

# Diesel Modeling in Portland Air Toxics Solutions Project

Sarah Armitage

Oregon Department of Environmental Quality

# Portland Air Toxics Solutions

## A geographic approach to understand and reduce air toxics

### Five priority categories for reduction:

- Residential wood burning
- Cars and trucks
- Heavy duty vehicles
- Construction equipment
- Industrial metals facilities

### Air Toxics 10 or more times above Health Benchmarks:

- 15 PAH
- Benzene
- Acrolein
- Diesel particulate
- 1,3 butadiene
- Naphthalene
- Cadmium
- Formaldehyde

# Three Types of Air Quality Data that Work Together

<b>Monitoring</b>	<b>Emission Inventory</b>	<b>Modeling</b>
What's in the air at the monitor location?	What are the pollution sources?	What is the concentration or risk level locally or regionally?
How do levels compare to standards or benchmarks?	How much pollution is released to the air?	What are spatial patterns, trends and predictions?
What should we further investigate or model?	What can be controlled, and how?	What are estimated concentrations in areas without monitoring?

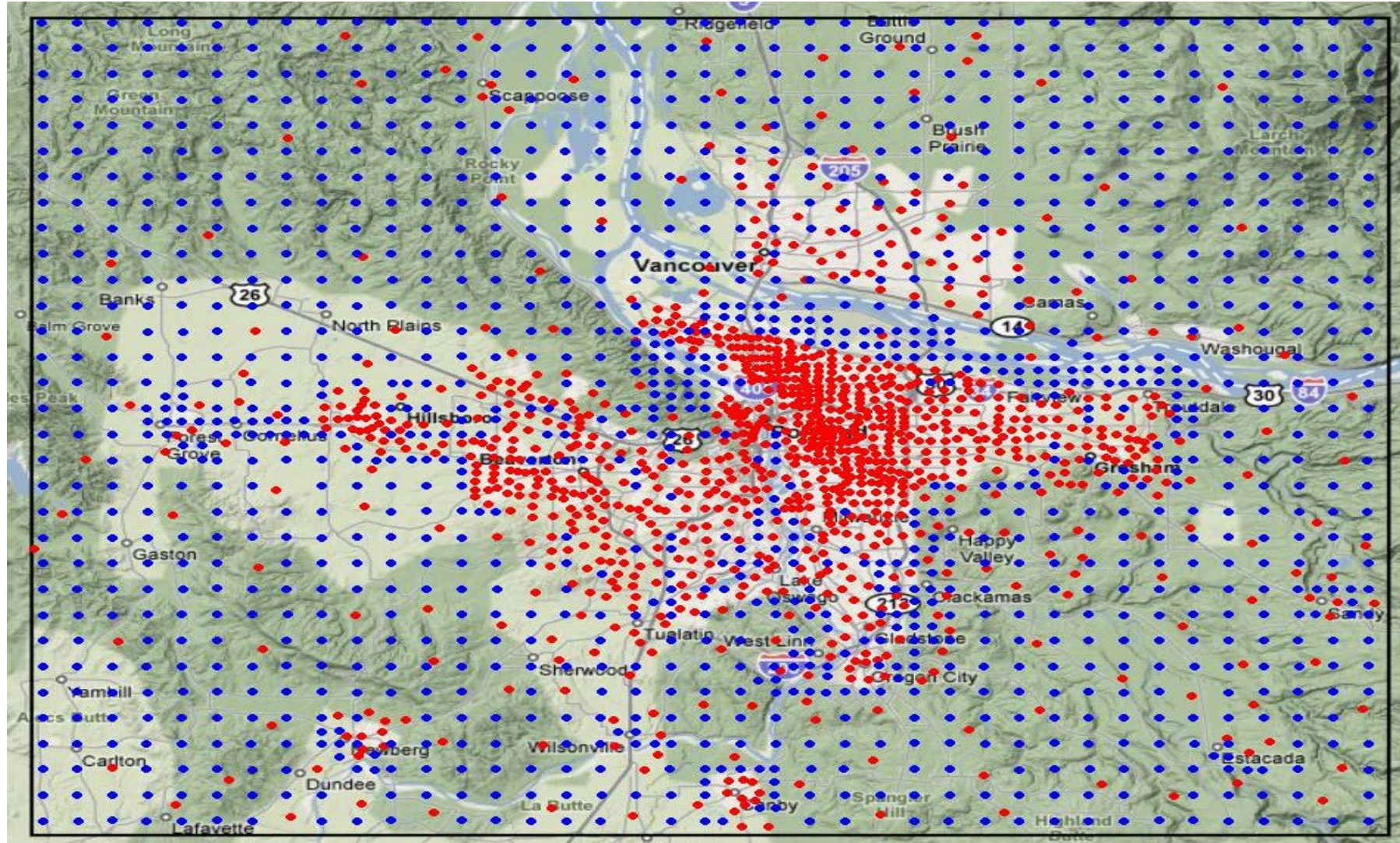
# Portland Air Toxics Solutions Modeling Steps

- Determine pollutants of concern
- Select study area, dispersion model and meteorology
- Develop emission inventory
- Select locations for estimating concentrations (receptors)
- Run model and compile modeled concentrations
  - By pollutant
  - By location
  - By source category
- Compare concentrations to air toxics benchmarks
- Identify air toxics and sources causing the most risk





# PATS Modeling Receptors





# PATS Diesel Map and Reduction Targets

## PATS 2017 MODELING RESULTS DIESEL PARTICULATE MATTER ALL SOURCES

--- PATS Study Area  
boundary  
--- Benchmark contour  
( $0.1 \mu\text{g}/\text{m}^3$ )

### Annual average concentration

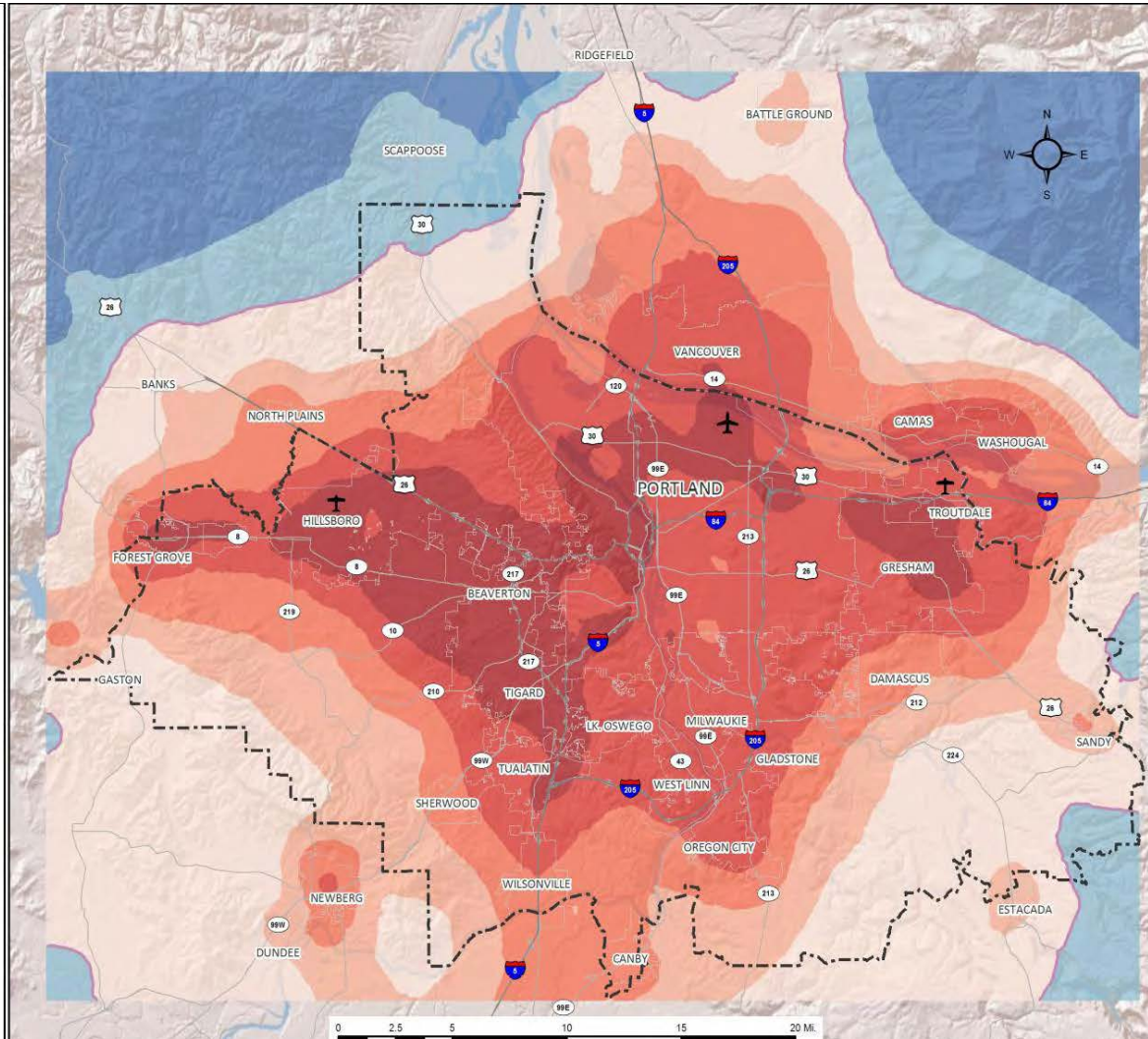
-  < 1/2X benchmark
-  1/2X - 1X benchmark
-  1X - 2X benchmark
-  2X - 3X benchmark
-  3X - 5X benchmark
-  5X - 10X benchmark
-  > 10X benchmark



State of Oregon  
Department of  
Environmental  
Quality

NOTE: Areas beyond the modeling  
domain (color-shaded region) are  
beyond the scope of this project.

REFERENCES:  
Concentration data from DEQ Portland  
Air Toxics Study (PATS)  
Basemap from Metro and ESRI data.



To reach diesel benchmark at top  
20% of receptors with highest  
concentrations:

- On road reduction target = 91%
- Non road reduction target = 93%
- Rail reduction target = 92%

# PATS Summary of Statistical Environmental Justice Analysis

**Disproportionate impact from all sources:**  
Higher → Lower

	Hispanic/Latino	Asian	African American/Black	Below Poverty
Higher ↓ Disproportionate impact by source category: ↓ Lower	Residential Wood Burning	Cars and Trucks	Commercial Solvent and Fuel Use	Cars and Trucks
	Construction and Non Road Engines	Construction and Non Road Engines	Construction and Non Road Engines	Commercial Solvent and Fuel Use
	Cars and Trucks	Residential Wood Burning		Permitted Industrial Facilities
	Commercial Solvent and Fuel Use	Commercial Solvent and Fuel Use		