

Overview of NW near-road pollution impacts



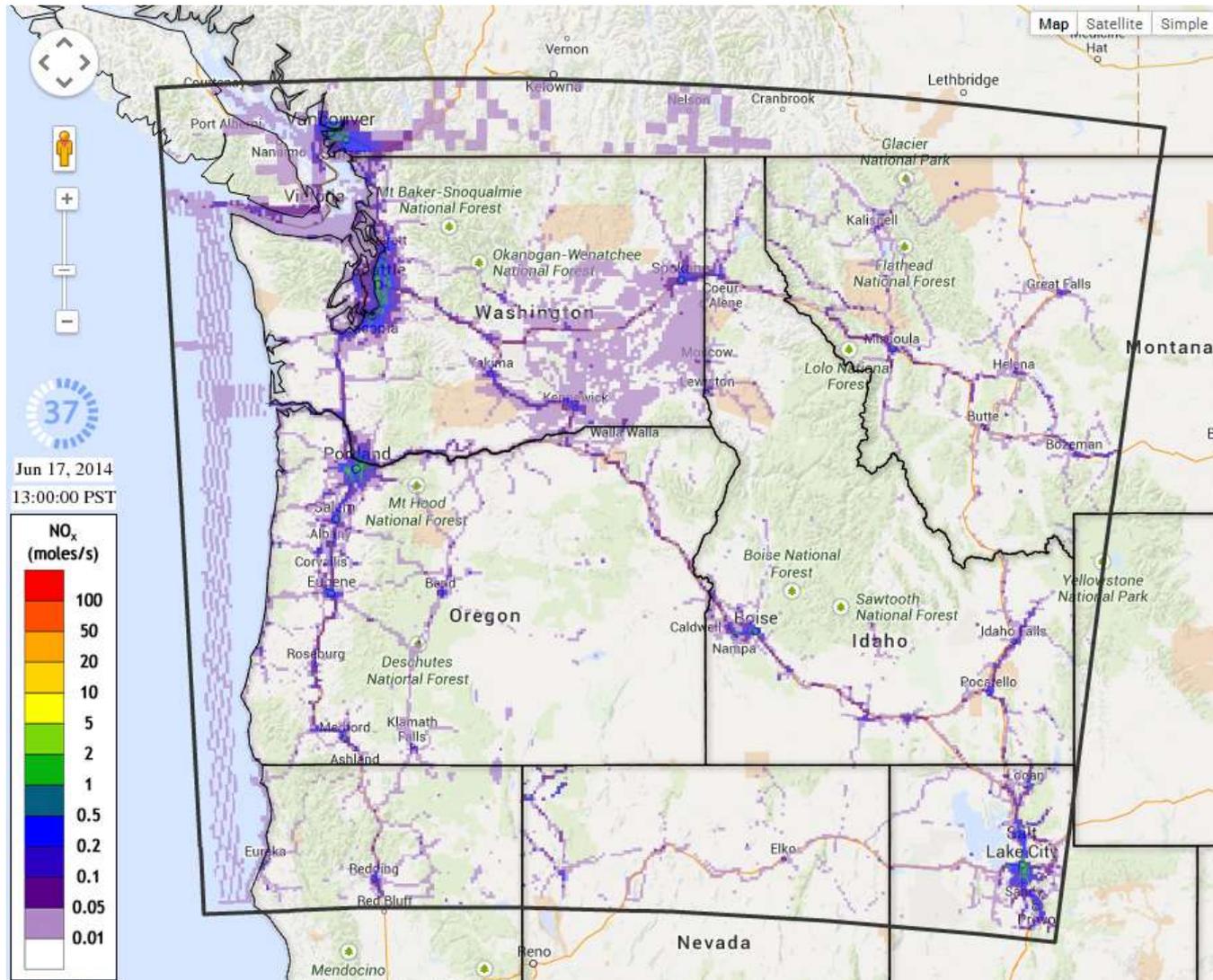
Puget Sound Clean Air

Erik Saganic

June 2014

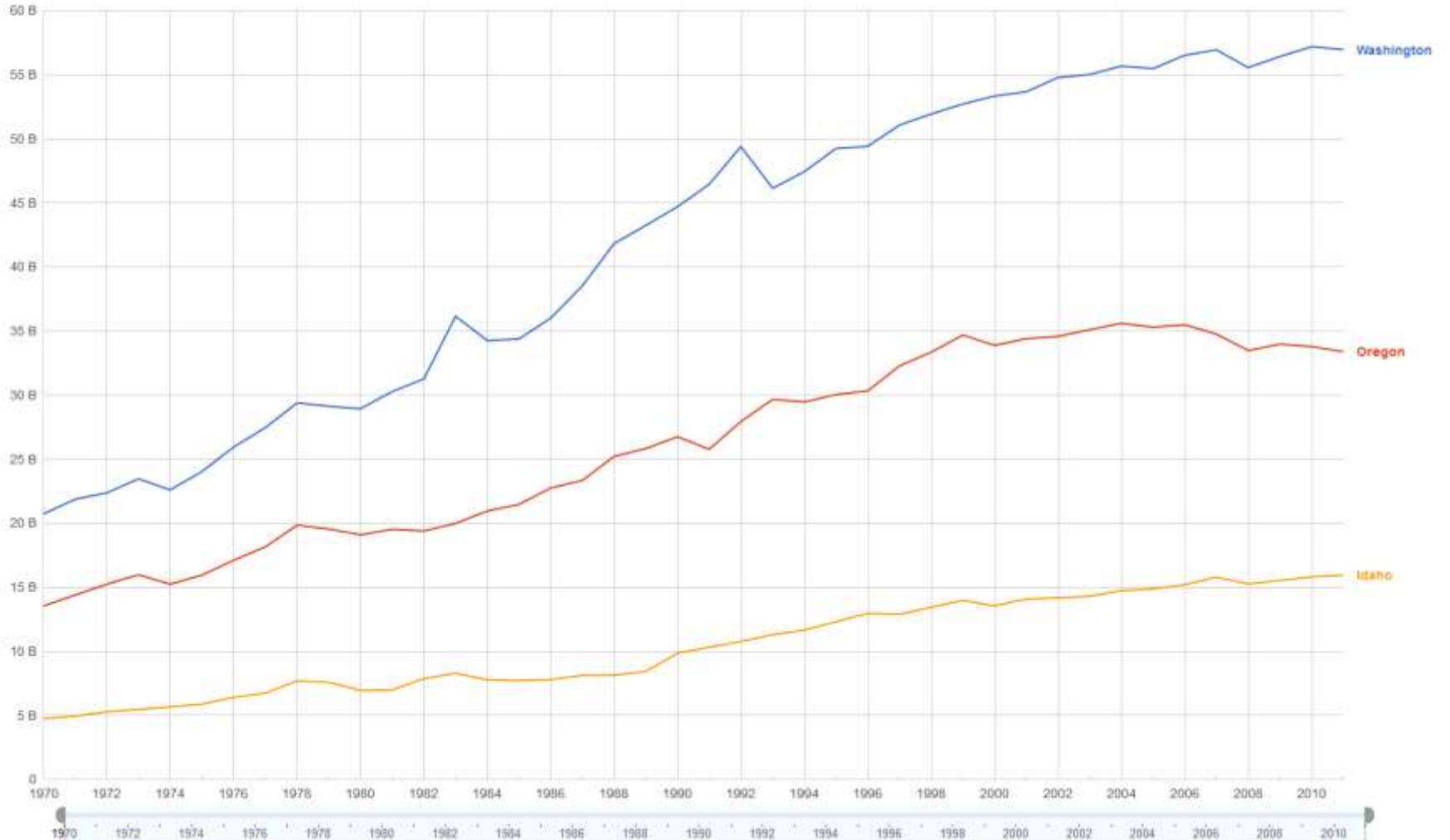
Traffic through major cities





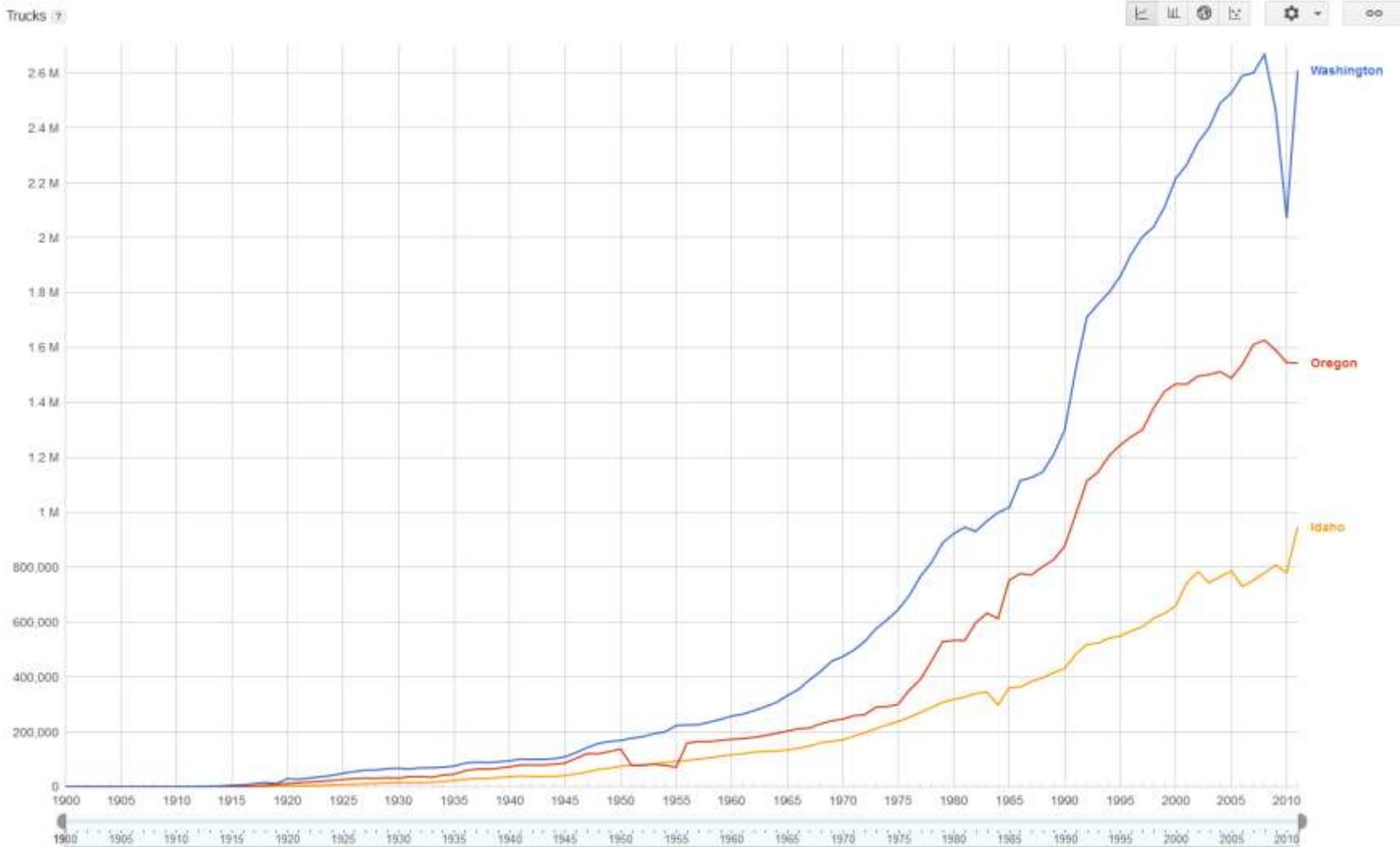
Collective ID, OR, and WA > 100B VMTs/year

Vehicle Miles Traveled : 7



Data from Office of Highway Policy Information, FHWA Last updated: Oct 25, 2013

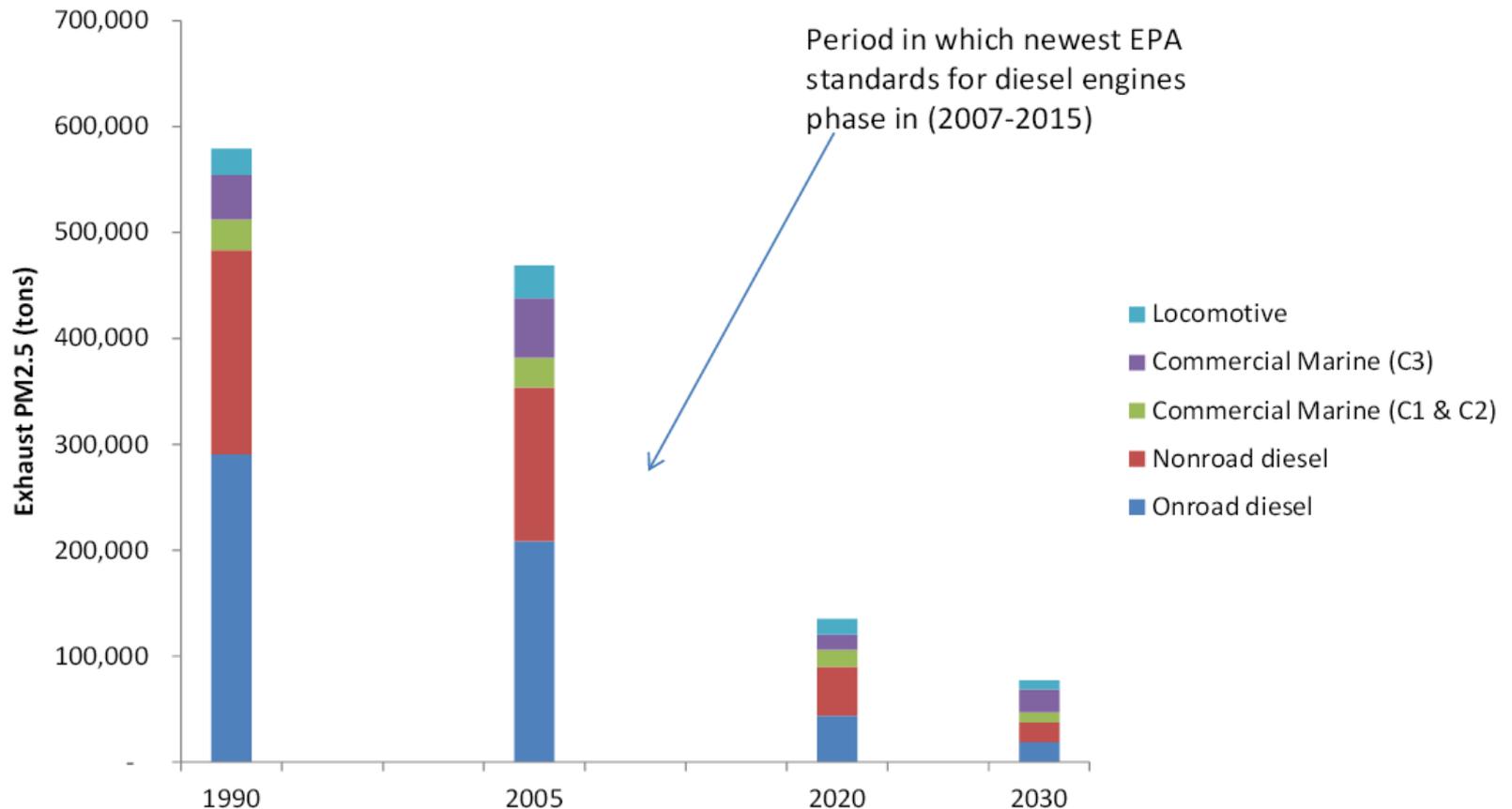
5 million trucks registered



Data from Office of Highway Policy Information, FHWA. Last updated: Oct 26, 2013

New technology improvements

Diesel PM_{2.5} Emission Trends



Near road health studies

- **Show associated with perinatal risks (low birth weight, pre-term birth, early bronchitis, etc)**
- **Short and long-term mortality risks**
- **In children, reduced lung function, increased asthma incidence**
- **Less studied, but associations were found:**
 - **Diabetes**
 - **Obesity**
 - **Autism**
 - **Reaction time**

Still a new field

- “Association” isn’t necessarily causal
- Longitudinal study showed no statistically significant relationship with traffic pollution exposure and preterm birth



ENVIRONMENTAL
HEALTH
PERSPECTIVES

<http://www.ehponline.org>

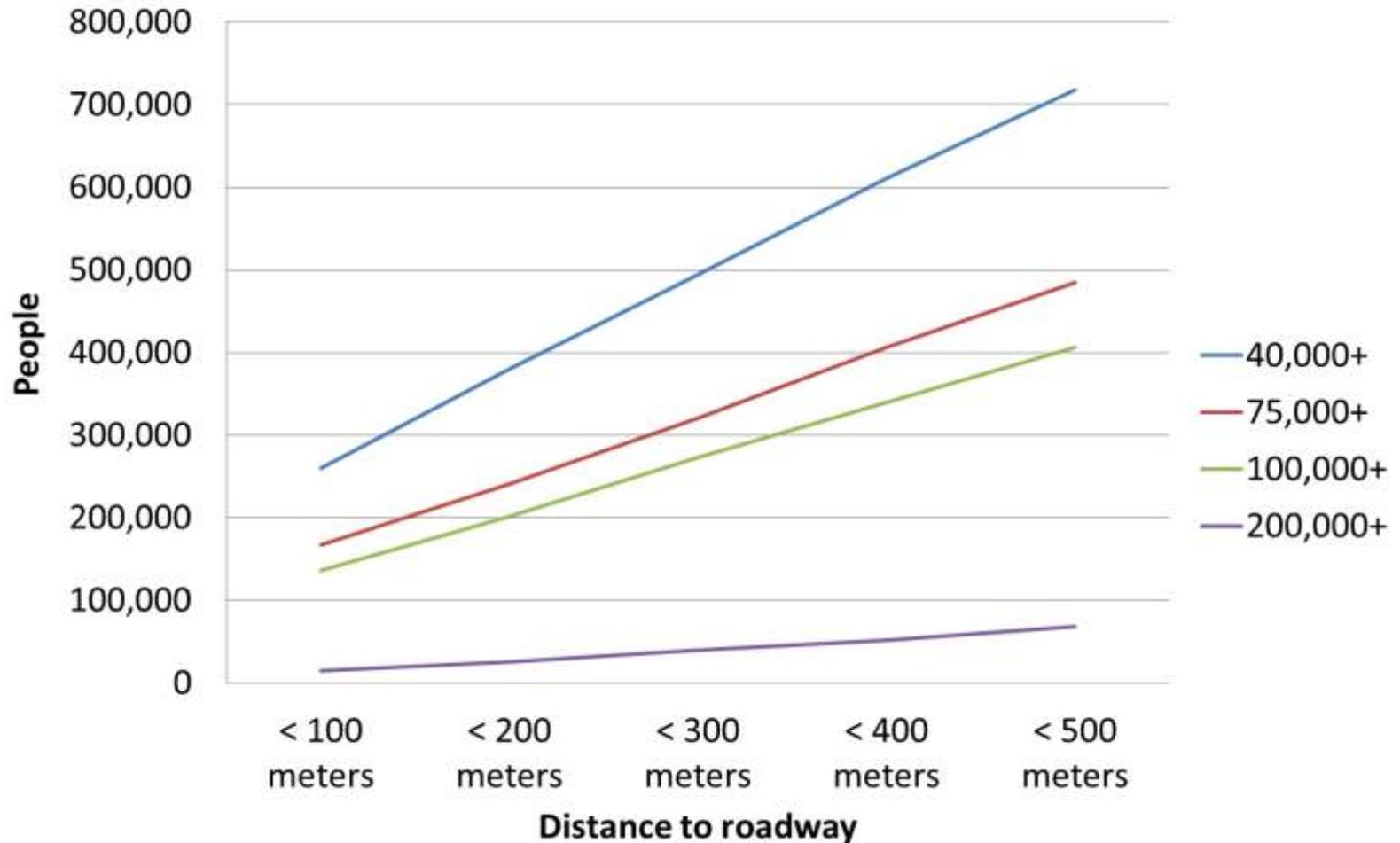
Sources of Fine Particulate Matter and Risk of Preterm Birth in Connecticut, 2000–2006: A Longitudinal Study

Gavin Pereira, Michelle L. Bell, Hyung Joo Lee, Petros Koutrakis, and Kathleen Belanger

<http://dx.doi.org/10.1289/ehp.1307741>
Received: 17 October 2013
Accepted: 22 May 2014
Advance Publication: 23 May 2014

Populations

Roadway distance to people with various traffic volumes in Puget Sound

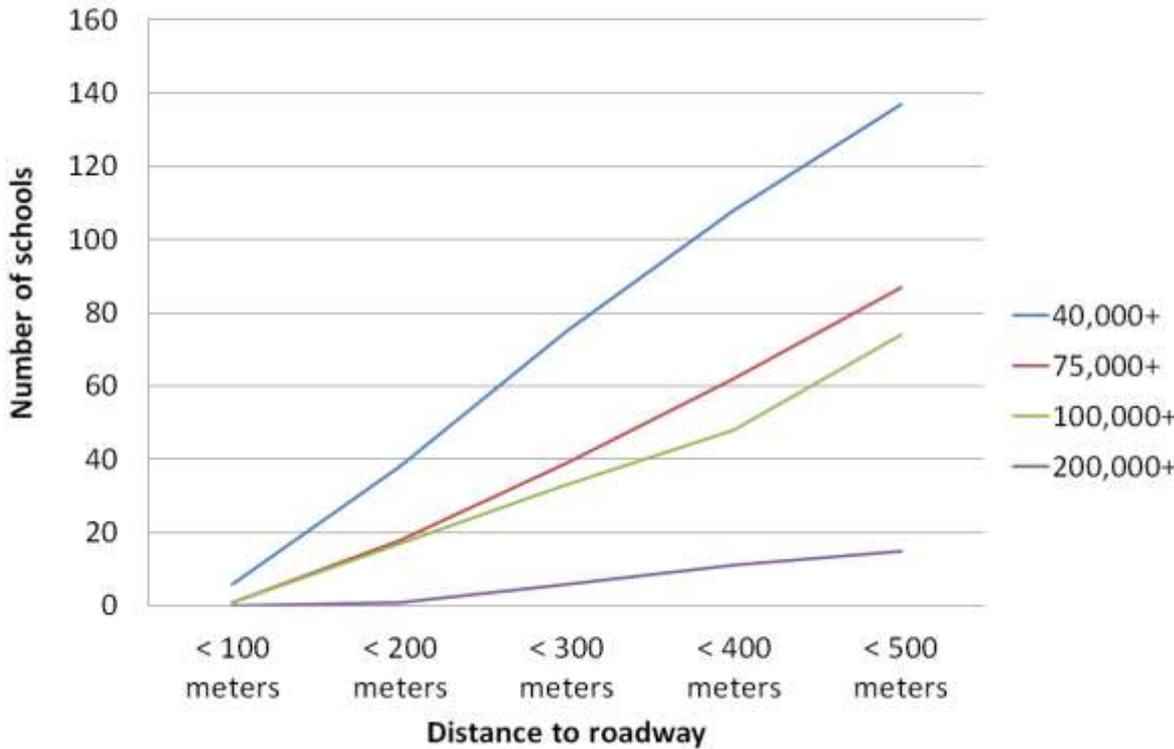


Press attention to schools near roads

- <http://www.invw.org/article/exhaust-diesel-fumes-foul-1379>
- <http://www.invw.org/project/exhausted-at-school>
- <http://www.invw.org/article/king-5-investigators-cali-1400>
- <http://www.invw.org/article/officials-in-olympia-dc-d-1392>

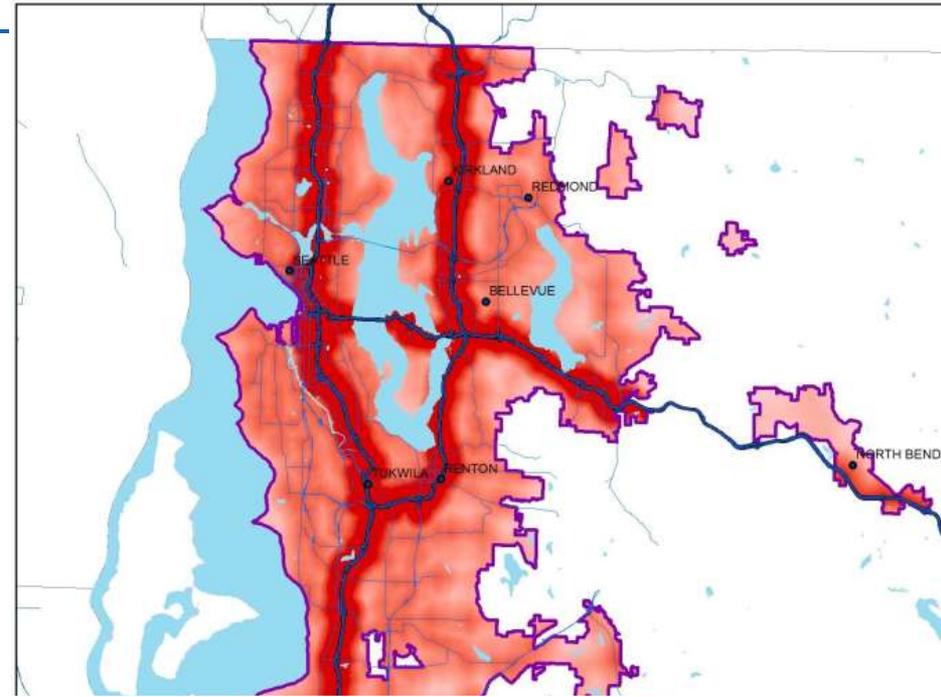
Schools

Roadway distance to schools with various traffic volumes in Puget Sound

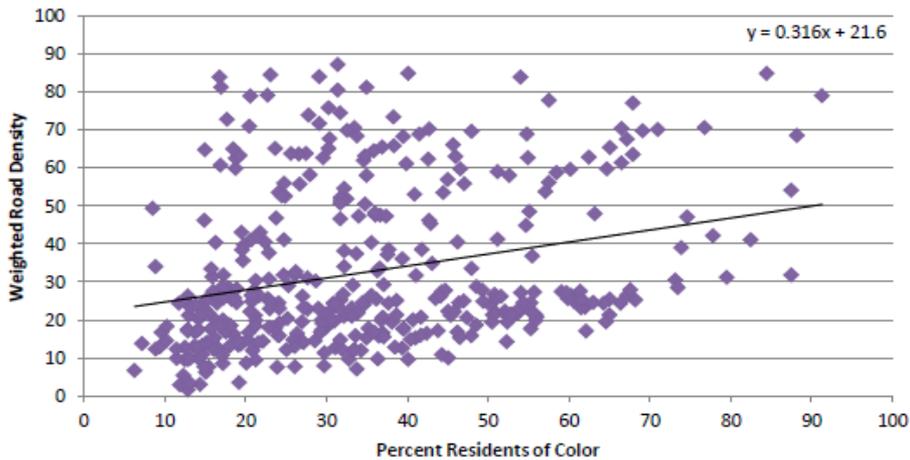


Equity (Jill Schulte)

Low-income and minorities generally closer to traffic volume



Weighted Road Density and Percent Residents of Color by Census Tract
Urban King County, 2010 Census



Weighted Road Density and Median Household Income by Census Tract
Urban King County, 2010 Census

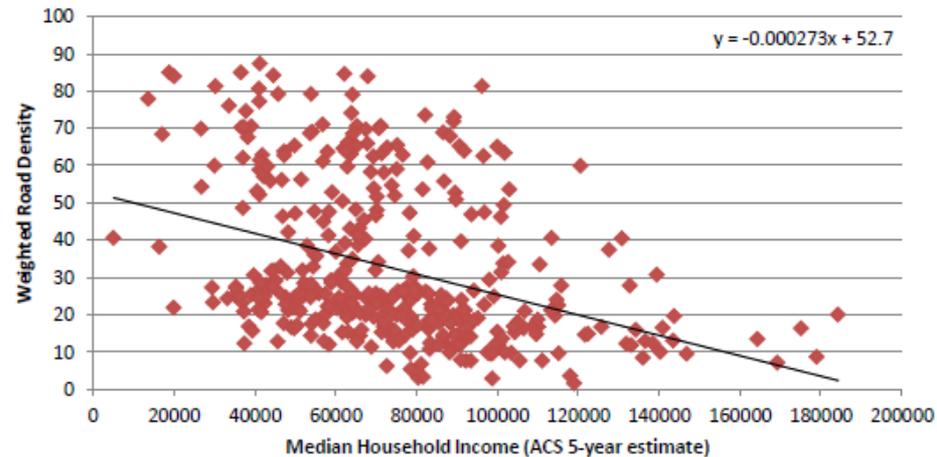


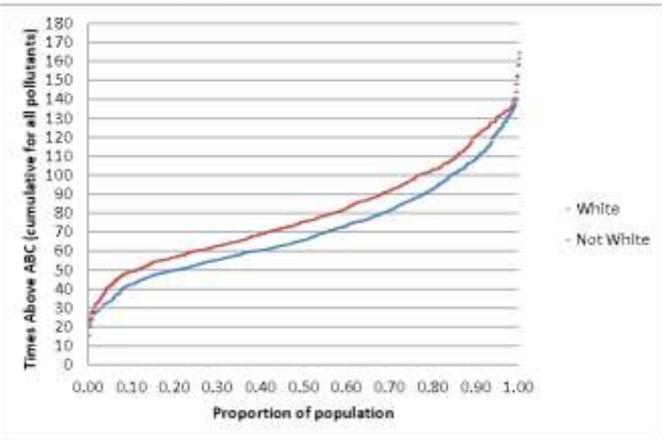
Figure 7. Weighted road density and percent residents of color by census tract, urban King County, 2010 census

Figure 5. Weighted road density and median household income by census tract, urban King County, 2010 census.

PATS

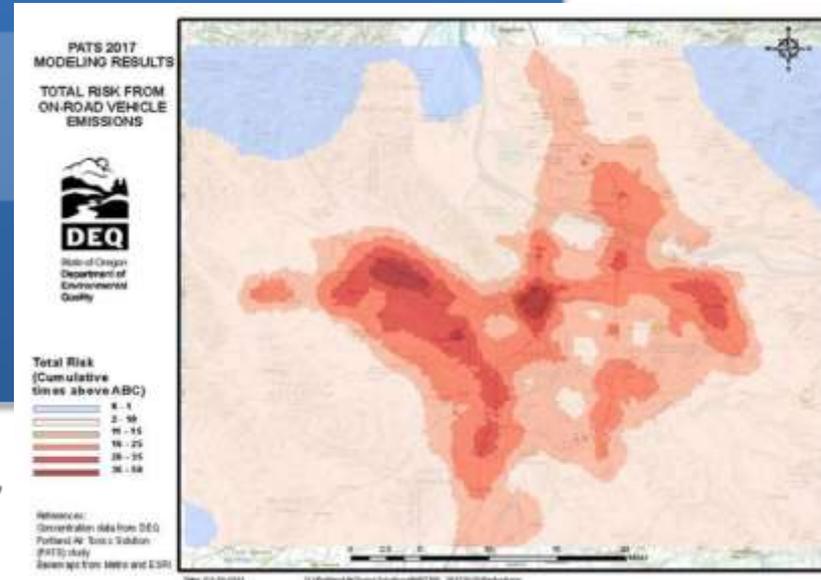
Disproportionate impact from all sources:

Higher \longrightarrow Lower

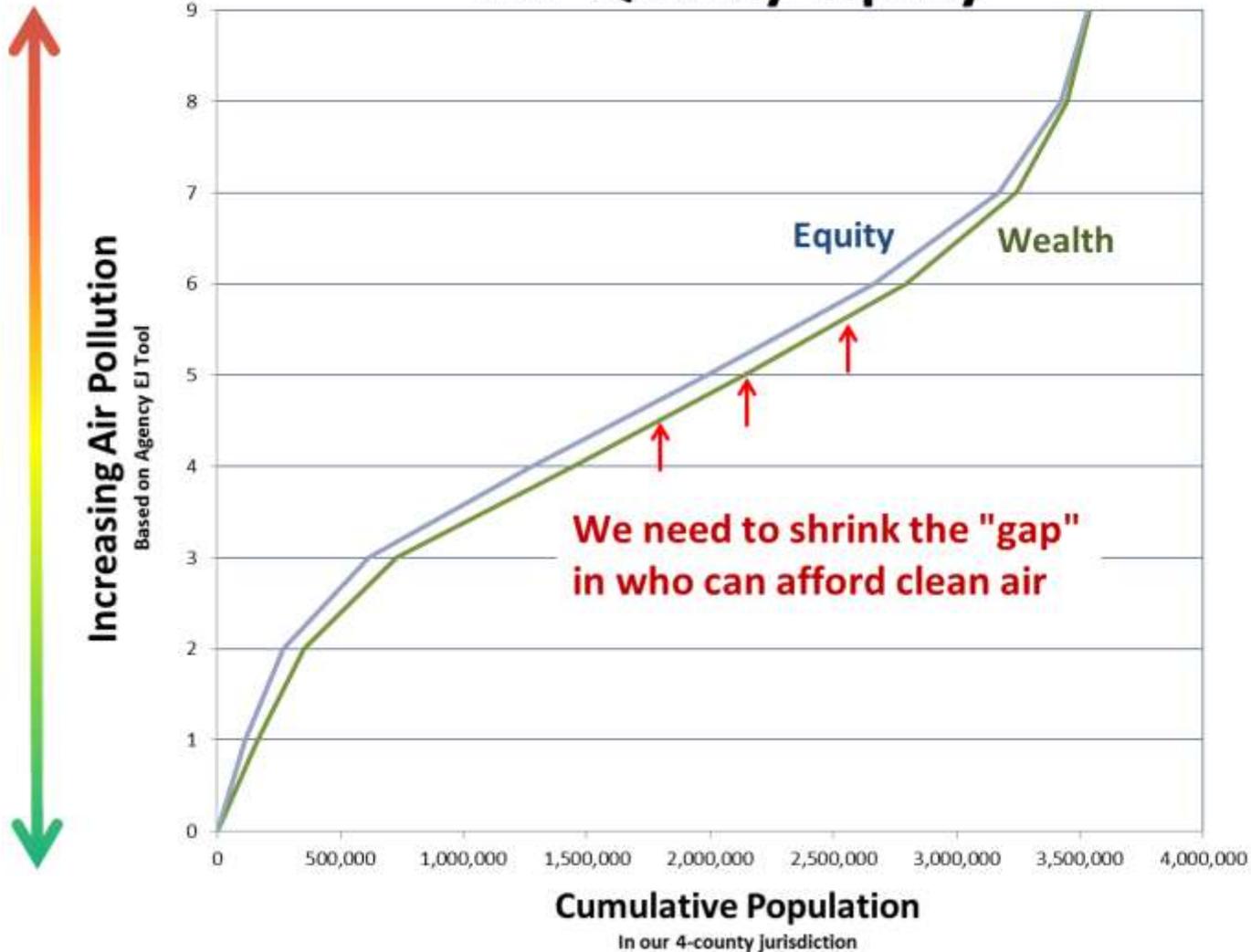


Commercial Solvent and Fuel Use

low income air toxics



Air Quality Equity



Karner et al 2010

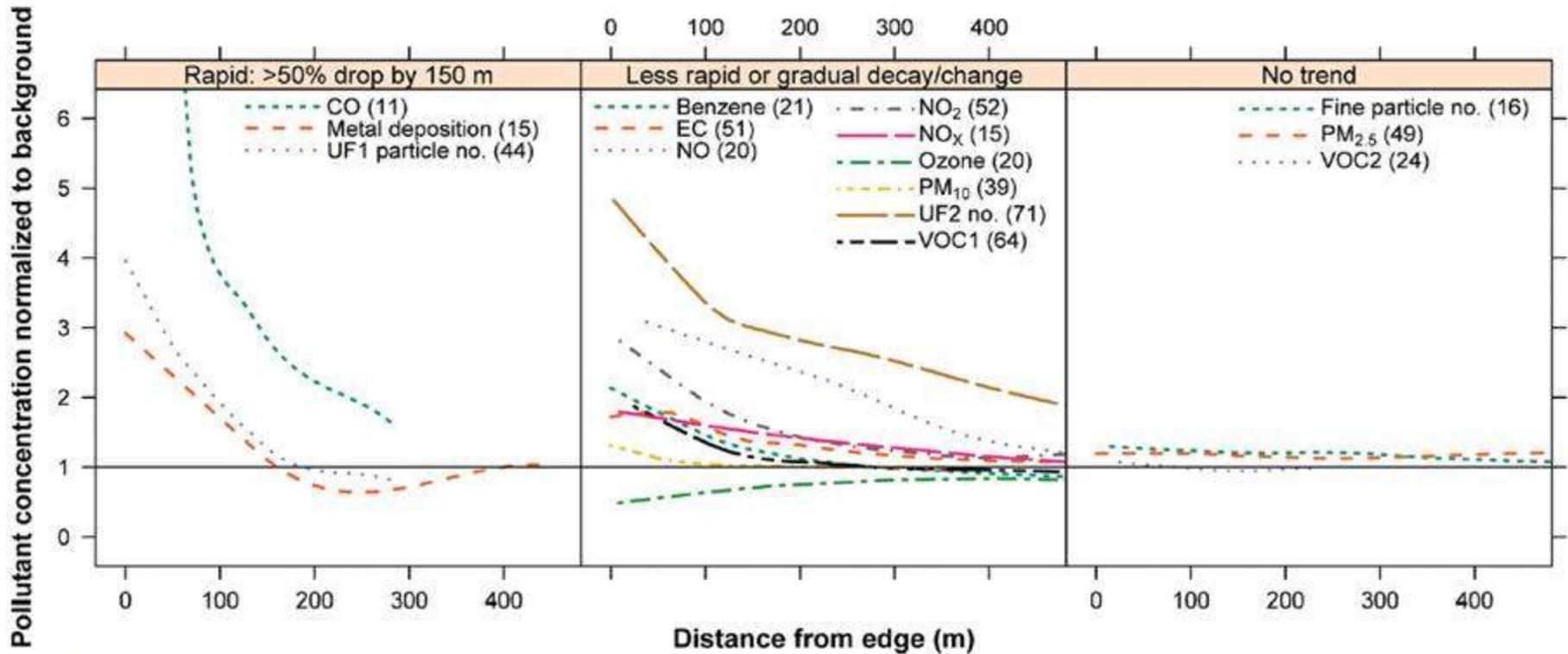
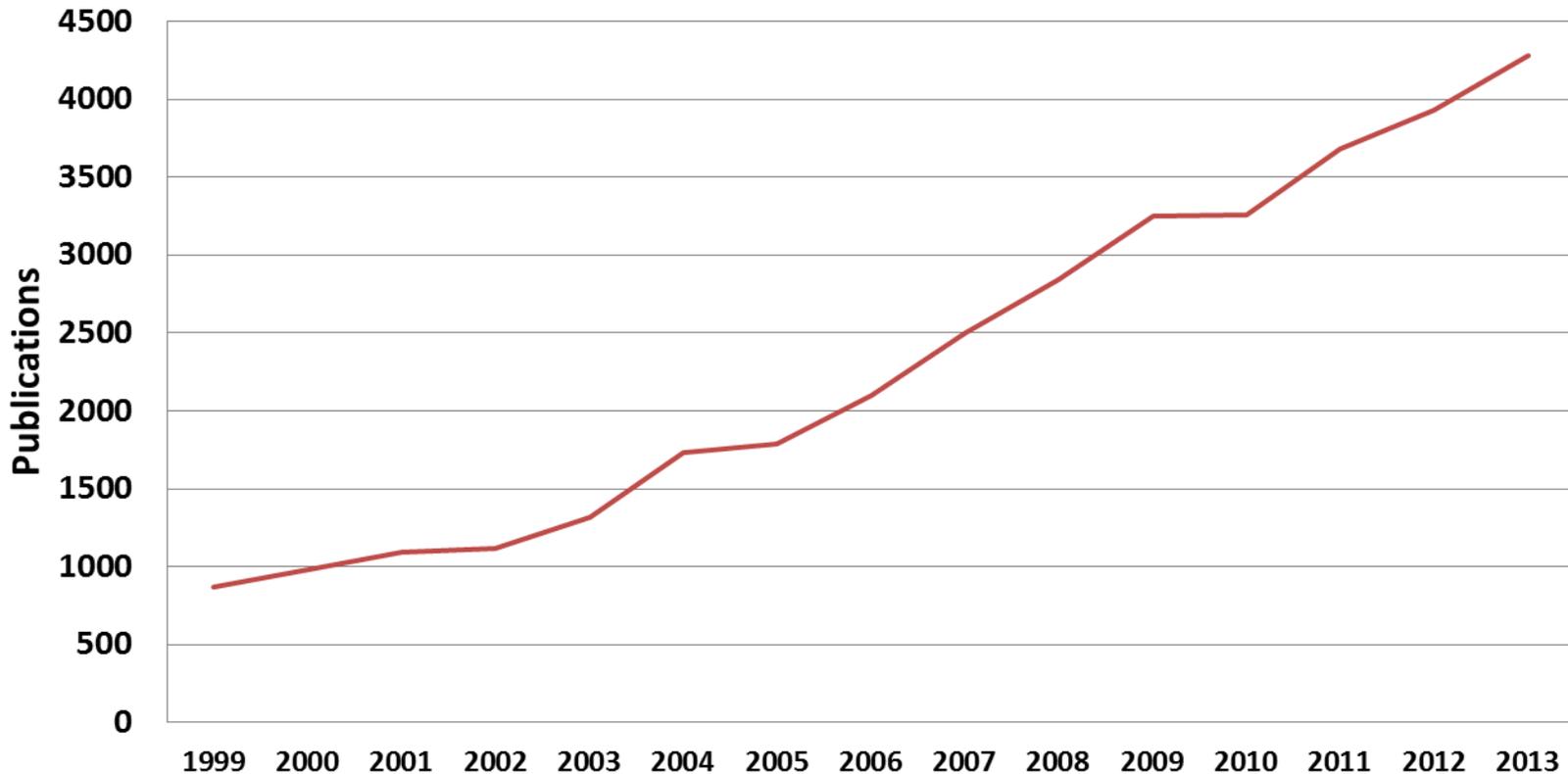


FIGURE 2. Local regression of background normalized concentrations on distance. The horizontal line indicates background concentration. A loess smoother ($\alpha = 0.75$, degree = 1) is fitted to each pollutant which is placed into one of three groups. The regression sample size, n , is given in parentheses after each pollutant.

UFPs are also not well understood

Number of publications containing "ultrafine particles" by year
(via Google Scholar Searches)



More to learn

“Relatively few studies have directly compared UFPs with other particle size fractions. These factors constrain our ability to draw definitive conclusions about the specific consequences of exposure to UFPs.”

HEI Perspectives 3

January 2013

Insights from HEI's research



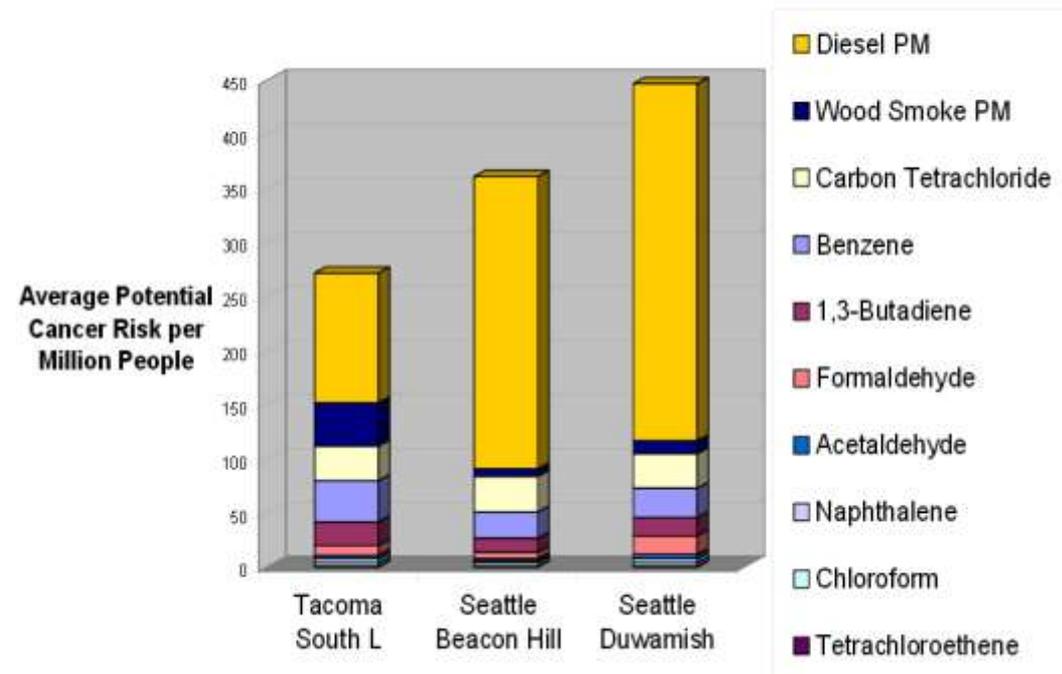
Understanding the Health Effects of Ambient Ultrafine Particles

HEI Review Panel on Ultrafine Particles

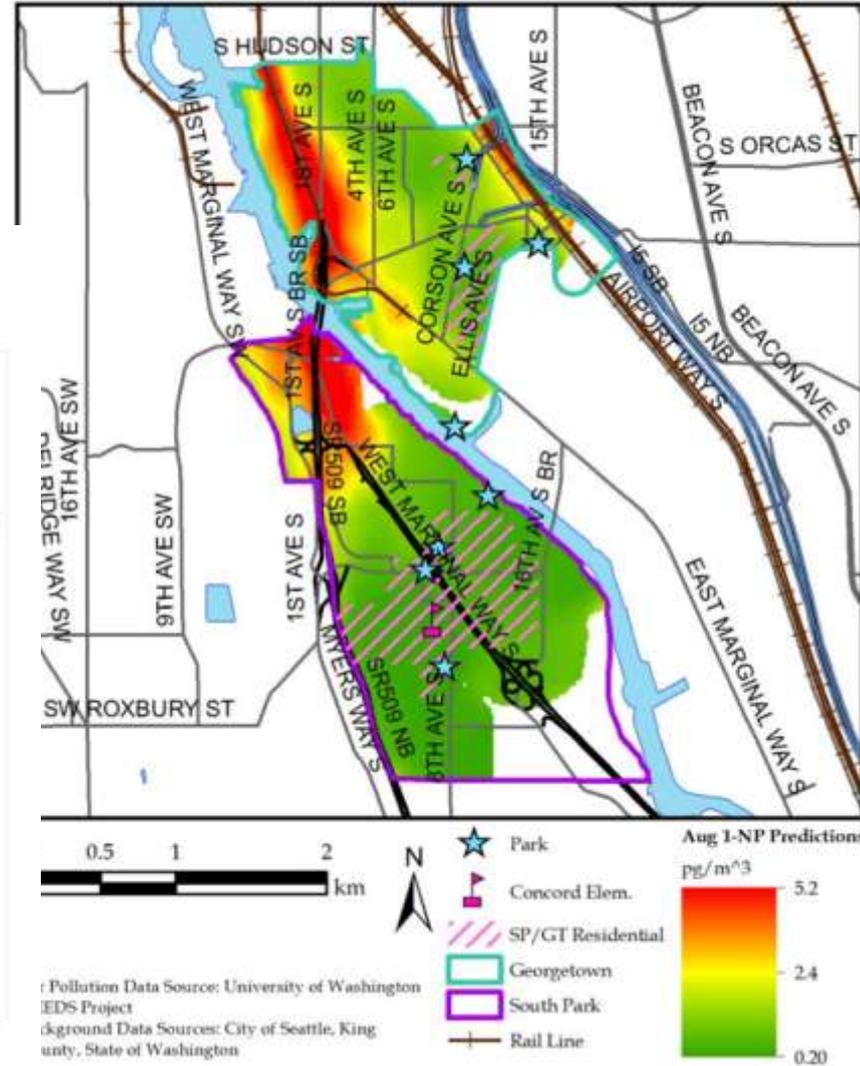
Diesel – cancer risk

- UW DEEDS (2013)
- PSCAA/UW (2010)

Figure B: Potential Cancer Risks with Diesel and Wood Smoke



August 1-NP Predictions



Diesel and wood smoke particulate matter results are based on recent estimates from other studies.^{2, 3}

Reducing Diesel Exhaust

- **Northwest Ports Clean Air Strategy**

- **Diesel Solutions**
 - **ABC fuel program**
 - **ScRAPS**
 - **Retrofits**

Mitigation

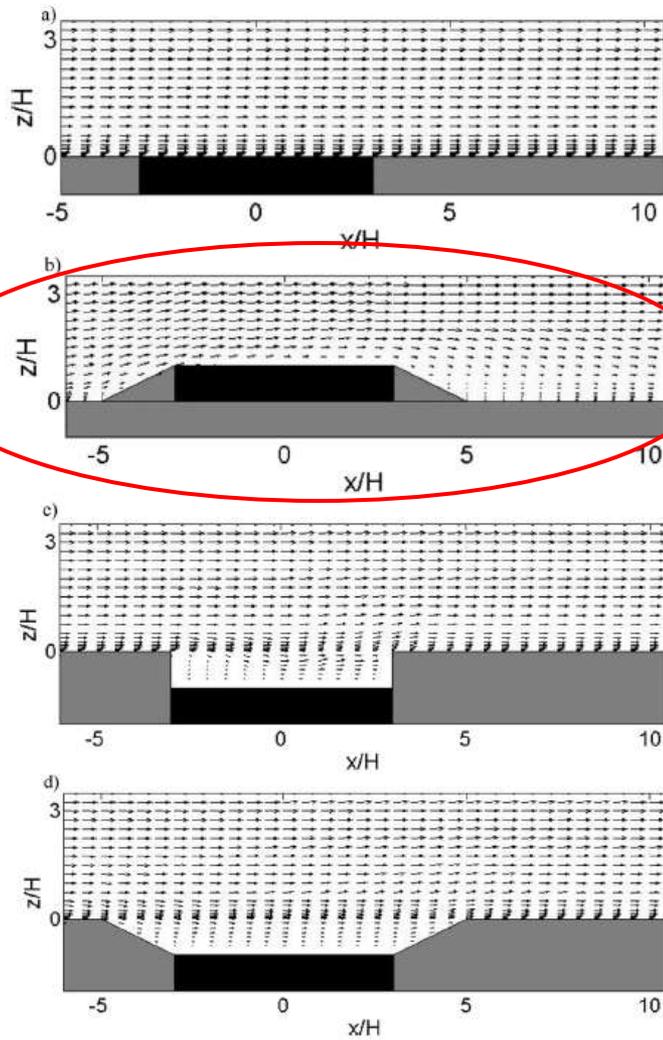
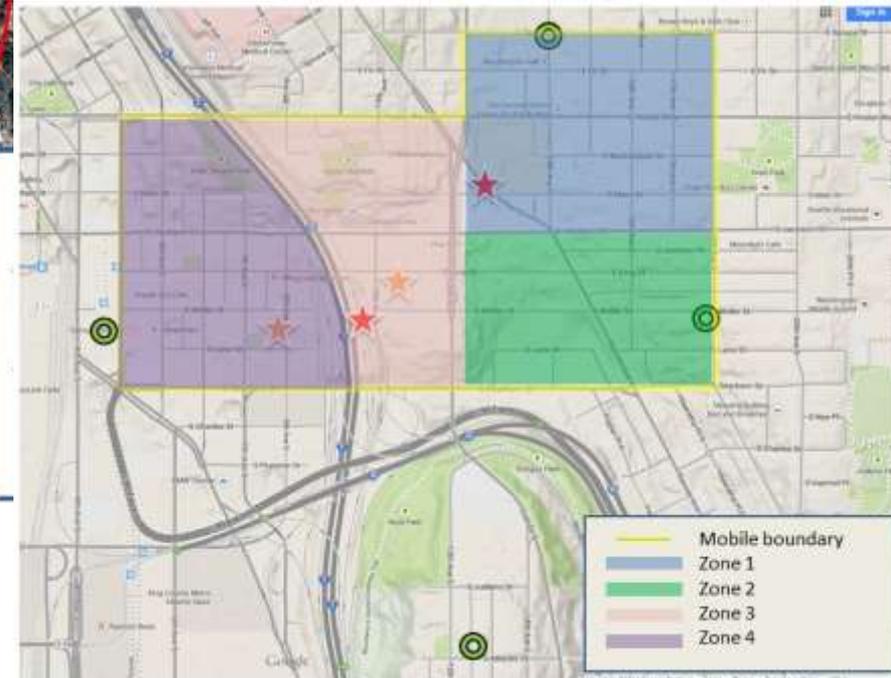
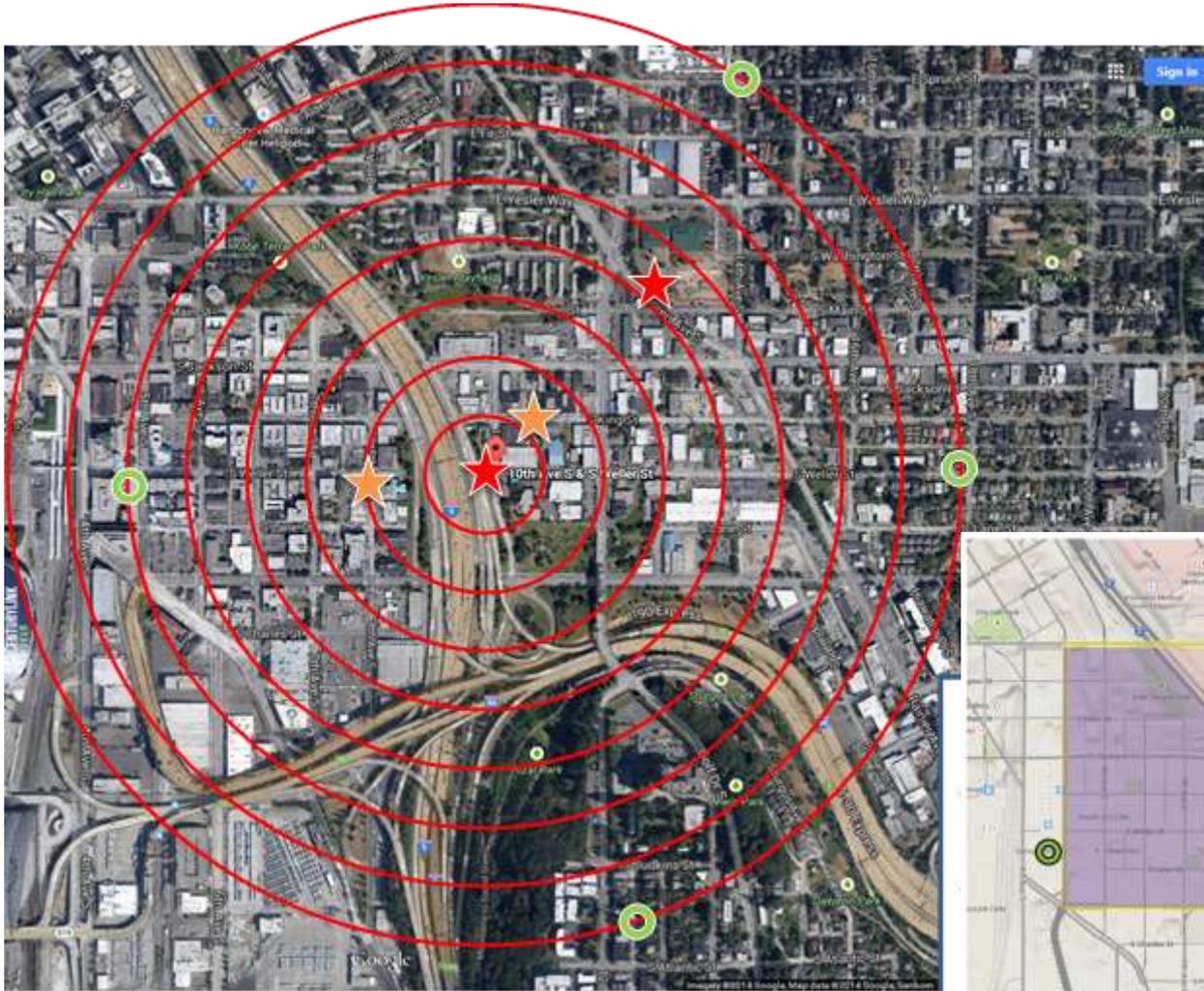


Fig. 3. Velocity vectors for a) Case A (level), b) Case B (elevated), c) Case C (depressed with straight edges), and d) Case E (depressed with angled edges). Origin is found in the center of the roadway at ground level, with the roadway extending from $x/H = -3$ to $+3$.

Summer Study



Questions?

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