A nighttime photograph of the St. Louis skyline, featuring the prominent Gateway Arch in the center. The city lights are reflected in the water of the Mississippi River in the foreground. The sky is a deep blue, and the overall scene is illuminated by the city's lights.

Using Technology in the Fight to End  
Childhood Lead Poisoning in  
St. Louis City

# **A Cooperative Project Funded Through the Centers for Disease Control and Prevention Environmental Tracking Grant**

## **Environmental Tracking Team Members**

**Roger Gibson, Program Manager**  
**Pat Phillips, Consulting Epidemiologist**  
**Patty Osman, Administrator for Lead Surveillance**  
**Pam Brauner, Liaison for Application Development**  
**Jeff Patridge, GIS Analyst**  
**Robert Schneider, Research Analyst**  
**Kris Schwartz, Research Analyst**  
**Marilyn Nobbman, Office Support Assistant**

## **Collaborative Partners**

**Tulane Center for Applied Environmental Public Health**  
**Missouri Department of Natural Resources**  
**Missouri Department of Economic Development**  
**City of St. Louis**



# **Overview of Activities to End Childhood Lead Poisoning in St. Louis**

- **Relative Pocket of Need (RPoN)**
- **Demolition Study**
- **Historic Smelter Project**



**Relative Pocket Of Need**

# Relative Pockets of Need

- In order to move beyond simple ranking procedures and develop more interpretable need models Missouri's DHSS through the Environmental Tracking Team began work on a Relative Pocket of Need Formula and Methodology in the Summer of 2003.



# Relative Pocket of Need?

- Relative
  - Information from multiple sources that exists on the same scale for comparability
- Pocket of Need
  - Region as defined by it's requirement for assistance or outside resources
- Relative Pocket of Need
  - Region whose requirements for assistance or outside resources are based on information that exists on a uniform scale allowing for enhanced interpretation and analysis



# Relative Pocket of Need

- Relative Pocket of Need (RPoN) Methodology
  - Ranks (Orders) Areas in Relationship to One Another Based on Related Types of Need
    - Types of Need Identified for Lead
      - Social
        - » Median Household Income
        - » Median Housing Value
      - Rental
        - » Number of Rentals
        - » Median Cost of Rentals
      - Lead
        - » Number of Houses Older than 1950



# Relative Pocket of Need (for Pb)

Relative Pocket of Need (Lead) Main Equation

$$\text{RPoN}_{\text{Pb}} = \frac{\text{P}}{\text{Area}} \bullet (F_1 - F_2)$$

Relative Pocket of Need (Lead) Main Factor Equation

$$F_n = \left( \left( \frac{M_s}{\sum M} \right) \bullet V_s \right) + \left( \left( \frac{M_R}{\sum M} \right) \bullet V_R \right) + \left( \left( \frac{M_{\text{Pb}}}{\sum M} \right) \bullet V_{\text{Pb}} \right)$$

Relative Pocket of Need Sub-Factor Equation ( $F_1$  Main Factor)

$$V_f = \left( \left( \frac{m_1}{\sum m} \right) \bullet e^{\left( \frac{xv_1 - \bar{X}v_1}{SDv_1} \right)} \right) + \dots + \left( \left( \frac{m_n}{\sum m} \right) \bullet e^{\left( \frac{xv_n - \bar{X}v_n}{SDv_n} \right)} \right)$$

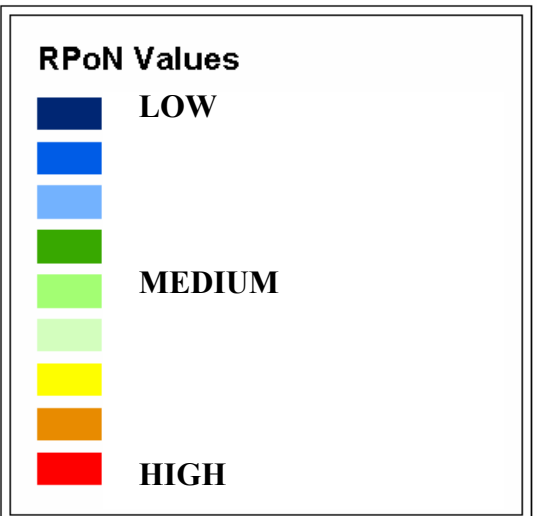
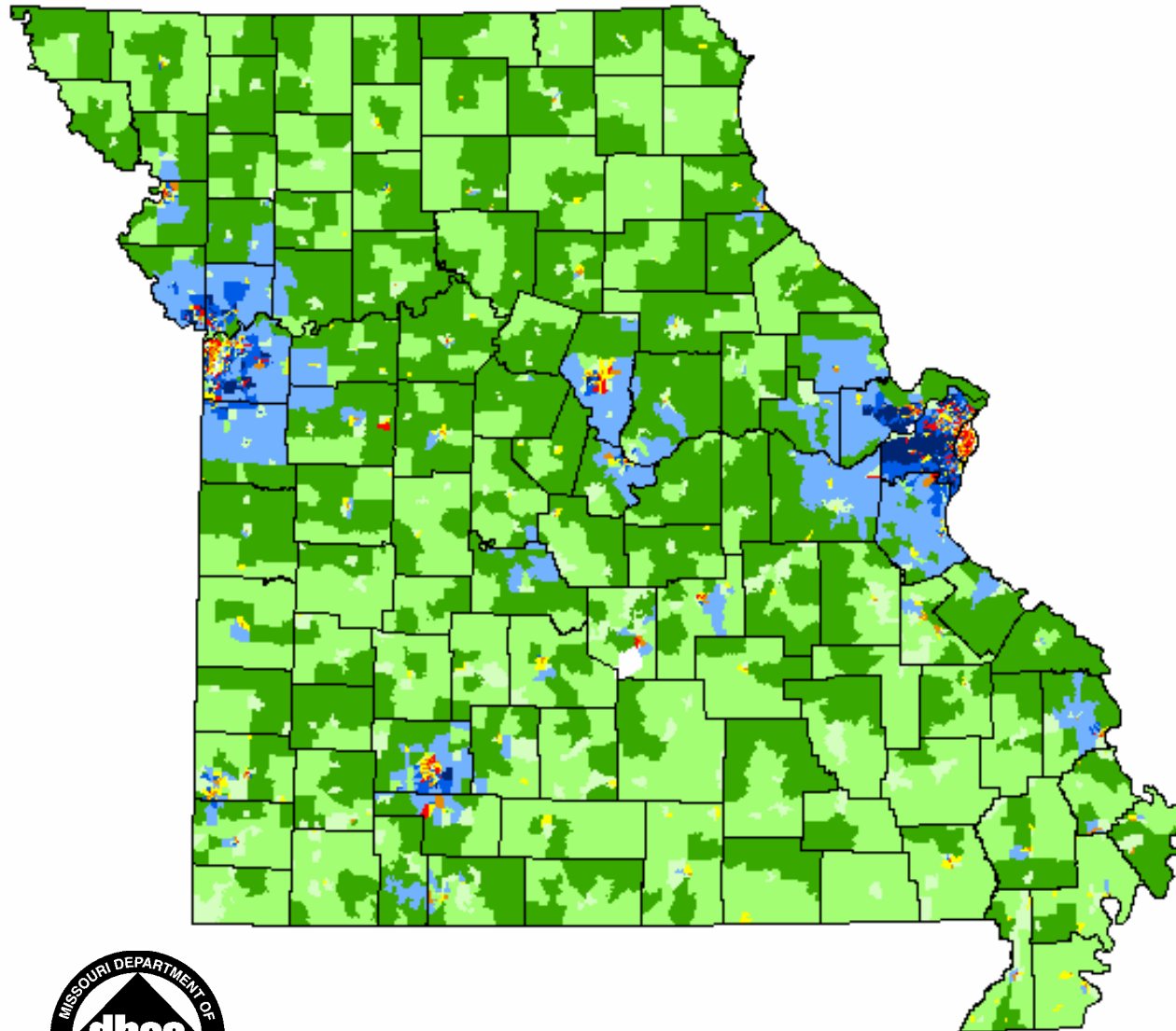
Relative Pocket of Need Sub-Factor Equation ( $F_2$  Main Factor)

$$V_f = \left( \left( \frac{m_1}{\sum m} \right) \bullet e^{-\left( \frac{xv_1 - \bar{X}v_1}{SDv_1} \right)} \right) + \dots + \left( \left( \frac{m_n}{\sum m} \right) \bullet e^{-\left( \frac{xv_n - \bar{X}v_n}{SDv_n} \right)} \right)$$



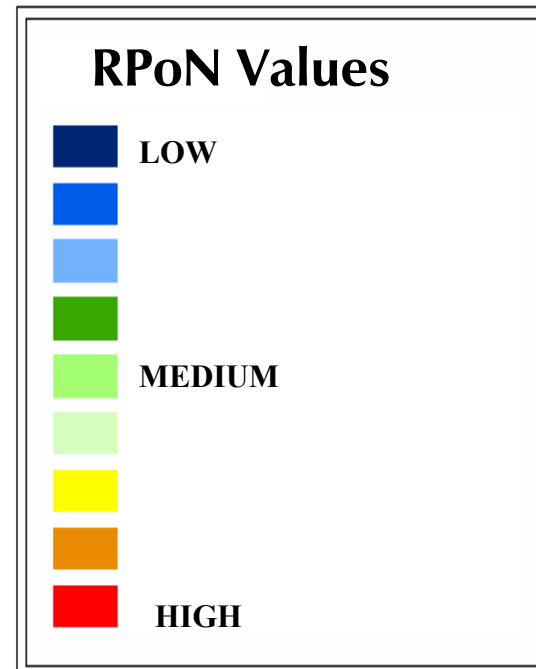
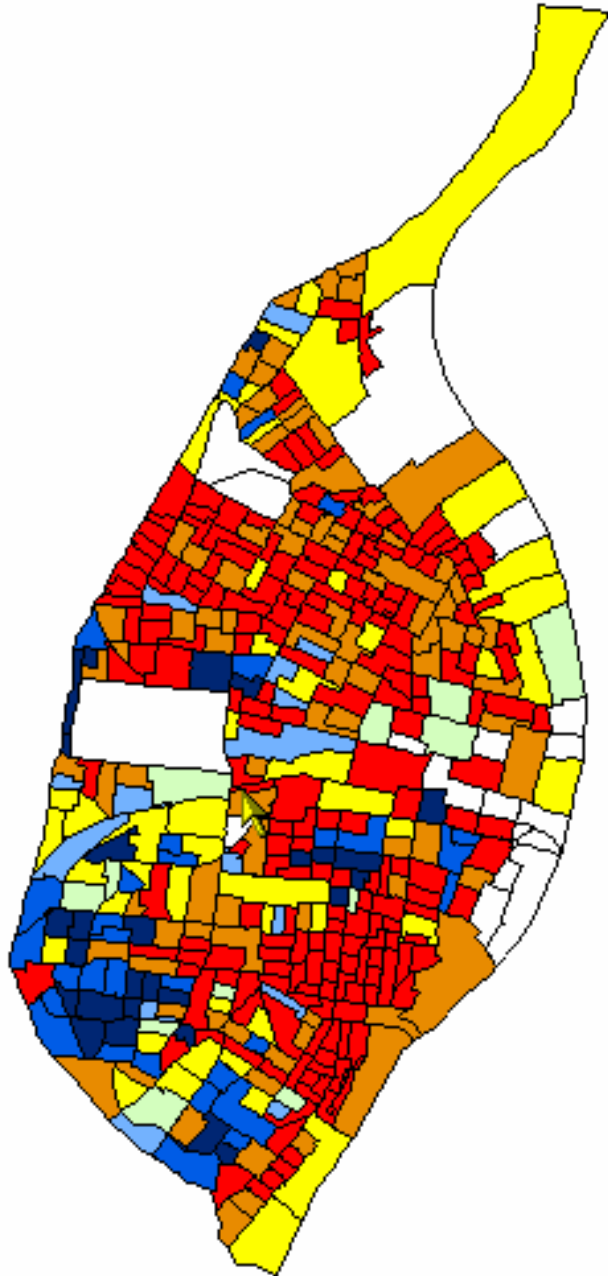
# Missouri RPoN

- All Sub-Factors Equal Weighted
- Social, Rental, and Lead Sub-Factors
- Weighted by Population
- Controlled for Area



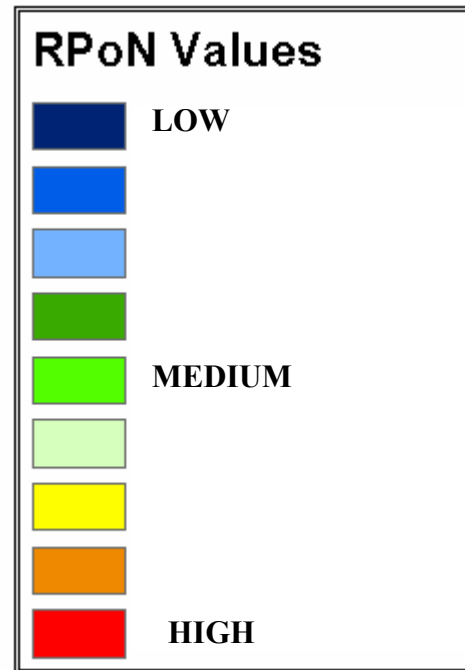
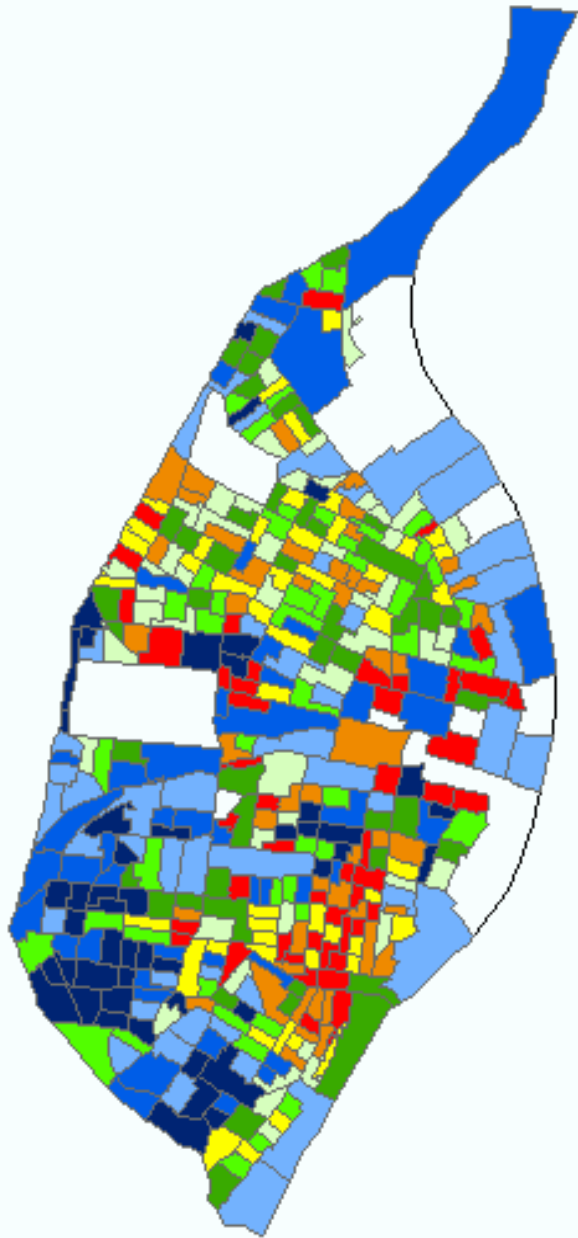
# City of St. Louis RPoN

State-Wide Comparison



# City of St. Louis RPoN

## City-Wide Comparison



# Demolition Study

A photograph of a demolition site. On the left, a tall, multi-story brick building stands with a significant portion of its facade removed, exposing the internal structural elements. To the right, a tall, blue lattice boom crane reaches towards the sky. The sky is a clear, bright blue with a few wispy clouds. The text "Demolition Study" is overlaid in a large, white, serif font across the center of the image.

# How the Study Developed

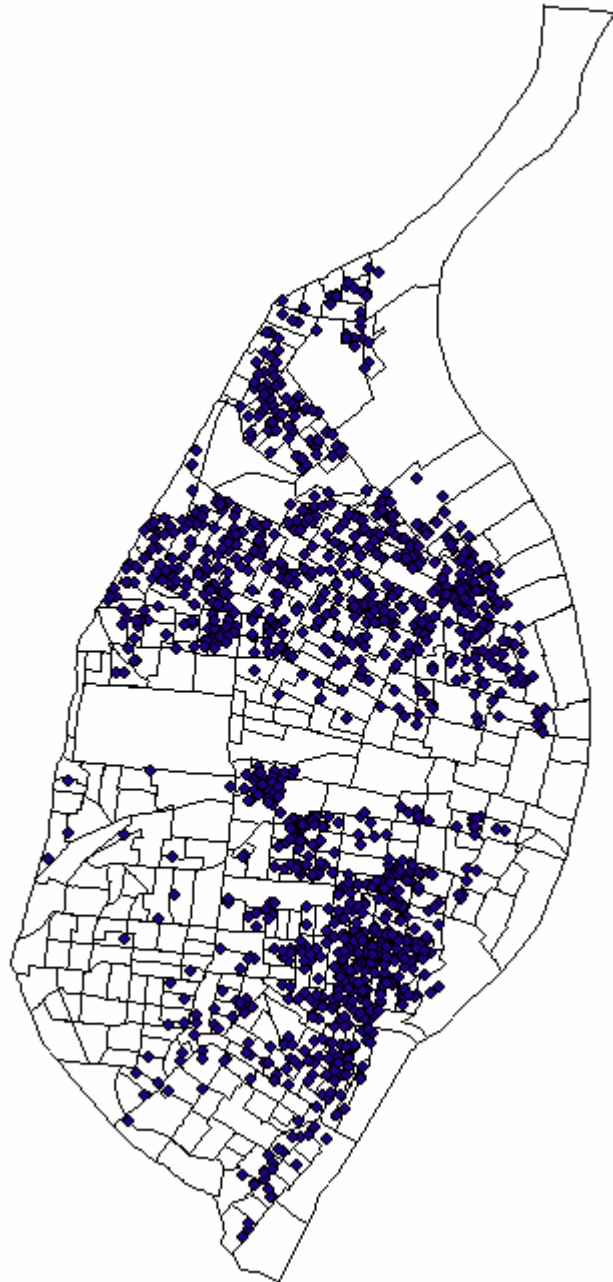
The St. Louis City Demolition Study grew out of a concern by City detox crews that children near demolition sites were showing higher than normal rates of elevated blood lead levels.



# Specific Aims of the Study

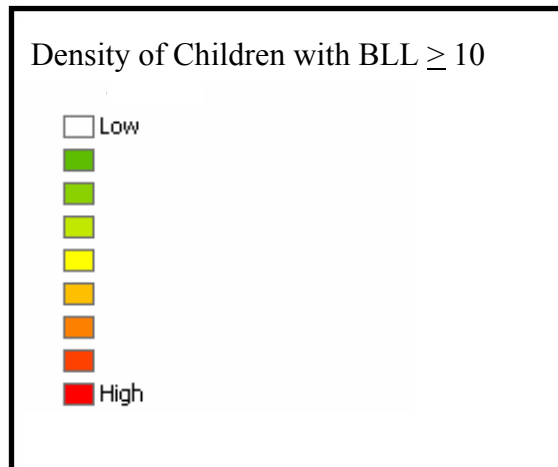
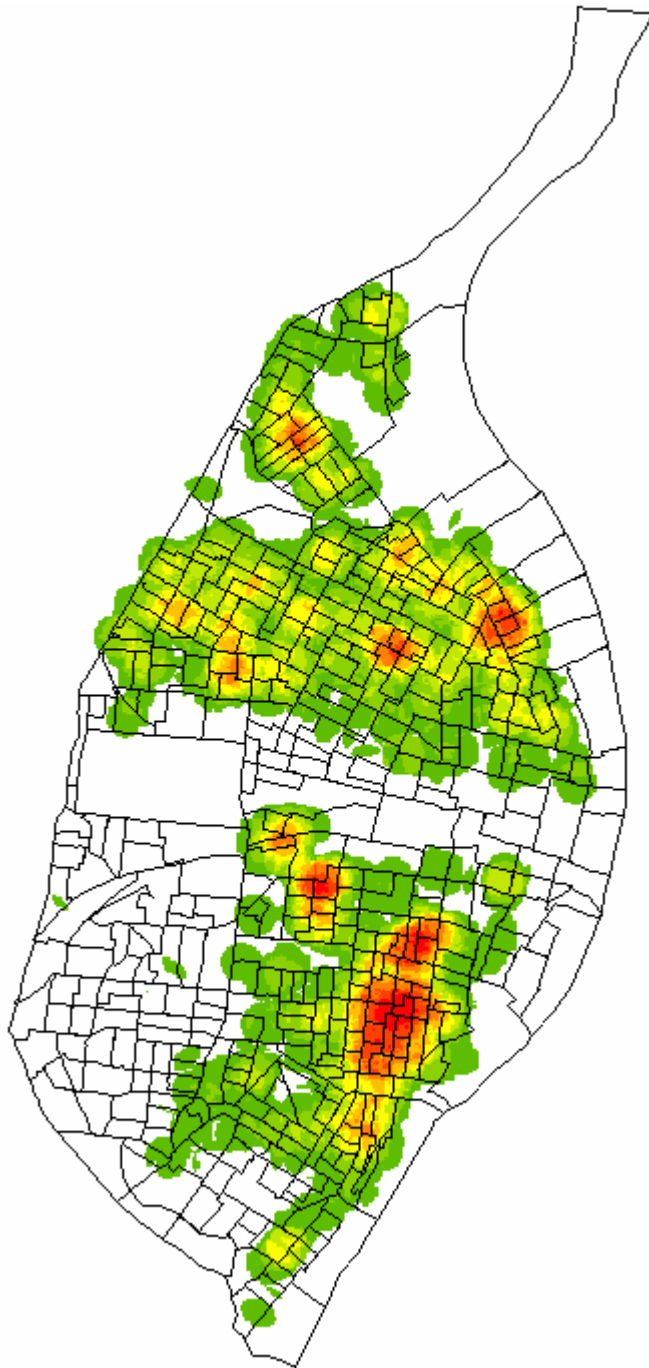
- Determine the number and geographic location of demolition activities in the City from Jan. 1, 2000 – Dec. 31, 2002
- To identify children screened for blood lead in the City during the same time period
- To determine if elevated lead levels cluster around demolition sites in the City
- To determine if there is a relationship between children's blood lead levels and the distance from their residence to a demo site
- To determine if demolition and containment procedures in the City are effective to protect children for demo-related exposure

# Distribution Pattern of All Elevated Children in St. Louis in 2002



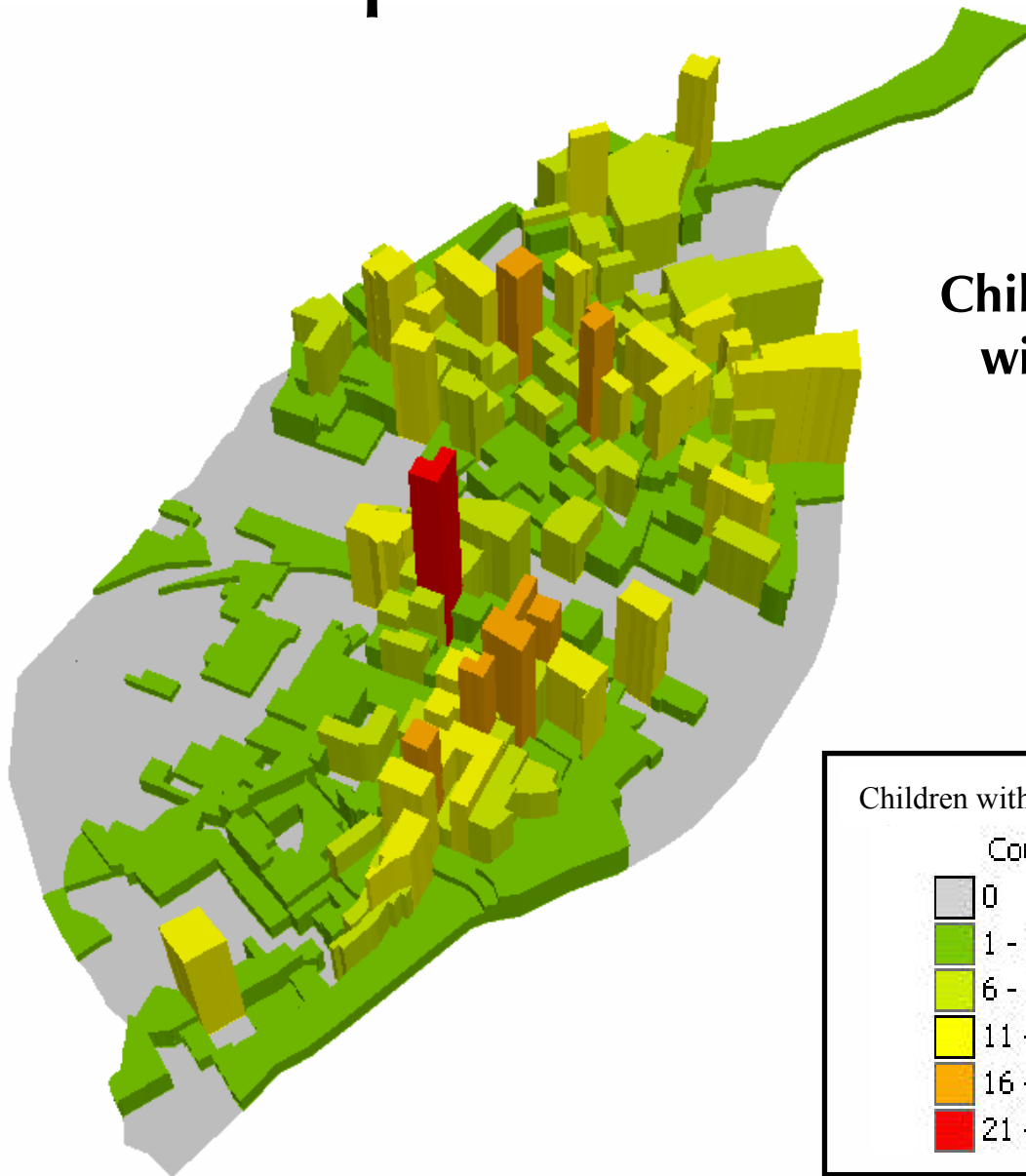
Children < 72 Months of Age with  
Blood Lead Levels  
10 ( $\mu\text{g}/\text{dl}$ ) or Greater 2002

# Density of Children < 72 months of Age with Blood Lead Levels 10 ( $\mu\text{g}/\text{dl}$ ) or Greater - 2002





# 3D Representation of All Elevated Children by Block Groups in St. Louis in 2002



Children < 72 Months of Age  
with Blood Lead Levels 10  
( $\mu\text{g}/\text{dl}$ ) or Greater

By Block Group

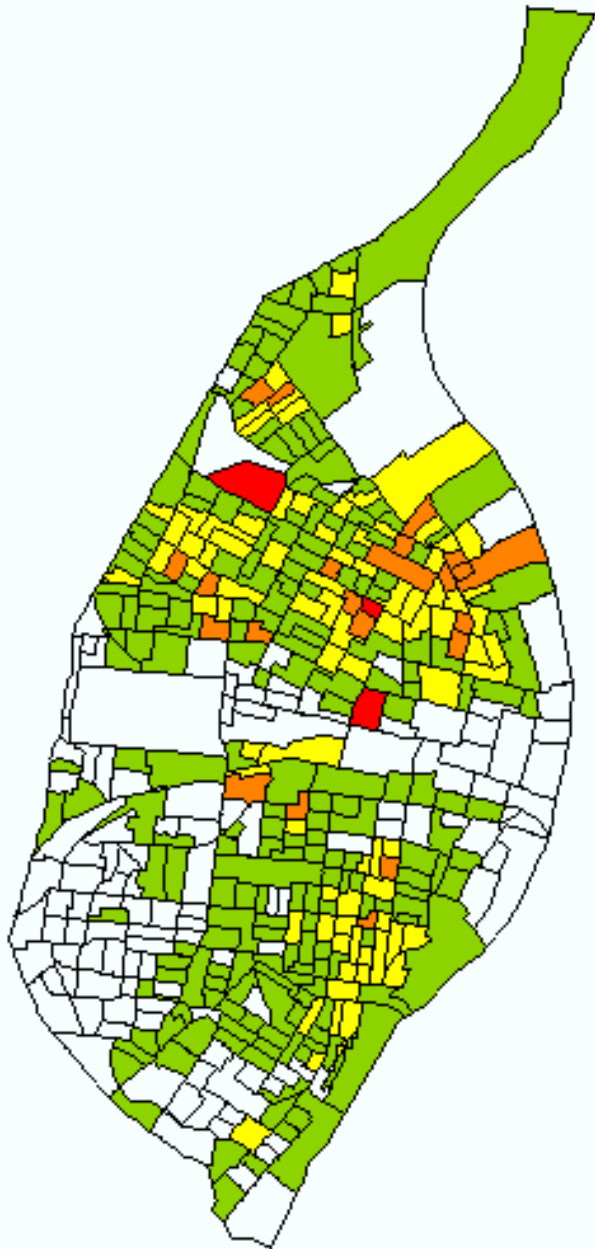
2002

Children with BLL  $\geq 10$

Count

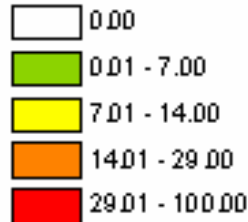


# Blood Lead Cases 10 ( $\mu\text{g}/\text{dl}$ ) or Greater Controlled by Population < 72 Months of Age 2002

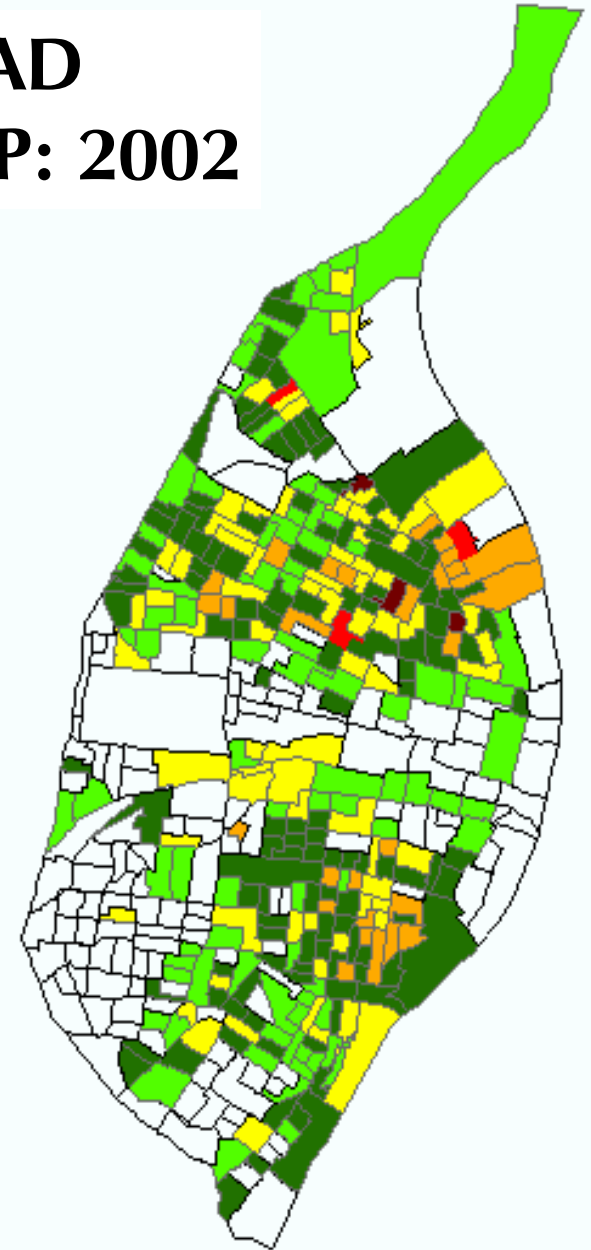
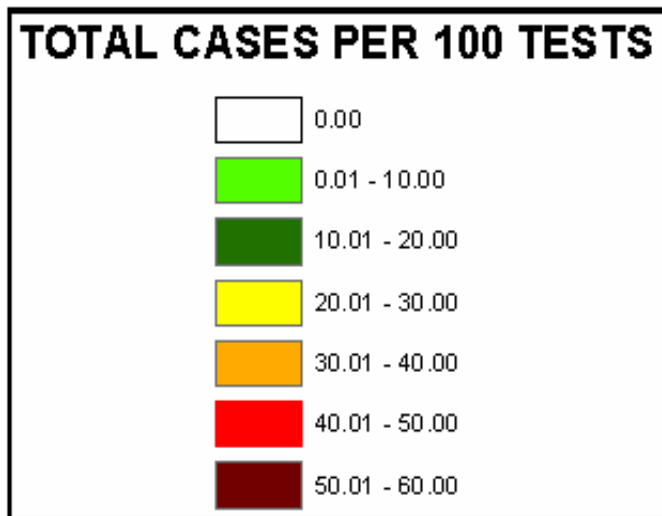


**TOTAL CASES CONTROLLED BY CHILDREN UNDER 72 MONTHS OF AGE**

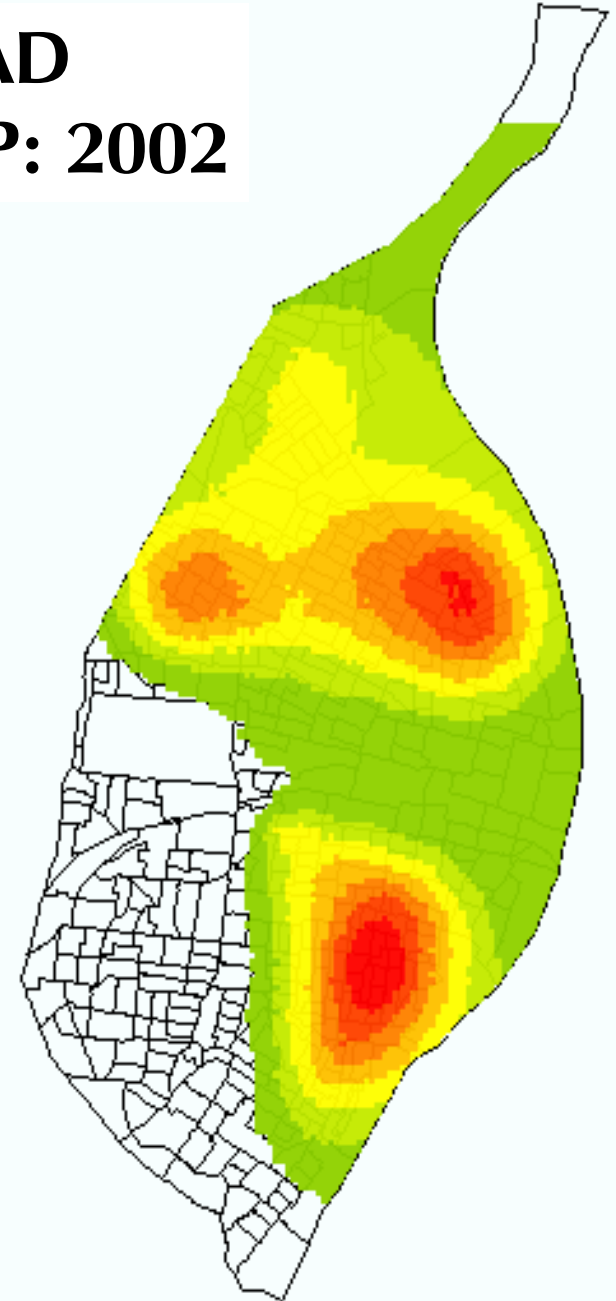
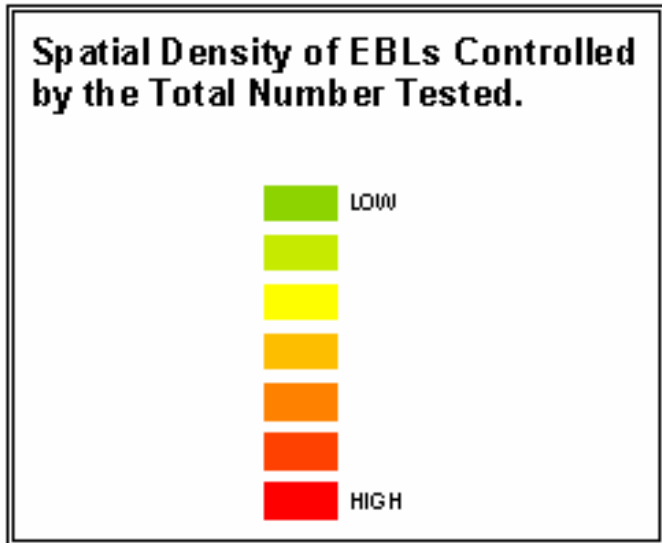
**CASES PER 100 CHILDREN**

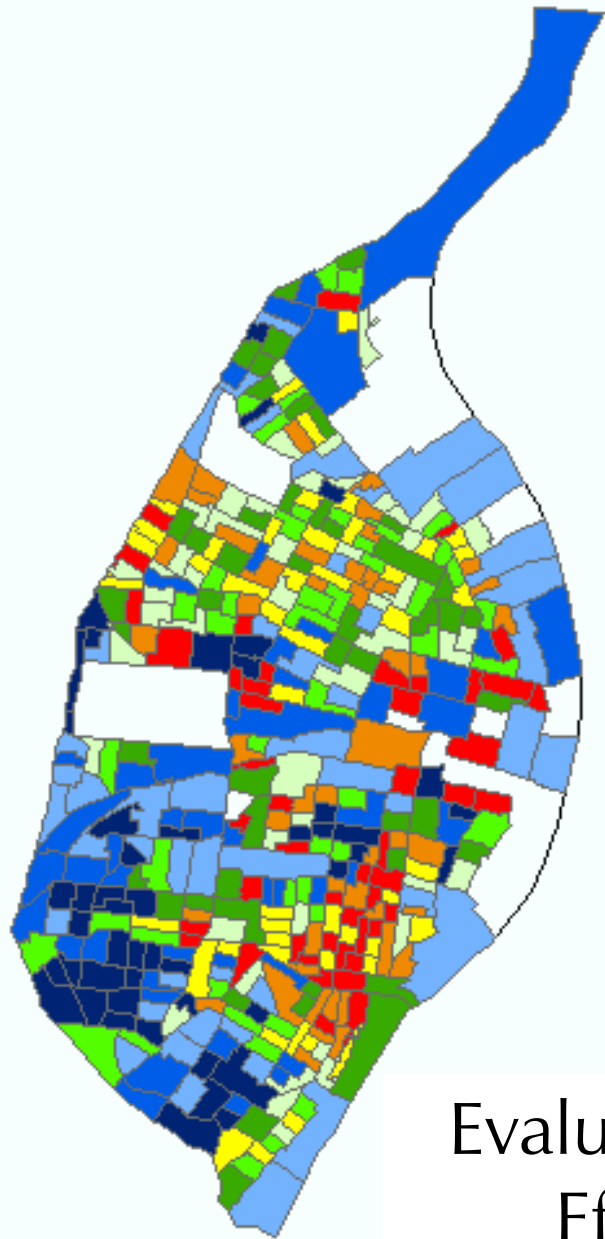


# ST. LOUIS CITY BLOOD LEAD SCREENINGS BY BLOCK GROUP: 2002

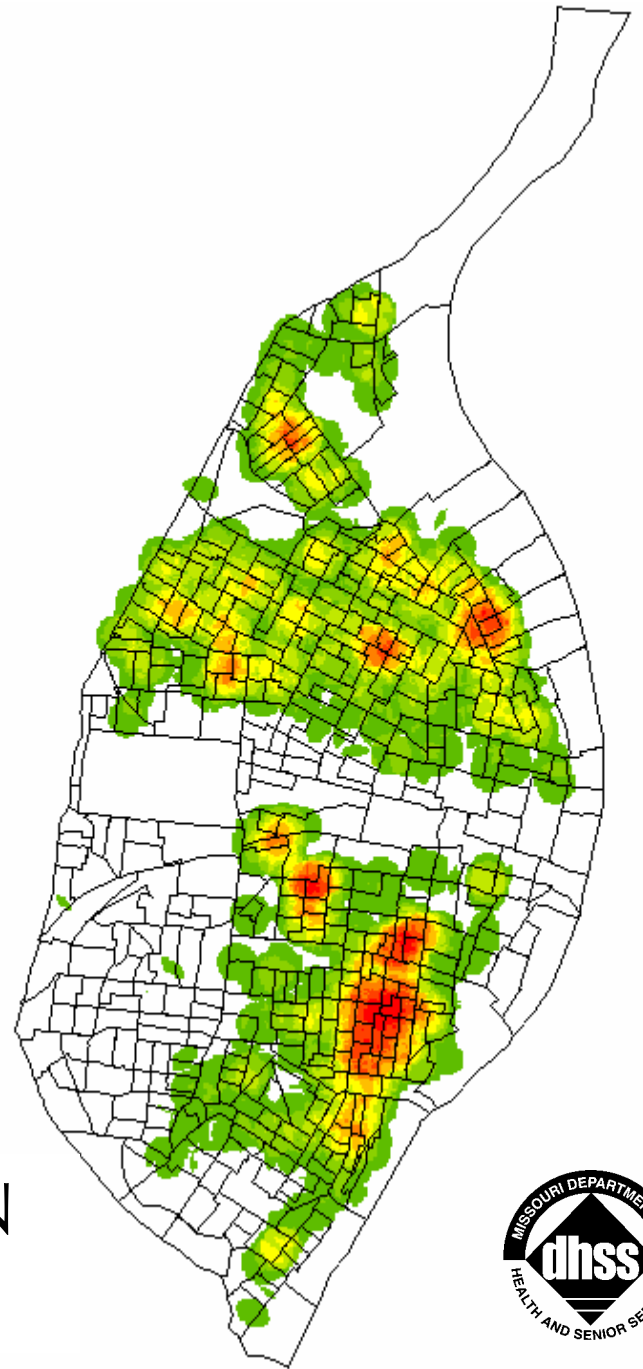


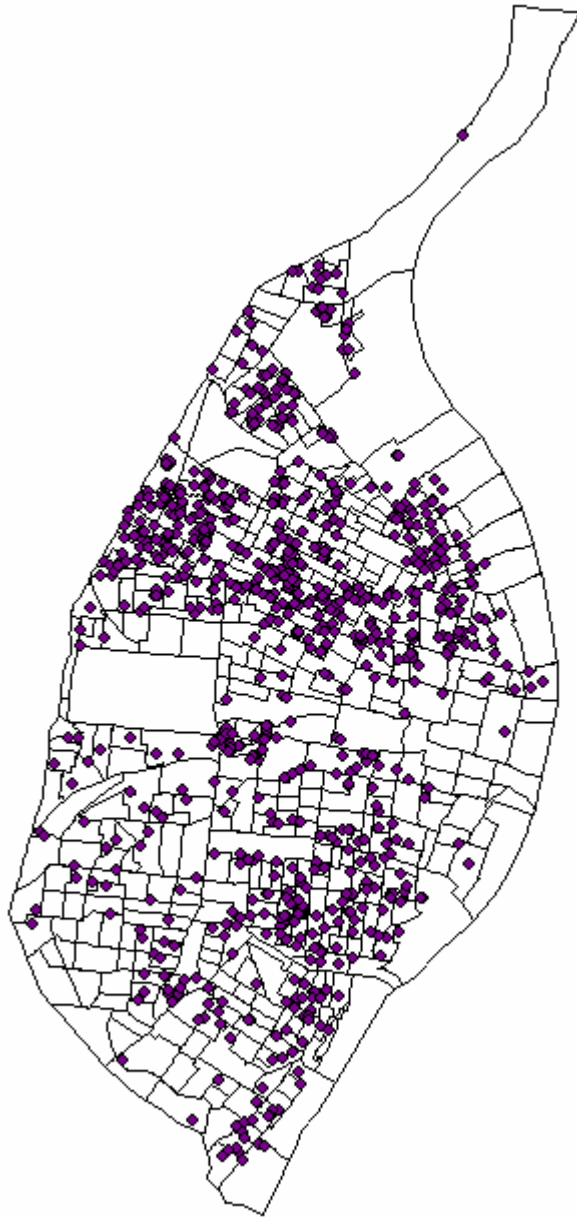
# ST. LOUIS CITY BLOOD LEAD SCREENINGS BY BLOCK GROUP: 2002





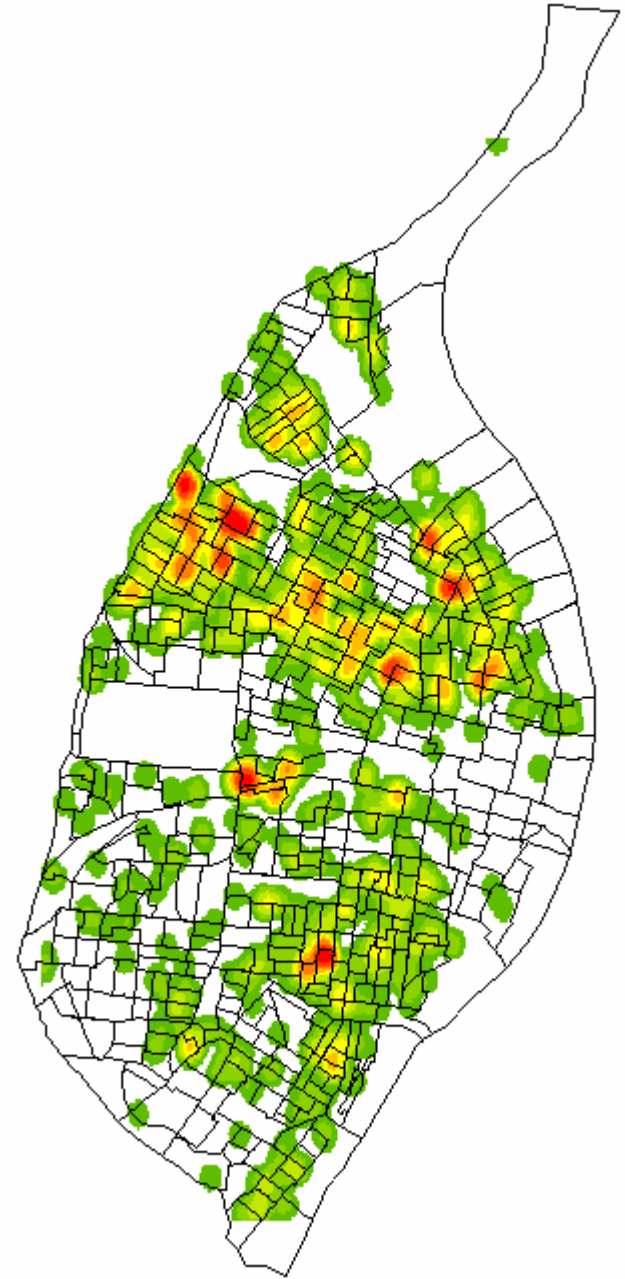
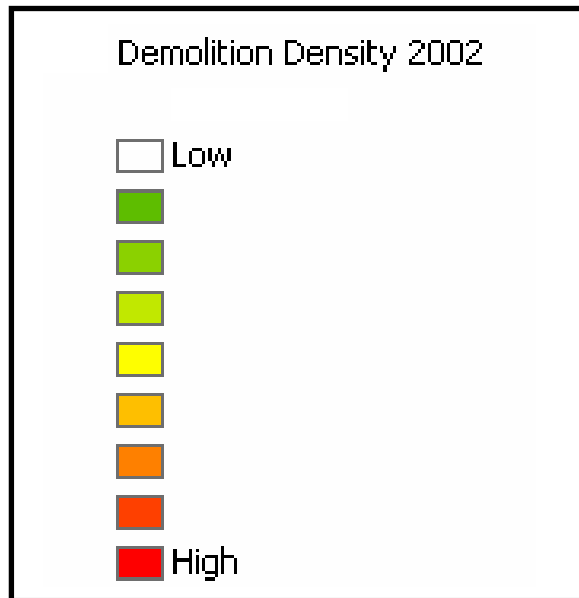
## Evaluation of RPoN Effectiveness



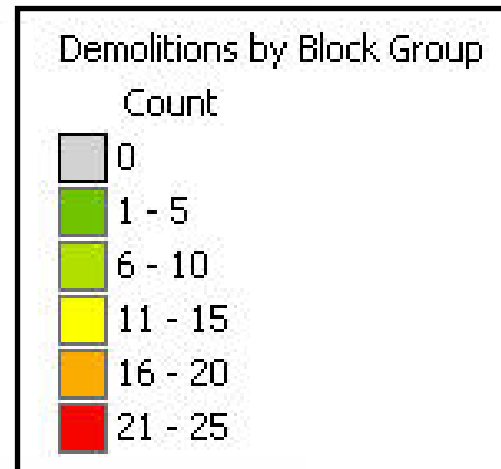


# 2002 Demolitions in St. Louis City

# Demolition Density 2002



# 2002 Demolitions By Block Group



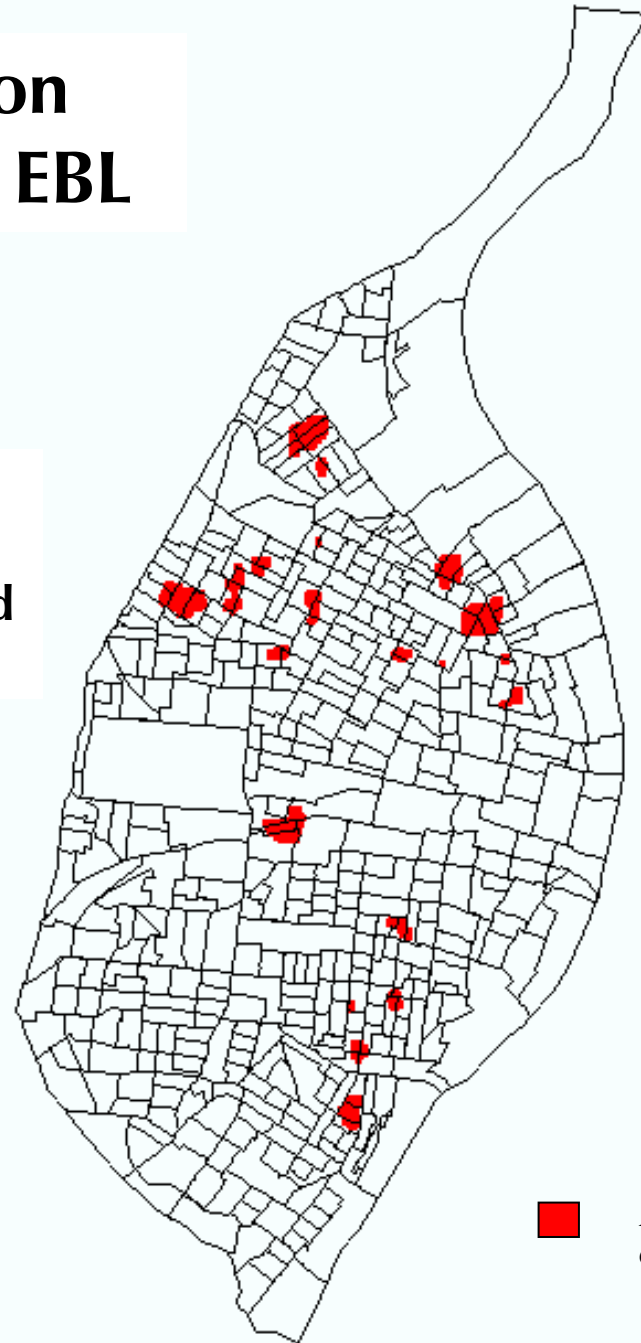


# SPATIAL ANALYSIS



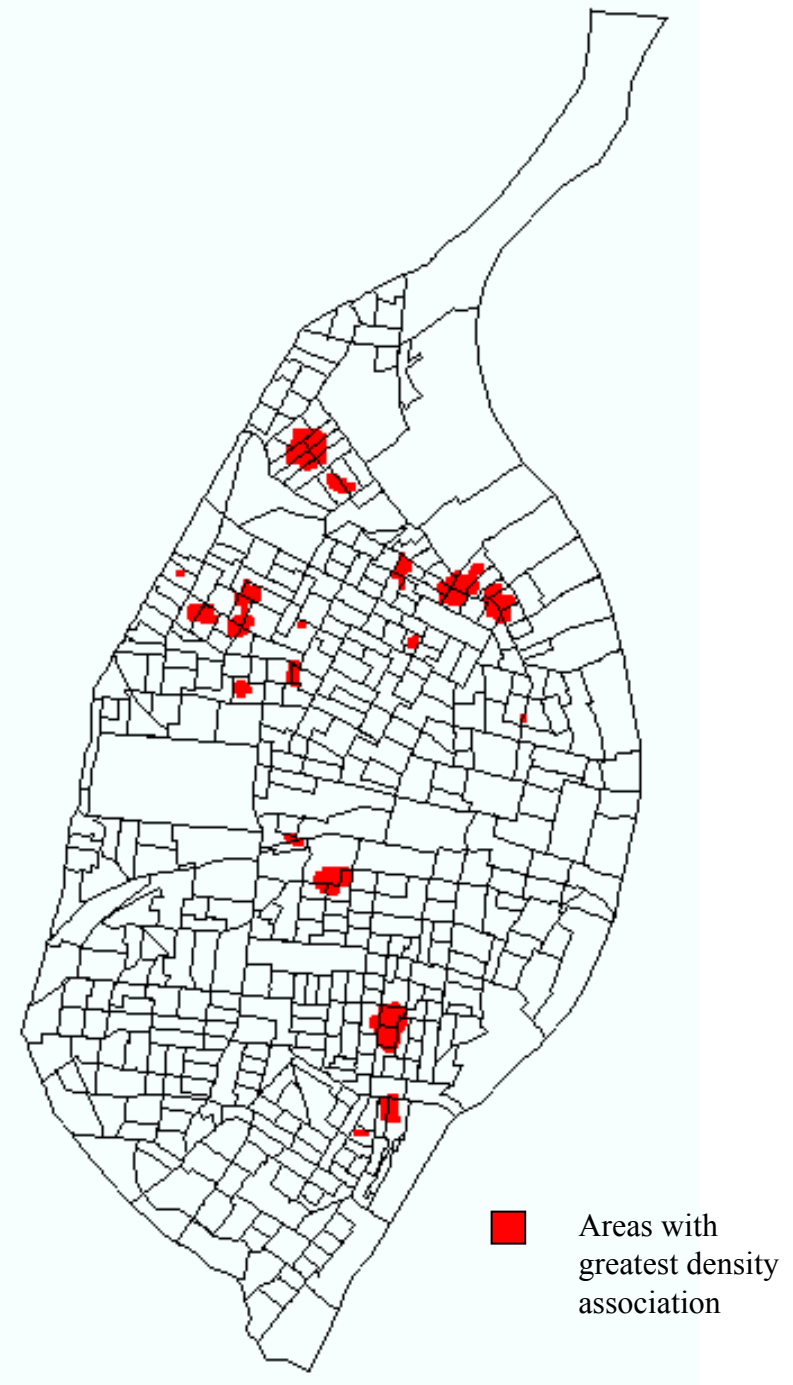
# 2002 – Comparing Demolition Areas to Greatest Density of EBL

**Greatest Density of Demolitions Compared to Greatest Density Of Children < 72 Months of Age with Blood Lead Levels 10 ( $\mu\text{g}/\text{dl}$ ) or Greater - 2002**



# Comparing 2002-2001 Demolition Areas to Greatest Density of EBL

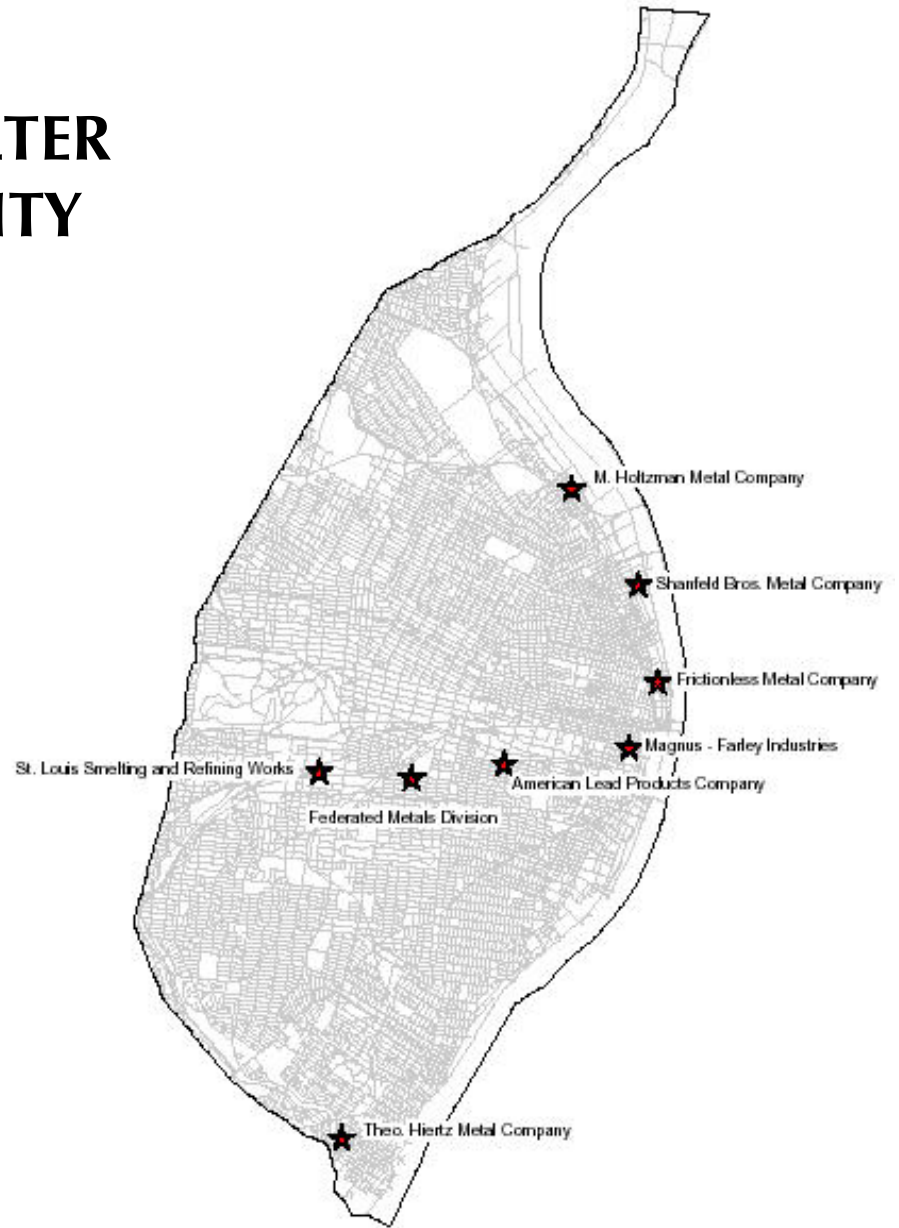
Greatest Density of Demolitions 2001 Compared  
To Greatest Density of Children < 72 Months of Age  
With Blood Lead Levels 10 ( $\mu\text{g}/\text{dl}$ ) or Greater in 2002



# Historic Smelter Project

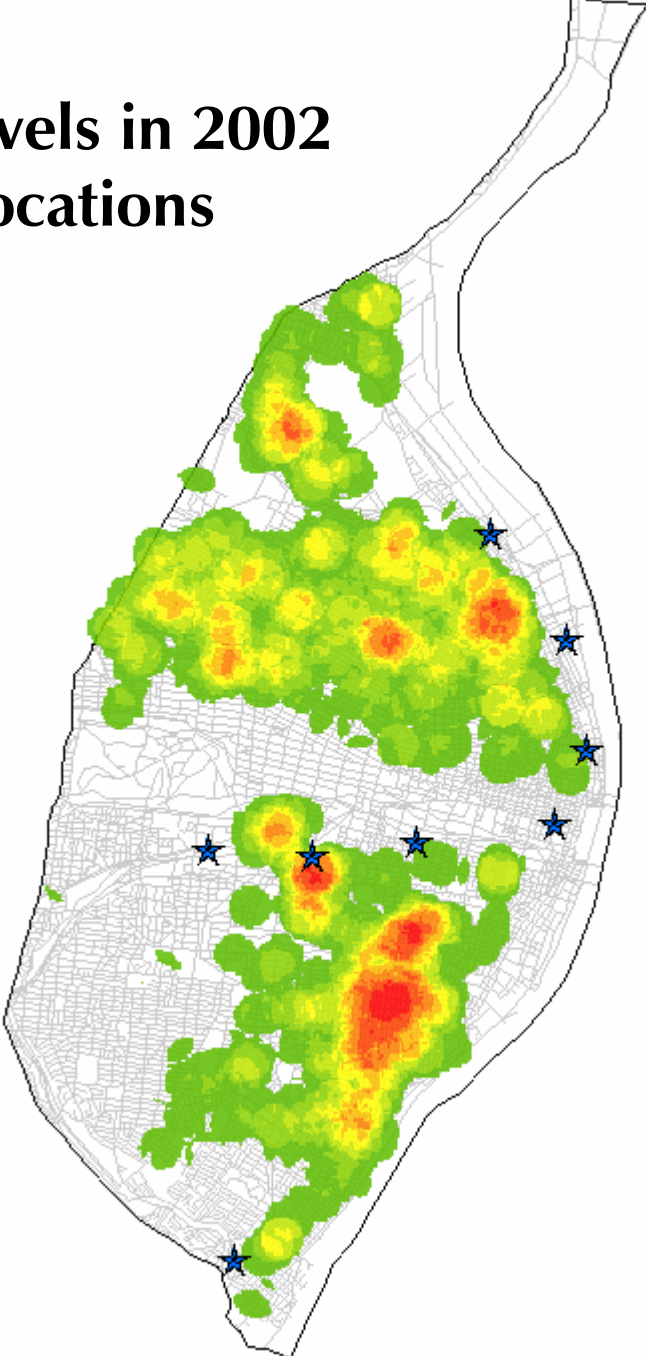


# IDENTIFIED HISTORIC SMELTER LOCATIONS IN ST. LOUIS CITY

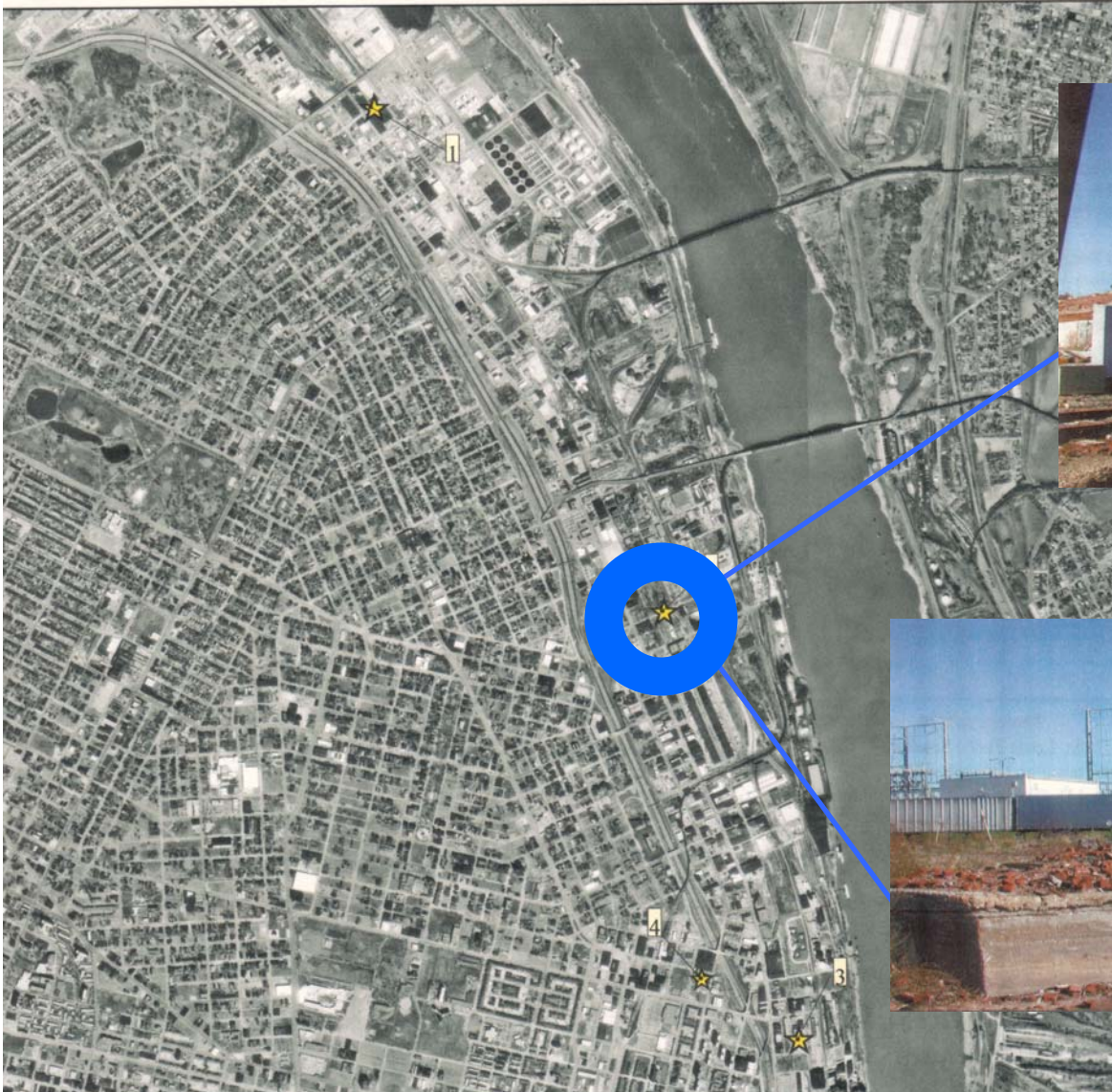


# Elevated Blood Lead Levels in 2002 And Historic Smelter Locations In St. Louis City

Spatial Density of Children  
<72 Months of Age with Blood  
Lead Levels 10 ( $\mu\text{g}/\text{dl}$ ) or Greater



# North St. Louis Historic Smelters



Shanfled Brothers Metal Company



# Where do we go from here?

- **Continue to build additional partnerships**
- **Incorporation of historic land use data**
- **Incorporation of meteorological data**
- **Dispersion Modeling**
- **Real-time air monitoring at a demo project**
- **? (Possibilities are unlimited)**



# The End



For further information on anything seen in this presentation please contact:

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