



# System and Data Requirements for Fire and Air Planning

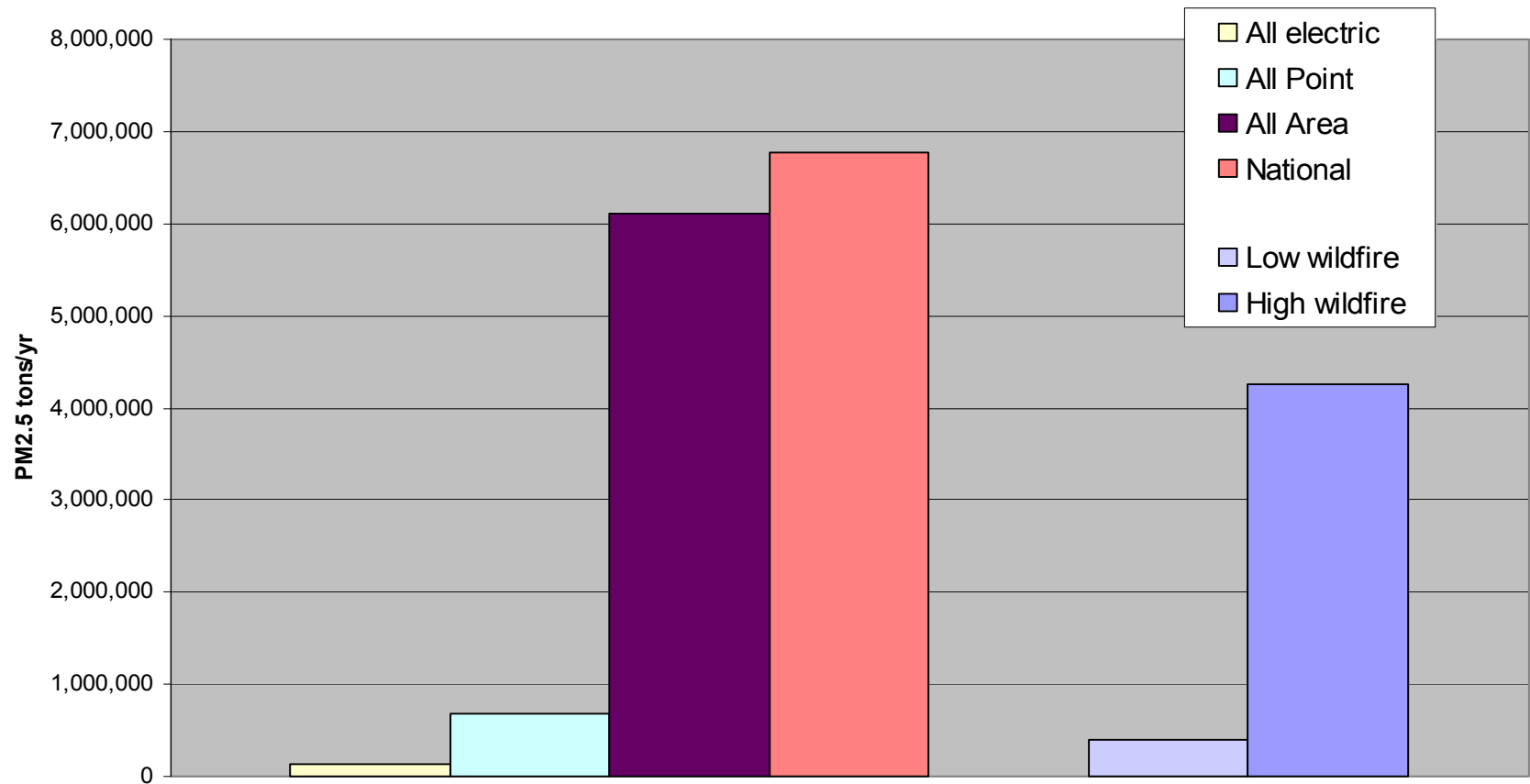
Janice Peterson

# System and Data Requirements Session Overview

- Emissions Estimation (Janice Peterson)
- Fire Emissions Inventories (Sam Sandberg)
- Fire Activity Tracking (Mike Hilbruner)
- Monitoring (Jim Russell)
- F-CAMMS Modeling Consortia's (Doug Fox)
- BlueSky (Sue Ferguson)
- Technology Transfer Session

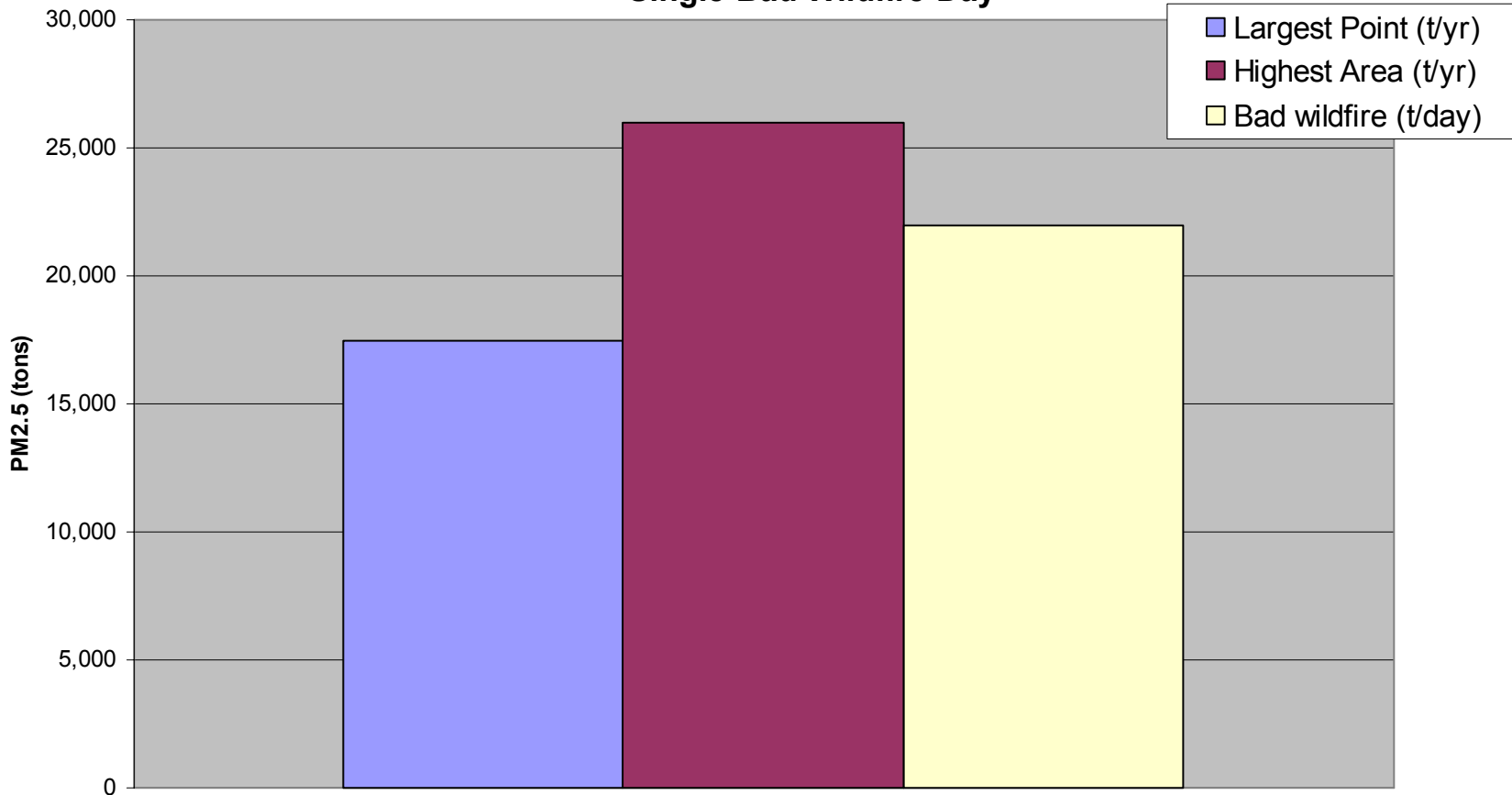
# Wildfire PM2.5 Compared to Other US Sources

National PM2.5 by Category



Wildfire can emit as much PM2.5 in a day as the largest point or highest area source (county total) does in a year

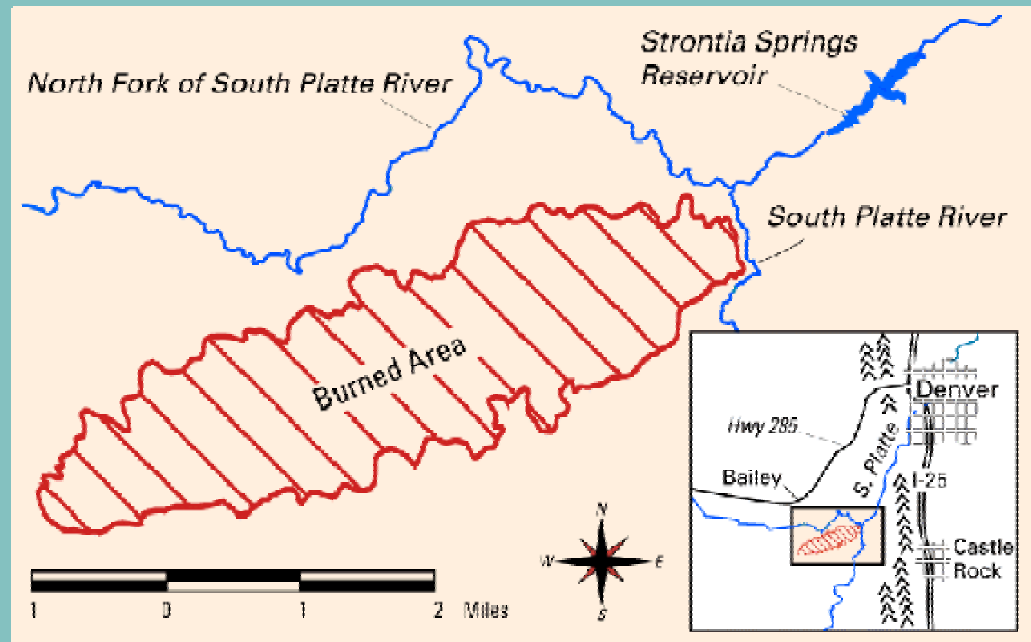
**PM2.5 Largest Point Source, Highest County Area Source Total,  
Single Bad Wildfire Day**



# Estimating Emissions

## Basic Data Requirements

- Area Burned
- Fuel Load
- Fuel Consumption
- Emission Factor



# Estimating Emissions

## Basic Data Requirements

- Area Burned
- **Fuel Load**
- Fuel Consumption
- Emission Factor



# Estimating Emissions

## Basic Data Requirements

- Area Burned
- Fuel Load
- **Fuel Consumption**
- Emission Factor



# Estimating Emissions

## Basic Data Requirements

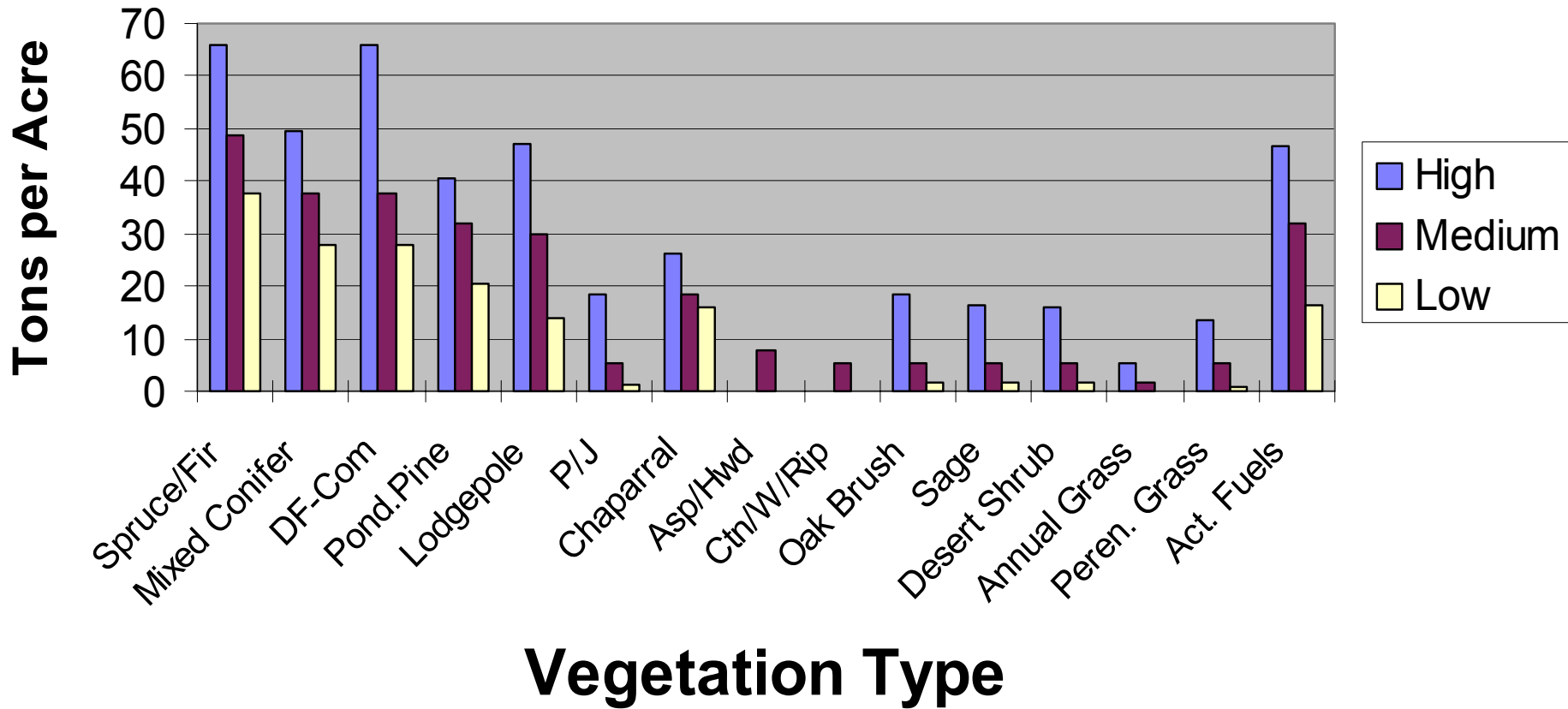
- Area Burned
- Fuel Load
- Fuel Consumption
- **Emission Factor**



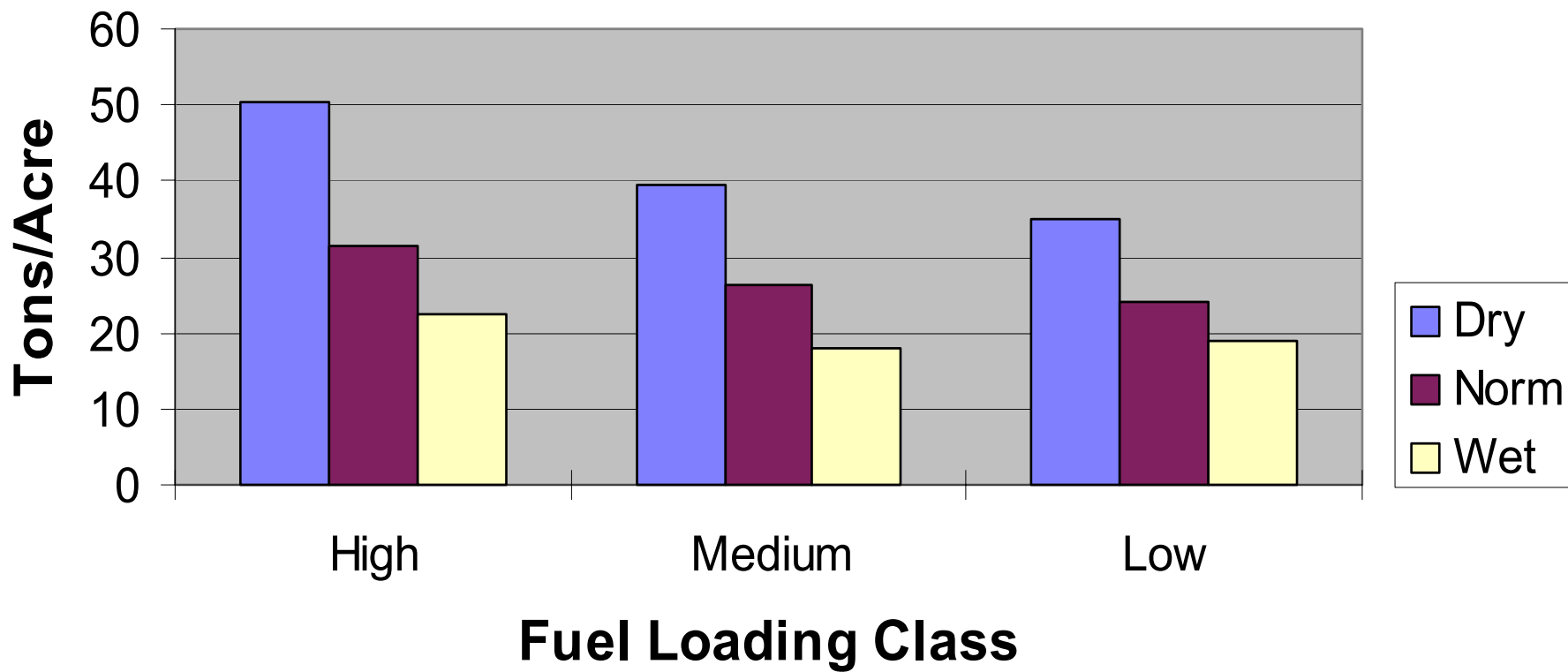
# Data Complexity Can Add Accuracy

FUEL BED COMPONENT	FUEL LOADING (t/a)	FUEL CONSUMPTION (percent)		EMISSION FACTOR (lbs/ton)		TOTAL EMISSIONS (lbs/ac)
		Flaming	Smoldering	Flaming	Smoldering	
Live Fuels (herb, grass, brush)	0-10	0-100		10-40	30-150	10-4000
Small Woody Fuels (0-1/4, 1/4-1, 1-3, litter)	1-15	50-90	0-10			
Large Fuels (3-6, 6-9, 9-20, 20+)	0-80	10-40	5-30			
Duff or Humus	0-100	0-50	0-50			

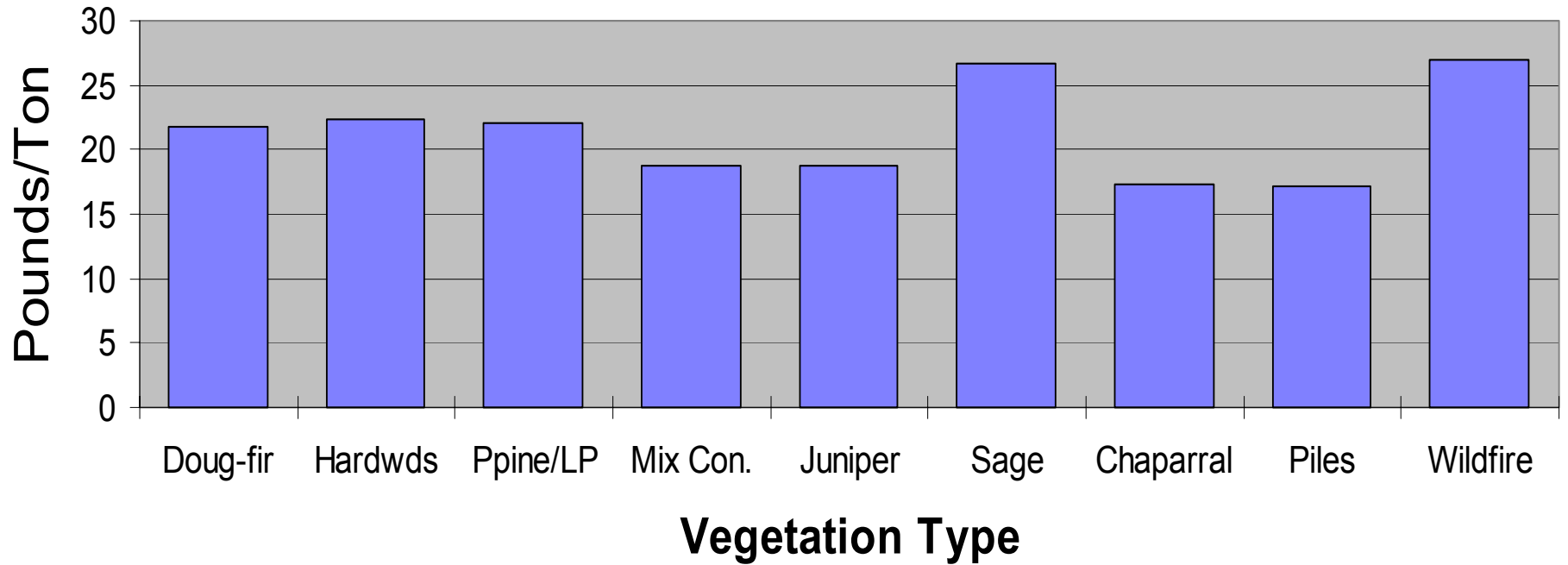
# Variability of Fuel Loading



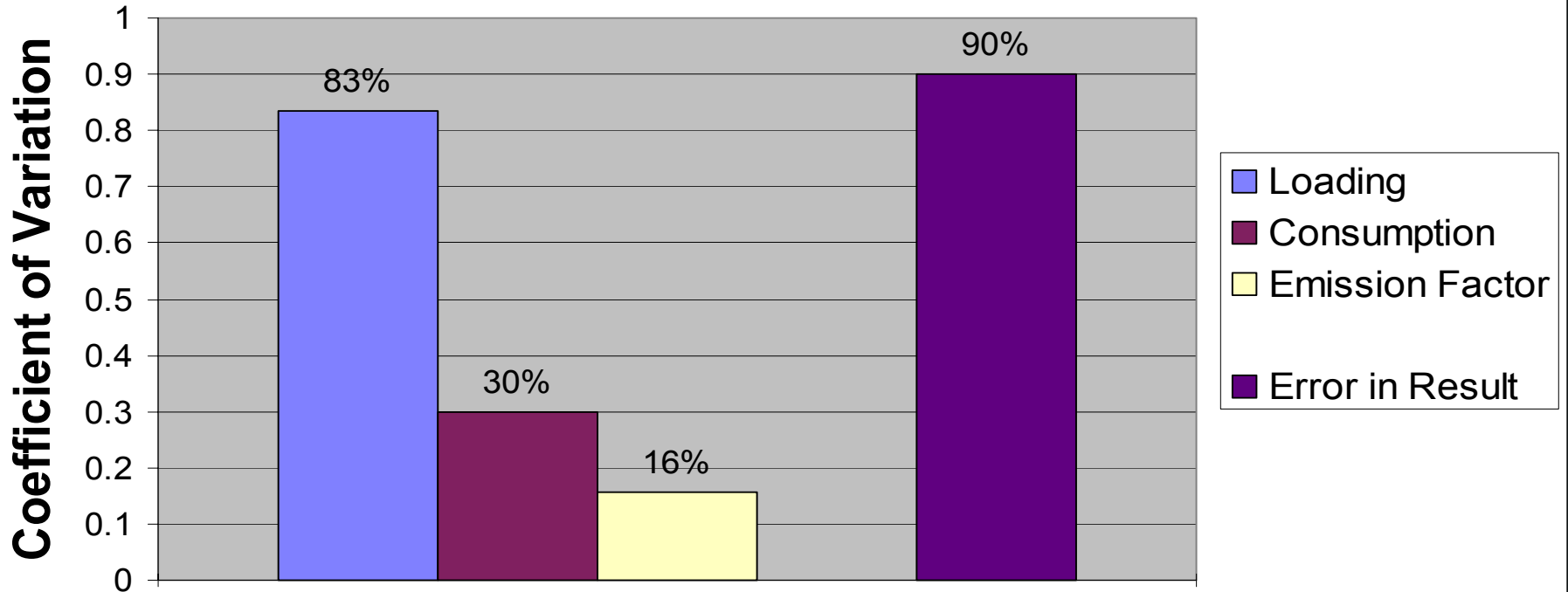
# Variation in Fuel Consumption for One Vegetation Type Type (Spruce/fir)



## Fire Average PM2.5 Emission Factors



# Percent Error Contribution by Component Used to Estimate Emissions



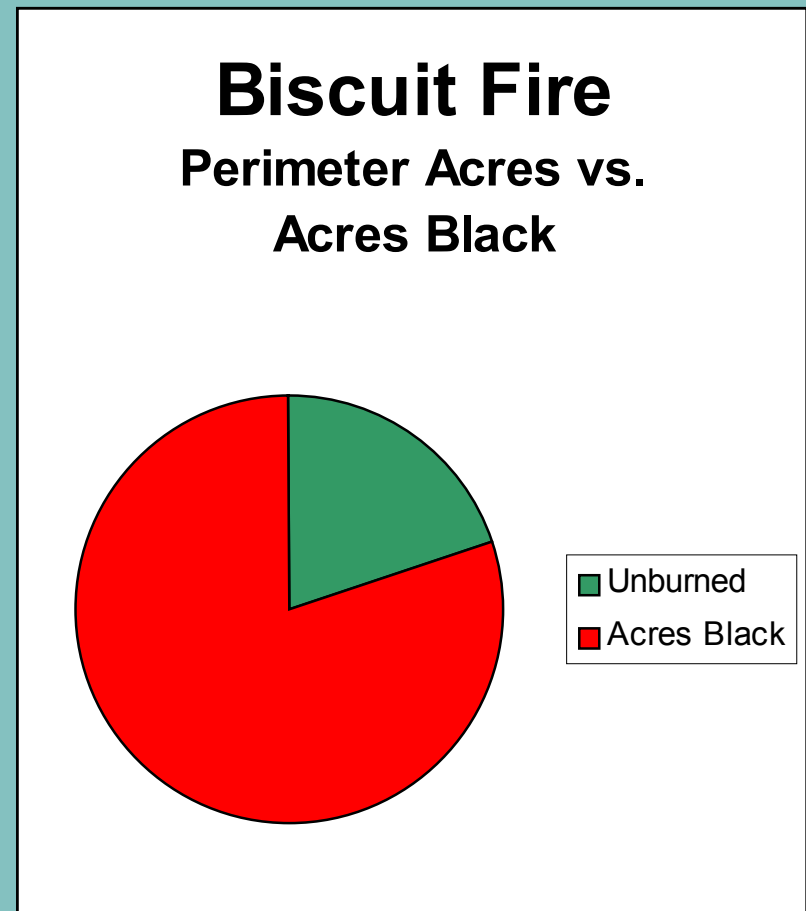
# ■ Biscuit Fire Example - Acres

- Biscuit Fire
  - 499,965 acres
- PM2.5 Emissions
  - 115,492 tons



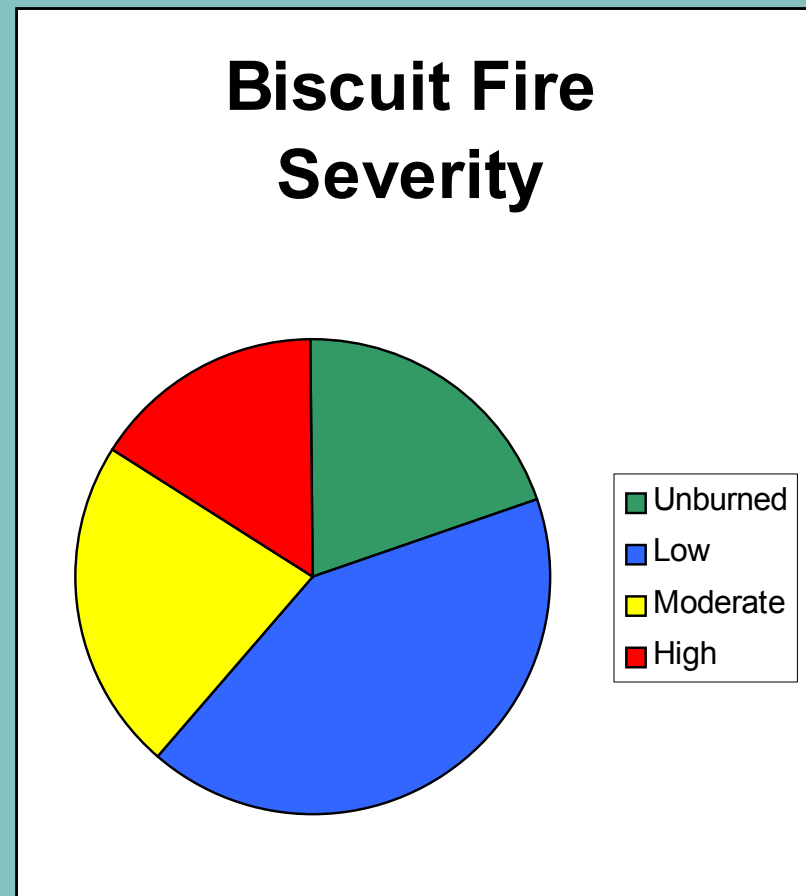
# Acres Burned – Acres Black

- Biscuit Fire
  - 499,965 acres
  - **99,993 unburned or very low severity**
- PM2.5 Emissions
  - 92,394 tons



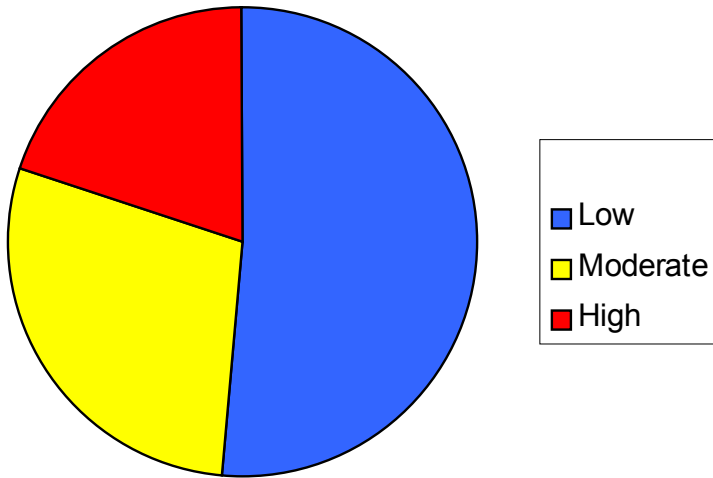
# Biscuit Fire Severity

- 499,965 acres
  - 99,993 unburned or very low
  - 204,986 low
  - 114,992 moderate
  - 79,994 high

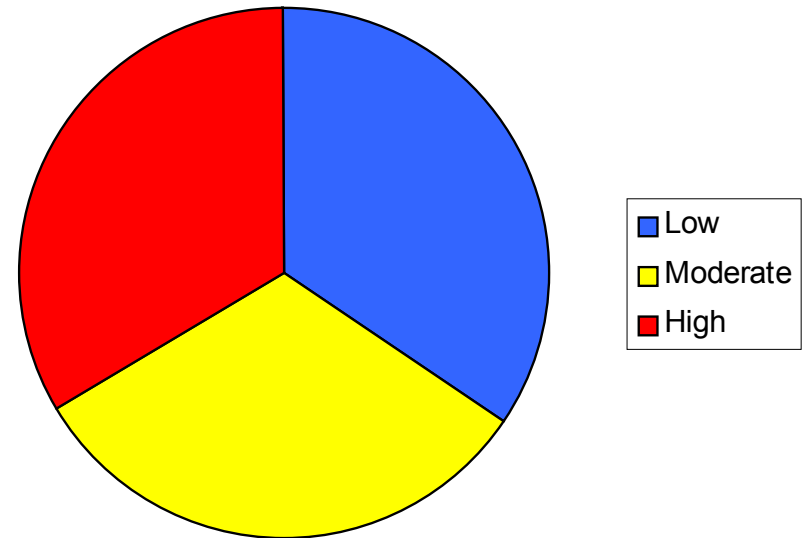


# Burn Characteristics Affect Emissions

## Biscuit Fire Severity



## Biscuit Fire Emissions by Severity



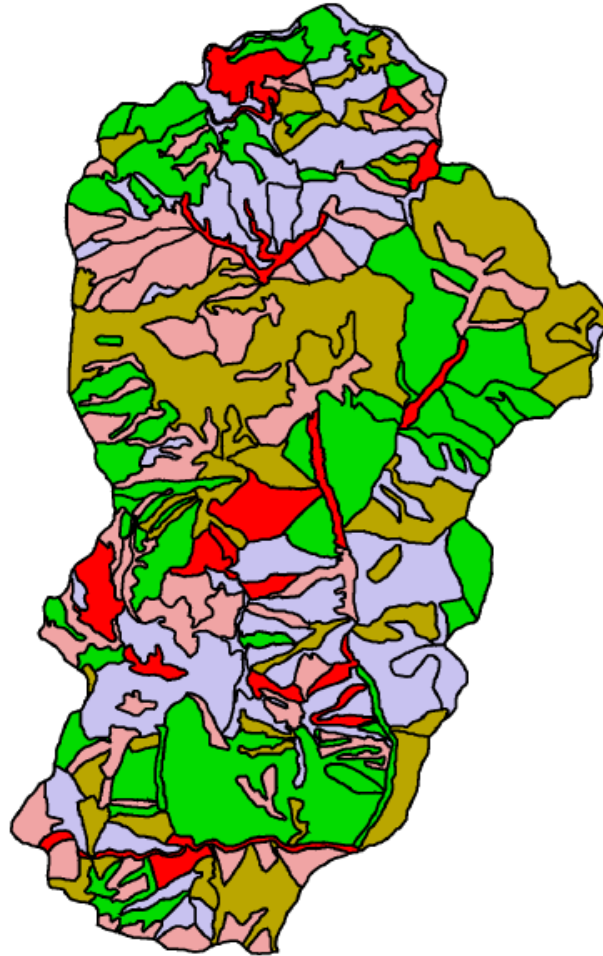
# PM10 Smoke Production

## Lower Grande Ronde 55

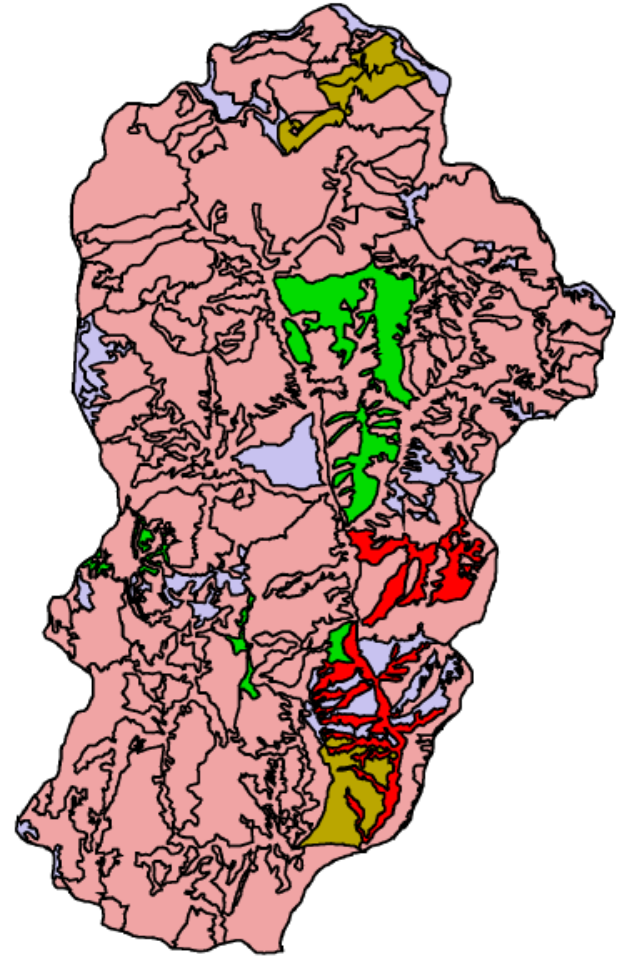
Smoke Production (kg/ha)

- Very Low (0-224.2)
- Low (224.3-448.3)
- Moderate (448.4-672.5)
- High (672.6-1896.6)
- Very High (>896.6)

Historical



Current



1 0 1 2 Kilometers

ICBEMP

# Data Needs for Emissions Estimation – Wildfire and Rx Fire

- Acres (\*systematic overestimation?)
  - Acres black (reported or modeled)
    - Acres by severity
- Fuel Type Maps
  - Reported fuel loading
    - Fuel loading by size class
- Fuel moisture mapping
  - Reported fuel moisture
    - Reported fuel consumption

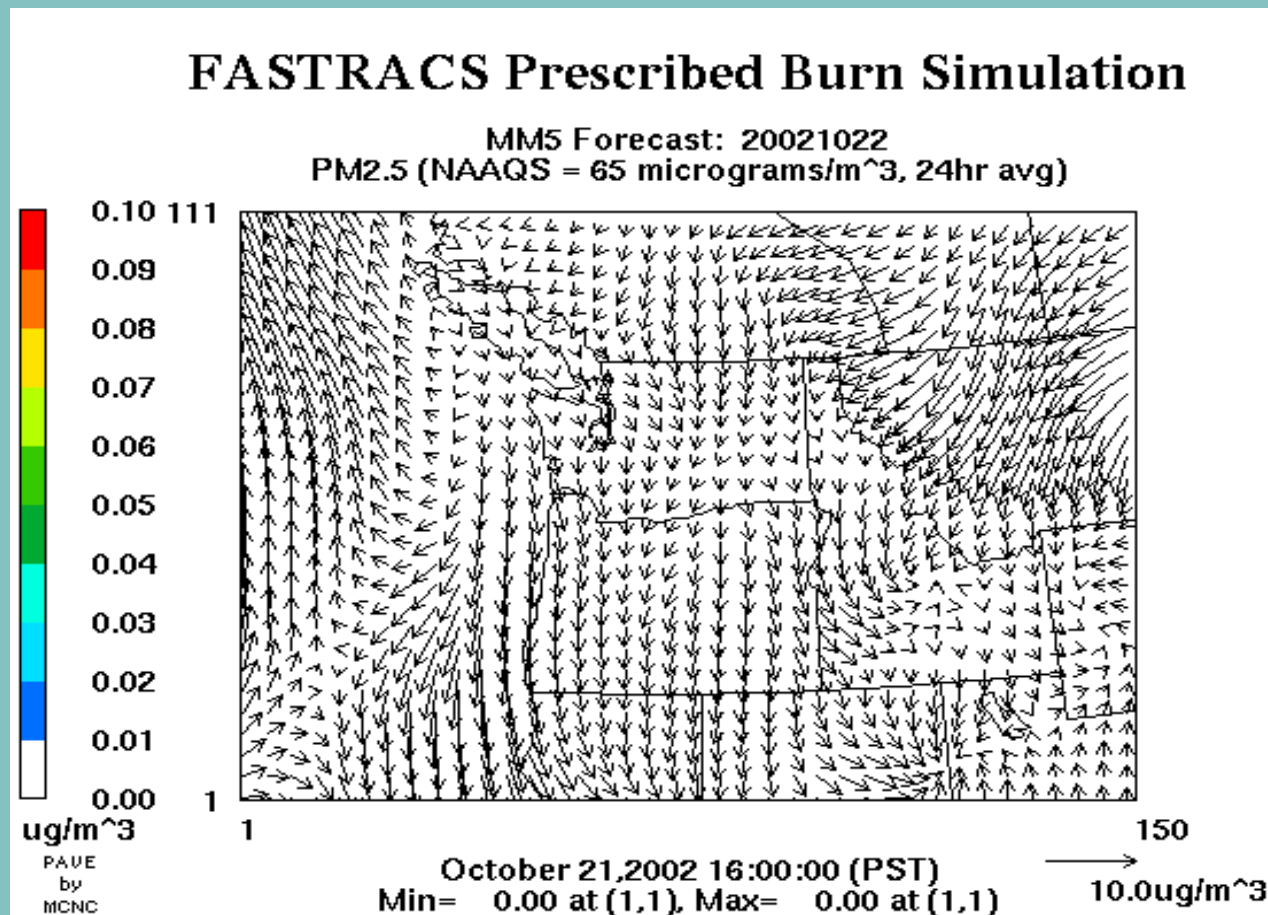
A dramatic sky scene featuring a bright, glowing sun in the upper center, partially obscured by dark, swirling clouds. The sun's light creates a warm, orange-red glow that permeates the upper portion of the frame. The lower portion of the image shows a dark, teal-colored sky with bright, glowing horizontal bands of light, suggesting a sunset or sunrise over a body of water or a similar landscape. The overall mood is intense and atmospheric.

Emissions vs. ....

# Emissions vs. ....Impacts



# Dispersion Modeling: Promises vs. Realities



# ■ Dispersion Modeling Accuracy

- Model sophistication (EPA certification)
- Meteorology
- Ignition Duration
- Fuel Moisture
- Flaming vs. Smoldering Consumption
- Fuel Loading
- ??

# Monitoring

- Accurate for impacts.
- Expensive, time consuming, difficult.
- What is our responsibility?
  - Wildfire
  - Rx Fire
    - Compliance
    - Reality vs. perception
    - Nuisance smoke



# System and Data Requirements Session Overview

- Emissions Estimation (Janice Peterson)
- Fire Emissions Inventories (Sam Sandberg)
- Fire Activity Tracking (Mike Hilbruner)
- Monitoring (Jim Russell)
- F-CAMMS Modeling Consortia's (Doug Fox)
- BlueSky (Sue Ferguson)
- Technology Transfer Session