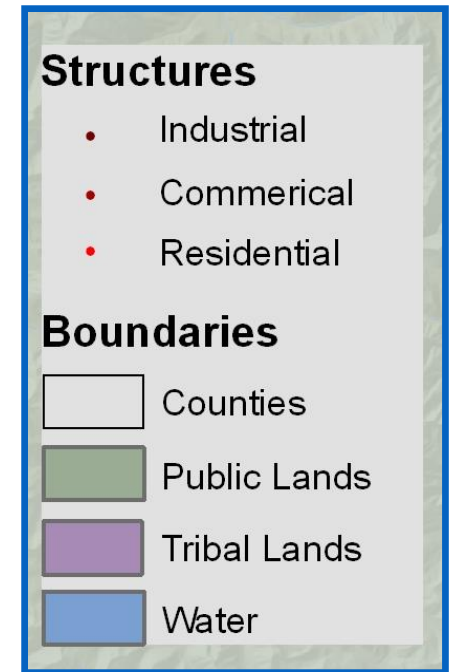
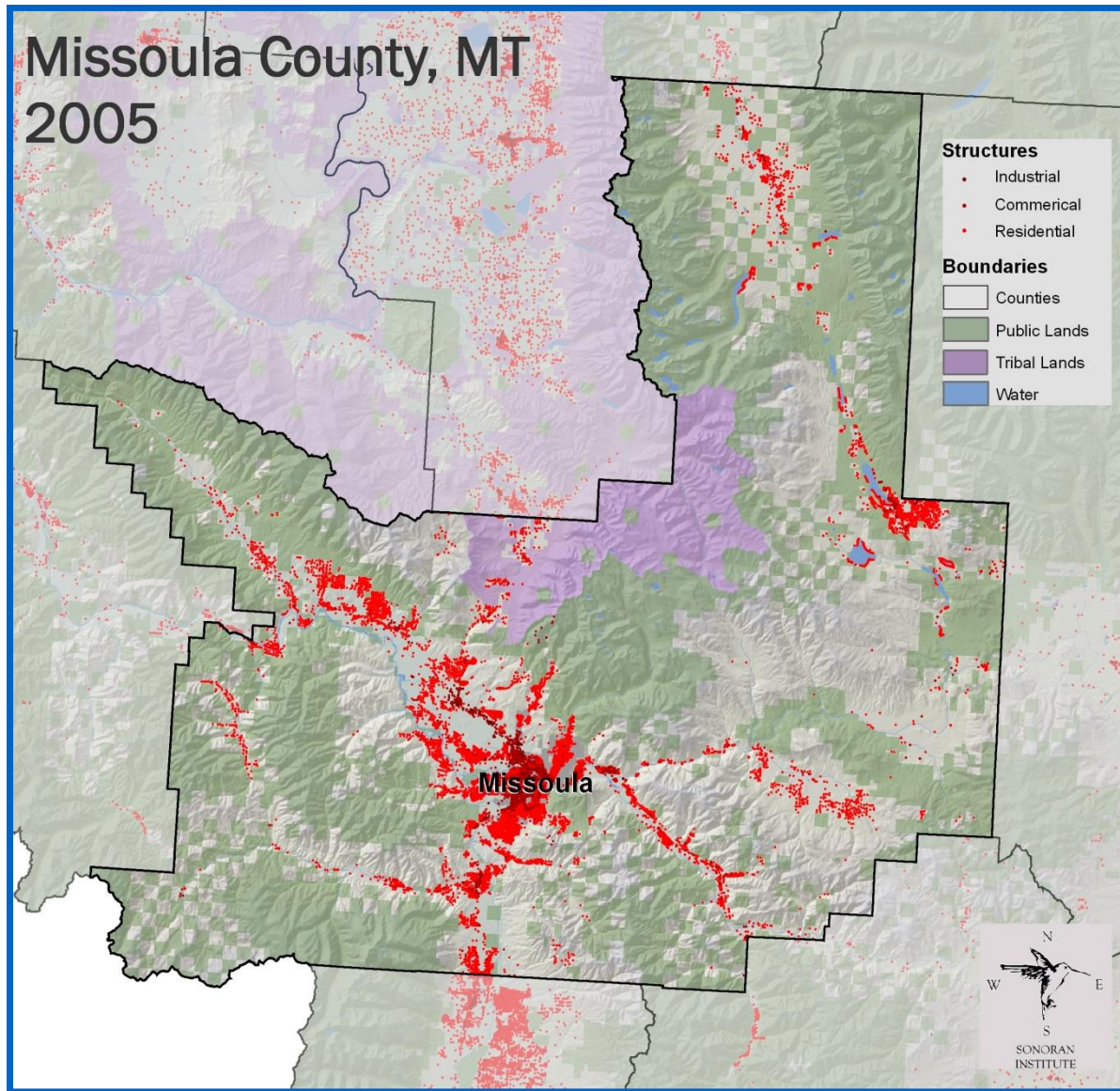


Missoula Winter PM_{2.5} Source Contribution Estimates, 2006-2007





Growth in Missoula County, 1905-2005



Source: The Sonoran Institute, Patty Gude

WELCOME TO
MISSOULA

Warning: The Montana Air Pollution Study Has
Determined That Breathing in This City May Be
Dangerous to Your Health.

THE GARDEN CITY

END

New Source Performance Standards for Solid Fuel Burning Devices

Step	PM Limit	Compliance Deadline
Step 1: Woodstoves and Pellet Stoves	4.5 grams per hour	May 15, 2015
Step 2: Woodstoves and Pellet Stoves	2.0 grams per hour with crib wood test 2.5 grams per hour with cord wood test	May 15, 2020