



***Environmental Justice Strategic Enforcement
Assessment Tool (EJ SEAT) in New York City***

***U.S. Environmental Protection Agency
National Environmental Justice Advisory Council
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OBJECTIVE OF THE EJSEAT MAPPING EXERCISE FOR NEW YORK CITY

Three of the technical members of the NEJAC EJ Screening Workgroup were asked by Workgroup chairs to map out the EJSEAT scores for a geographical area that we were very familiar with, (i.e., in my case, New York City) to see if the scores matched up well with our knowledge of “on-the-ground” conditions.

I mapped the EJ SEAT scores for each NYC census tract (2,200+ tracts), as well as several of the individual variables that make up the total scores, in order to determine if, in fact, the scores “looked” about right when examined from a purely visual perspective. If the EJ SEAT scores did not seem to match up with what I knew to be reality, then perhaps by mapping some of the individual variables, we would be able to discern if any particular factor within the score was helping to skew the results.

The following slides show the context of environmental and socio-demographic conditions in NYC, the results of mapping some of the individual factors that comprise the EJ SEAT scores, the mapped EJ SEAT scores by census tracts, some anomalies between the results and reality as I know it, and some concerns about the use of EJ SEAT in New York City.

New York City

- NYC boroughs
- surrounding areas



Locator Map by A.R. Maroko, Urban GISc Lab, City University of New York, Lehman College

The Context of New York City's Environment

NYC is an island city, with only one of the five boroughs (the Bronx, which is a peninsula) on the mainland of the U.S. There is virtually no freight train service into NYC, for various geographical and political reasons. This means that, in effect, almost all freight is trucked in (mainly through the Bronx) and much of the passenger vehicular traffic also passes through the Bronx to reach the other boroughs and points east on Long Island. Although NYC is well-served by an extensive public transportation network, millions of vehicles each day travel into or through the city.

The Cross Bronx Expressway has the highest volume of vehicles of any highway in the nation. The Bronx, as well as parts of Brooklyn and Queens, also have a high number of TRI facilities and other major stationary point sources of air pollution. And since NYC is so densely settled, even residential complexes, medical institutions, and small emitters cumulatively have a large impact on air quality for proximate residential populations.

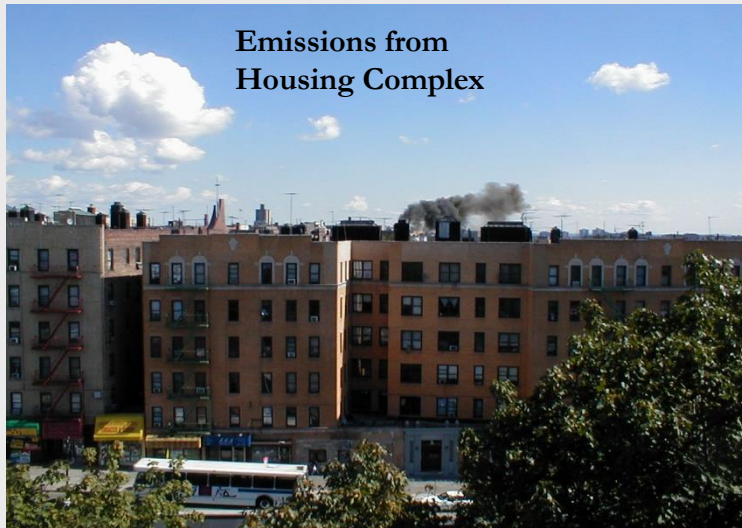
Noxious Land Uses in New York City



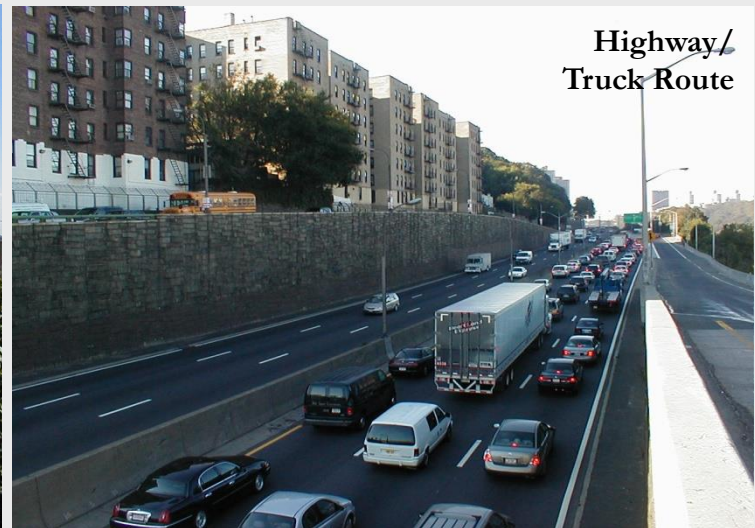
Toxic Release Inventory (TRI) Facility



Sludge Pelletization Plant



Emissions from
Housing Complex



Highway/
Truck Route

Photos by Juan Carlos Saborio, Lehman College, Urban GISc Lab

Highways of the Bronx – Yesterday’s “City of Tomorrow,” Today

“This image is a microcosm of conditions in the South Bronx, where communities are enveloped by a dense network of highways, contributing to a labyrinth of pollution that surrounds the residential neighborhoods.

Much of the traffic is not local, but rather contains a high proportion of long-distance trucks, due to the fact that the Bronx is the only borough of New York City located on the mainland, and therefore most freight destined for the rest of the city and points east passes through the Bronx. This transportation scheme results in the Bronx having not only one of the highest vehicular counts on its roadways, but also one of the highest asthma hospitalization rates in the nation.

When this highway system was developed, it was considered by many to be an example of progressive planning. Now, however, it has a stranglehold on the people of the Bronx, many of whom are particularly vulnerable to its effects due to socio-demographic factors and underlying health conditions and health care access issues.”

Juliana Maantay, *Urban Geography*, January, 2009,

Caption to Brian Morgan’s cover photograph of Bronx highways



Cover of *Urban Geography*,
January, 2009. Photo by
Brian Morgan, Urban GISc
Lab, CUNY

New York City's Socio-Demographic Characteristics

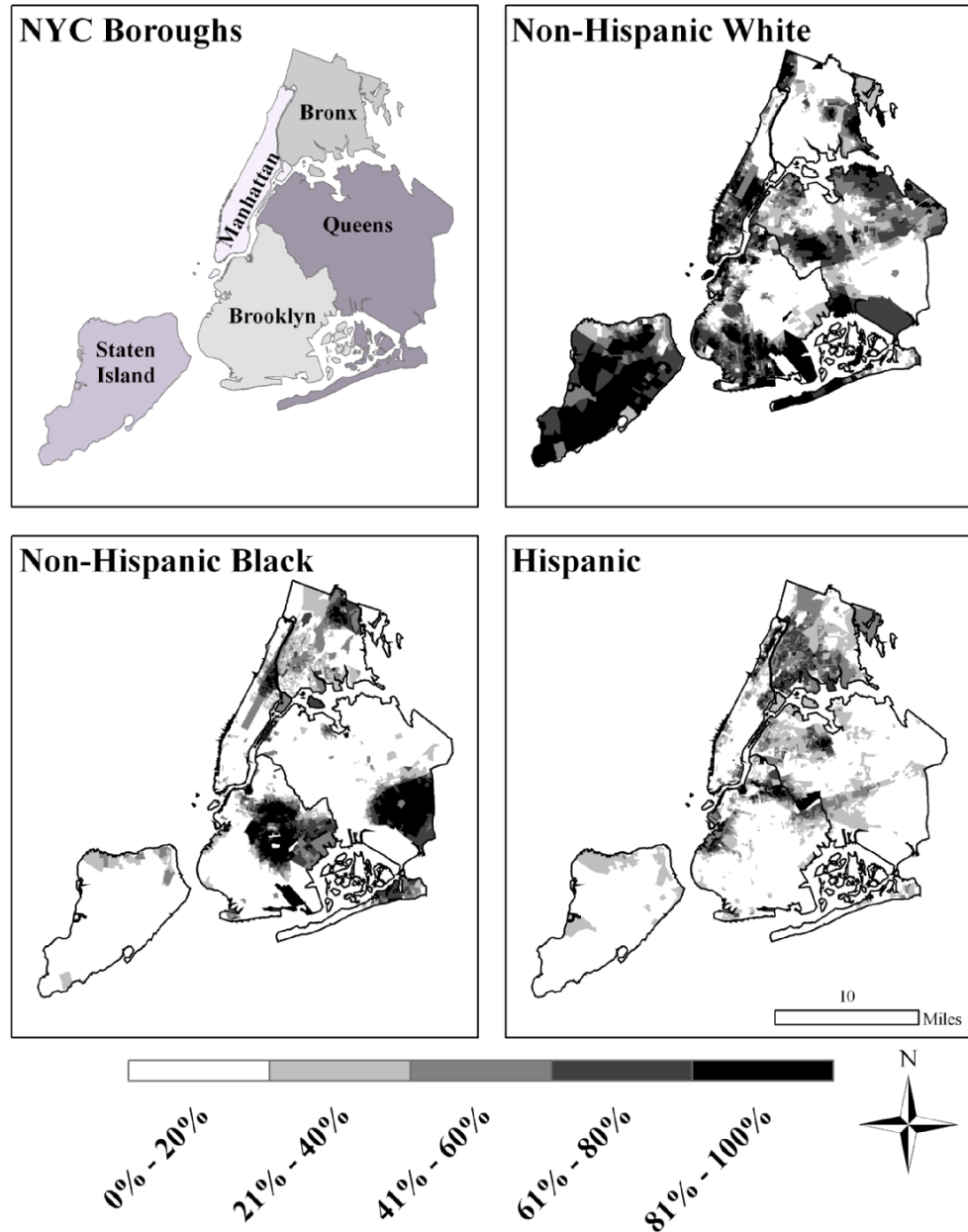
NYC is still a very segregated city, with Non-Hispanic Black and Hispanic populations concentrated in large sections of each of the boroughs, and Non-Hispanic White populations often separated in more affluent enclaves. The city is (as of the 2000 census) over 65% “minority.” The Bronx is over 87% “minority.”

In many census tracts, more than half the population is below the Federal poverty line, and the Congressional District that includes the South Bronx is the poorest in the nation. Parts of Manhattan also have some of the wealthiest census tracts in the nation. The disparity in wealth is marked, even sometimes within one city block.

Demographic (Race/Ethnicity) Characteristics in New York City

According to the 2000 Census, NYC's population was approximately 65% "minority," with the Borough of the Bronx being 87% "minority." Based on the spatial distribution of major racial/ethnic groups, NYC is still, for the most part, a segregated city.

Source: Maantay, J.A., and Maroko, A.R., 2008. Mapping urban risk: Flood hazards, race, & environmental justice in New York, *Applied Geography*, 29(4)



Industrial Zoning in NYC

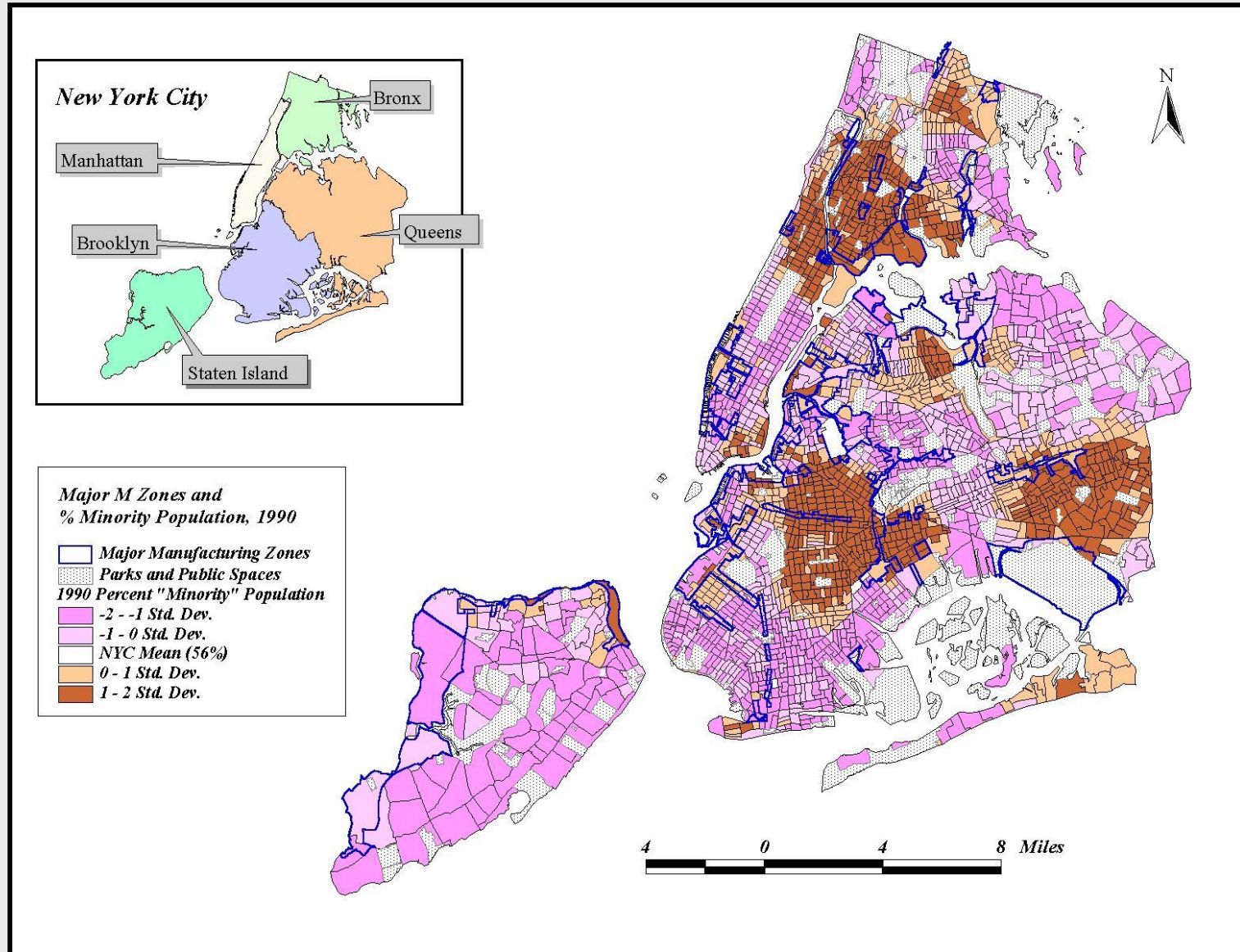
Industrial facilities and land uses can legally locate only within an industrial zone (the so-called “M,” or manufacturing, zones). Many of these zones are artifacts of the historical settlement pattern of NYC, the city’s role as a port/waterfront city, and the perceived need in the 19th and early 20th centuries of having working-class communities be within walking distance to the factories and ports where the nearby residents worked.

However, zoning has been changed over the years, and industrial zones have changed locations, have increased and decreased in geographic extent, and also have increased and decreased in intensity of noxious uses permitted in a given zone.

When these changes to industrial zones (from 1961-1998) were charted, it was found that increases in extent and intensity of “M” zones occurred mainly in less affluent and more minority neighborhoods, and decreases in extent and intensity occurred mainly in more affluent, white, and/or gentrifying neighborhoods.

Due to the location of NYC’s industrial zones, polluting facilities and land uses impact mainly minority and lower-income communities.

Industrial Zones in NYC and “Minority” Populations



Source: Maantay, J.A., Zoning, Equity, and Public Health. *American Journal of Public Health* 91, (2001): 1033 –1041. Map by J. Maantay

Individual EJ SEAT Factors that were mapped for NYC:

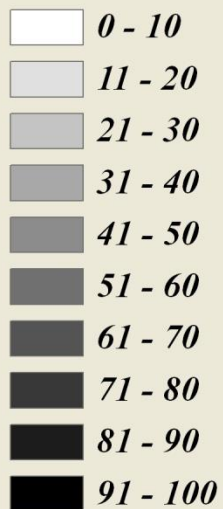
- Facility Density
- % under Poverty line
- % Minority Population
- Ozone concentration – 8-hour average
- NATA Cancer Risk
- NATA Non-Cancer Diesel Particulate Matter (PM)
- NATA Neurological and Respiratory Hazard Index
- NATA PM 2.5 Concentration
- Toxic Chemical Releases and Transfers from Industrial Facilities

NOTE: These individual factors were selected from the more comprehensive list of EJ SEAT factors, and do not represent the entire suite of factors used in creating the EJ SEAT score.

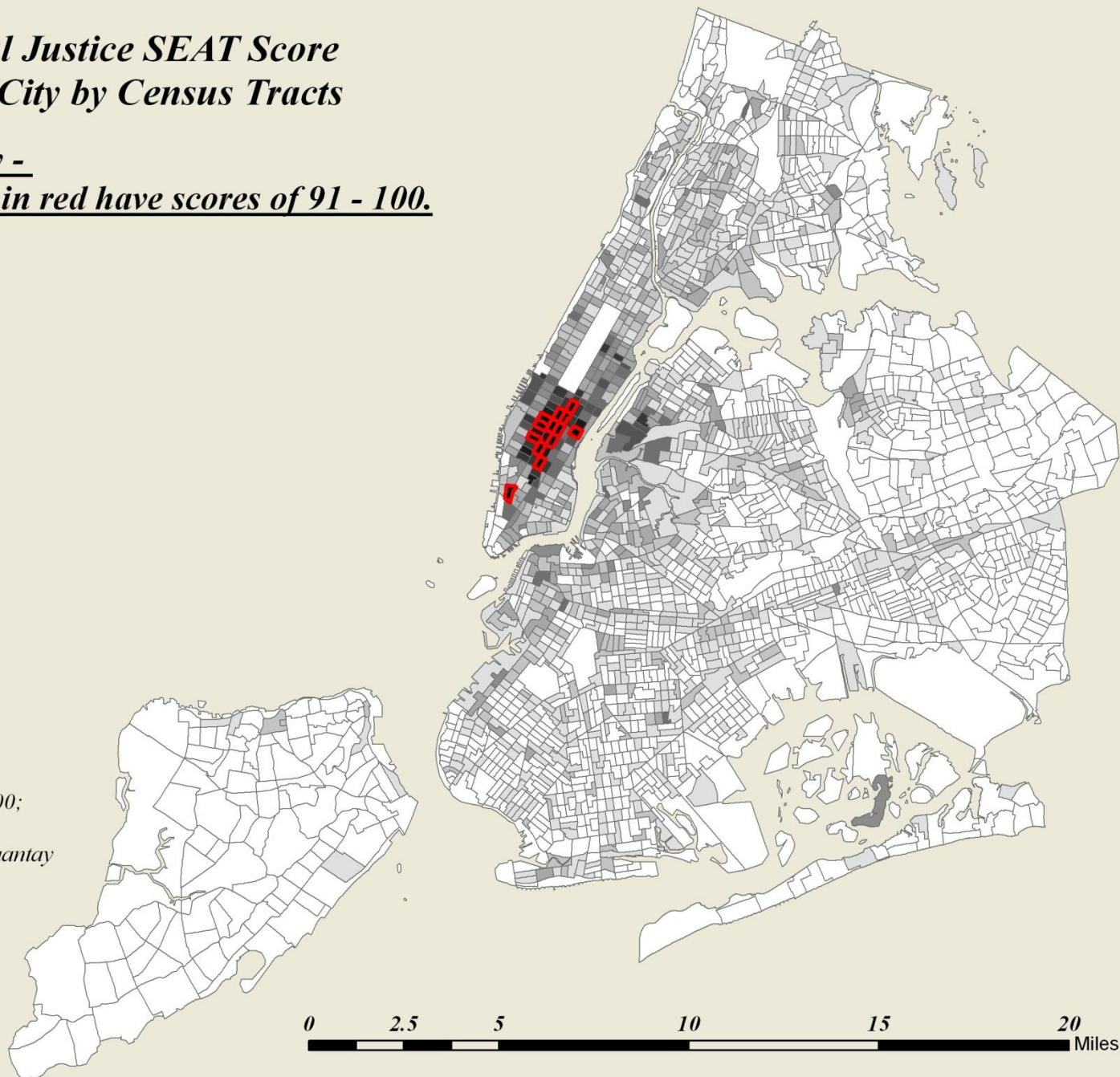
Environmental Justice SEAT Score for New York City by Census Tracts

Facility Density -
Tracts outlined in red have scores of 91 - 100.

EJSEAT Score



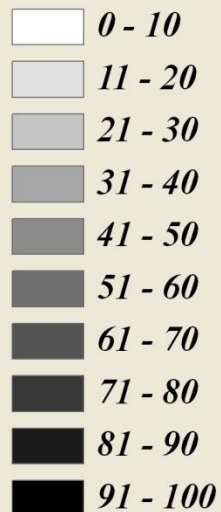
Data Sources:
US Census Bureau, 2000;
US EPA, 2008
Map Compiled by J.Maantay
Sept. 18, 2008



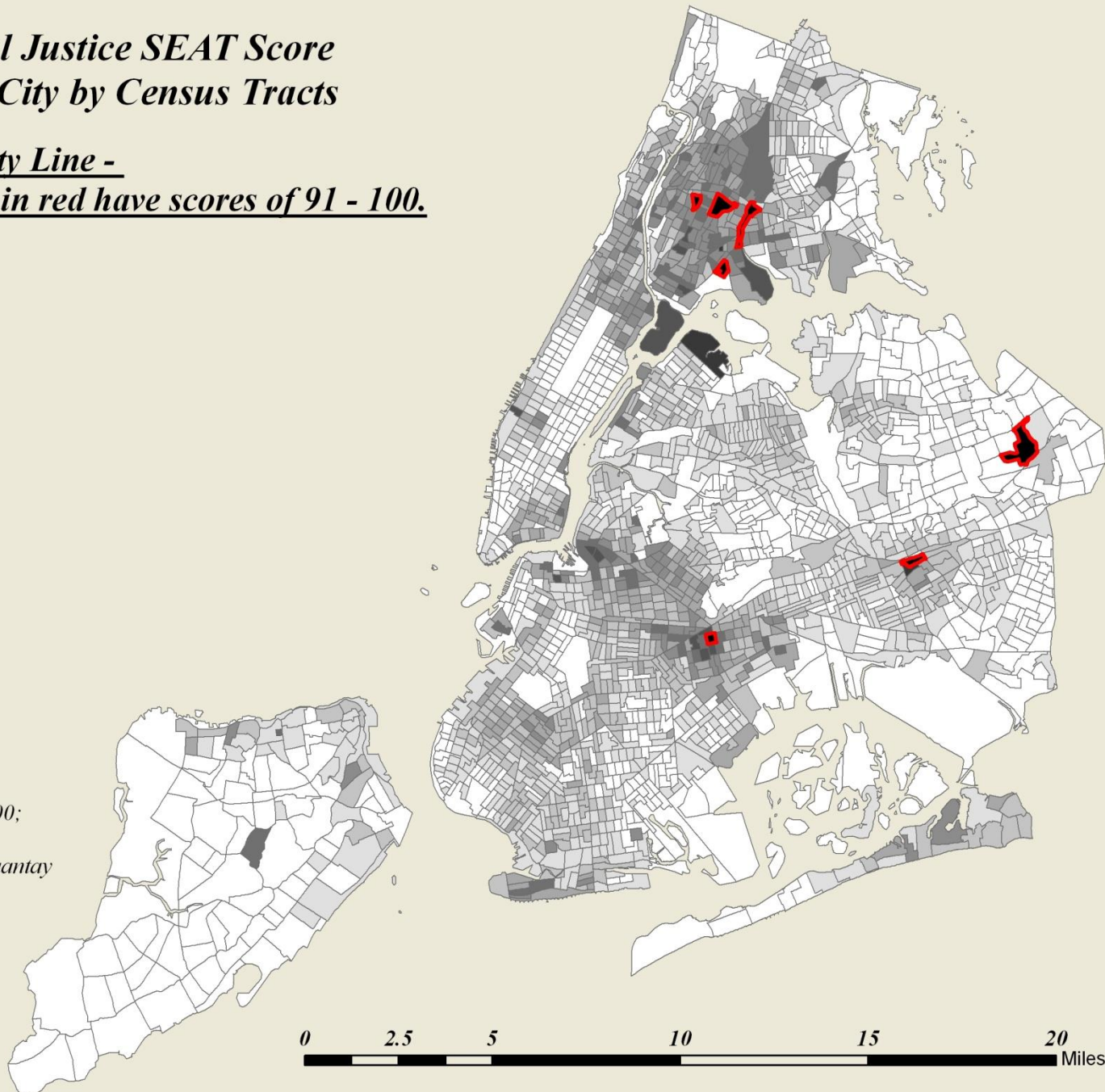
Environmental Justice SEAT Score for New York City by Census Tracts

*% Under Poverty Line -
Tracts outlined in red have scores of 91 - 100.*

EJSEAT Score



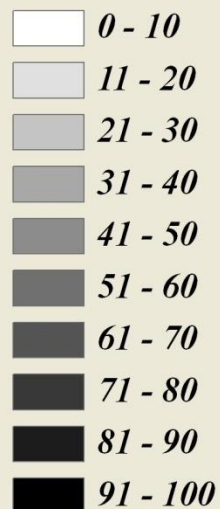
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US EPA, 2008
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Sept. 18, 2008*



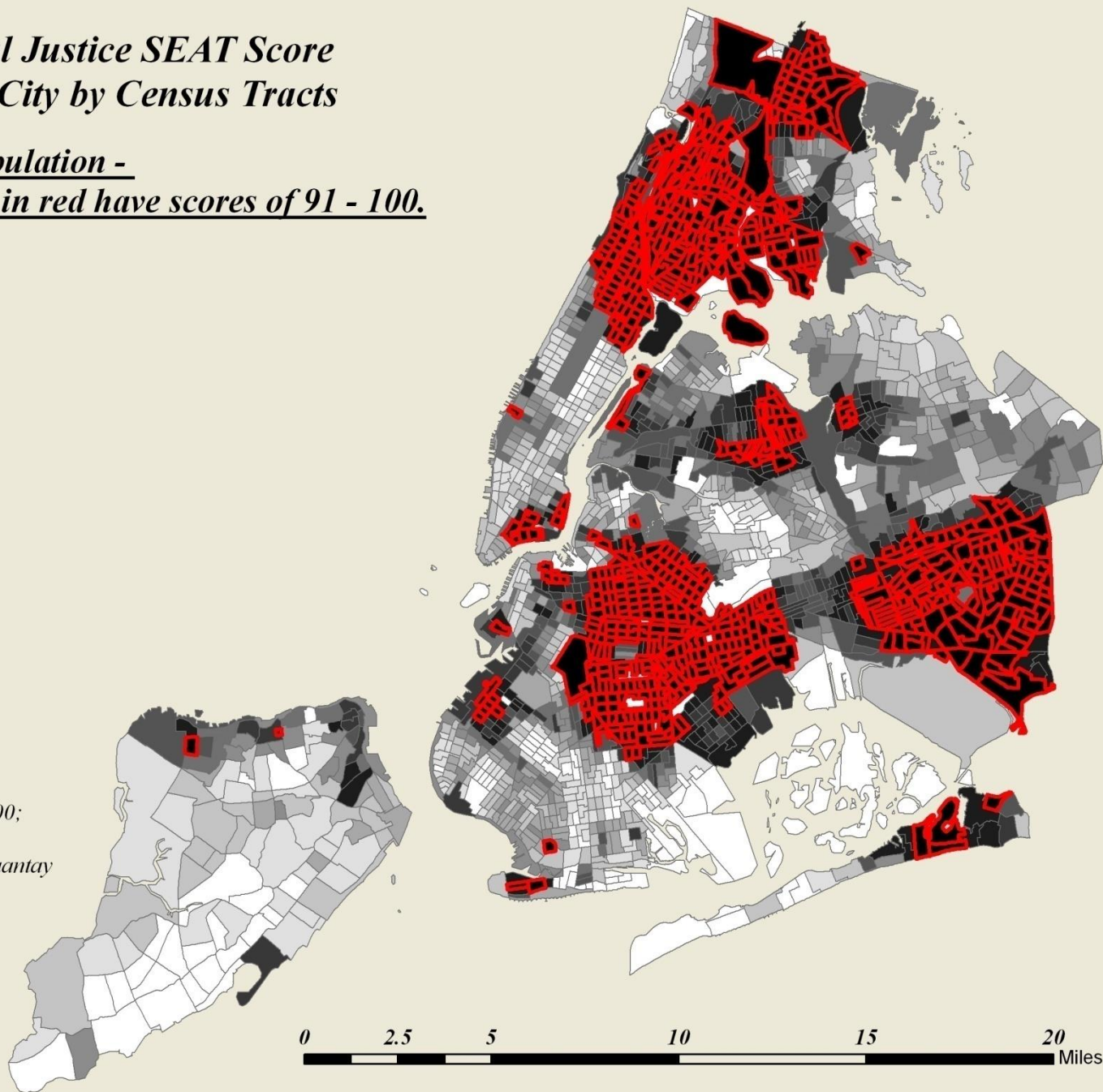
Environmental Justice SEAT Score for New York City by Census Tracts

*% Minority Population -
Tracts outlined in red have scores of 91 - 100.*

EJSEAT Score



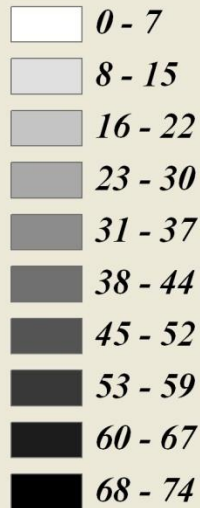
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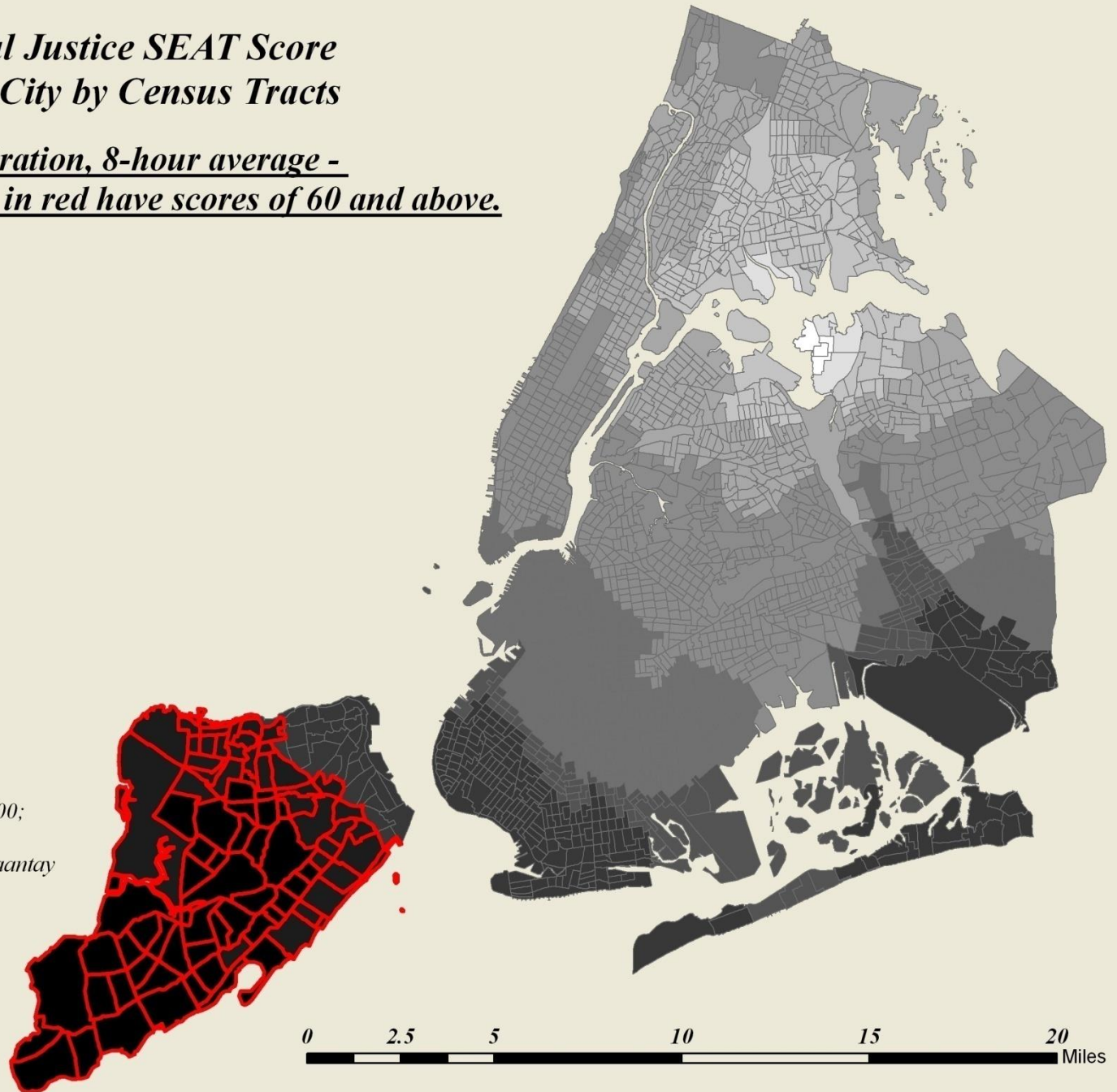
Environmental Justice SEAT Score for New York City by Census Tracts

*Ozone Concentration, 8-hour average -
Tracts outlined in red have scores of 60 and above.*

EJSEAT Score



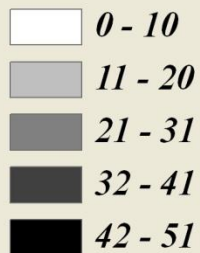
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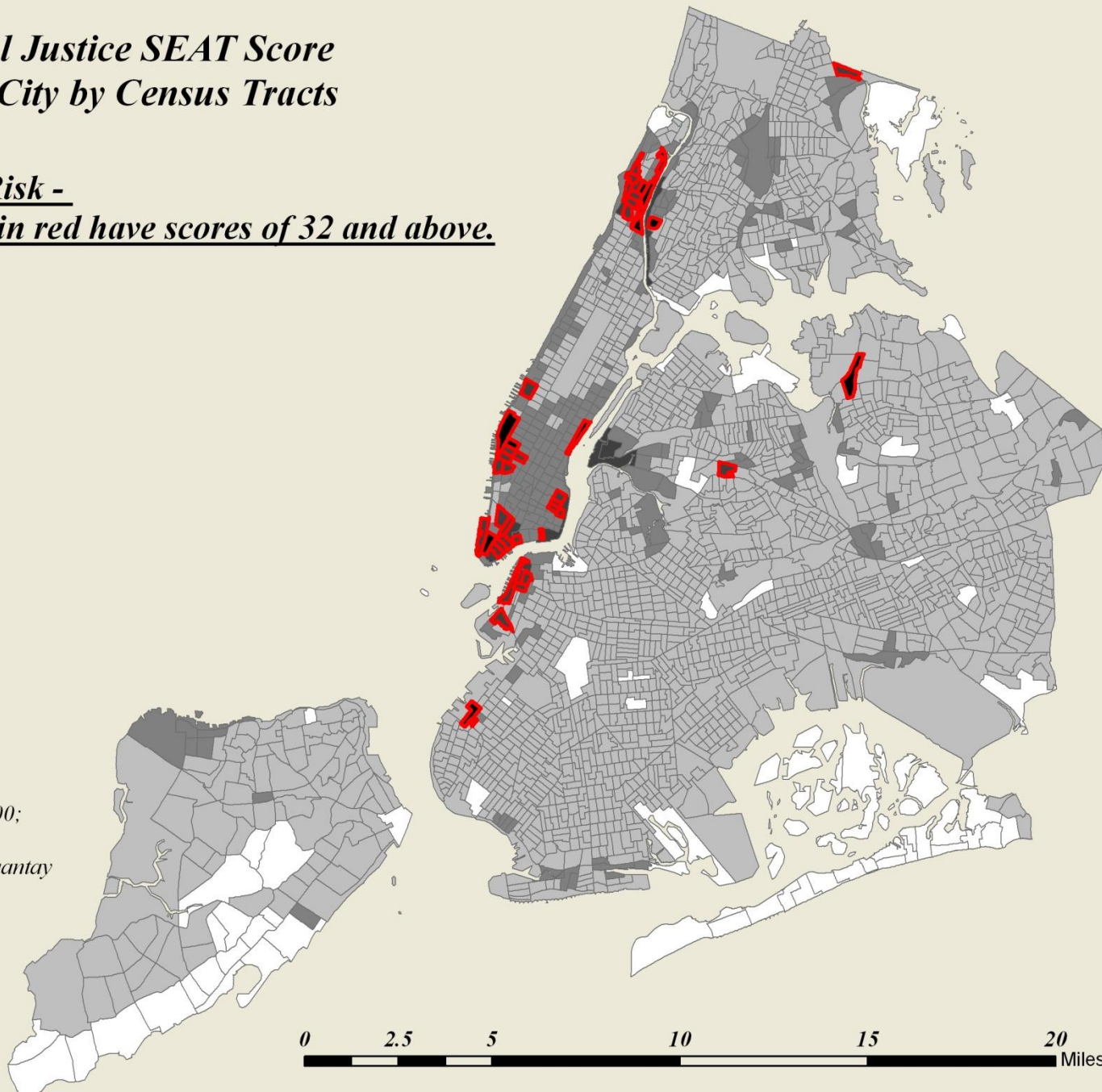
Environmental Justice SEAT Score for New York City by Census Tracts

*NATA Cancer Risk -
Tracts outlined in red have scores of 32 and above.*

EJSEAT Score



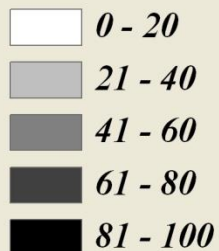
*Data Sources:
US Census Bureau, 2000;
US EPA, 2008
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Sept. 18, 2008*



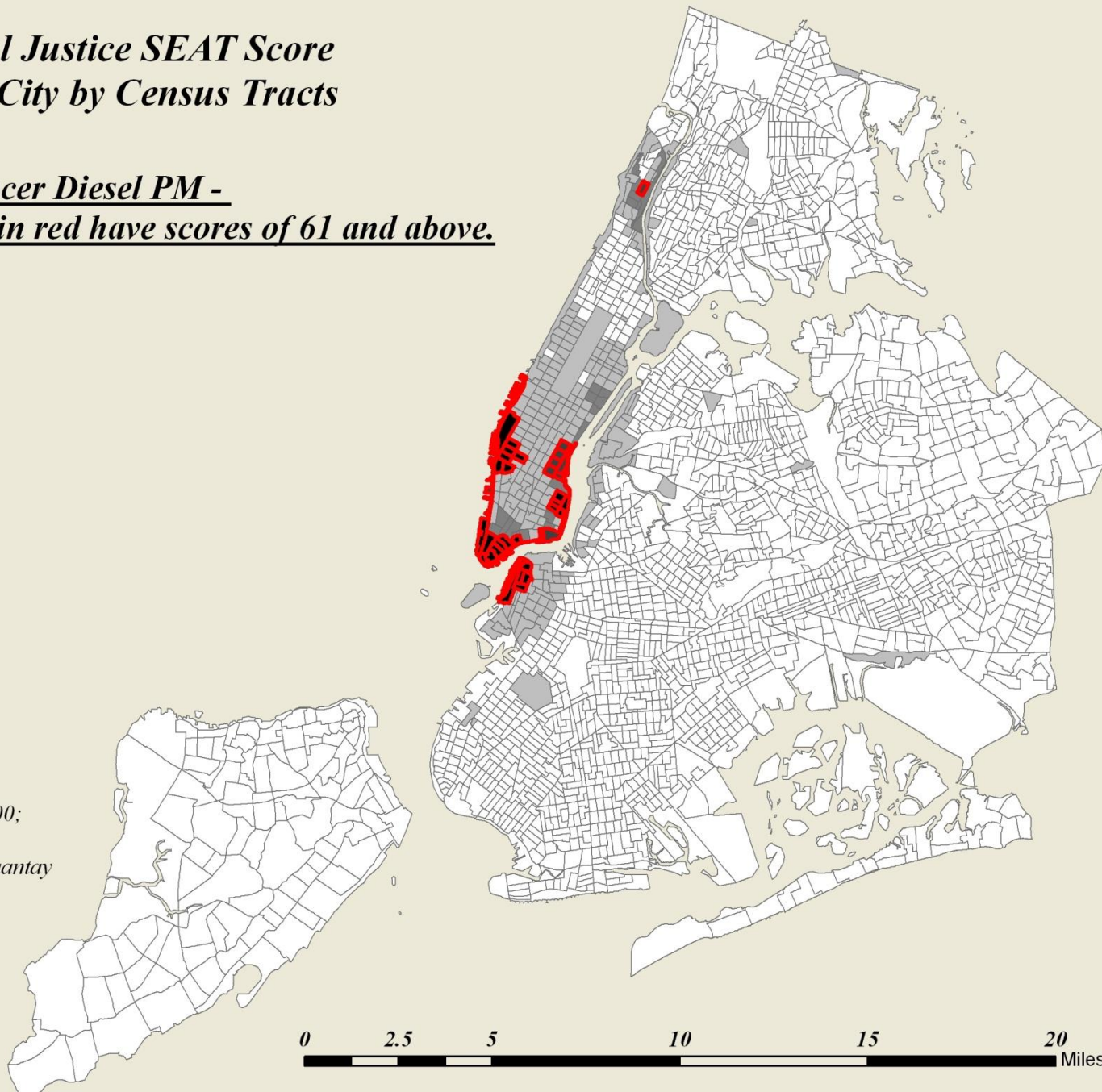
Environmental Justice SEAT Score for New York City by Census Tracts

*NATA Non-Cancer Diesel PM -
Tracts outlined in red have scores of 61 and above.*

EJSEAT Score



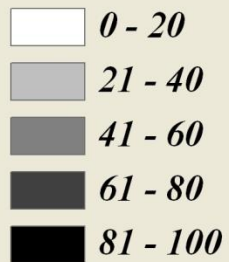
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US EPA, 2008
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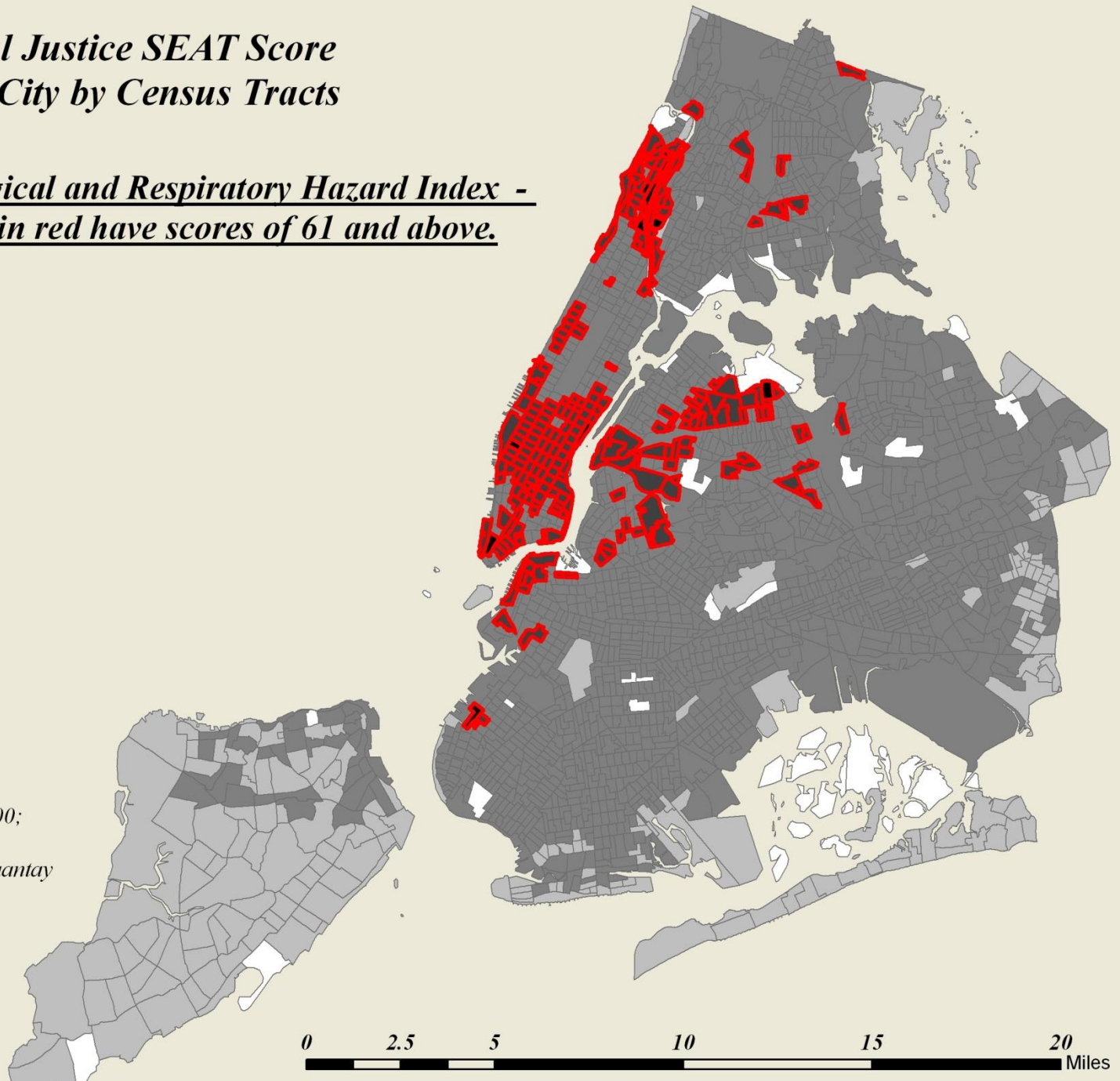
Environmental Justice SEAT Score for New York City by Census Tracts

*NATA Neurological and Respiratory Hazard Index -
Tracts outlined in red have scores of 61 and above.*

EJSEAT Score



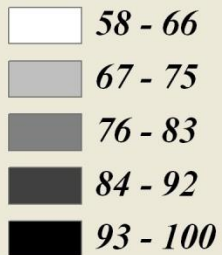
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US EPA, 2008
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Sept. 18, 2008*



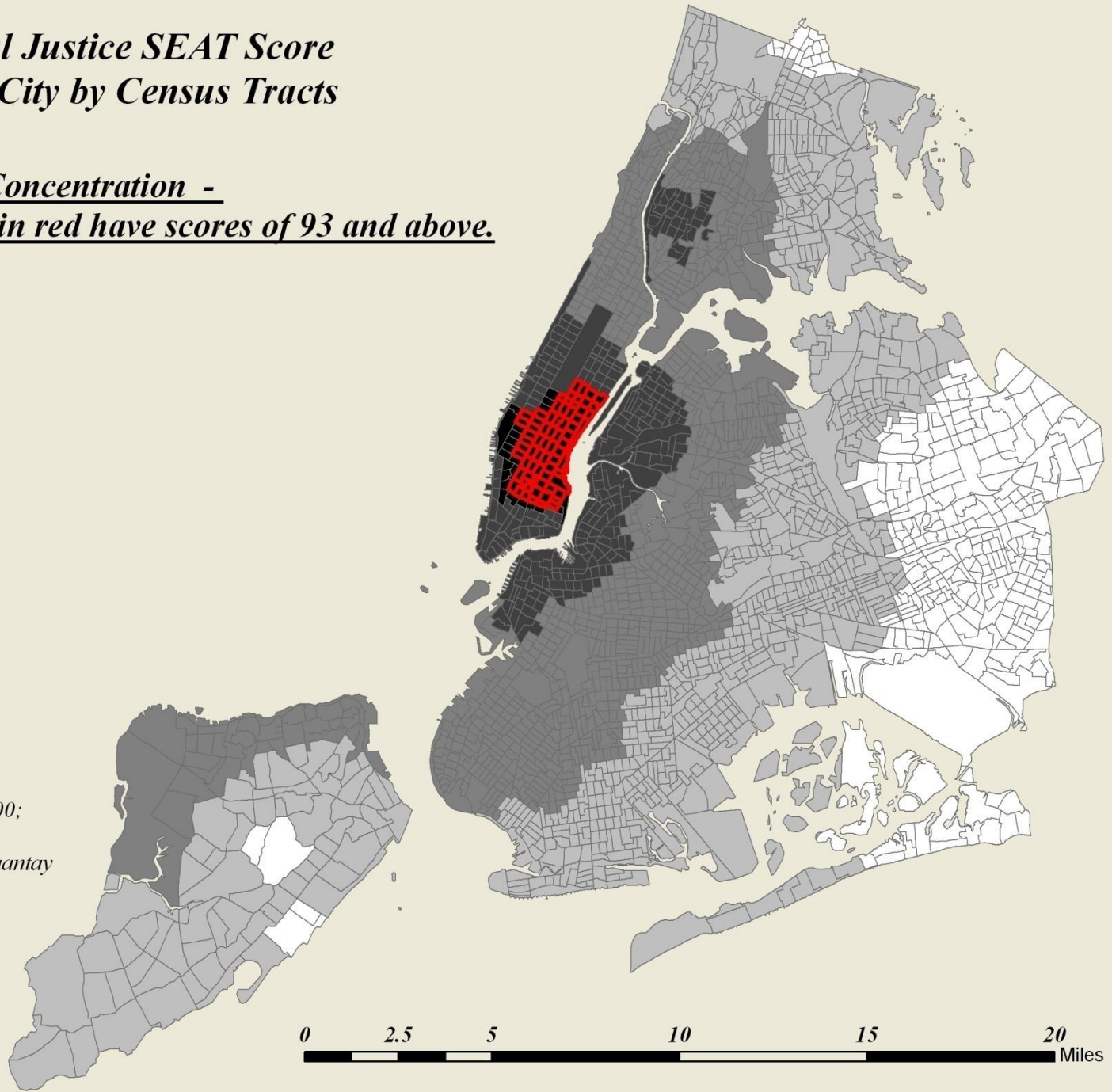
Environmental Justice SEAT Score for New York City by Census Tracts

*NATA PM 2.5 Concentration -
Tracts outlined in red have scores of 93 and above.*

EJSEAT Score



*Data Sources:
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US EPA, 2008
Map Compiled by J.Maantay
Sept. 18, 2008*



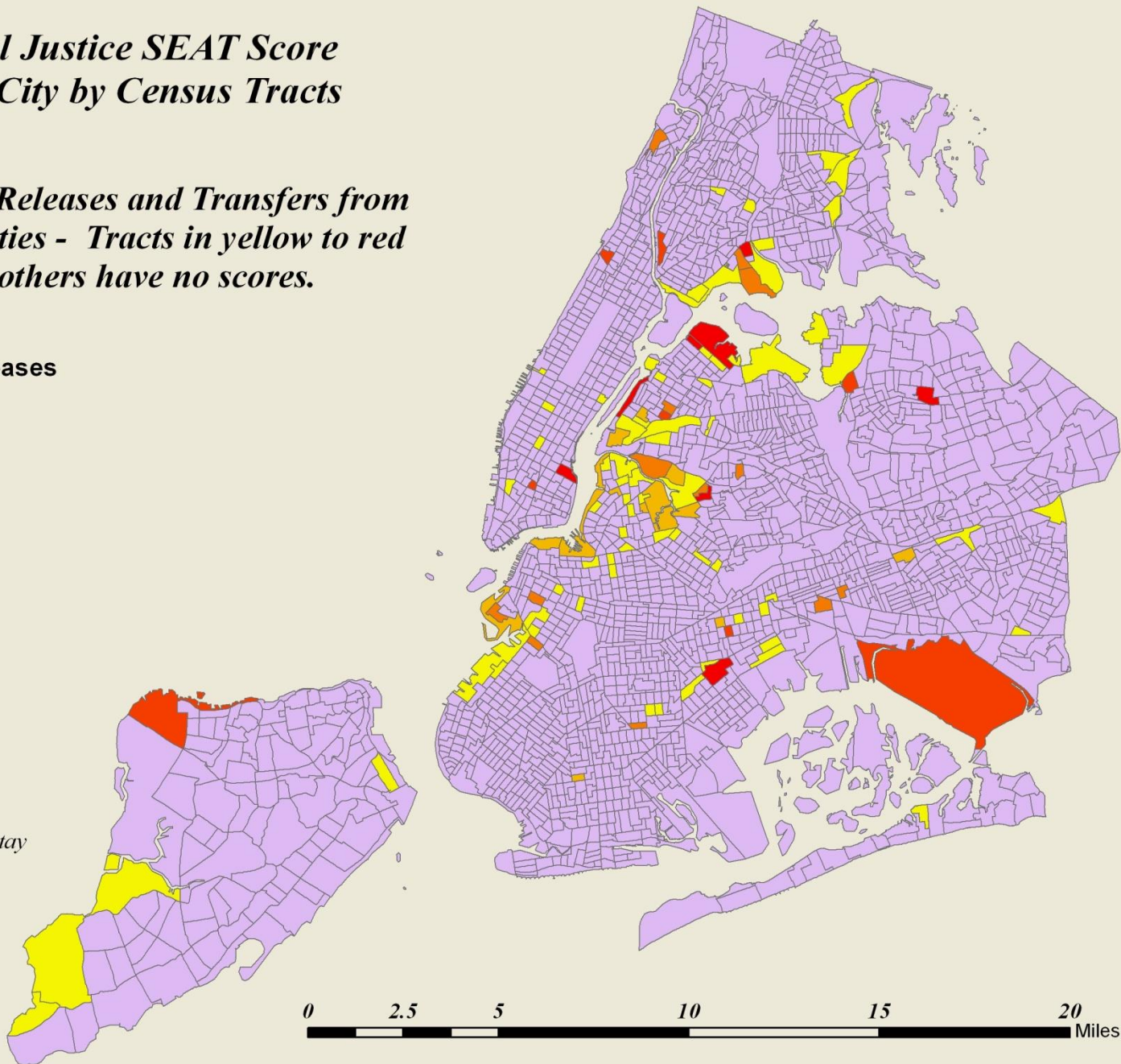
Environmental Justice SEAT Score for New York City by Census Tracts

*Toxic Chemical Releases and Transfers from
Industrial Facilities - Tracts in yellow to red
have scores, the others have no scores.*

Toxic Chemical Releases



*Data Sources:
US Census Bureau, 2000;
US EPA, 2008
Map Compiled by J.Maantay
Sept. 18, 2008*

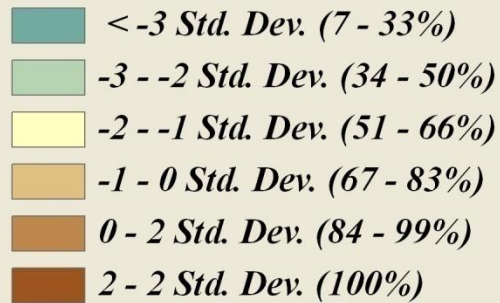


Possible Anomalies Raising Questions about the validity of EJ SEAT Scores in NYC:

- **Facility Density score highest in mid-town Manhattan?**
- **% Under Poverty Line highest in parks and uninhabited islands?**
- **8-hour Ozone concentration highest in Staten Island?**
- **Cancer risk highest in the Financial District, West Side of midtown, and Washington Heights in Manhattan, and Sunset Park, Brooklyn?**
- **Non-cancer Diesel 2.5 highest in coastal areas of lower Manhattan and Brooklyn Heights? Most of the city is in 0-20 range?**
- **Neurological and Respiratory Hazard Index highest in Manhattan below Central Park, upper Manhattan, and scattered parts of Queens, Brooklyn, and the Bronx (some are parks)?**
- **PM 2.5 concentration highest in east side of Manhattan?**

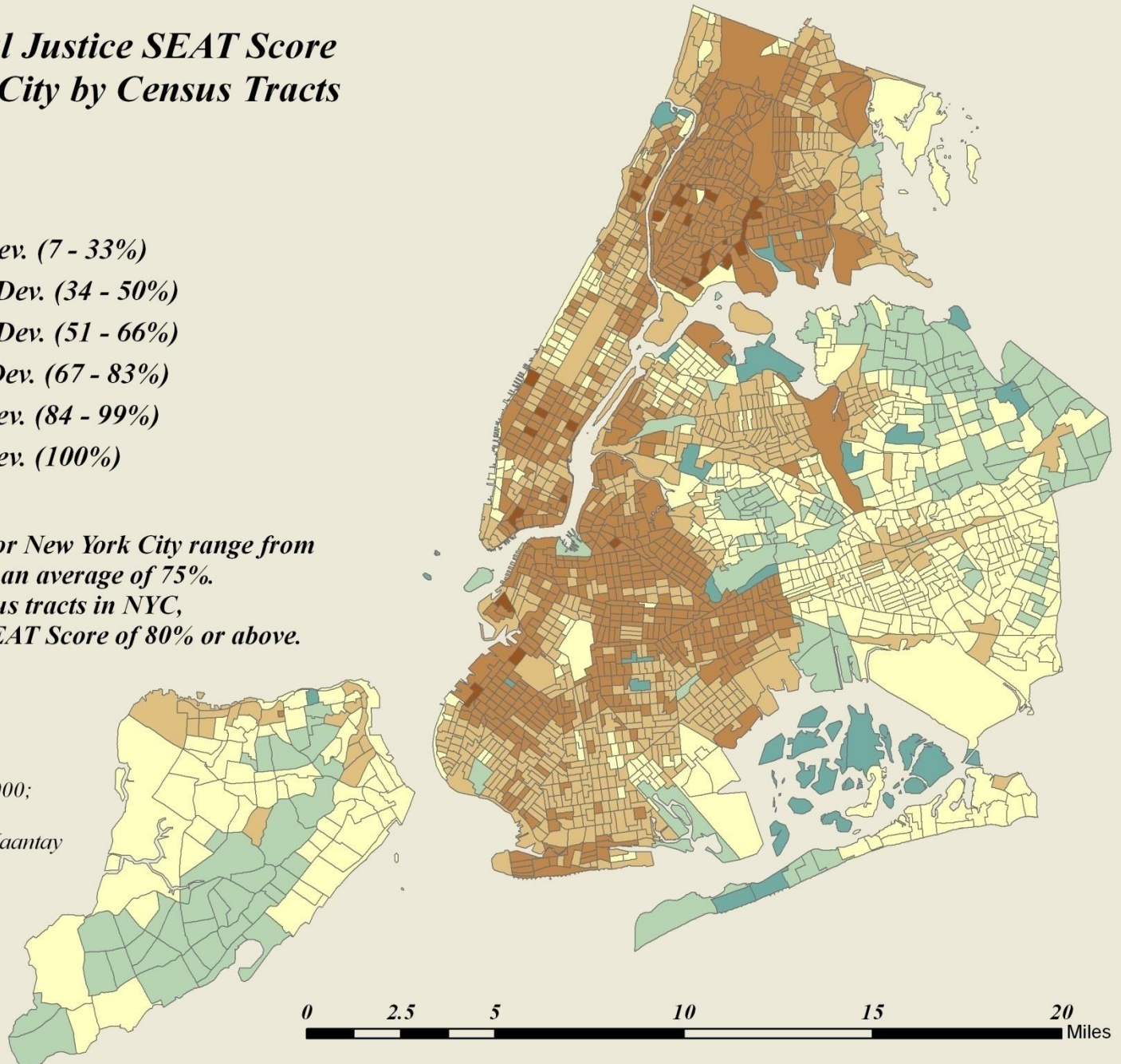
Environmental Justice SEAT Score for New York City by Census Tracts

EJSEAT Score



*EJ SEAT Scores for New York City range from 7% to 100 %, with an average of 75%.
Of the 2, 217 census tracts in NYC,
964 have an EJ SEAT Score of 80% or above.*

*Data Sources:
US Census Bureau, 2000;
US EPA, 2008
Map Compiled by J.Maantay
Sept. 18, 2008*



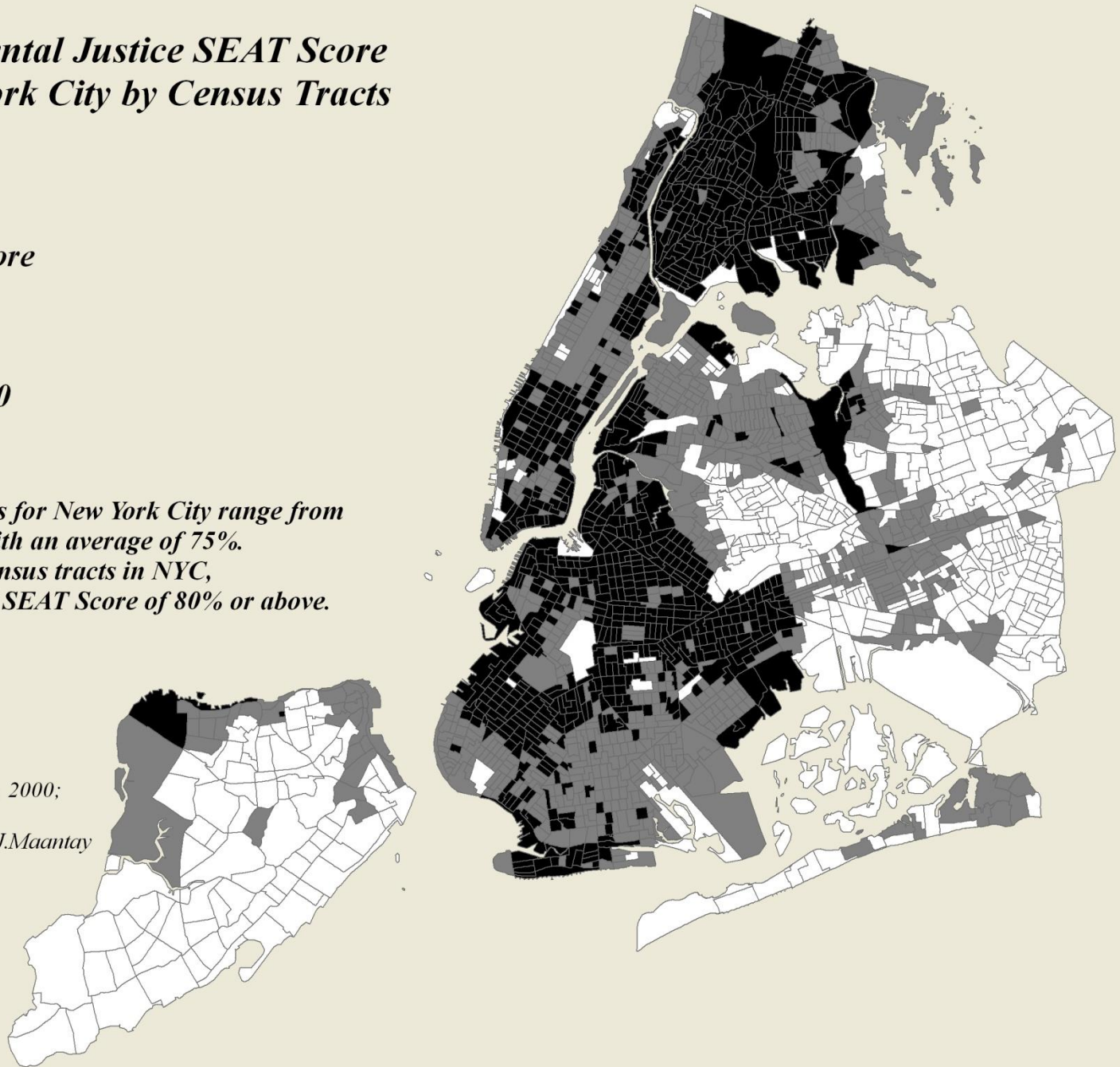
Environmental Justice SEAT Score for New York City by Census Tracts

EJ SEAT Score



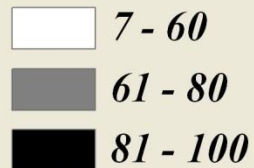
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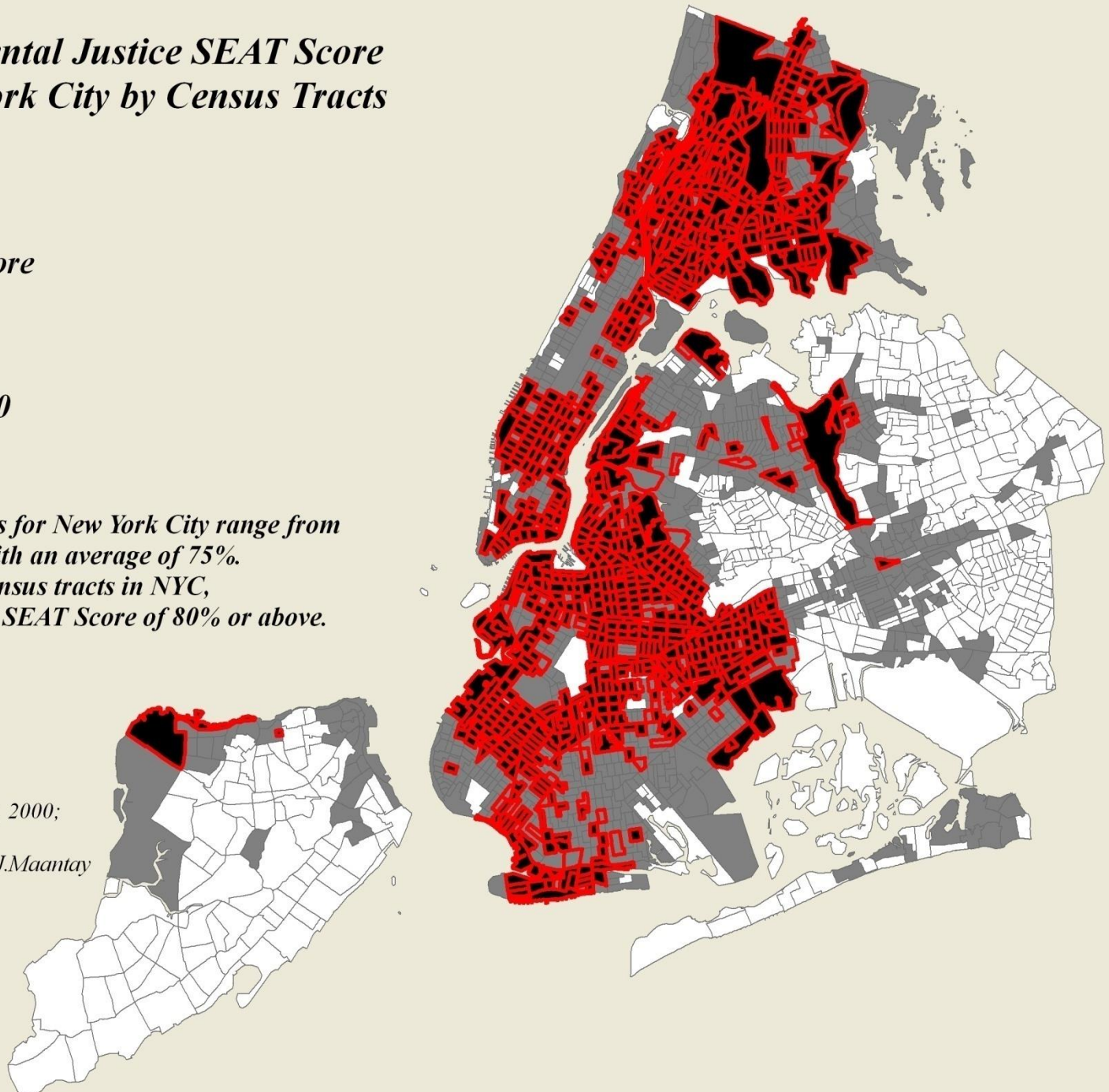
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
Environmental Justice SEAT Score for New York City by Census Tracts


 *Parks and Public Open Space*


EJSEAT Score

 *7 - 30 %*

 *31 - 57 %*

 *58 - 72 %*

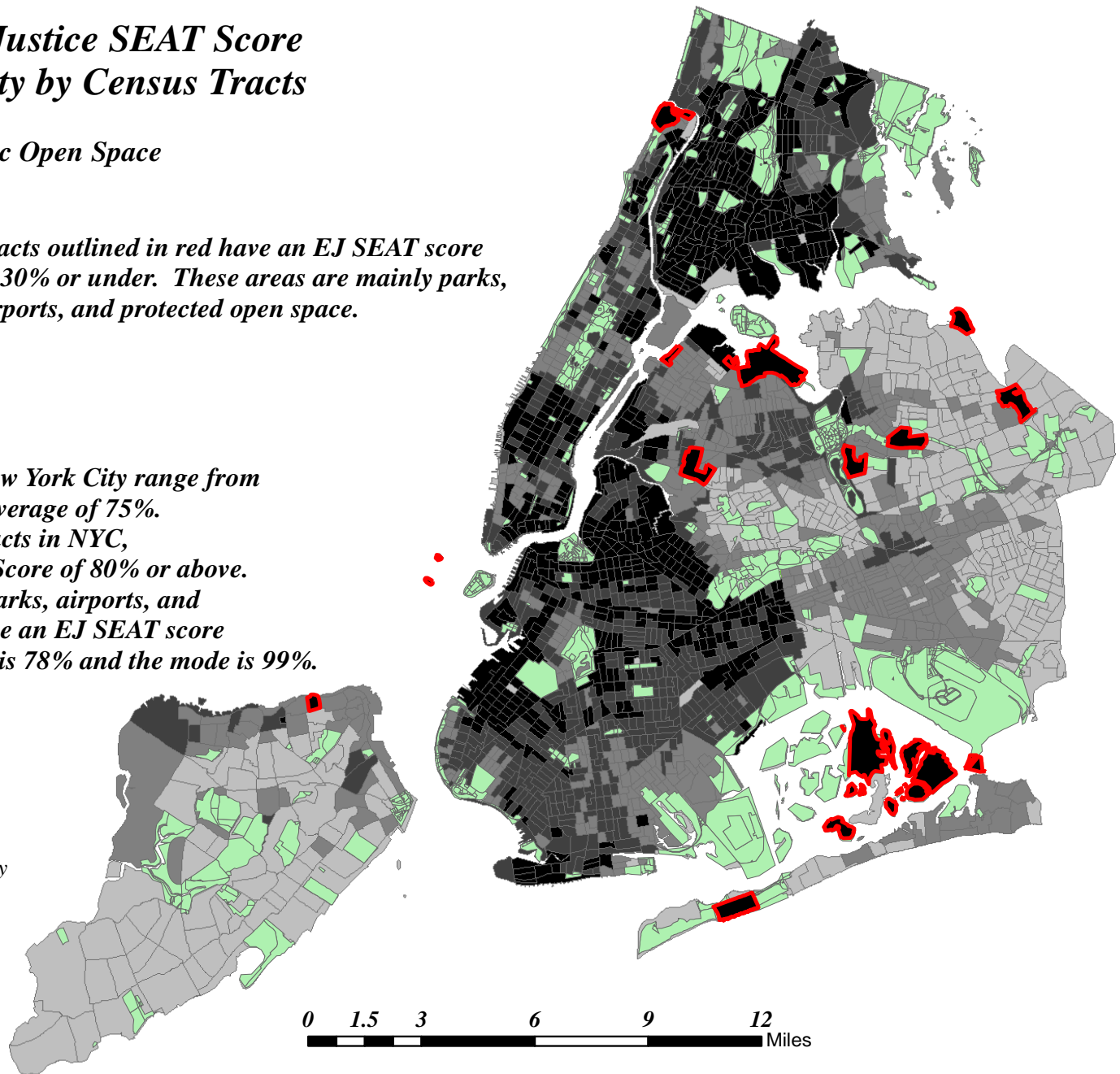
 *73 - 86 %*

 *87 - 100 %*

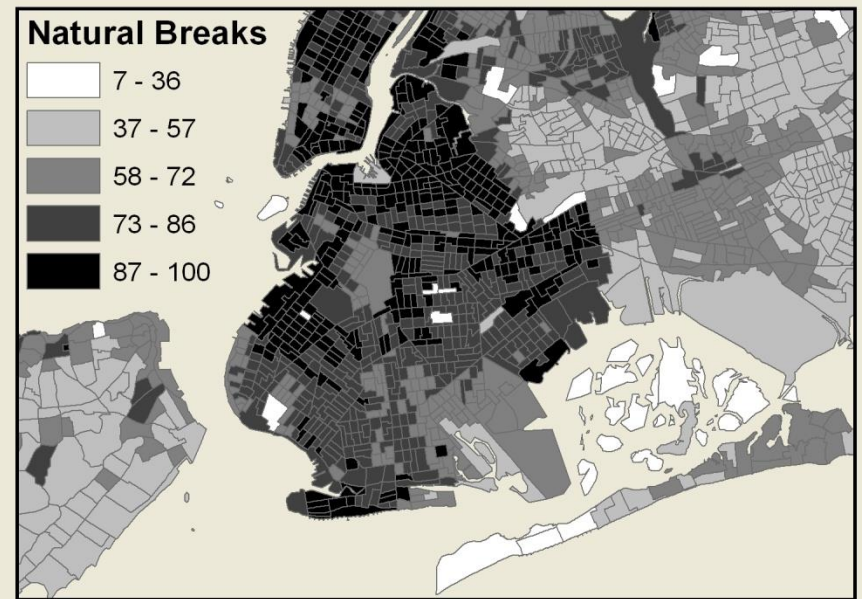
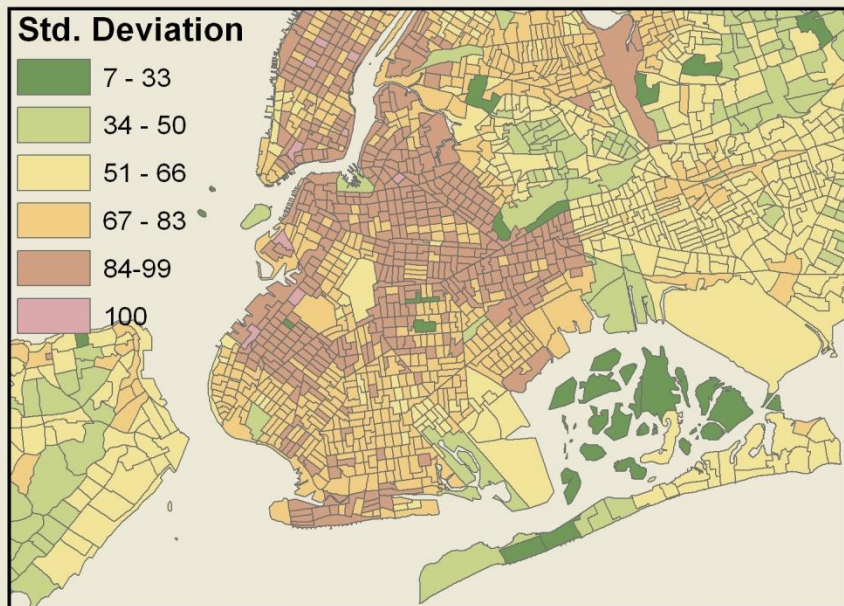
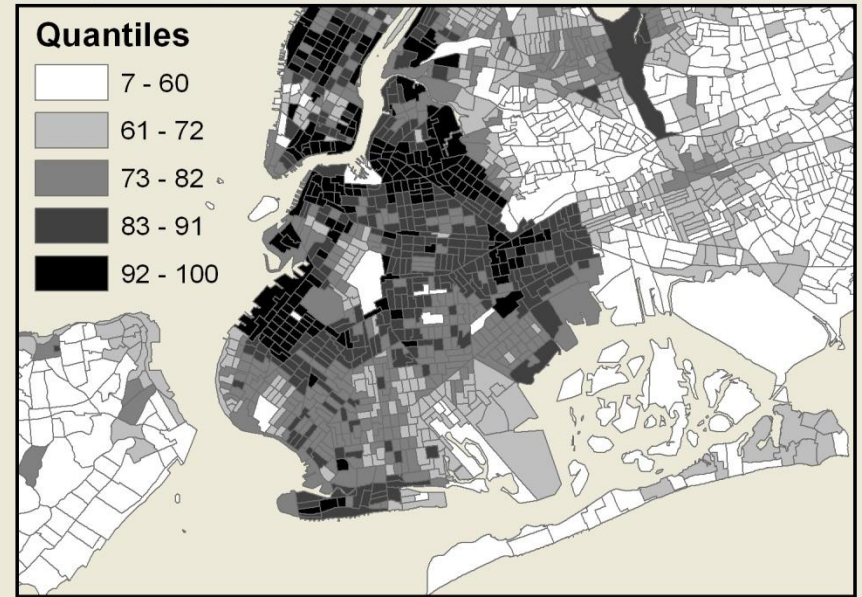
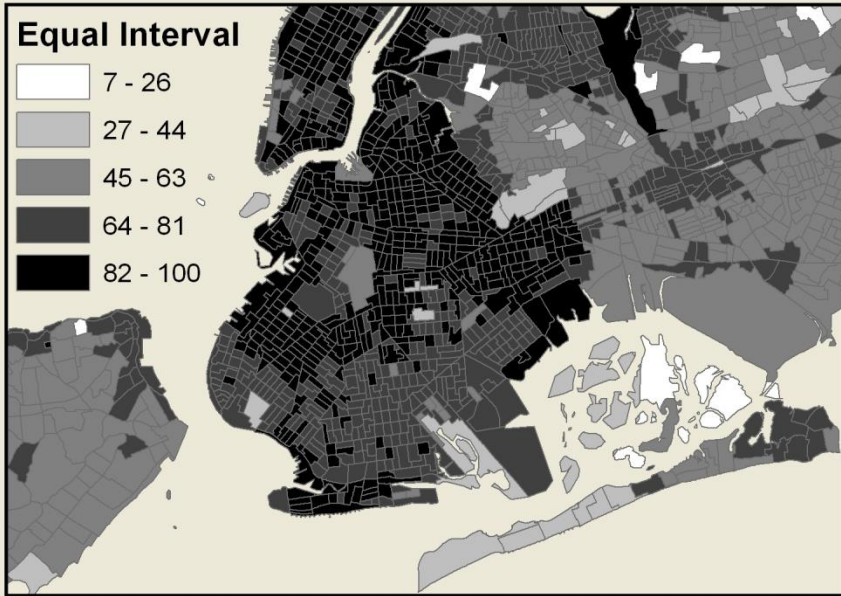
Tracts outlined in red have an EJ SEAT score of 30% or under. These areas are mainly parks, airports, and protected open space.

EJ SEAT Scores for New York City range from 7% to 100 %, with an average of 75%. Of the 2, 217 census tracts in NYC, 964 have an EJ SEAT Score of 80% or above. Eleven tracts (mainly parks, airports, and protected wetlands) have an EJ SEAT score of < 30%. The median is 78% and the mode is 99%.

*Data Sources:
US Census Bureau, 2000;
US EPA, 2008
Map Compiled by J.Maantay
Sept. 18, 2008*



Zooming in to EJ SEAT Scores in Brooklyn, Comparing Classification Methods



Data Sources: US Census Bureau, 2000; US EPA, 2008.

Map Compiled by J.Maantay, Sept. 18, 2008

Possible Concerns with EJ SEAT in hyper-heterogeneous urban areas like New York City:

- **Census tracts are small in area, and it is difficult to avoid “edge effects,” and MAUP (the Modifiable Areal Unit Problem). Adjacent census tracts tend to have similar environmental exposures and burdens, the tract boundary is no barrier for exposures/burdens, yet because of the way EJ SEAT is constructed, adjacent tracts could have very different scores.**
- **Parks in densely developed urban areas like NYC tend to have their own census tracts, obviously containing little actual census population, but nevertheless show up as large areas of usually extremely high or low EJ SEAT scores. This is visually misleading, and will tend to skew statistical analyses.**
- **All tracts in urbanized areas like NYC have relatively high EJ SEAT scores, compared to the rest of the state. Although the range is from 7% - 100%, the lower scores (11 tracts @ <30 %) are outliers and represent mainly uninhabited areas, (airports, parks, wetlands) while almost half of the 2,217 tracts are > 80%. The average is 75%, the median is 78%, the mode is 99% (the most frequent value).**