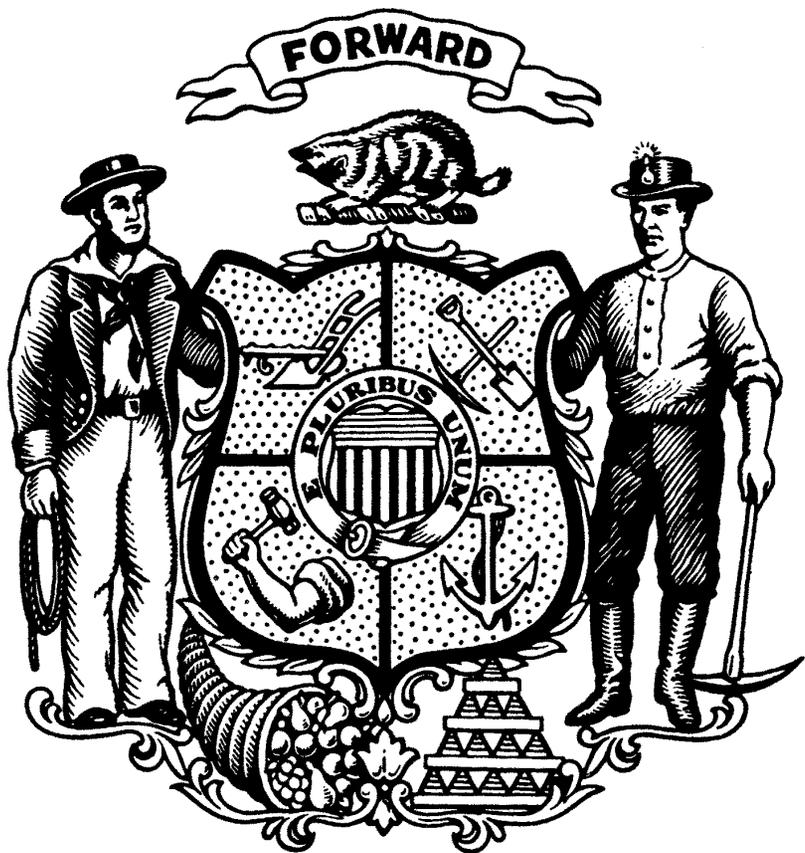


Tracking Childhood Lead Testing and Poisoning in Wisconsin: Linking Hazards with Health Outcomes



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Environmental Tracking: Linking Hazards with Health Outcomes

Childhood Lead Poisoning

- In Wisconsin during 2002 more than 4,400 children less than six years of age were tested and had blood lead levels of 10 ug/dL or greater;
- Approximately 80,000 children are tested each year within Wisconsin;
- Considered to be an environmental disease, caused primarily by exposure to lead in the household;
 - Lead-based paint, primarily in pre-1950 housing
 - Dust on walls, floors and windowsills
 - The potential for exposure increases as children become mobile at around 1 year of age

Environmental Tracking: Linking Hazards with Health Outcomes

Childhood Lead Poisoning

- A ‘preventable’ disease in that the occurrence of and exposure to lead in the home environment can be controlled;
 - WCLPP [PreventionP](#)
 - Housing based: Primary prevention seeks to reduce or eliminate the potential sources for exposure
- WCLPPP is not only interested in tracking incidence and prevalence of lead testing and poisoning, but also in identifying, tracking and attempting to ameliorate the sources of lead in the environment;
- Tracking lead in the home environment is critical to the success of the WCLPPP:

lead in child’s environment (hazard) => elevated blood lead levels (potential outcome)

Environmental Tracking: Linking Hazards with Health Outcomes

Childhood Lead Poisoning

- Lead in the home environment is strongly correlated to:
 - Age of housing
 - Condition of housing
- Both are strongly correlated to property value and socio-economic status of the property owner/tenants
 - Relative value of housing
 - Rental v. ownership status of tenants
 - **Participation in Medicaid and/or WIC program as indicator of SES:**
- **The increased risk is likely related to the age and condition of housing available to low income families.**

Environmental Tracking: Linking Hazards with Health Outcomes

Childhood Lead Poisoning

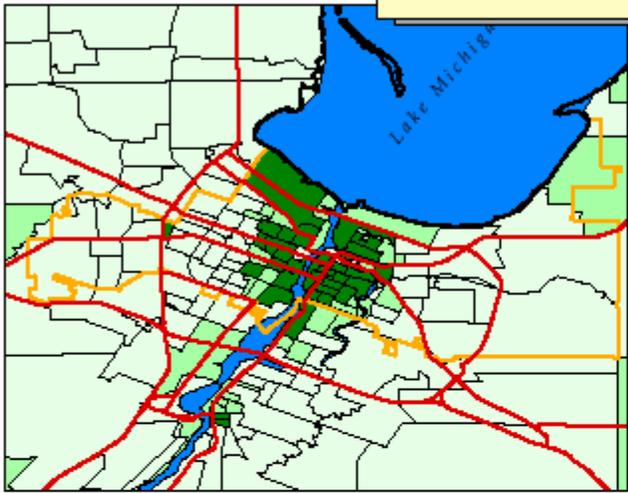
- WCLPPP maintains extensive data base of children and housing stock:
 - STELLAR data base:
 - Blood lead testing in children 0 through 5 years old,
 - Interventions and medical follow-up,
 - Housing conditions and lead hazard abatement;
 - Medicaid and WIC eligibility and enrollment data bases;
 - Tax Assessor, housing stock and census data bases.
- WCLPPP conducts analysis and tracking to quantify the scope and nature of hazards and outcomes, and to focus efforts on the highest risk children and housing.

Environmental Tracking: Linking Hazards with Health Outcomes

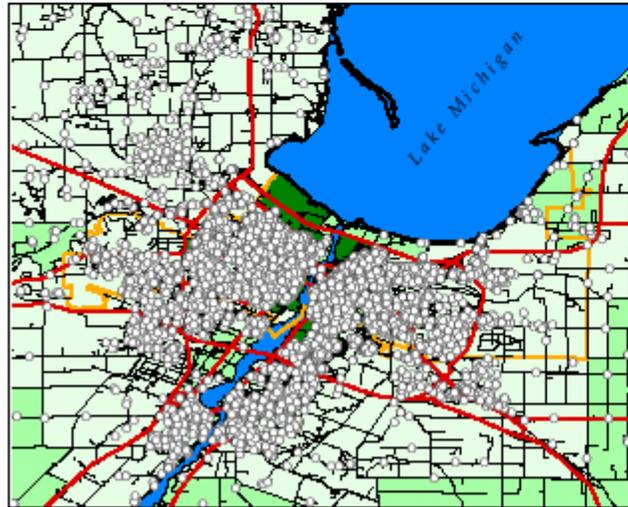
Childhood Lead Poisoning

- Of the children in the WCLPPP database for whom we have housing information:
 - 92 % of poisoned children resided in pre-1950 housing;
 - 88 % of poisoned children were in Medicaid and/or WIC;
 - 81 % of poisoned children resided in pre-1950 housing AND were Medicaid and/or WIC eligible during the year they were tested and found to be poisoned;
 - 28 % of children in Medicaid and/or WIC AND residing in pre-1950 housing were found to have at least one blood lead test result ≥ 10 ug/dL
- ==> highest risk children are those in Medicaid and/or WIC who live in pre-1950 housing**

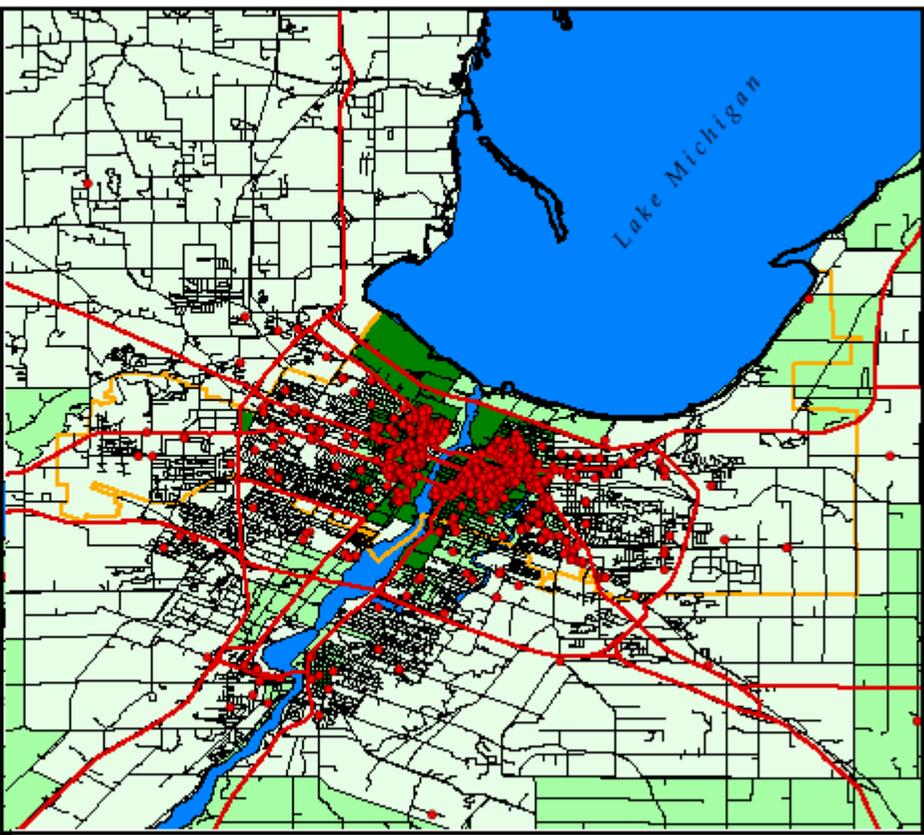
Lead Poisoning in Wisconsin: Where Children Live Makes a Difference



Percent of housing built prior to 1950 (see Legend).



Locations of children who were tested for lead poisoning, 1995 - 2001.



Locations of children with lead poisoning (blood lead level $\geq 10 \mu\text{g/dL}$), 1995 - 2001 test results.

Percent of Housing Built Prior to 1950

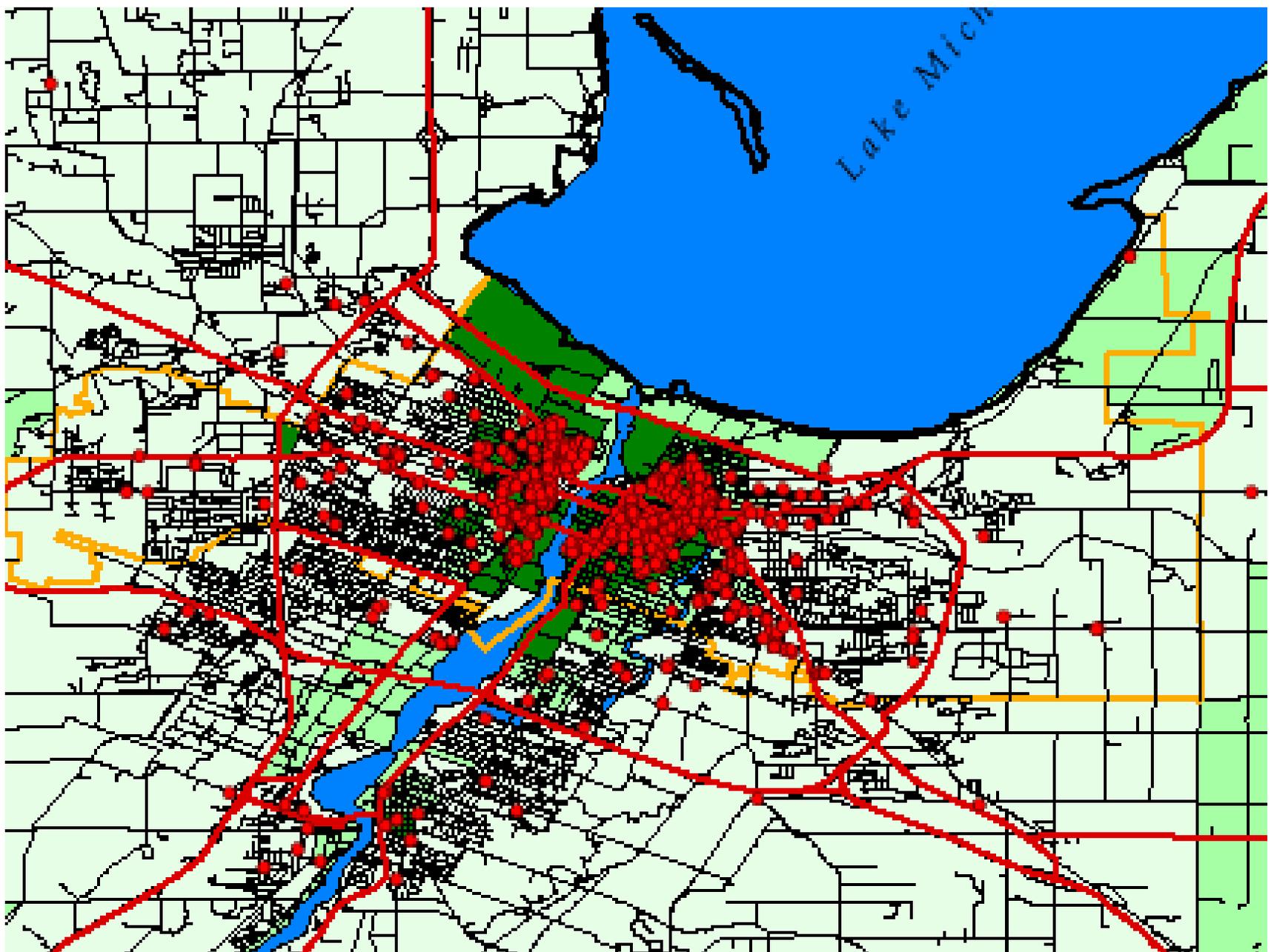
- 0 - 33
- 34 - 66
- 67 - 100

- County Roads
- County Highways
- City Boundary
- County Boundary
- Water



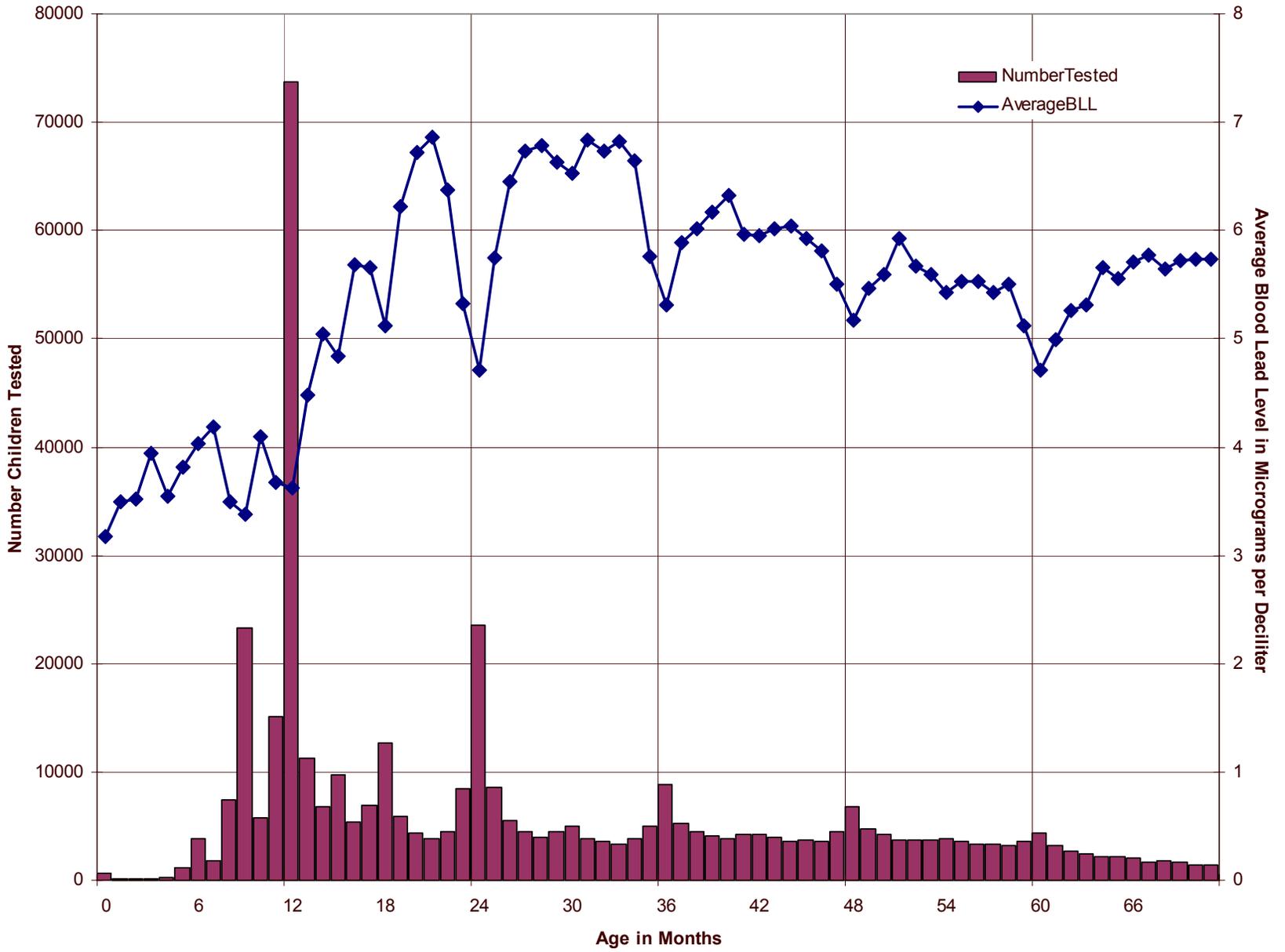
City of Green Bay

Source: Wisconsin Childhood Lead Poisoning Prevention Program, Division of Public Health, Department of Health and Family Services; Housing Data from U.S. Census Bureau (12/2002)

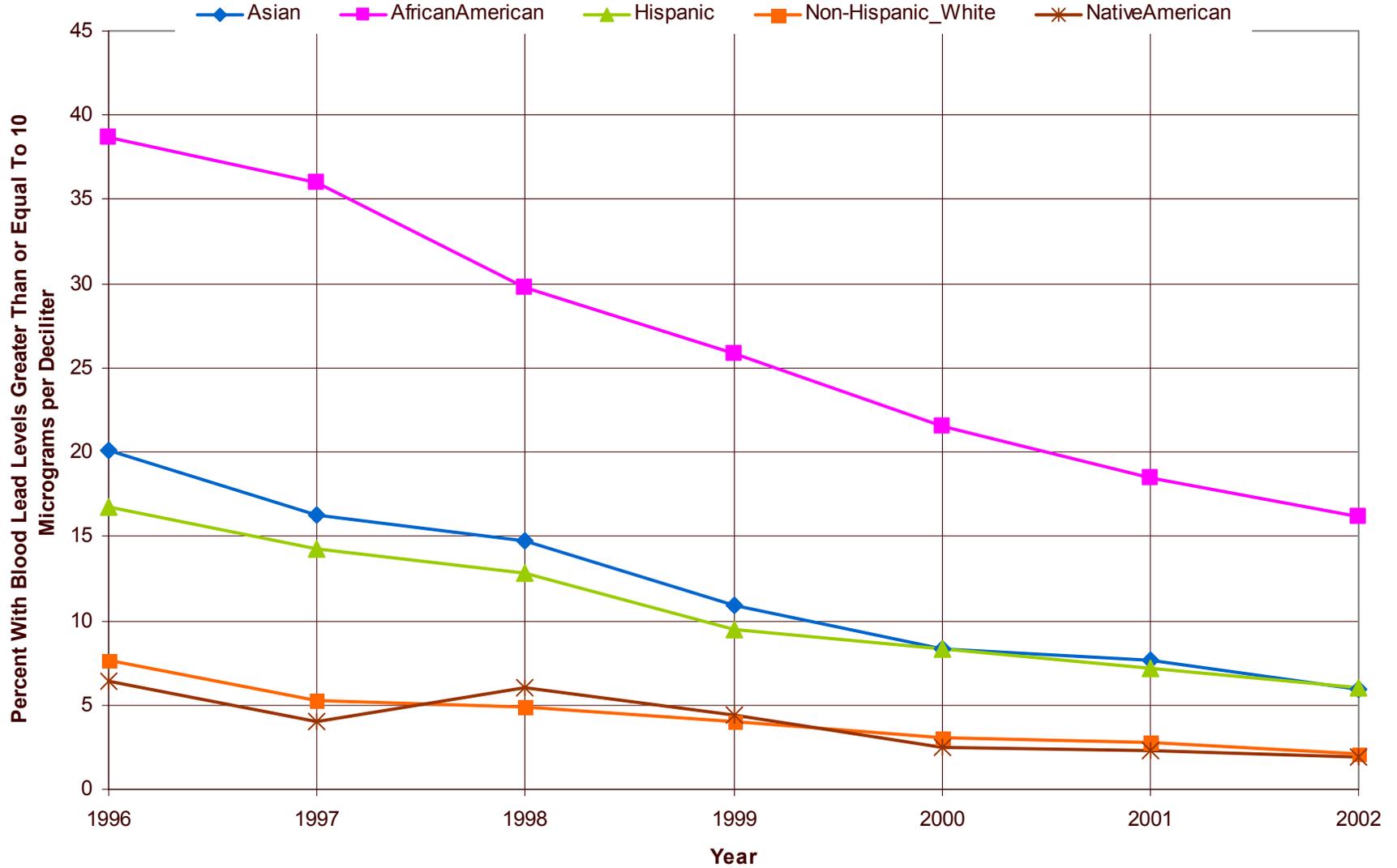


Number of Children Tested and Average Blood Lead Level v. Age

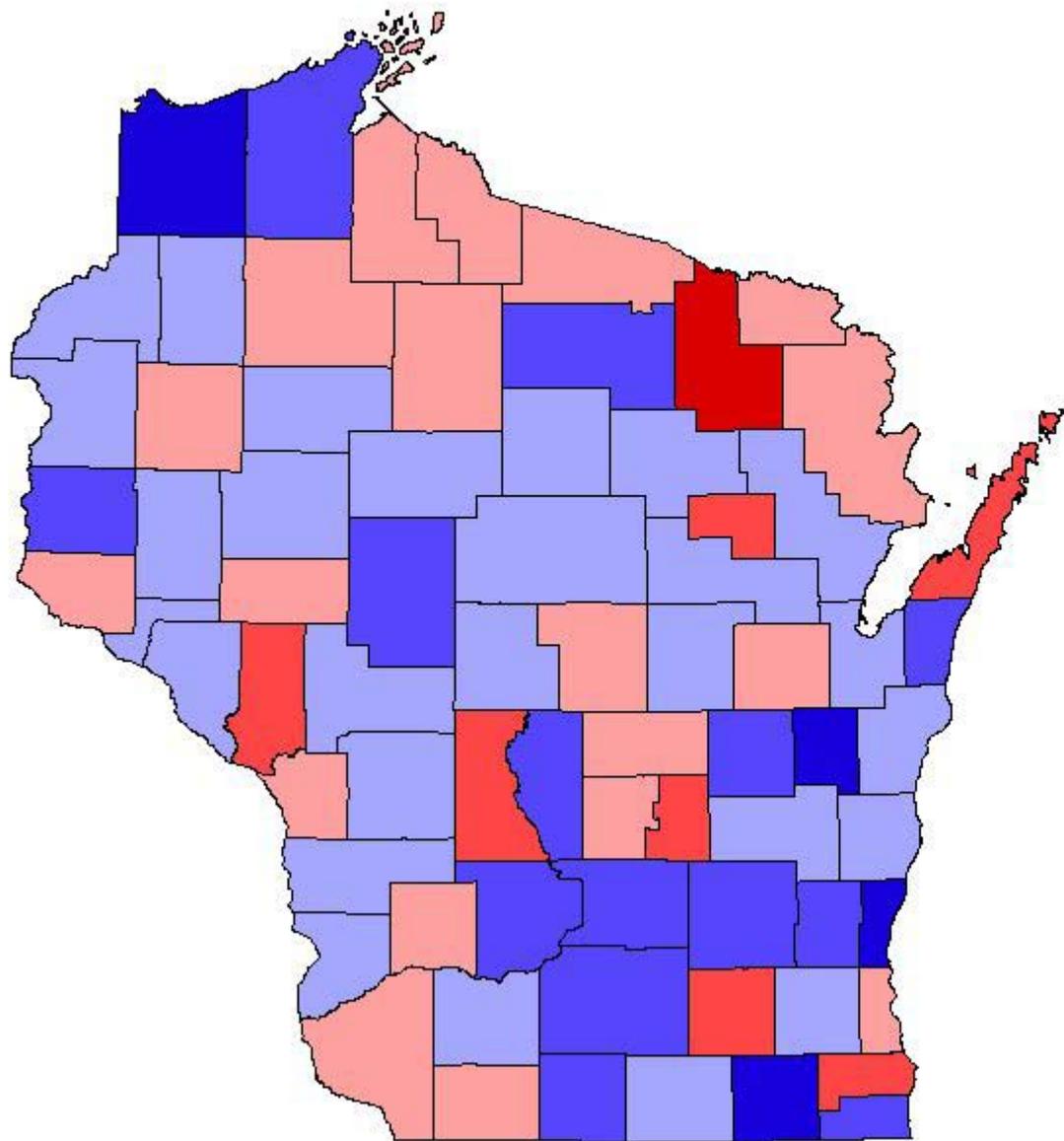
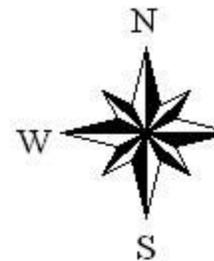
Wisconsin Children Tested 1998 - 2002



Prevalence of Blood Lead Poisoning Among Wisconsin Children Less Than Six Years Old by Race and Ethnicity 1996-2002



Testing Rates for Children Eligible for Medicaid 2001



_2001_MA_Testing_Rat

-  -3 -2 Std. Dev.
-  -2 -1 Std. Dev.
-  -1 -0 Std. Dev.
-  Mean
-  0 - 1 Std. Dev.
-  1 - 2 Std. Dev.
-  2 - 3 Std. Dev.

Medicaid Data Sharing

WCLPPP provides blood lead testing data to the Medicaid Program on a quarterly basis

- Medicaid prepares and submits quarterly reports to individual providers
 - list of Medicaid eligible children who have not had an appropriate blood lead test
- WCLPPP provides assistance during the matching process to ensure that all tested children are sufficiently included

Medicaid Data Sharing (cont'd)

WCLPPP has on-line, real-time access to Medicaid Eligibility Database

- Medicaid eligibility data updates downloaded quarterly
- Data cleaned and reformatted to allow use with WCLPPP data
- Cleaned and reformatted data matched to WCLPPP child and test data
- Matched data used for various analyses regarding screening rates, incidence and prevalence among the Medicaid and non-Medicaid populations

Medicaid Provider Performance

To identify changes in annual testing rates for individual providers and types of providers

- In association with 'Health Check' exams to identify 'Found' and 'Missed Opportunities'
- Public v. Private providers (e.g., LHDs/WICs v. FQHCs v. private)
- Fee-for-service v. managed care
- Individual HMOs

WIC Pilot Project Monthly Reports

WCLPPP blood lead testing data and status provided to WIC projects via the 'Statewide Lookup Table'

- Enrollment data obtained monthly from WIC program
- WIC data cleaned and reformatted to allow match with WCLPPP data
- Cleaned and reformatted WIC data matched to STELLAR children and testing history
- Allows individual clinicians to determine whether or not a blood lead test is recommended for an individual child at the time of their visit to the WIC clinic

WCLPPP - Medicaid Data Matching

- The WCLPPP – Medicaid data match links the WCLPPP Stellar lead testing with the Medicaid eligibility database.
- Multi-step process to develop the data set from which the summary analyses and statistics are derived.
- The first step is a match between the WCLPPP Stellar ‘Child’ table and the Medicaid eligibility database.

WCLPPP - Medicaid Data Matching

Match between WCLPPP “Stellar” data and Medicaid Eligibility Data

- sequential
- based on name, date of birth, gender
- uses SAS v 8.02 running on a stand-alone PC
- direct and ‘fuzzy’ matches using SAS, including Spedis and Soundex functions
- “Eligibility” defined as being ‘eligible’ at least once during a year of interest, as determined by ‘Eligibility Begin’ and ‘Eligibility End’ dates in the Medicaid database

WCLPPP - Medicaid Data Matching

'Normal' Match

- matching algorithms written in SAS
- matches exact spellings of first name, last name, gender
- slightly fuzzy on birthday: +/- one day and one year
- "Matched" and "Residuals" files created
- accounts for 70% to 90% of all matches

WCLPPP - Medicaid Data Matching

Spedis-Based Matching

- Built-in SAS function
- measures the 'distance' between the spelling of two words
- degree of 'dissimilarity'
- range of acceptable distance set by user
 - tolerance determined from sensitivity analyses
- match done on "Residuals" file
- exact dates of birth
- matches added to "Matched" file; "Residuals" file created
- typically accounts for 10% to 30% of all matches

WCLPPP - Medicaid Data Matching

Soundex-Based Matching

- Built-in SAS function
- common coding algorithm for encoding names
 - driver's licenses
 - tax rolls
- converts each word into a short sequence of characters and numerals
- 'hard wired,' cannot be 'tweaked'
- exact dates of birth
- match done on "Residuals" file; matches added to "Matched" file
- typically only a couple hundred matches; manually checked

Spedis Match Between MA and WCLPPP Children Based on First Name, Last Name, Date of Birth and Gender (fictitious names)

Tolerance Factor	STELLAR_UN_LEAD	RECIPIENTID_MA	FIRSTNAME_LEAD	FIRSTNAME_MA	LASTNAME_LEAD	LASTNAME_MA	DATEOFBIRTH_LEAD
30	348	101010101	JESSE Jr	JESSE	GOLDEN	GOLDEN Jr	4/2/00
30	376	101010104	JACK	JACK	LEE Jr	LEE	4/25/00
30	406	101010105	STEFANY	STEFANIE	SCHEURMANN	SCHEURMAN	8/13/00
30	438	101010110	CARLOS	CARLOS	MONTEZ	MONTES	6/26/00
30	473	101010115	ROMAN	ROMAN	PETTERSEN-ZAH	PETTERSEN	11/8/99
30	552	101010122	TAYLOR	TAYLOR	RAFFENSPERG	RAFFENSPERGER	2/24/01
30	596	101010123	ALFREDO	ALFREDO	MARTINES	MARTINEZ	12/31/00
30	644	101010125	ANNA	ANNA	ADAMZ	ADAMS	11/2/99
30	751	101010132	RAYMEL	RAYMELL	BROWN	BROWN	8/4/00
30	3242	101010154	TYRONE	TY	WRIGHT	WRIGHT	6/21/00
30	4764	101010159	CHRISTOPHER	CHRISTOPHE	RIVERA	RIVERA	11/7/00
30	7000	101010165	STAR	STAR	HERNANDEZ-MOR	HERNANDEZ MOR	1/12/01
30	7560	101010166	RAEKWON	RAEKWON	ENRIGHT	ENRIGHT GOLDE	1/26/01
90	946	101010135	SAMERA	SAMERA	YANG	FISCHER	1/16/01
110	30210	101010176	GEORGE	RONALD	DOEDEN	RANDLE	9/8/00

Soundex Match Between MA and WCLPPP Children Based on First Name, Last Name, Date of Birth and Gender

(fictitious names)

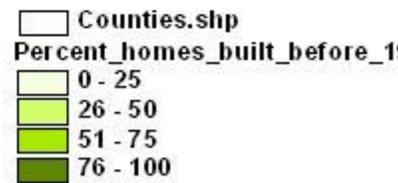
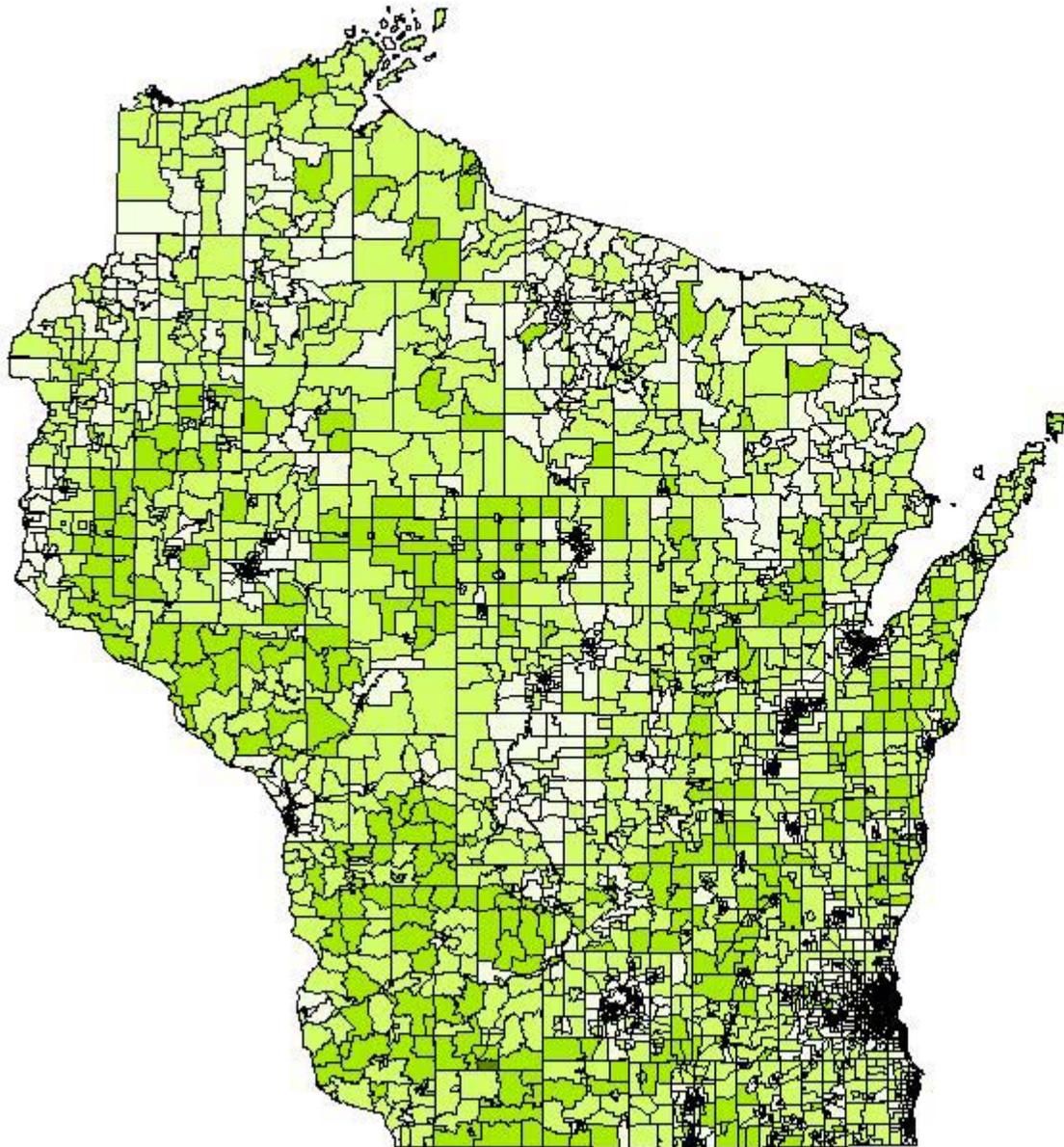
FIRSTNAME_LEAD	FIRSTNAME_MA	SoundexFirst NameLead	SoundexFirst NameMA	LASTNAME_LEAD	LASTNAME_MA	SoundexLast NameLead	SoundexLast NameMA
ALYSSA	ALYSSA	A42	A42	YANG	YANG	Y52	Y52
ALYSSA	ALYSSA	A42	A42	YANG	YANG	Y52	Y52
ALYSSA	ALYSSA	A42	A42	YANG	YANG	Y52	Y52
ALEXANDRIA	ALEXANDRIA	A42536	A42536	PRADO	PRADO	P63	P63
ALEJANDRO	ALEJANDRO	A42536	A42536	GALINDO JR	GALINDO JR	G45326	G45326
ANDREW	ANDREW	A536	A536	MCCANN	MCCANN	M25	M25
ARIANNA	ARIANNA	A65	A65	SUTTON	SUTTON	S35	S35
ARIONNE	ARIONNE	A65	A65	DARRINGTON	DARRINGTON	D65235	D65235
BRENDAN	BRENDAN	B6535	B6535	DANIELS	DANIELS	D542	D542
CHRISTOPHE	CHRISTOPHE	C6231	C6231	CROSBY	CROSBY	C621	C621
CORNESHA	CORNESHA	C652	C652	COPE	COPE	C1	C1
DEVIN	DEVIN	D15	D15	HOLBROOK	HOLBROOK	H4162	H4162
DIONNE	DIONNE	D5	D5	HUTCHINSON	HUTCHINSON	H32525	H32525
ETHAN	ETHAN	E35	E35	BLACK	BLACK	B42	B42
ETHAN	ETHAN	E35	E35	ROMAN	ROMAN	R55	R55
FABIOLA	FABIOLA	F14	F14	LEE	LEE	L	L
HANNAH	HANNAH	H5	H5	WILCOX	WILCOX	W422	W422
JOSEPH	JOSEPH	J21	J21	MARTIN	MARTIN	M635	M635
JOCELYN	JOCELYN	J245	J245	SMITHEE	SMITHEE	S53	S53
JANIECE	JANIECE	J52	J52	WILLIAMS	WILLIAMS	W452	W452
KEVIN	KEVIN	K15	K15	SHAW	SHAW	S	S
KIRSTEN	KIRSTEN	K6235	K6235	MOORE JR	MOORE JR	M626	M626
LUIS GUSTA	LUIS GUSTA	L2223	L2223	STRUM	STRUM	S365	S365
LONA	LEYONNA	L5	L5	AGUILAR	AGUILAR	A246	A246
LEONARDO	LEONARDO	L563	L563	DAVIS	DAVIS	D12	D12
MICAYLA	MICAYLA	M24	M24	PEAK	PEAK	P2	P2
MAKAYLA	MAKAYLA	M24	M24	MCCANN	MCCANN	M25	M25
MICHAEL	MICHAEL	M24	M24	DE LA GARZA	DE LA GARZA	D4262	D4262
MADISON	MADISON	M325	M325	PAWLAK	PAWLAK	P42	P42
MARK	MARK	M62	M62	SANDERS	SANDERS	S5362	S5362
MARTAVIUS	MARTAVIUS	M6312	M6312	BYERS	BYERS	B62	B62
MEREDITH	MEREDITH	M633	M633	BLAKE	BLAKE	B42	B42

Wisconsin Homes

37% of homes in Wisconsin were built before 1950 and have a high probability of containing lead paint.

(1990 U.S. Census Data)

Percentage of Housing Built Prior to 1950

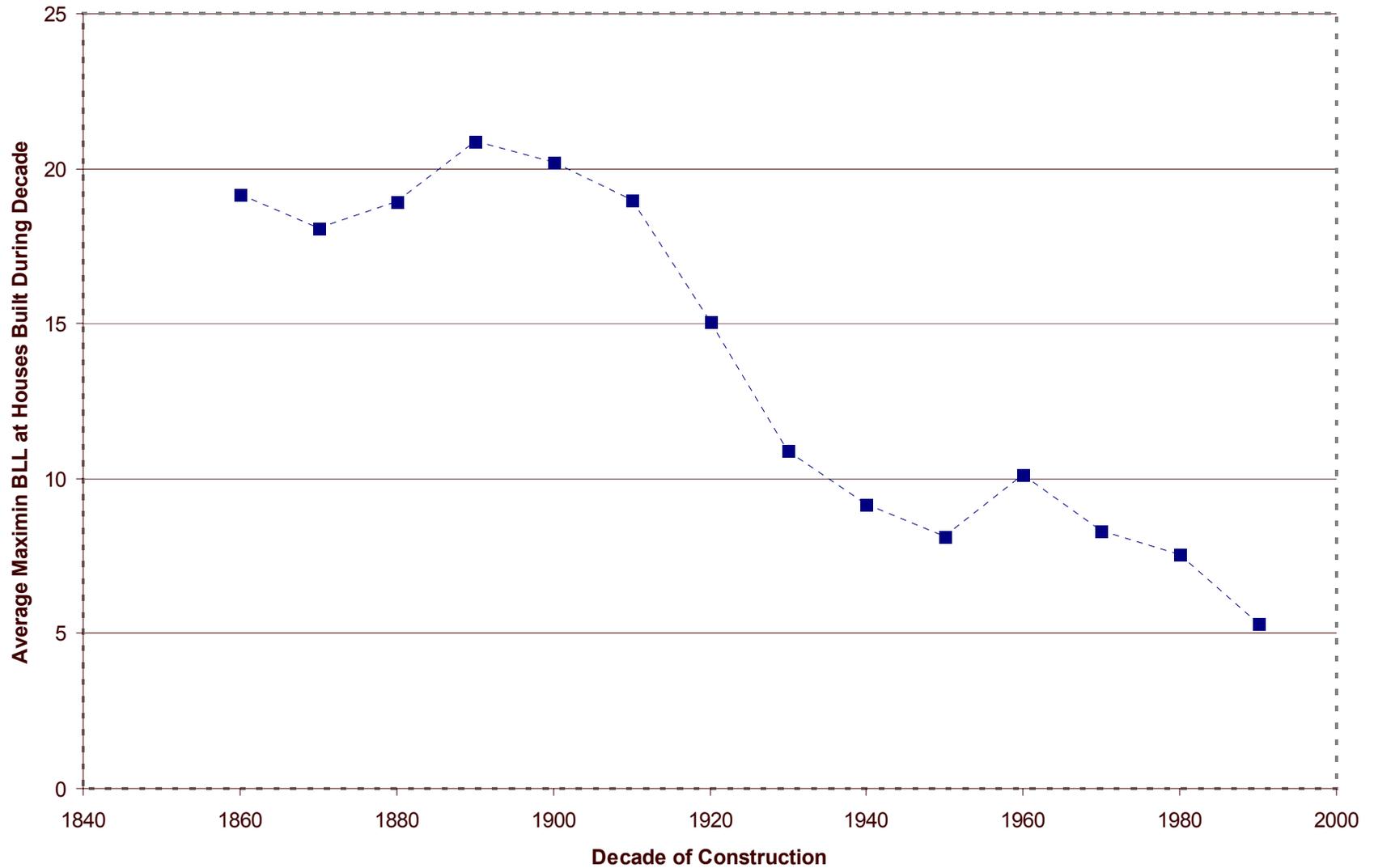


Tax Assessor Data and Housing Analysis

Data from 17 individual tax assessor offices

- Appleton, Beloit, Eau Claire, Green Bay, Janesville, Kenosha, La Crosse, Madison, Menasha, Milwaukee, Oshkosh, Racine, Sheboygan, Superior, Waukesha, Wausau, Wisconsin Rapids
- Year of construction, size, property valuation, condition and ownership information
- For a variety of uses within WCLPPP, including the development of screening 'risk profiles' based on housing and socio-economic variables
- Data in variety of formats; requires extensive cleaning and re-formatting
- 'Double-mass' type analysis showing the distribution of testing and poisoning as a function of housing age for individual and groups of communities

**Decade of Construction vs Average Maximum BLL at Address:
1840's through 1990's
Milwaukee, Racine, Sheboygan, Waukesha, Eau Claire, Menasha**



Tax Assessor Data and Housing Analysis

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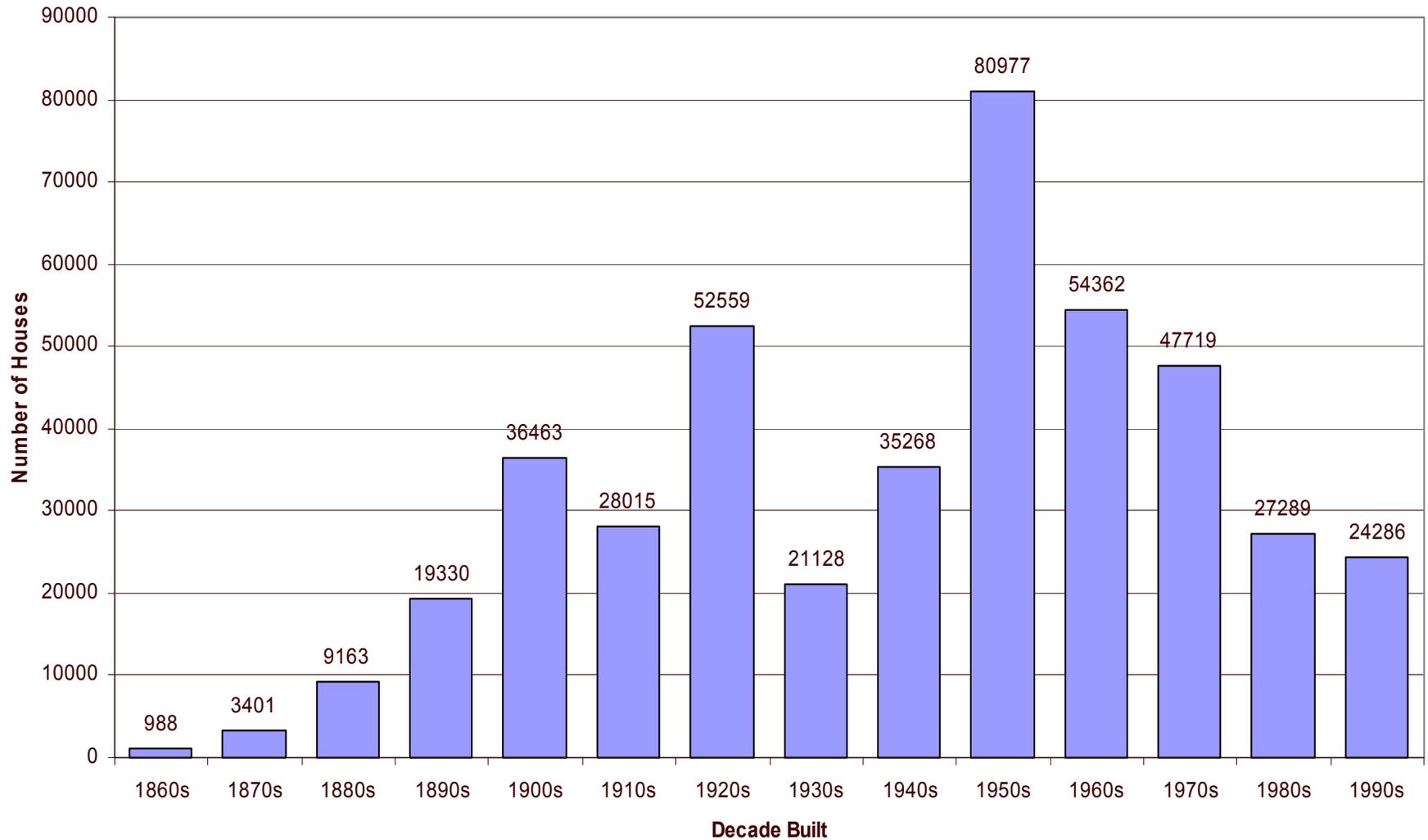
Age of Housing: WCLPPP Tax Assessor Data Base

722,078 houses built prior to 1950;

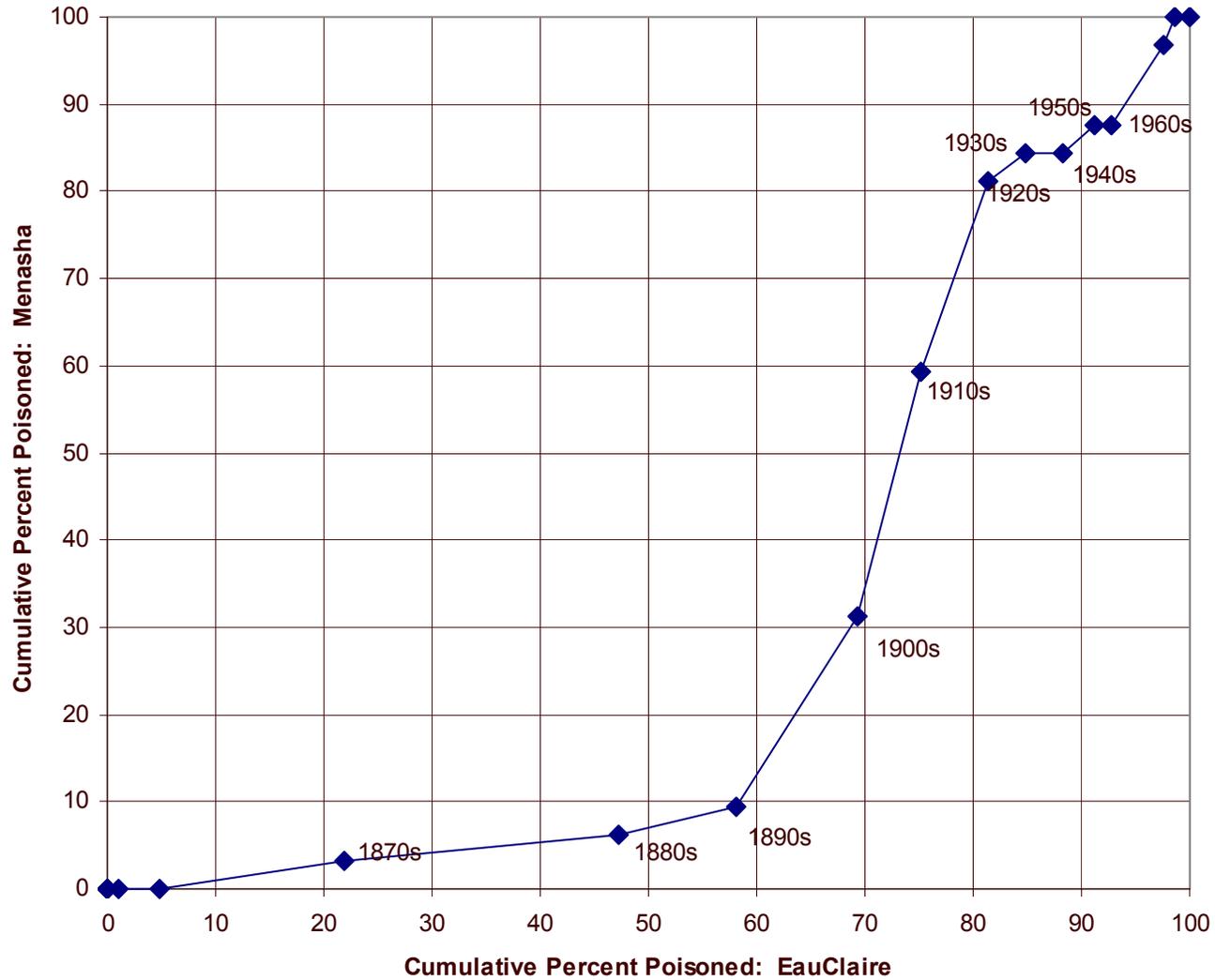
206,980 of which are in WCLPPP Tax Assessor database, with

65,528 associated with at least one 0 through 5 year old tested for blood lead, and

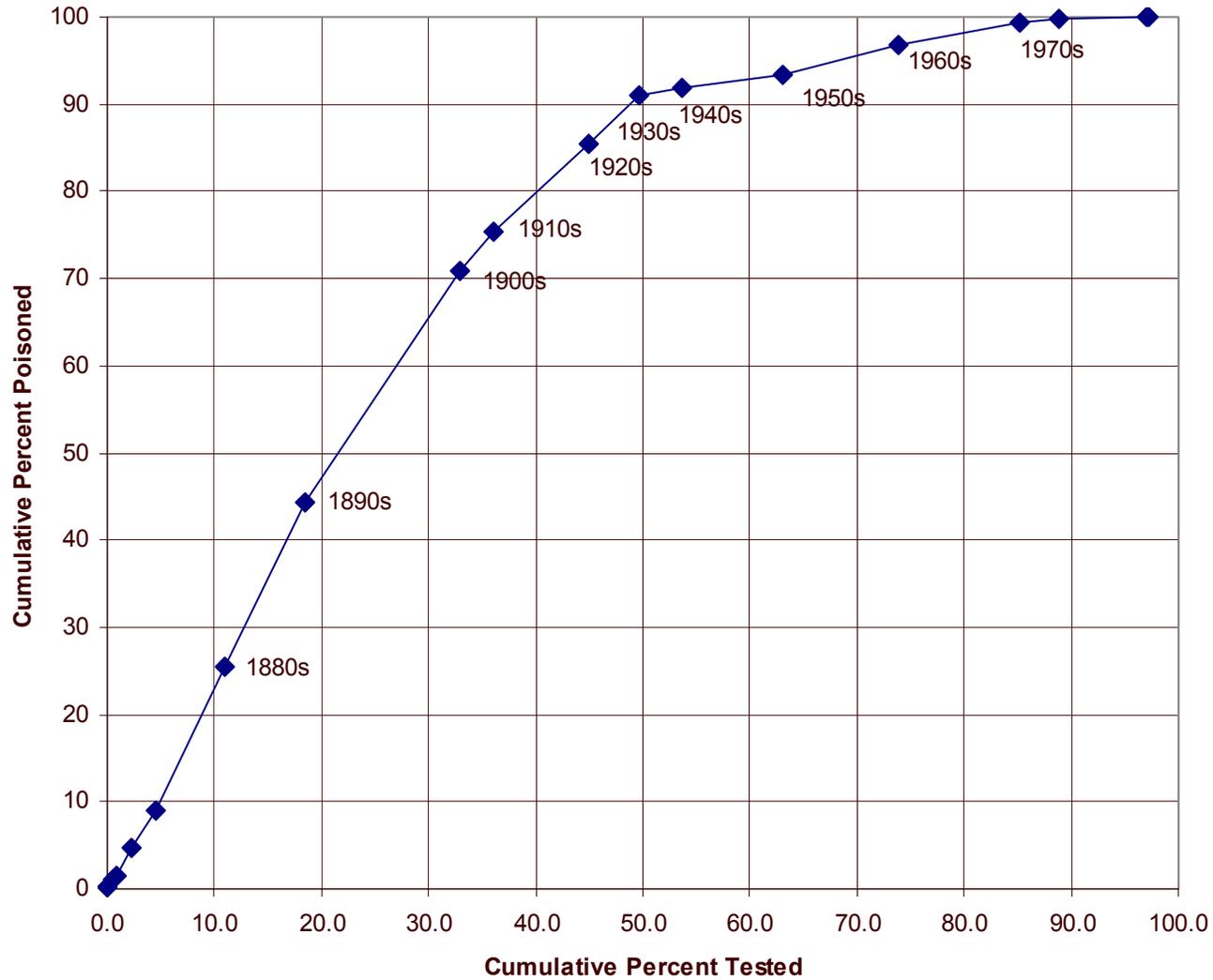
10,128 associated with at least one 0 through 5 year old with a blood lead level ≥ 10 ug/dL



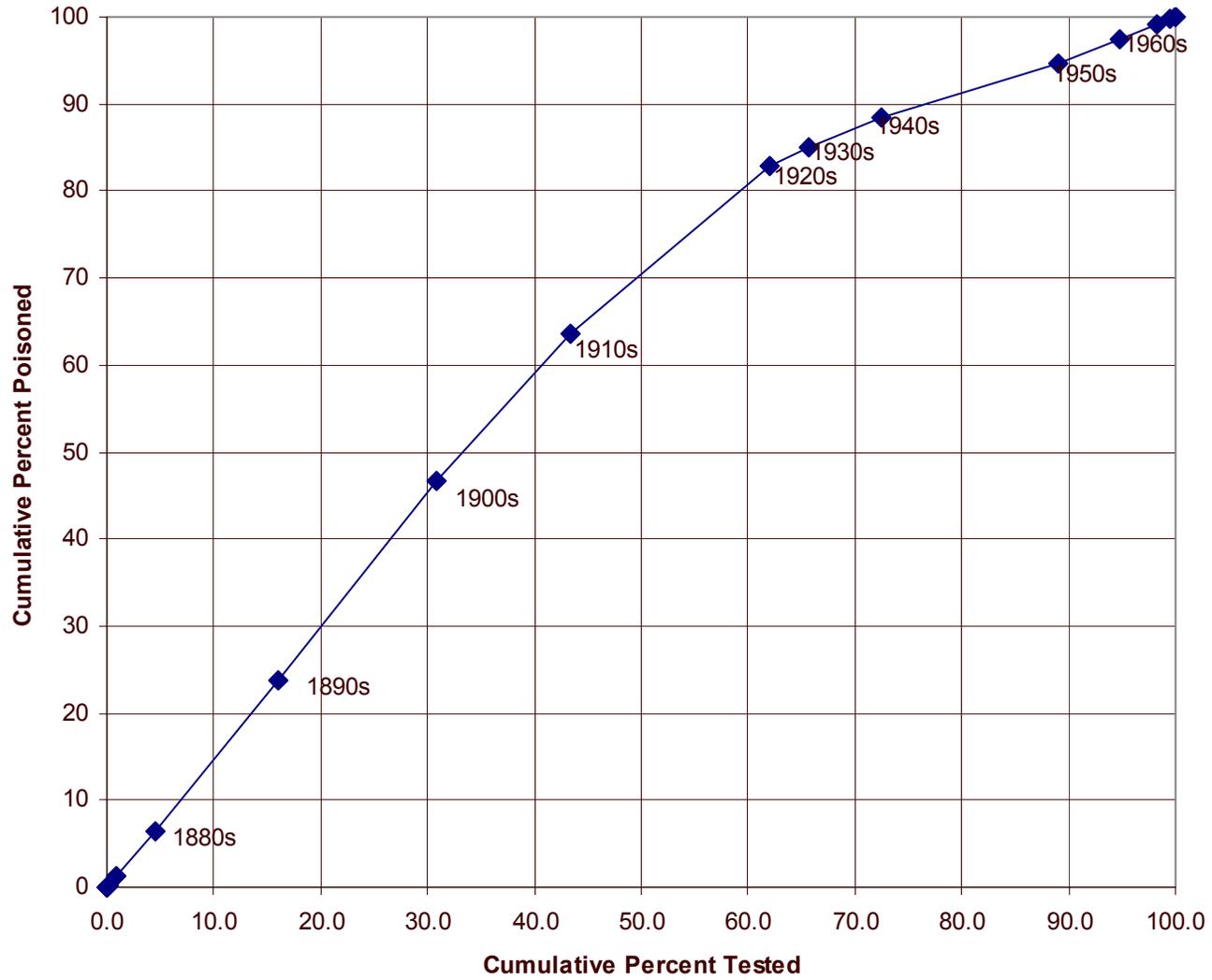
Eau Claire v Menasha: Double-Mass Curve Poisoned



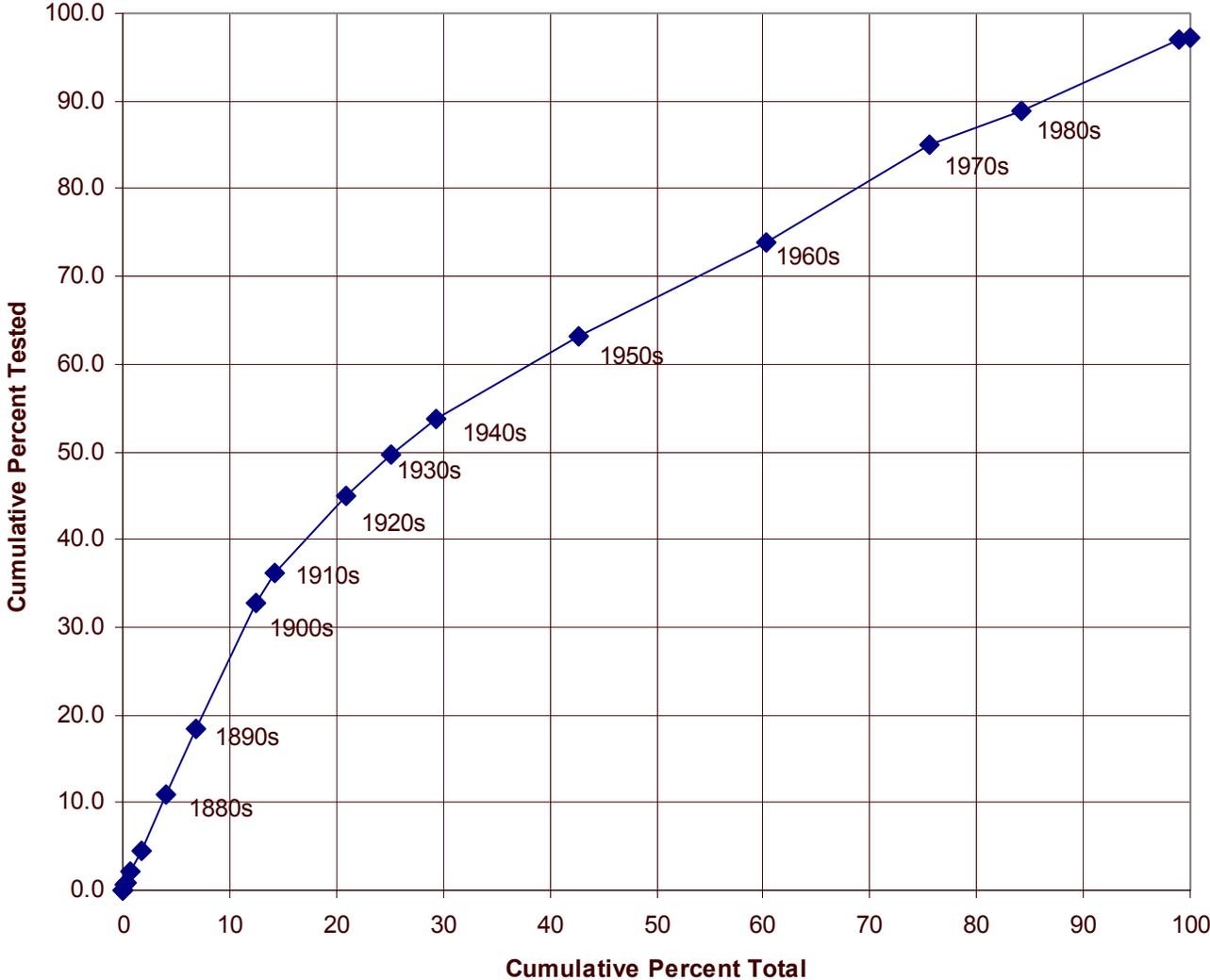
Janesville: Double-Mass Curve Poisoned v. Tested



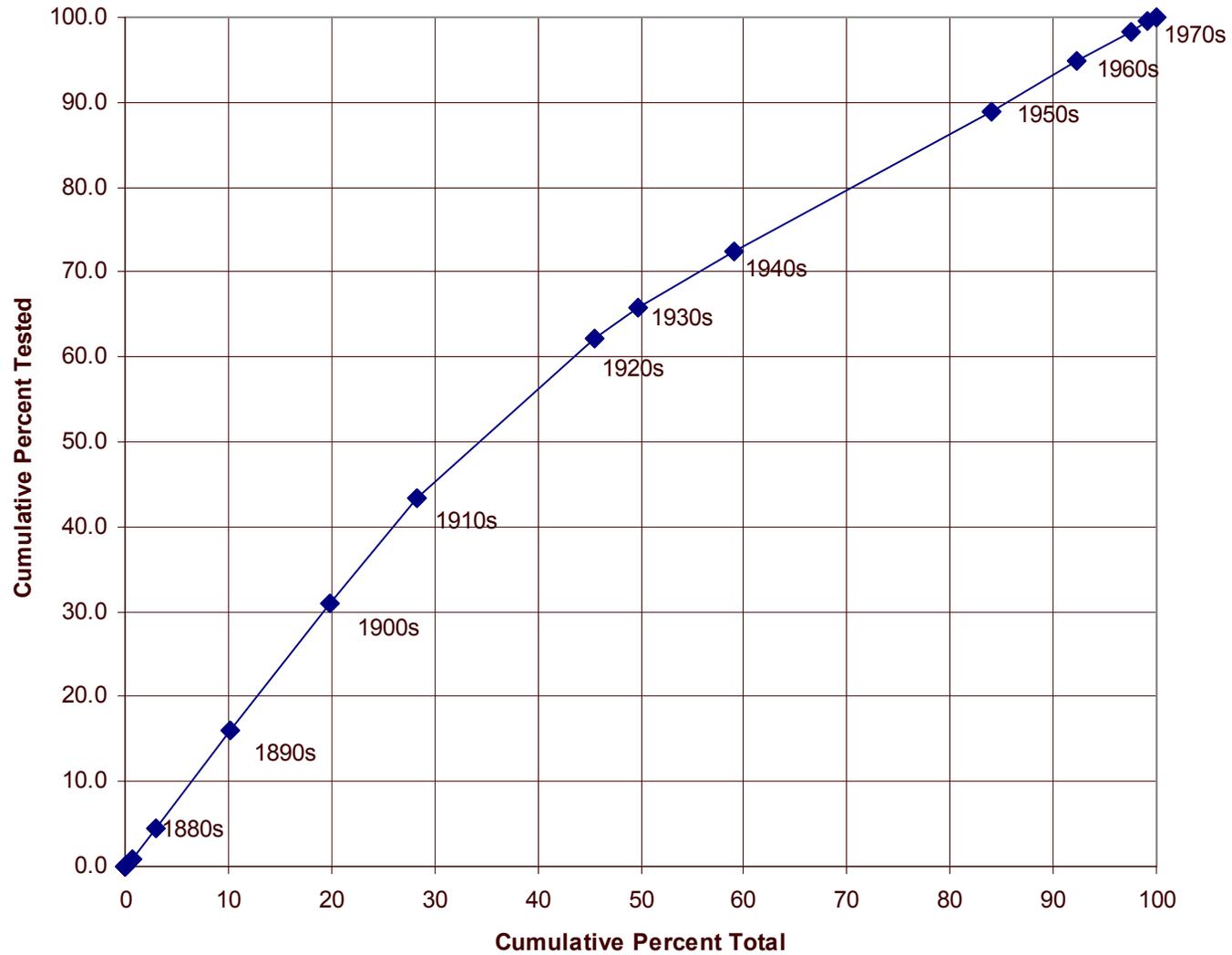
Milwaukee: Double-Mass Curve Poisoned v. Tested



Janesville: Double-Mass Curve Tested v. Total



Milwaukee: Double-Mass Curve Tested v. Total

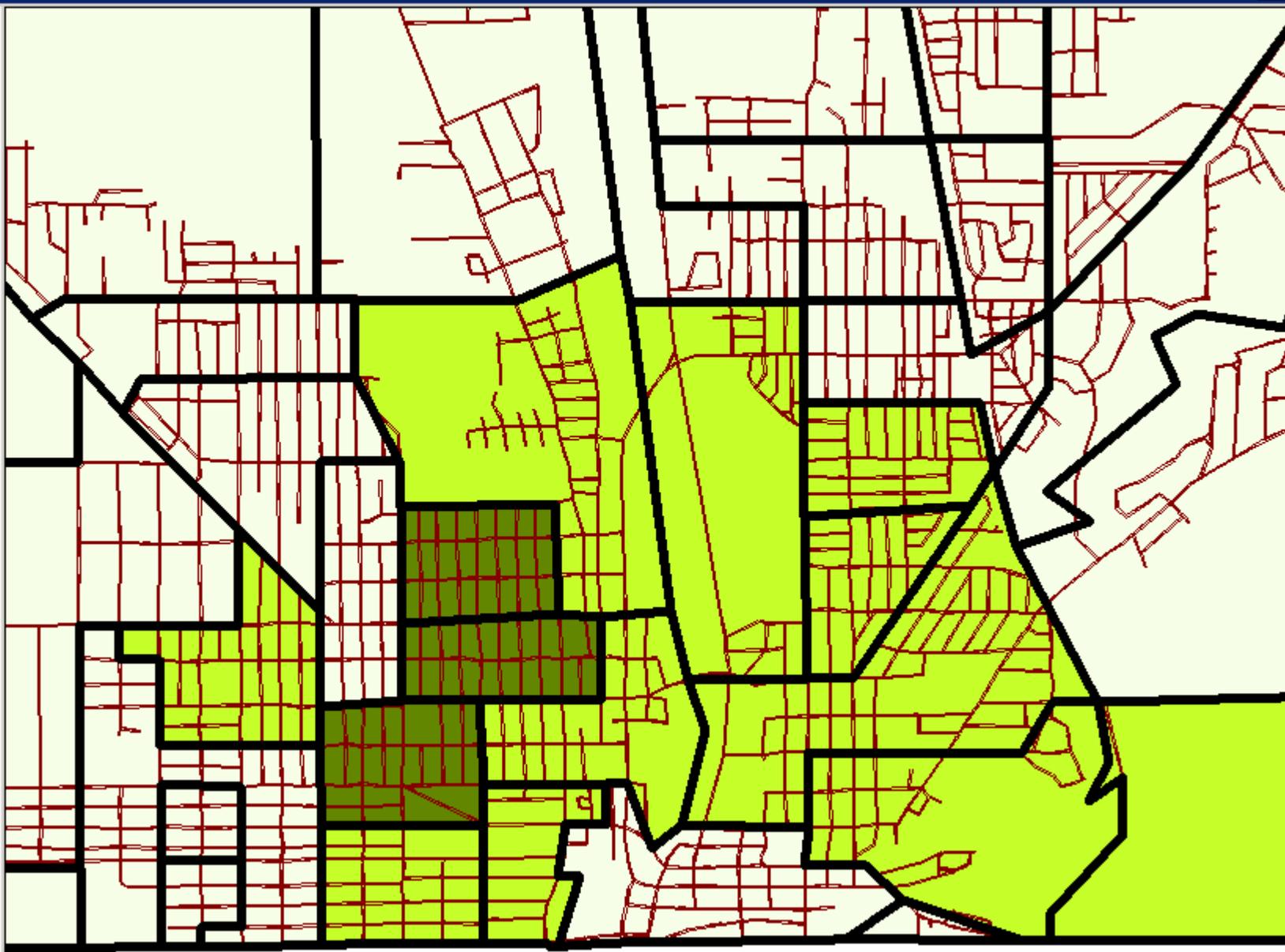




ew1

Block Groups

- Ma_untested_2003.dbf
- Rk_roads.shp
- Rk_hwys.shp
- Gis_all.dbf
 - 1800 - 1929
 - 1930 - 1949
 - 1950 - 2000
- PercentBuiltBefore1950
 - 0 - 33
 - 34 - 66
 - 67 - 100





ew1

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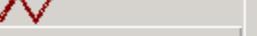
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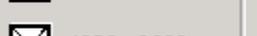


Gis_all.dbf

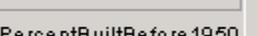
1800 - 1929



1930 - 1949

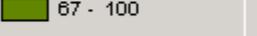


1950 - 2000



Percent Built Before 1950

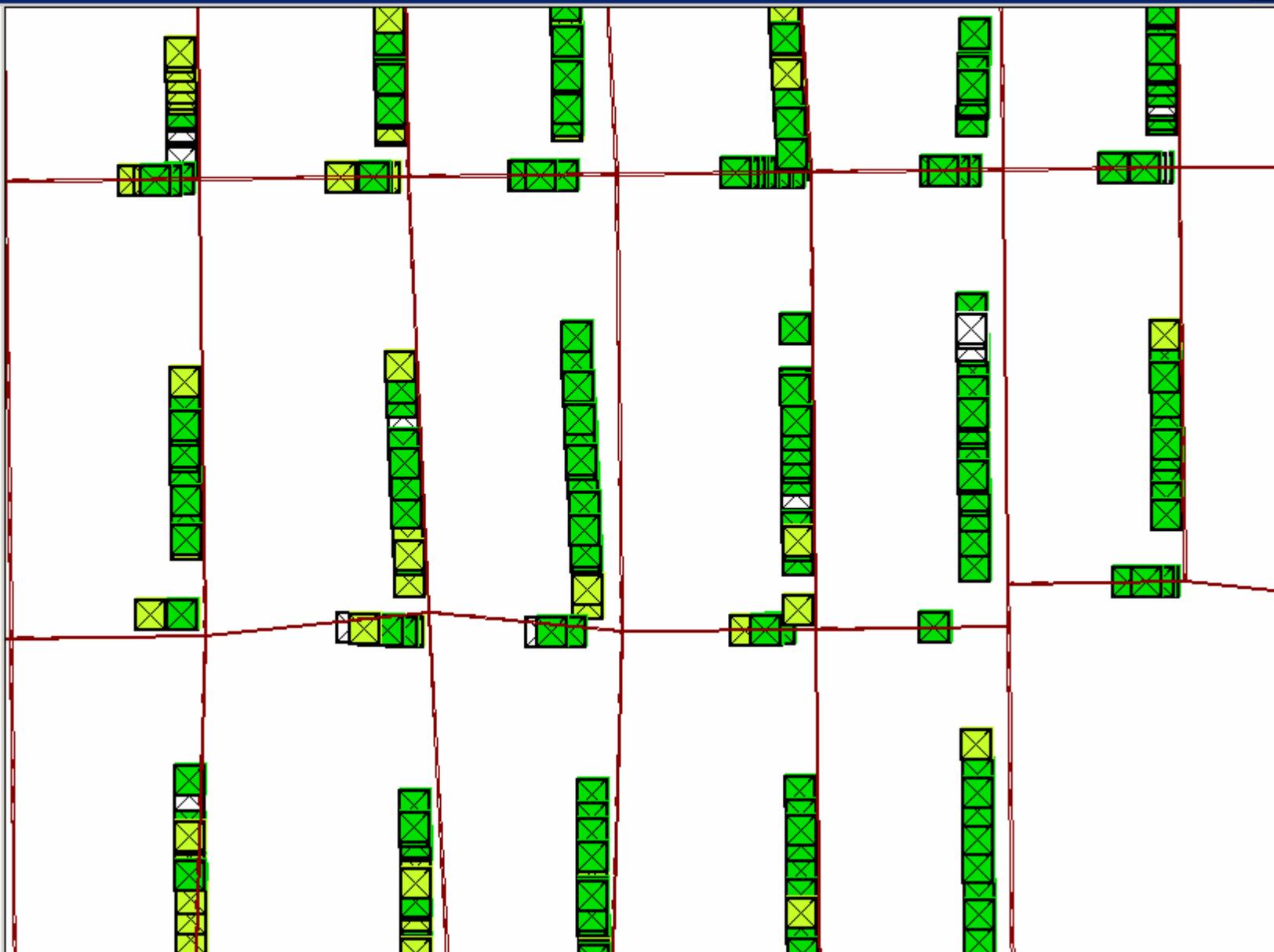
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Poisonedaddresses.dbf

Ma_untested_2003.dbf



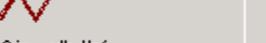
Block Groups



Rk_roads.shp



Rk_hwys.shp

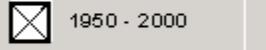


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