Air Measure Topics:

Exploring the relationship between traffic-related pollutants, adverse birth outcomes, and asthma

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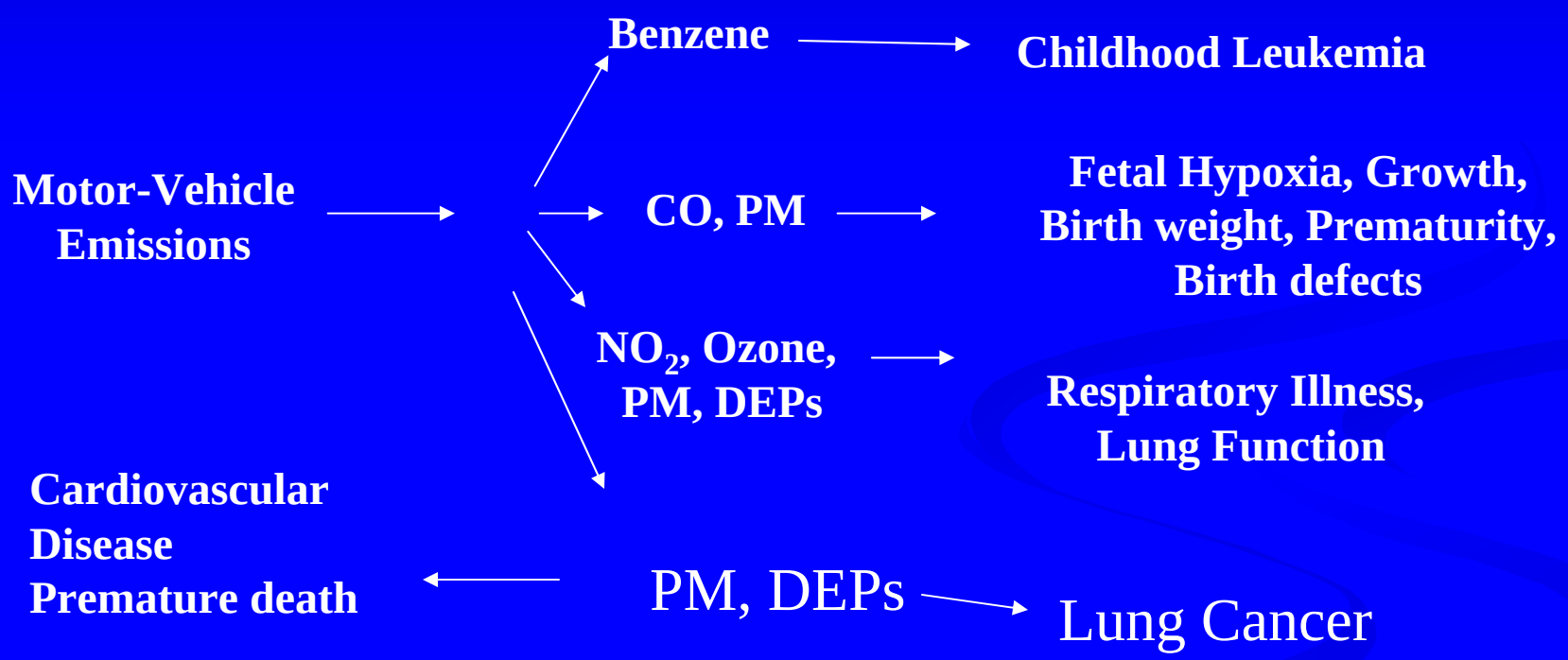
Health Effects Associated with Motor-Vehicle Emissions



Goals

- To produce tools for stakeholders to best visualize geographic “hotspots” of adverse reproductive outcomes and asthma indicators
- To link best validated approach for exposure assessment to cases and controls to examine association with traffic-related pollutants

Health Measures:

Adverse Health Outcomes

- Term Low Birthweight (births > 37 weeks gestation and < 2500 g)
- Prematurity (< 37 weeks gestation)

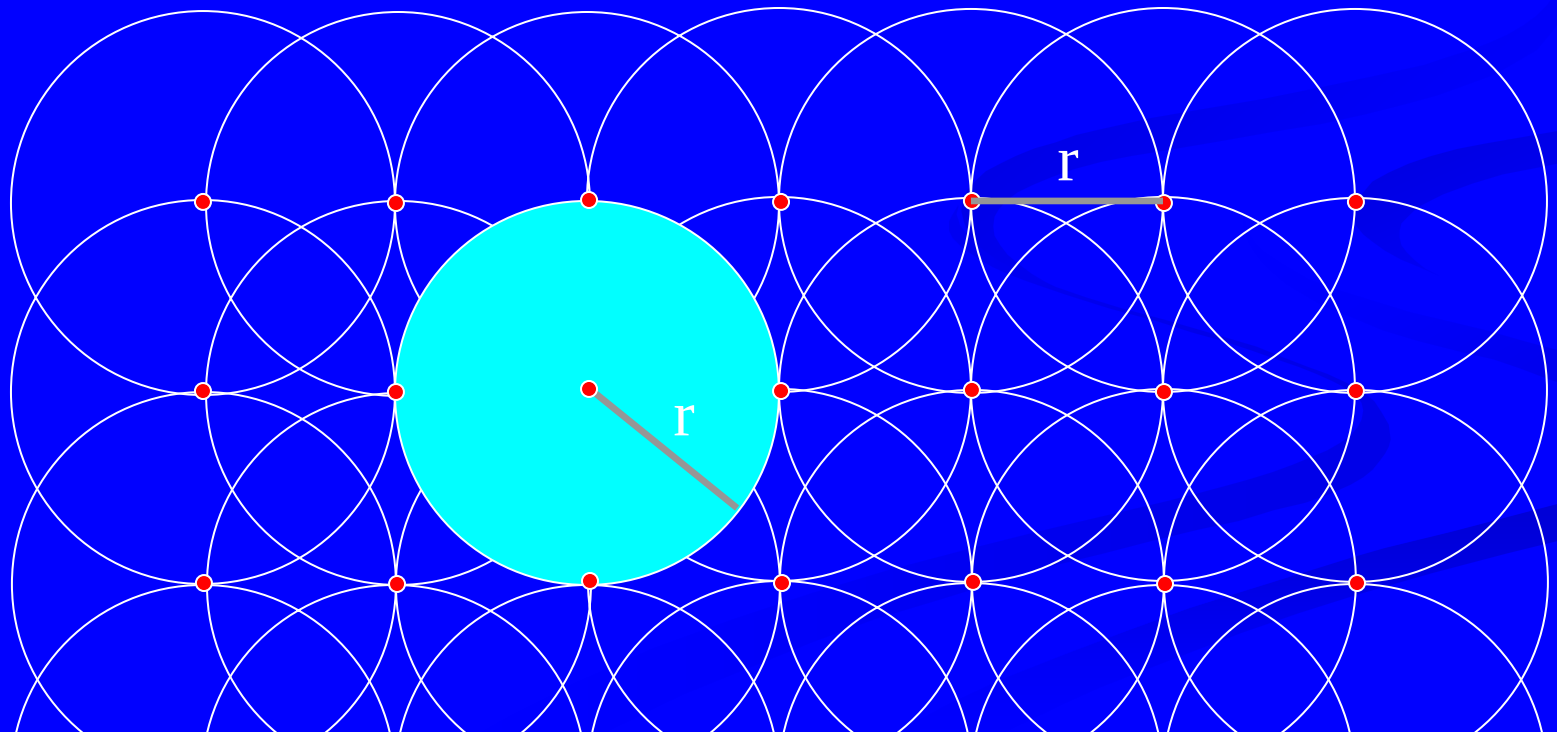
Asthma

- Hospitalization
- ER visits
- Outpatient Visits
- Symptom Medication Purchases
- Maintenance Medication Purchases

Sources: Kaiser Permanente of Northern California
Medical Care Statistics Section, CA DHS (Medicaid)
California Center for Health Statistics

Assessing spatial variation in disease risk

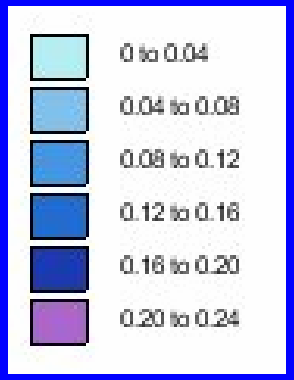
- Using kernal density methods to generate local estimates of the density of rates

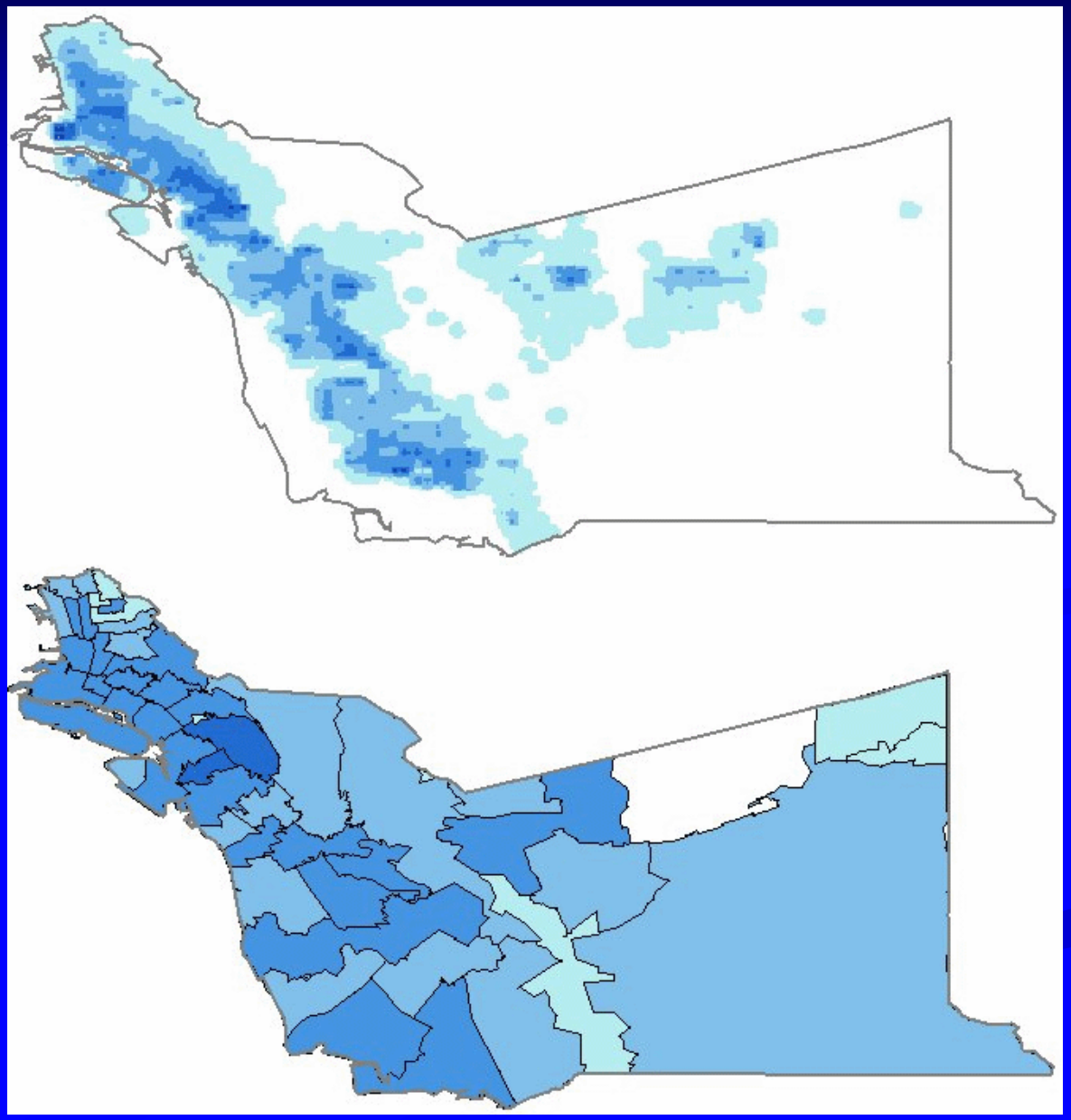


On-going monitoring and dissemination of information on the distribution of environmentally related disease

Pilot Project 1

Pre-term birth rate, Alameda County, 2001 (By density estimation and by zip)

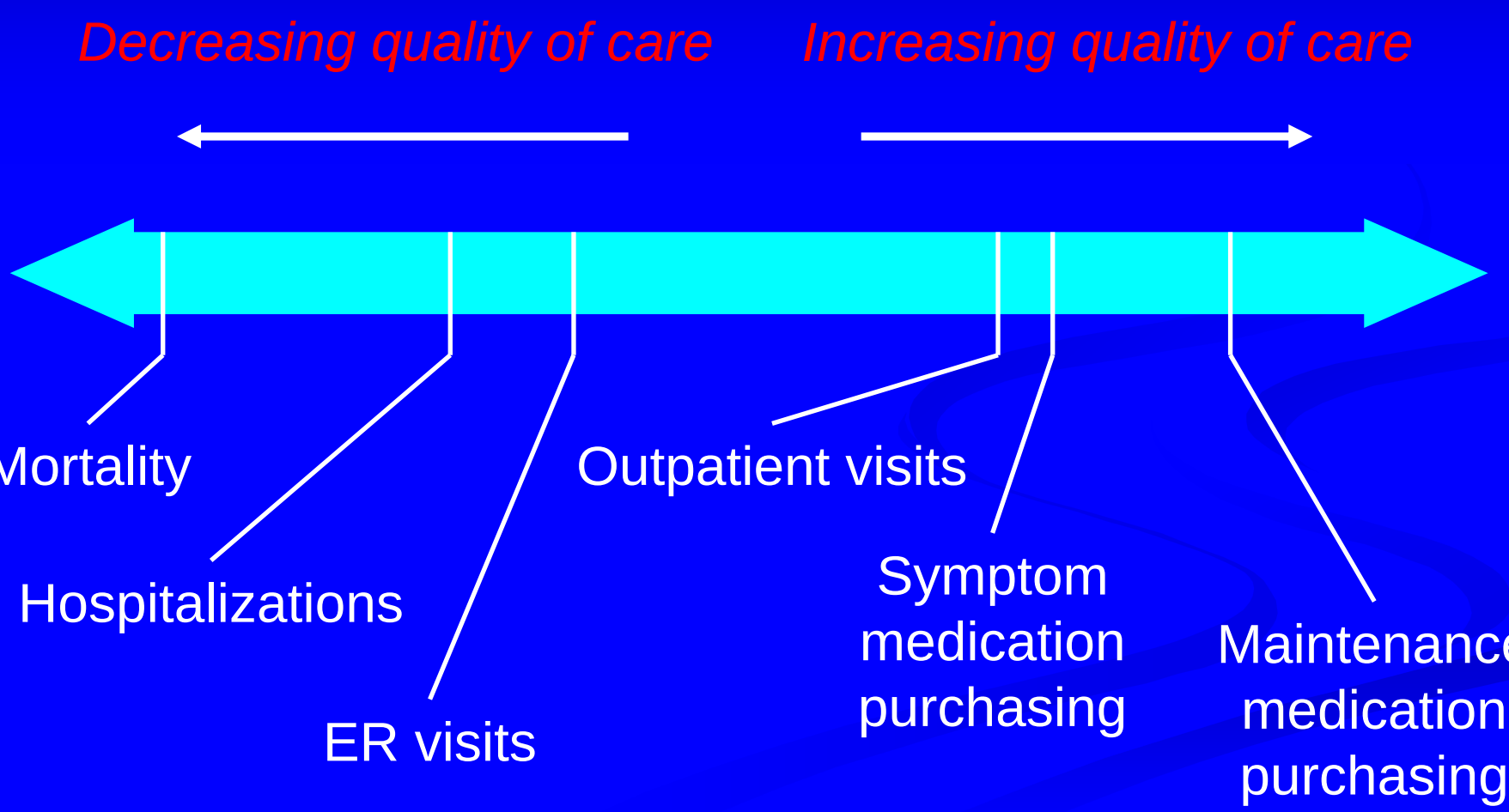




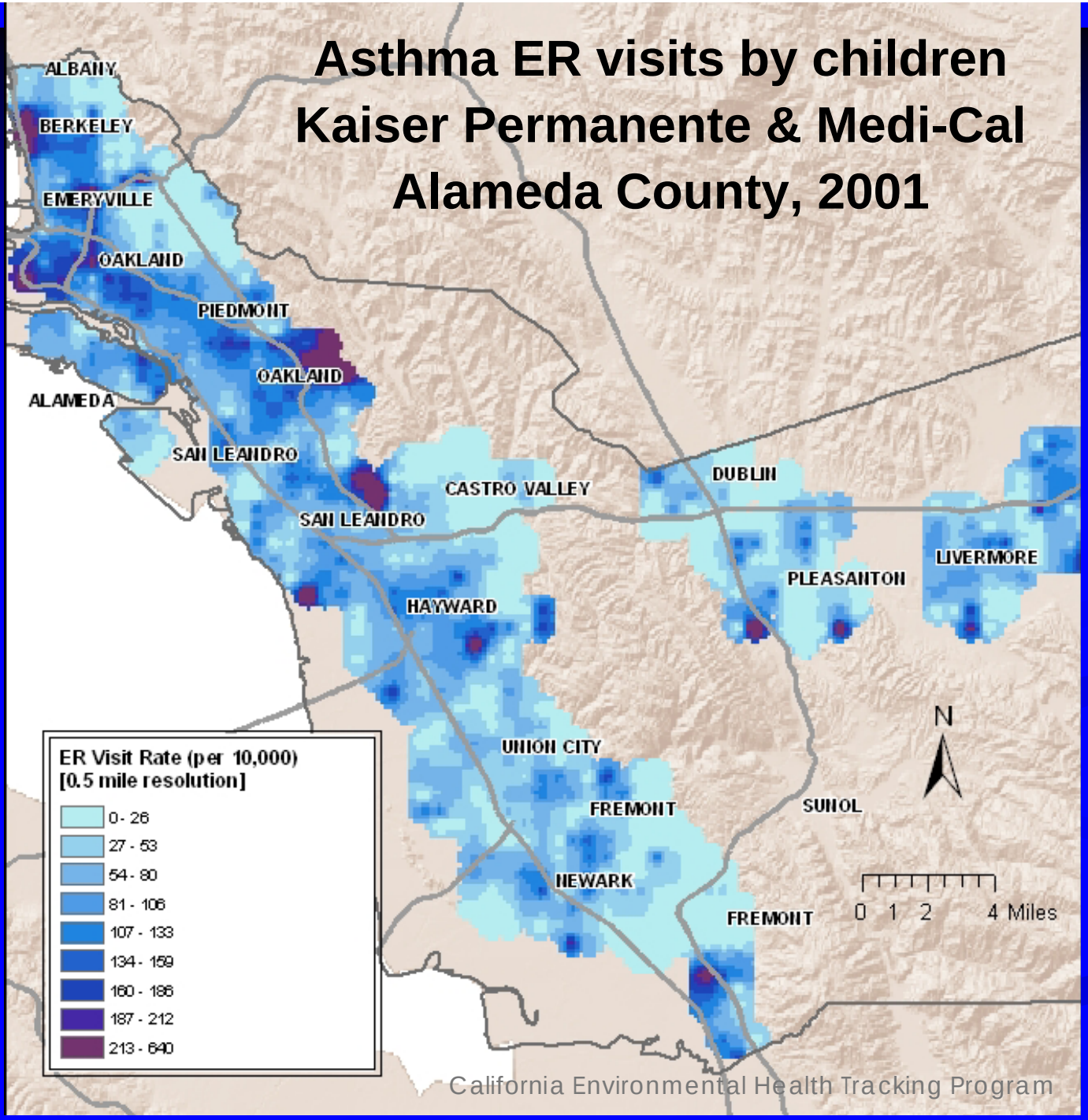
How are we tracking asthma?

- Using two data sources: public (Medi-Cal) and private (Kaiser Permanente)
- Non- random sample
  - Combined, represents a good cross section of Alameda County
  - Captures ~ 1/3 of all children in Alameda County= **176,789**
- Larger and more comprehensive sample offsets some of the problems with having a non-random sample
- *Note: we currently have analysis of pediatric asthma*

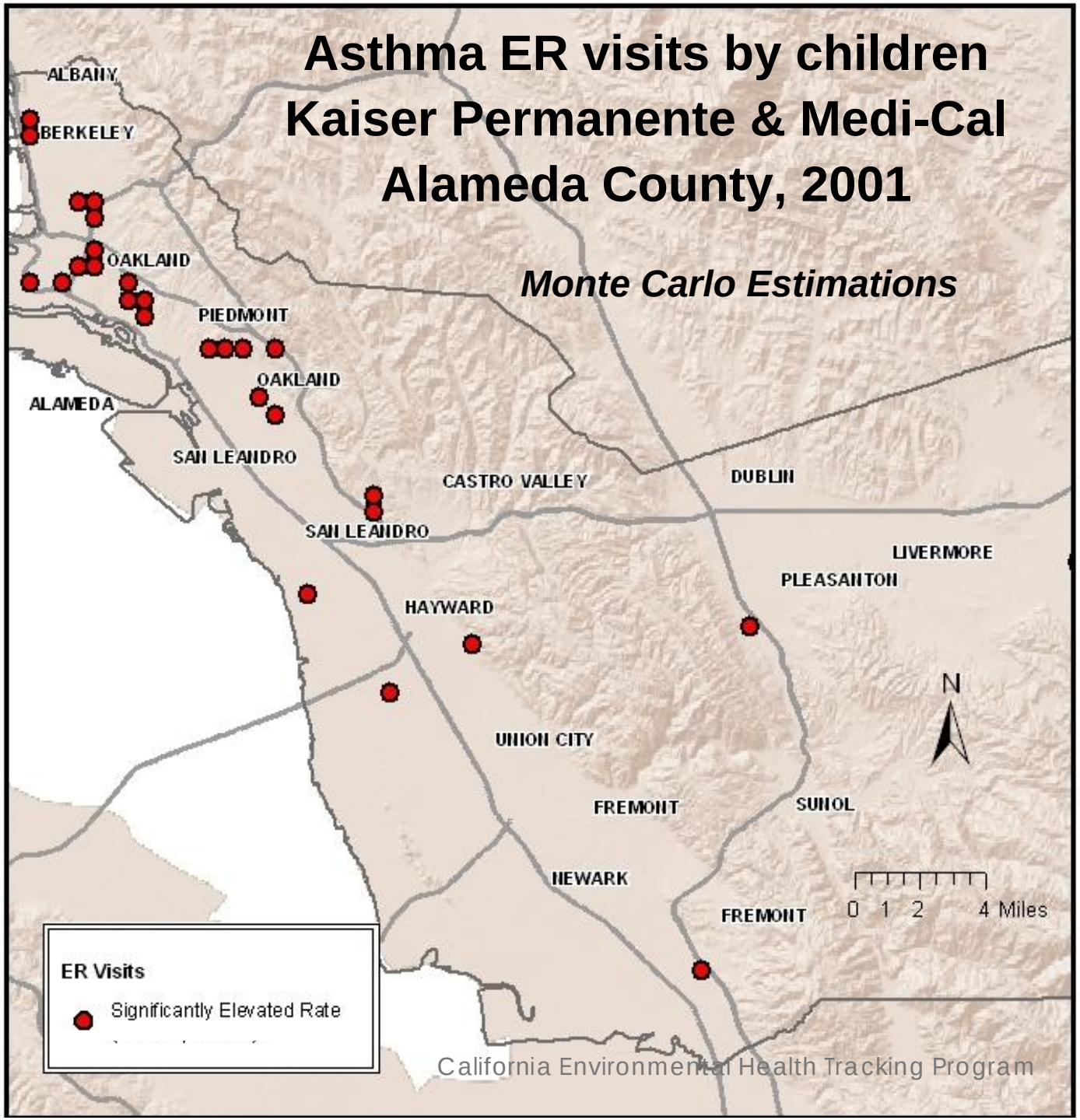
Asthma Indicators



Asthma ER visits by children
Kaiser Permanente & Medi-Cal
Alameda County, 2001

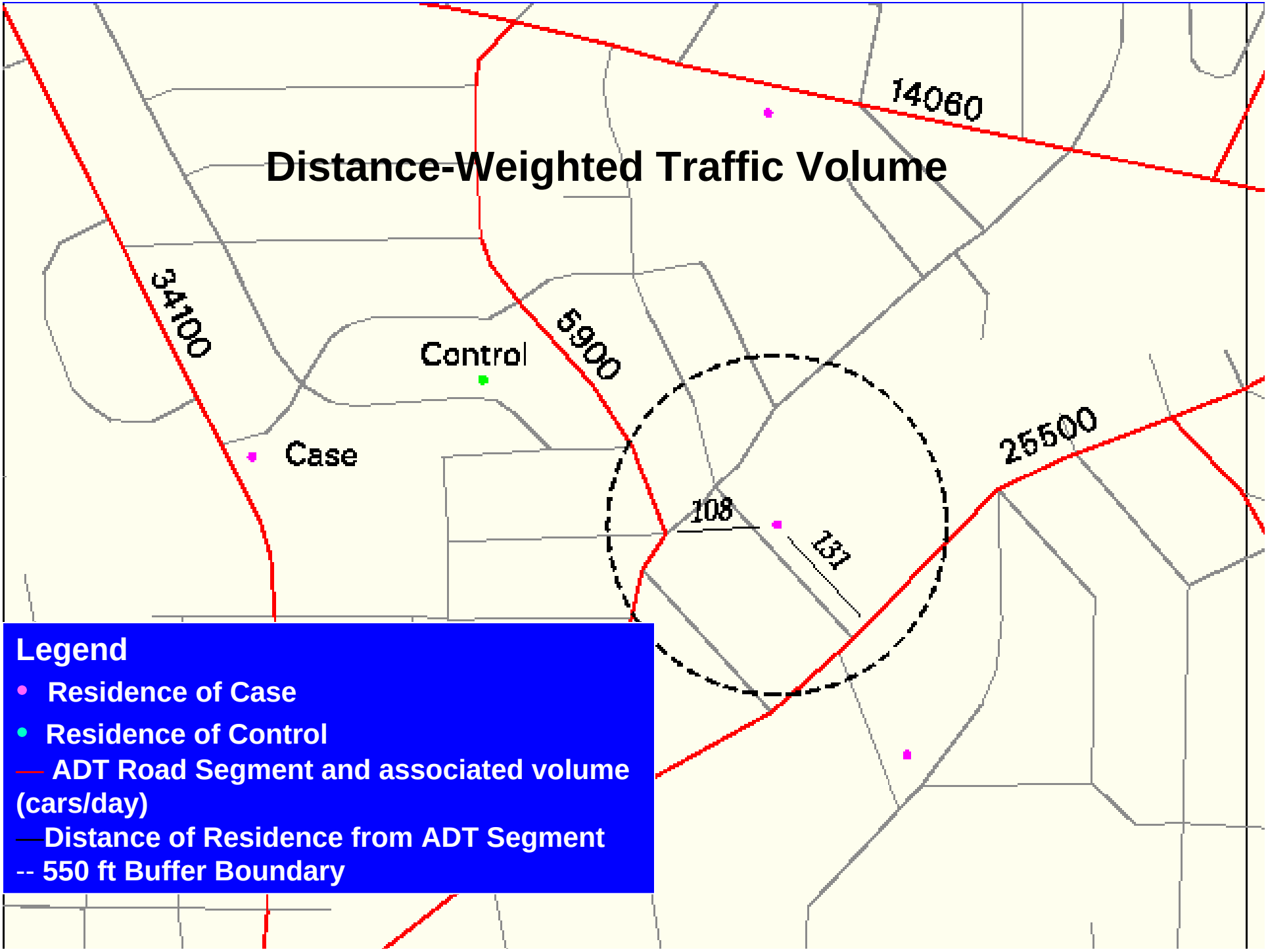


California Environmental Health Tracking Program


Asthma ER visits by children
Kaiser Permanente & Medi-Cal
Alameda County, 2001
Monte Carlo Estimations
ALBANY
BERKELEY
OAKLAND
PIEDMONT
OAKLAND
ALAMEDA
SAN LEANDRO
CASTRO VALLEY
DUBLIN
SAN LEANDRO
LIVERMORE
PLEASANTON
HAYWARD
N
UNION CITY
FREMONT
SUNOL
NEWARK
FREMONT
0 1 2 4 Miles
ER Visits
Significantly Elevated Rate
California Environmental Health Tracking Program

Measures of Traffic-Related Pollution

- Distance-weighted Traffic Volume
- Land use regression
- Integrated Meterological Dispersion Model

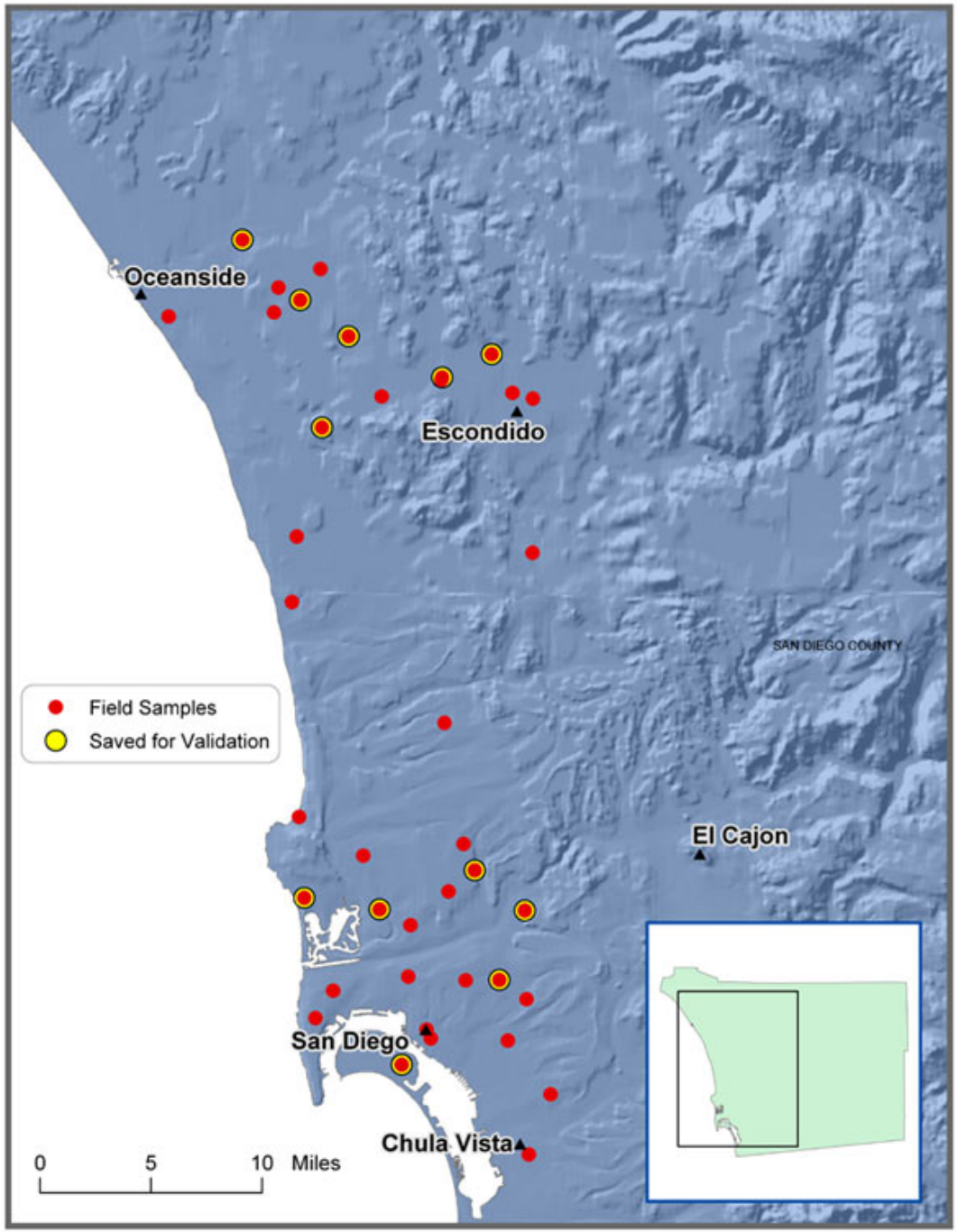

Distance-Weighted Traffic Volume
14060
34100
5900
25500
Control
Case
108
131
Legend
Residence of Case
Residence of Control
ADT Road Segment and associated volume (cars/day)
Distance of Residence from ADT Segment
-- 550 ft Buffer Boundary


1.0
0.5
0
Normalized Air Pollution Concentration
Street to Residence
Weighting Distance

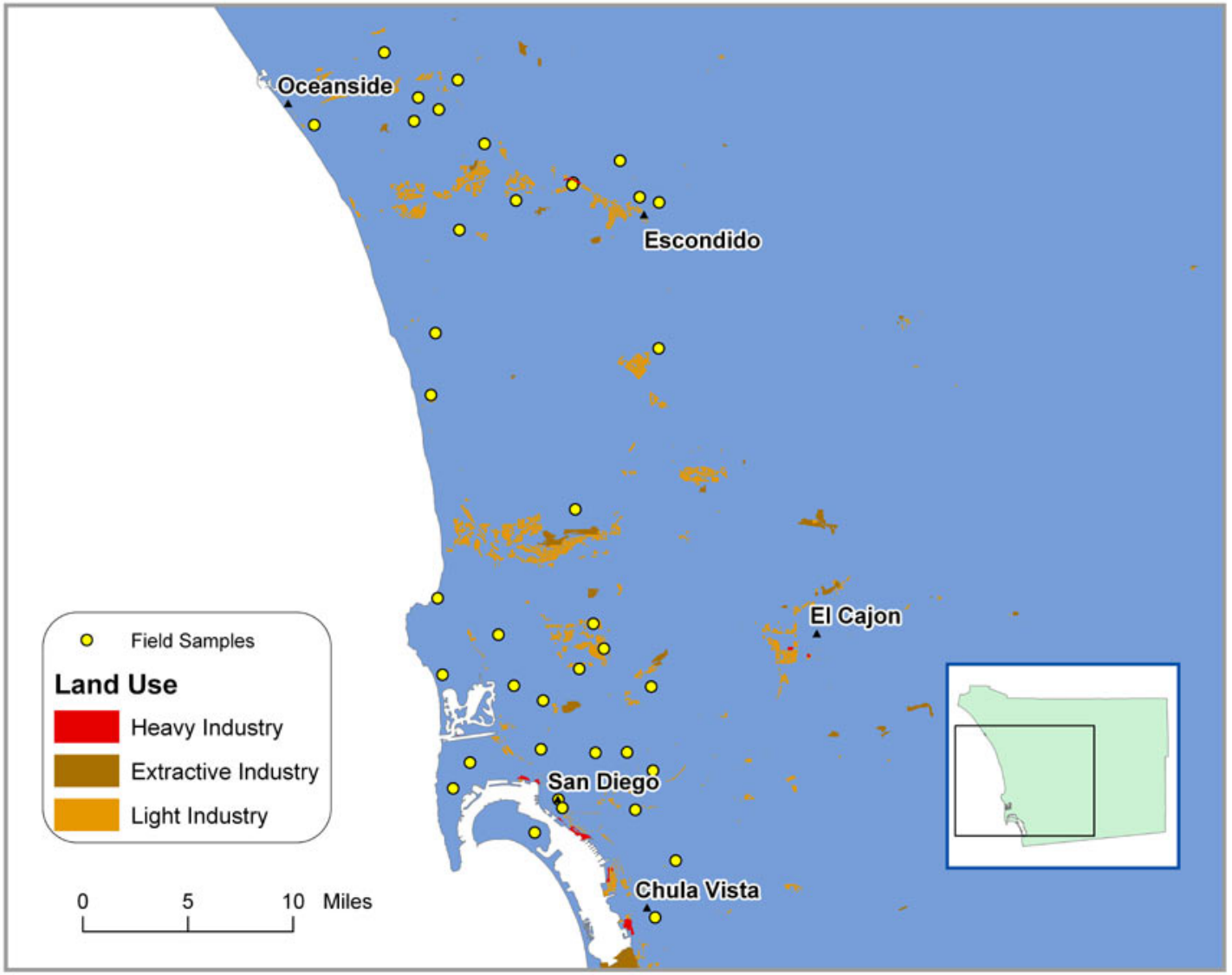
Traffic Counts – Distance weighted by dispersion models

- "Pearson" model assumes:
  - No wind
  - Pollutants essentially inert and disperse from the source
- "Gaussian" model assumes:
  - 1 m/sec wind
  - Pollution concentration height of 1 m

Land Use Regression

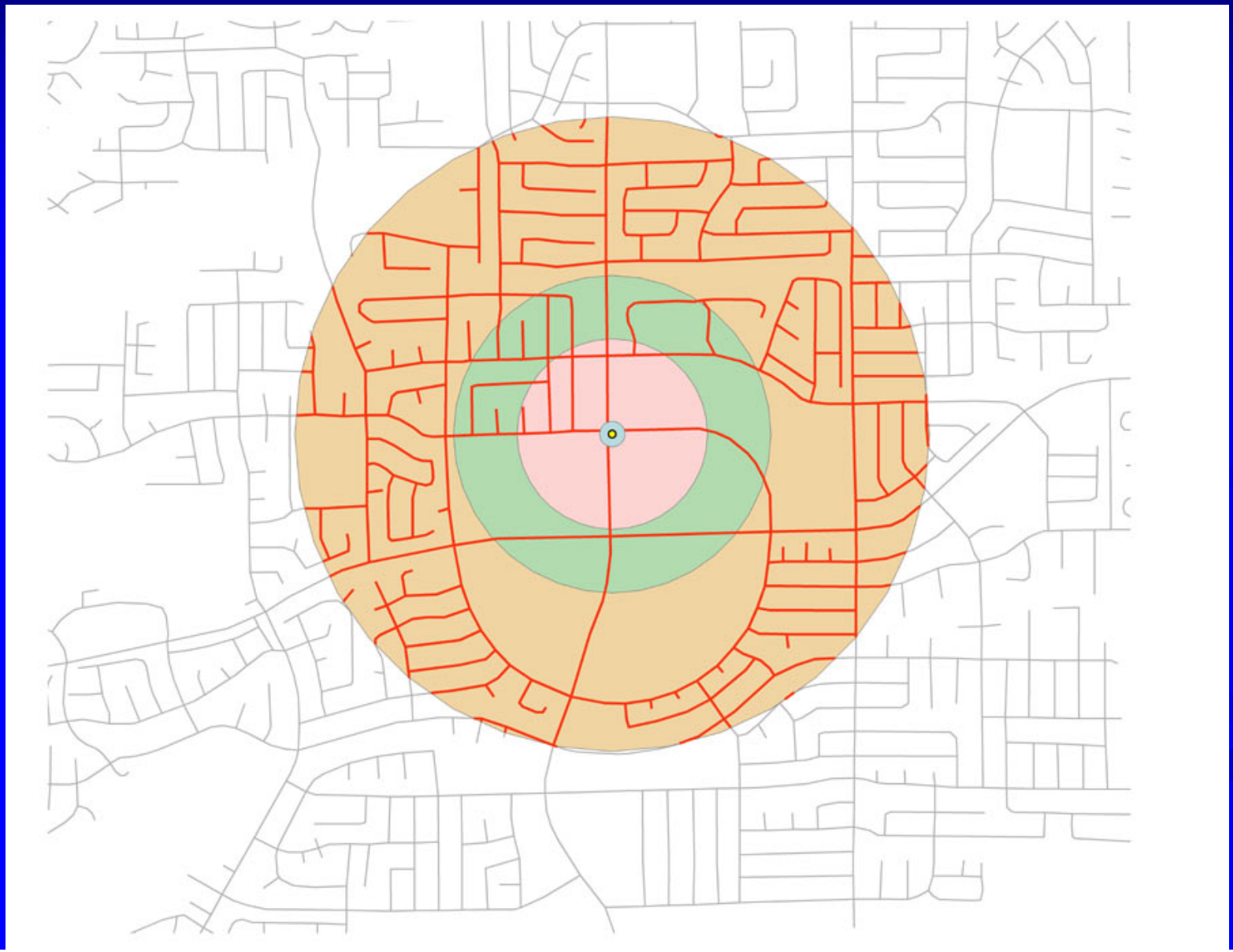


Industrial Land Use (2003)



Source: San Diego Association of Governments

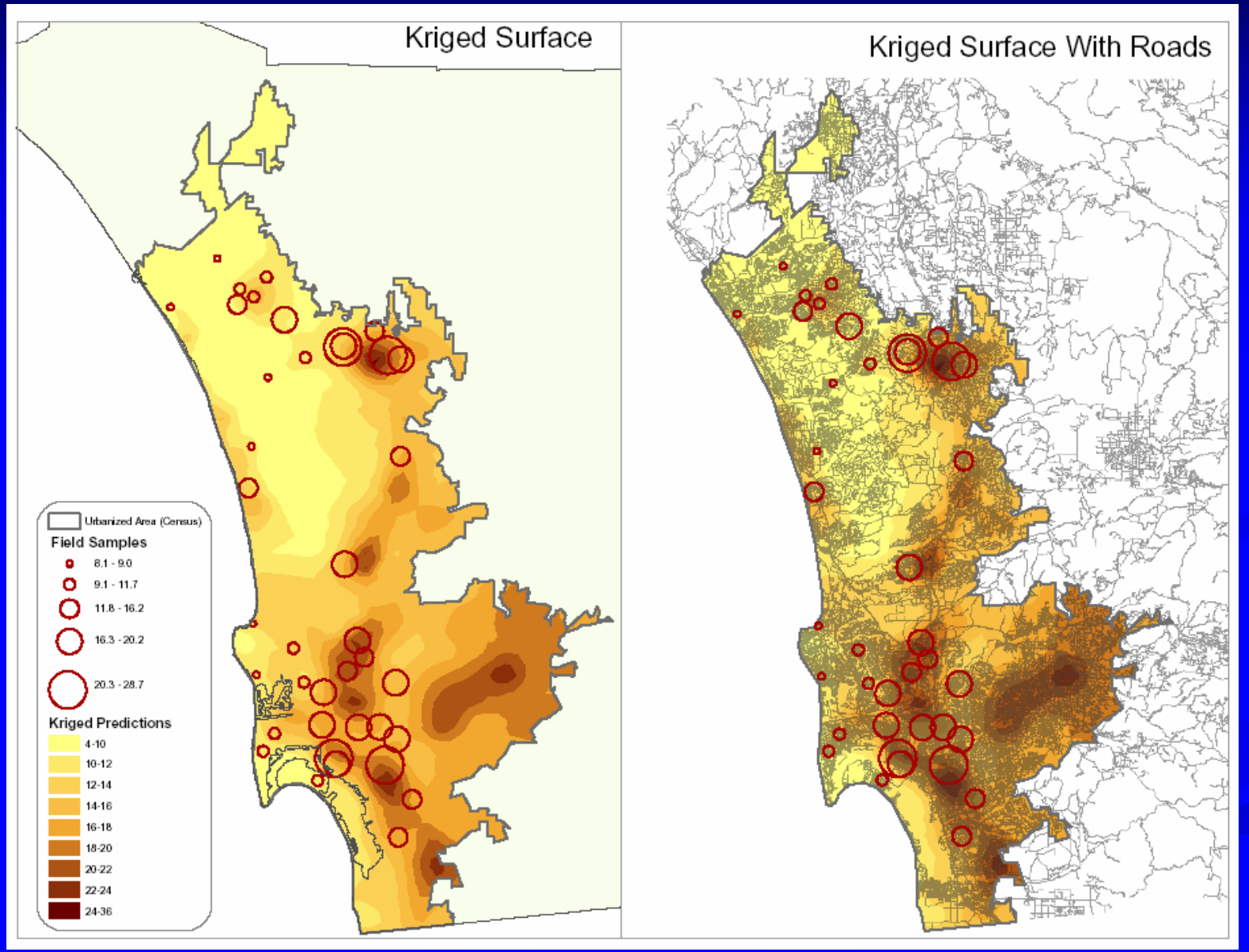
Clip to Buffers



Final Model

R-Squared 79%

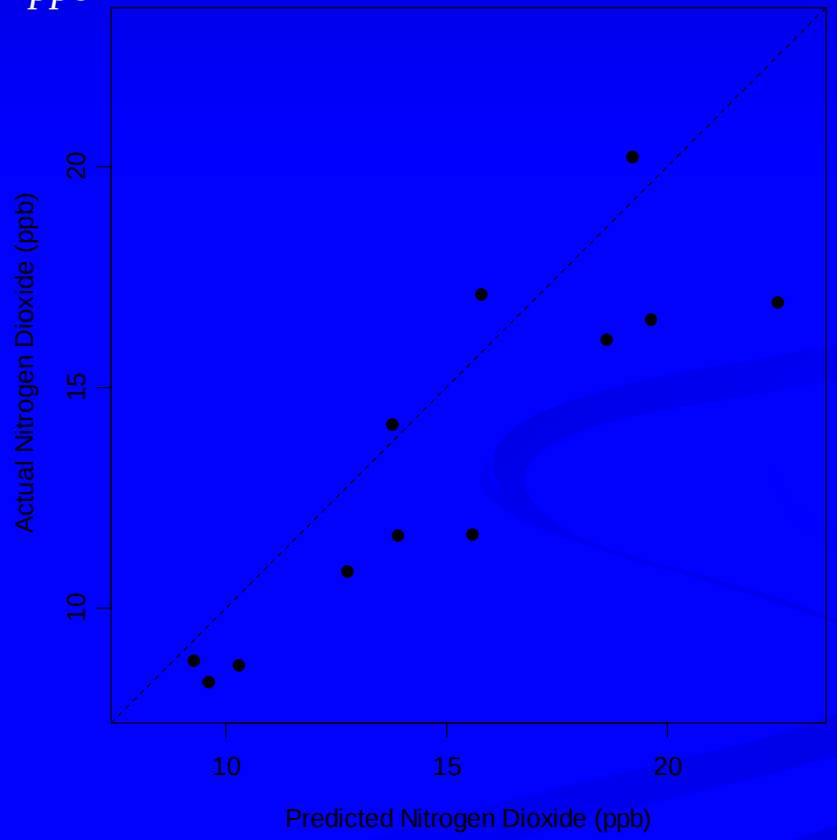
	Value	SE	t	p	VIF
(Intercept)	5.3051	1.1039	4.81	0.0000	-
Road Length (40m)	29.4083	7.0382	4.18	0.0002	1.05
Traffic Volume (40-300m)	0.0017	0.0004	4.23	0.0002	1.29
Traffic Volume (300-1000m)	0.0002	0.0001	3.72	0.0007	1.08
Distance to Coast	0.0003	0.0001	4.62	0.0001	1.25


Kriged Surface
Kriged Surface With Roads
Urbanized Area (Census)
Field Samples
8.1 - 9.0
9.1 - 11.7
11.8 - 16.2
16.3 - 20.2
20.3 - 28.7
Kriged Predictions
4-10
10-12
12-14
14-16
16-18
18-20
20-22
22-24
24-36

Predictions

All Validation Samples

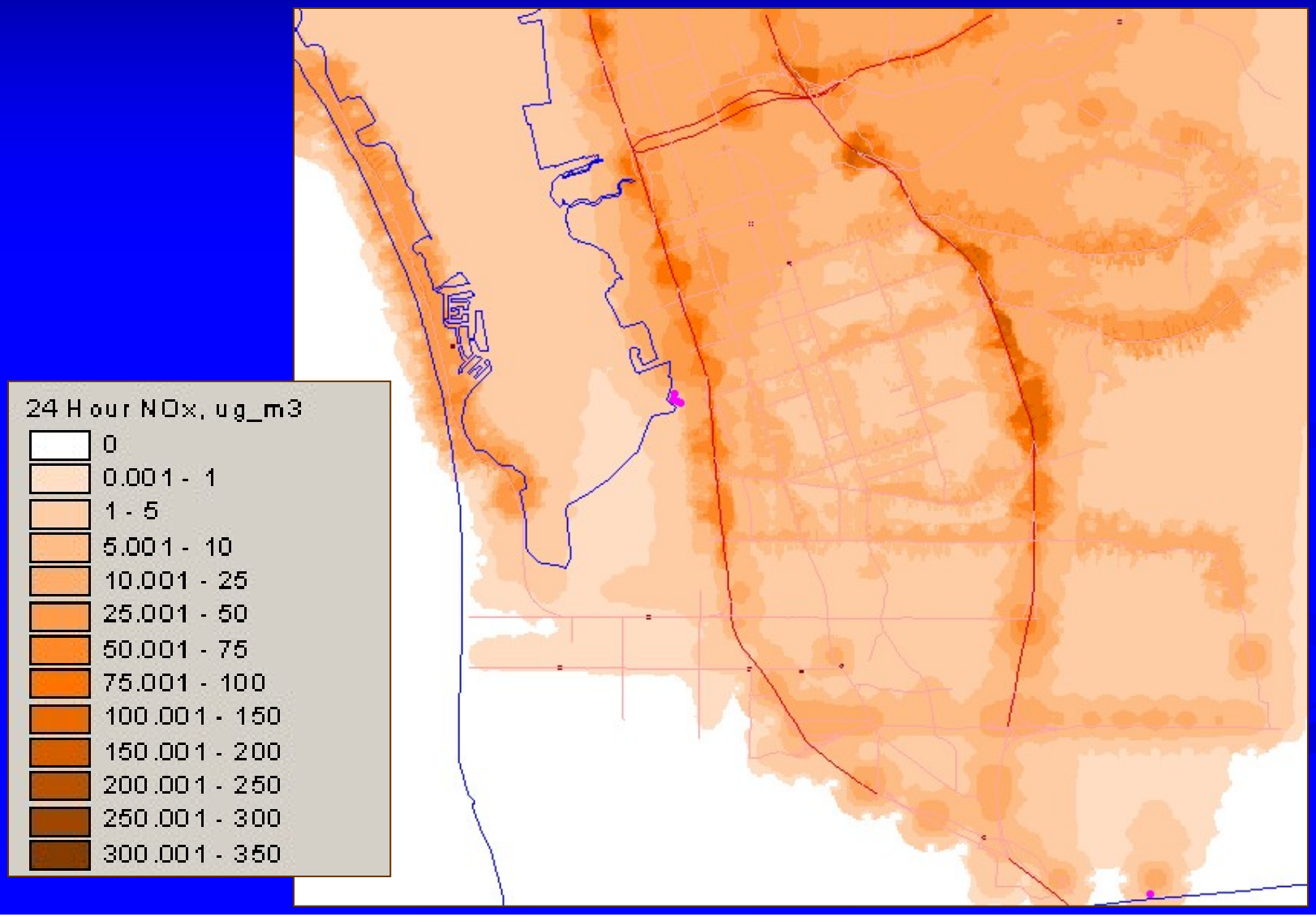
On average predicts to within 2.1 ppb



ADMS-Urban (v. 2)

- Integrated Meteorological Emission Model
  - Incorporates boundary layer effects, photochemistry, and dispersion
- Run with 10 modeling domains, each 14.4 sq km
- Inputs: traffic count data; areas sources; point sources to 1 ton/year (inc. height and diameter of stacks); met data

Modeled total NOx for 2000, San Diego County



Conclusions

- Kernal Density Estimation powerful tool for visualization of health outcomes for stakeholders
- Distance-weighted traffic volume and land use regression good approaches for estimating pollution risk
  - Validation results pending