

ENVIRONMENTAL JUSTICE FOR WHOM?
BROWNFIELD REDEVELOPMENT AND GENTRIFICATION IN THE CITY OF CHICAGO

By

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DEDICATION

This thesis is dedicated to my late grandfather, Angel Becerra Sanchez
and my late uncle, Harold W. Melvin.

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ABBREVIATIONS

BCP	Brownfield Cleanup Program
BRS	Brownfield Redevelopment Site
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CTA	Chicago Transit Authority
GAO	Government Accountability Office
GCS	Geographic Coordinate System
GIS	Geographic Information Systems
EO	Executive Order
EJ	Environmental Justice
EJM	Environmental Justice Movement
EPA	Environmental Protection Agency
EVI	Ecovillage at Ithaca
FIPS	Federal Information Processing Standards
HOLC	Home Owner's Loan Corporation
IEPA	Illinois Environmental Protection Agency
LEED	Leadership in Energy and Environmental Design
LULU	Locally Unwanted Land Uses
NAD	North American Datum
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
NRF	No Further Remediation Letter

PCBs	Polychlorinated Biphenyls
PRP	Potentially Responsible Party
SRP	Site Remediation Program
TIGER	Topologically Integrated Geographic Encoding and Referencing
UCC	United Church of Christ
UN	United Nations
UNCSD	United Nations Conference on Sustainable Development
USEPA	United States Environmental Protection Agency

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ABSTRACT:

Since 1990, the U.S. Environmental Protection Agency's Brownfield Revitalization Program has been used as a mechanism for cleanup and land redevelopment of industrial sites. Historically, low-income people of color live in close proximity to environmental hazards. Dominant narratives on brownfield redevelopment highlight increased property value as a positive economic development outcome for homeowners and reduced urban blight in the neighborhood. However, economically disadvantaged residents living close to redeveloped brownfield sites struggle to afford higher rents as the neighborhoods become more desirable to young professionals and the middle class after redevelopment.

The city of Chicago serves as a good place to study the relationship between brownfield redevelopment and gentrification. This study uses geospatial quantitative techniques as well as qualitative methods to explore this relationship in Chicago. As scholars and activists aim to achieve environmental justice, it is important to address the economic and social implications of brownfield revitalization.

CHAPTER 1: Introduction

Historically, environmental justice scholars have focused on the siting of environmental hazards and their relationship to the location of low income communities and communities of color (Lee, 1987; Bryant & Mohai, 1992; GAO, 1983; Bullard, Mohai, Saha, and Wright, 2007). Although environmental justice research has made tremendous strides in understanding discrimination in the siting of facilities, providing strong evidence for communities to fight against further siting, it has not thoroughly explored the socioeconomic implications of abandoned industrial sites and brownfield redevelopment. Understanding more about brownfield redevelopment is important because urban redevelopment has become synonymous with economic development.

The U.S. Environmental Protection Agency (USEPA) defines brownfields as “real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”¹ As a result, the majority of former and abandoned industrial sites are classified as brownfields. The USEPA Brownfield Revitalization program began in 1992 as an alternative mechanism for cleanup and land development of former industrial sites. Although there are no records indicating the exact number of brownfields and redeveloped sites, as of 2012, there are an estimated 450,000 brownfields in the US. Since its inception, the brownfields program has successfully leveraged more than \$14 billion in brownfields cleanup and redevelopment funding from the private and public sector.

Although the USEPA’s Brownfield Revitalization program can convert locally unwanted land uses (LULUs) into desirable uses such as green space and parks, it also opens the door to outside investors interested in capitalizing on low property values for redevelopment. As a result,

¹ EPA Brownfields Definition. <http://www.epa.gov/brownfields/>

these new developments often include condominiums and retail space that attracts the middle class instead of meeting working class needs. This movement towards commercial space, high rents, and sale of property can change neighborhood character. Communities that experience brownfield redevelopment are becoming more vulnerable to gentrification as their revitalized neighborhoods become more desirable for the middle class, college students, and young professionals who seek a return to the city from the suburbs.

The term “gentrification,” first coined by European sociologist Ruth Glass, was used to describe the transformation of London neighborhoods in the 1960s as an “invasion” by the wealthy,

“One by one, many of the working class quarters of London have invaded the middle classes—upper and lower. Shabby, modest mews and cottages—two rooms up and two down—have been taken over, when their leases have expired, and have become elegant expensive residences. Larger Victorian houses, downgraded in an earlier or recent period—which were used as lodging houses or were otherwise in multiple occupation—have been upgraded once again. Nowadays, many of these houses are being subdivided into costly flats or ‘houselets’ (in terms of the new real estate snob jargon). The current social status and value of such dwellings are frequently in inverse relation to their status, and in any case enormously inflated by comparison with previous levels in their neighborhoods. Once this process of ‘gentrification’ starts in a district it goes on rapidly until all or most of the original working class occupiers are displaced and the social character of the district is changed” (Glass 1964: xviii-xix).

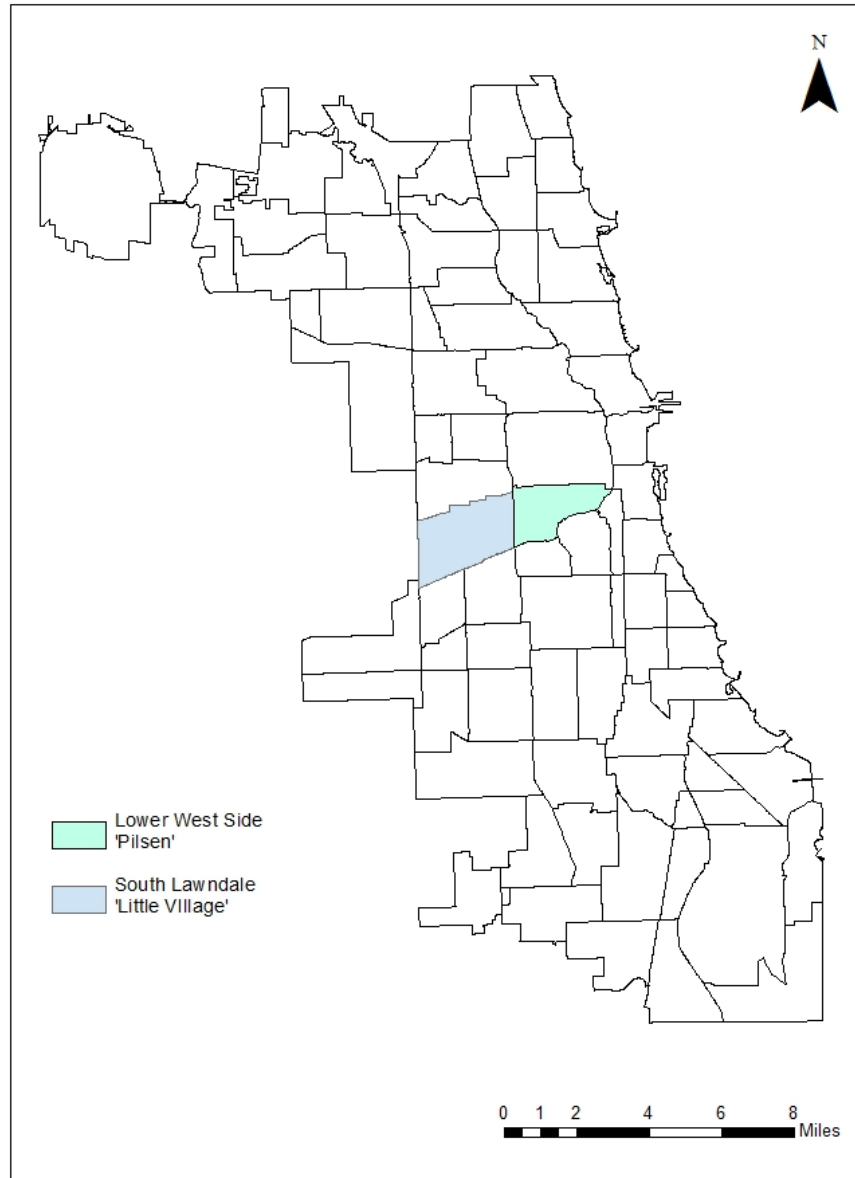
Although Glass coined the term “gentrification” in the 1960s, Neil Smith (1996) reveals that gentrification existed long before then. For example, under Napoleon III, Baron Georges-

Eugene Haussmann's modernization program required the acquisition and demolition of residential areas where the poor resided in Paris's urban core. As a result, the modernization program led to the displacement of the city's poor to make way for Paris' now famous tree-lined boulevards and iconic monuments. Thus, this reveals that the displacement of the poor as a result of city revitalization is not a new issue, but one that persists today.

In contemporary times, urban sociologist Neil Smith explained gentrification as an economic process based on capital investment and urban space, generating a rent-gap. According to Smith, gentrification occurs in areas with a wide gap between current property values and potential value of land. Thus, when the land is redeveloped, it can attract new tenants and change the community's characteristics (Smith, 1987), leading to the displacement of the working class. As communities are victorious in closing environmental hazardous facilities, as is the case in Chicago's Little Village neighborhood, they are faced with unprecedented policy hurdles and challenges in regards to site clean-up and redevelopment.² Gentrification is one of the major challenges in moving forward with the sale and redevelopment of land in Little Village, a predominantly low income and Mexican-American community. The Little Village neighborhood is a prime location in Chicago's southwest side with easy access public transportation to downtown. Little Village is also adjacent to the already gentrified Pilsen neighborhood (see Figure 1). Thus, in an effort to maintain neighborhood character and prevent displacement, community activists find it is imperative for the community to be fully engaged in the decision-making processes that will determine the future use of the sites.

² Closure of Chicago's Crawford and Fisk electric plants ends coal era. Plants were the last coal-fired electric generating plants in a major U.S. city. August 30, 2012. http://articles.chicagotribune.com/2012-08-30/business/chi-closure-of-chicagos-crawford-fisk-electric-plants-ends-coal-era-20120830_1_fisk-and-crawford-midwest-generation-coal-plants

Figure 1: Map of Chicago Community Areas – South Lawndale ‘Little Village’ and Lower West Side ‘Pilsen’



Source: City of Chicago

Environmental justice activists and scholars have begun to shed light on displacement risks of low-income communities and communities of color in neighborhoods that have undergone brownfield redevelopment (Quastel, 2009; Pearsall, 2010). For example, Pearsall (2010) employs vulnerability assessment techniques to compare 36 redeveloped brownfield neighborhoods with 36 existing brownfields in New York City to determine which neighborhoods experienced gentrification during the redevelopment process between 1990 and 2000. The study found that 50% percent of the neighborhoods that had redeveloped sites between 1990 and 2000.

The purpose of this thesis is to contribute to the environmental justice literature on abandoned industrial sites and brownfield redevelopment and contribute to the emerging literature on the impacts of brownfield redevelopment on gentrification. Chicago is an ideal site for a study like this because of its history of industrialization, hypersegregation, urban renewal, and its status as a global city. In this thesis, the theoretical and analytical frameworks of environmental justice, urban sociology, and public policy will facilitate the examination of brownfield redevelopment and gentrification in Chicago. It will use integrated geospatial quantitative and qualitative methods to answer two questions:

- 1) Does brownfield redevelopment increase property values?
- 2) Is brownfield redevelopment associated with racial and socio-economic change in affected neighborhoods? What is the nature of that change?

This thesis is organized as follows: Chapter 1 provides an introduction to the research project and a brief overview of the three interdisciplinary fields that guide this research: environmental justice, urban sociology, and public policy. Chapter 2 presents an overview and analysis of brownfield redevelopment literature, its underpinnings and gaps in the research.

Chapter 3 describes the historical context of Chicago from its industrial beginnings in the late 1800s to its most recent evolving status as a global city, both of which were fueled by the free market economy. Chapter 4 describes the data and quantitative methodological approach of brownfield redevelopment and gentrification geospatial analysis. Chapter 5 presents the results of the geospatial analysis. It also includes a discussion of the results and the way the findings of this study relate to prior studies. Chapter 6 contains a brief summary of the thesis research and recommendations.

In order to better understand the socioeconomic implications of brownfield redevelopment and gentrification, it is important to provide a brief overview of the three fields of study that guide this research: urban sociology, environmental justice and public policy. Urban sociology provides the foundation to understand the social fabric of a city, which consists of demographics on ethnic composition, wealth, education level, and employment. Social fabric and social inequity allow one to understand environmental justice claims, who gets what, how much, and why. Federal agencies, such as the Environmental Protection Agency (EPA), are responsible for implementation of policies created for the protection of human health and the environment, such as the Clean Air Act, Clean Water Act, and Comprehensive Environmental Response Compensation and Liability Act (CERCLA). However, the public policy decision-making process often makes decisions without the consultation and direct engagement of communities. In addition, it excludes those who do not have the power and/or knowledge to access decision-making channels and understand the complexities of environmental law and policy.

1.1 Urban Sociology

Urban sociology is the sociological study of human interaction in metropolitan areas. This field is relevant to this thesis research since the scope is Chicago, an urban city. A historical analysis of a city's social fabric is necessary to understand how and why neighborhoods are segregated, their implications, and why this history is relevant to brownfield redevelopment and gentrification, such as the potential loss of vital social networks. Thus, this section highlights urban sociology literature relevant to the social construction of the city.

Creating the 'Underclass' Through Institutionalized Racism

Massey and Denton elucidate the mechanisms that created the urban "underclass" in the U.S. In their book, *American Apartheid*, Massey and Denton demonstrate how residential racial segregation is a key organizational feature of American society that resulted in the creation of the underclass, causing poverty concentration in predominantly-Black neighborhoods in cities across the U.S. This was done through institutionalized racism in the housing market. 'Redlining' was one of the most common forms of institutionalized racism, the practice of denying, or charging more for home loans in racially determined areas, thus placing a negative stigma on neighborhoods literally delineated in red as exhibited in Figure 2 and Figure 3. Redlining stems from a rating system developed by The Home Owner's Loan Corporation (HOLC) in the 1930s, which was used to assess risk associated with loans given in specific urban neighborhoods. The rating system consisted of four categories of neighborhood quality. HOLC prioritized the allocation of loans to the top two categories, which were the most desirable and inhabited areas by the elite and businessmen. The lowest category was coded with the color red and rarely received loans. The redlined areas coincided with Black neighborhoods and other ethnic enclaves

(Massey and Denton, 1993 pp. 50-54; Jackson, 1987, pp.197). Thus, redlining practices contributed to the concentration of poverty as Blacks had limited housing choices in Chicago.

Figure 2: Redlining in Chicago’s Northside

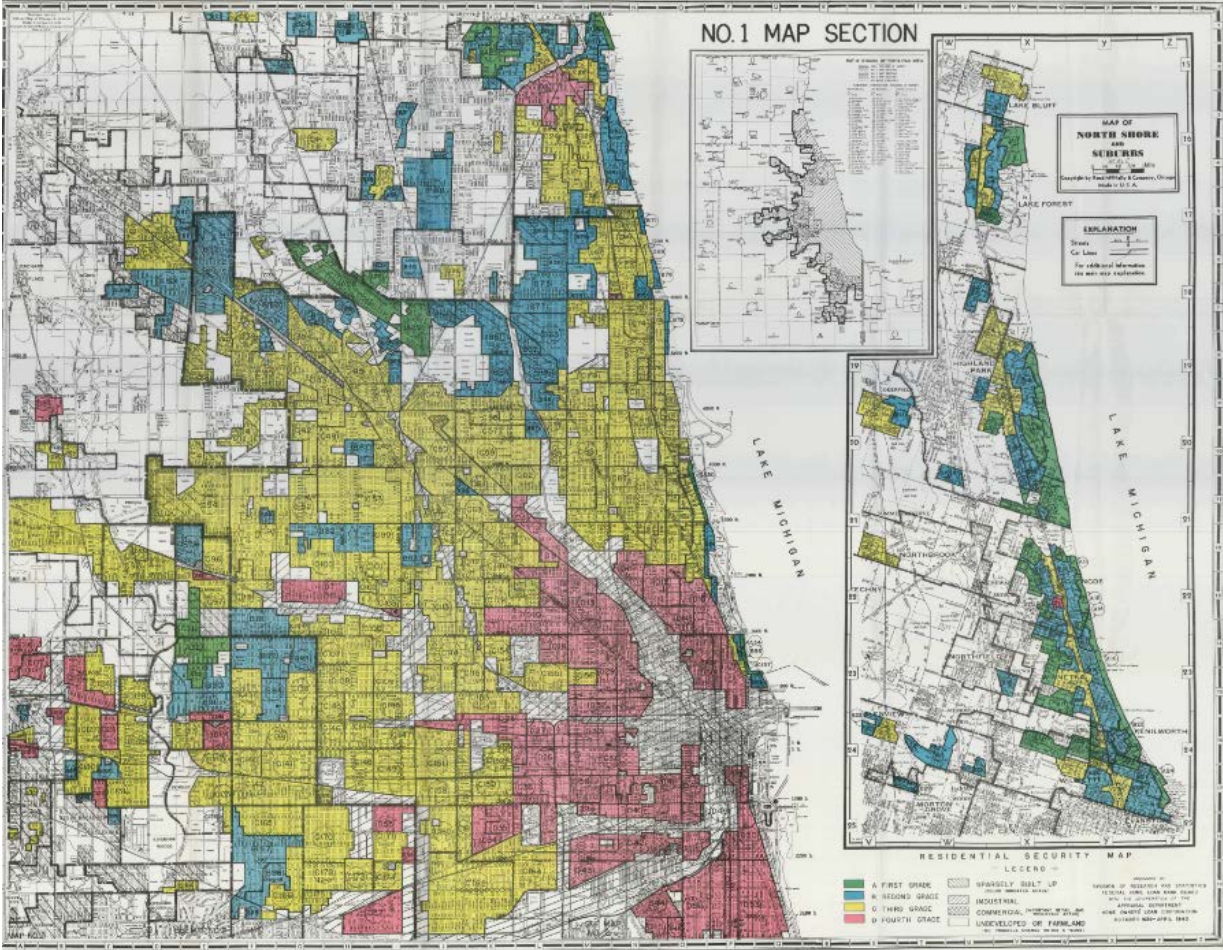


Photo Courtesy of LaDale Winling
<http://www.urbanoasis.org>

Figure 3: Redlining in Chicago's Southside

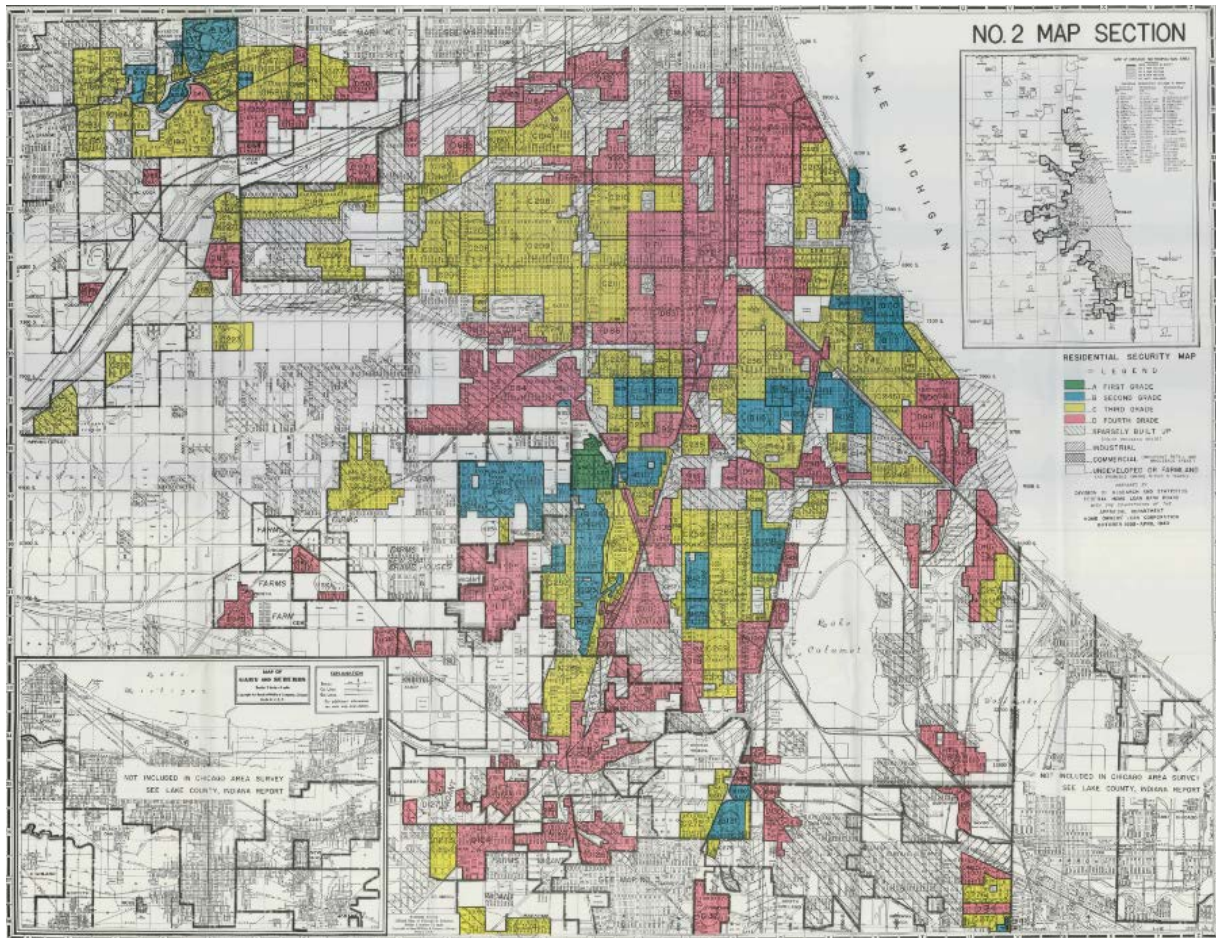


Photo Courtesy of LaDale Winling
<http://www.urbanosis.org>

The concentration of poverty was further exacerbated by the divestment from the inner city as capital followed White flight to the suburbs after World War II. As a result, homes in the inner city became dilapidated and abandoned, having a profound negative effect on educational resources, employment, loss of commercial facilities, and leaving the ‘underclass’ dependent on welfare. Thus, this creates barriers to spatial and social mobility, which determines well-being: quality of schooling, value of housing, exposure to crime, quality of public services, and environment. These effects are more pronounced in cities with hypersegregation, such as Chicago. Hypersegregation is a spatial demography of racial groups based on at least four out of five dimensions: uneven distribution, racial isolation, tight clustering, concentration in a small area, and spatially centralized around the urban core or spread on the periphery (Wilson, 1987; Massey and Denton, 1993)

Restrictive covenants became important factors in segregation and residential patterns, limiting the housing choices of low-income communities and communities of color. Restrictive Covenants are clauses inserted in contractual agreements among property owners, which outline what property owners can do with their land and buildings (Massey and Denton, 1993 pp. 36, Taylor, 2009, pp. 398). In some cases, restrictive covenants stated that property owners could not permit a person of color to own, occupy, or lease their property. Failure to abide by the restrictive covenants resulted in going to court to enforce the restrictive covenant and seek damage. Restrictive covenants were widely used in Chicago to define and maintain the racial characteristics of neighborhoods.

Although racial segregation has impacted Chicago’s social fabric, scholars such as William Julius Wilson, argue that class has become more significant than race. In his most famous work, *The Declining Significance of Race*, Wilson (1987) argues that systems of

production and governmental policies have historically impacted Black and White access to resources and privileges, but also prejudice and hostility. However, the change from preindustrial to industrial systems of production provided Blacks with the ability to increase their economic and political resources (Wilson, 1987). Thus, in contemporary society, socio-economic status within the Black community has become the prime indicator for social mobility instead of solely race.

Zoning Laws

Juliana Maantay (2002) explores the relationship between land use laws and environmental equity as well as their implications for public health. Maantay focuses on how zoning has changed in New York City from 1961-1998. The author claims that current zoning has the tendency to “create conditions for environmental injustice to occur” (Maantay 2002). Maantay explores the spatial changes of M zones, which are manufacturing zones in New York City, through GIS analysis. Her findings reveal that people living in or adjacent to the majority of M zones were more likely to be a member of a minority group and likely poor. The Bronx, which is the most impoverished borough, has the highest percentage of minority population at 87.4% within M zones, 37.9% in Manhattan, and 33.1 percent in Staten Island. Maantay notes that Manhattan has experienced more decreases in M zones compared to the Bronx. Thus, zoning changes create the effect to concentrate noxious facilities in low-income communities of color. Low-income communities and communities of color are most vulnerable to environmentally hazardous facility siting due to their perceived limited or lack of political power (see Bullard, 1983; GAO 1983; UCC 1987; Bullard, 1990; Mohai and Bryant, 1992; Hines, 2001; Pastor, Sadd, and Hipp, 2001; Saha and Mohai 2005; Stretesky and Schelley 2009).

Maantay's study also provides historical evidence of race-and-class-based segregation created through policies. For example, New York City's 1916 zoning resolution kept immigrant workers out of sight of wealthy women who shopped on Fifth Avenue, which was achieved by creating an exclusive zone to protect the interests of the wealthy and affluent (Maantay, 2002; Taylor, 2009). Additionally, Maantay reveals the zoning changes that occurred in urban cities after White-flight and landlord abandonment, which resulted in re-zoned areas as manufacturing land uses.

Yale Rabin (1990) coined the term 'expulsive zoning' to explain re-zoning practices, such as the one observed by Maantay (2002). Rabin (1990) demonstrates that many residential neighborhoods composed of people of color have been re-zoned as 'industrial' by White planners. Although these decisions are not made with reference to race, their impact, given racial segregation, has profound racial implications. Because it appears that the rezoned areas were mainly Black, and because Whites who may have been similarly displaced were not subject to racially determined limitations in seeking alternative housing, the adverse impacts of expulsive zoning on Blacks were far more severe and included, in addition to accelerated blight, increases in over-crowding and racial segregation. These types of zoning decisions allowed heavy industry to locate in African American residential neighborhoods and also led banks to stop lending money for home improvement and maintenance because of improper zoning.

Neoliberalism and the Global City

Saskia Sassen (2001) defines the global city as a post-industrial production site, an important node in the global economy with key economic, political, cultural, and infrastructural characteristics. During the 1980s-1990s, gentrification became a politically supported tactic to

maintain New York's status as a global city and transform the urban social landscape into a 'mosaic.' In other words, gentrifying segregated communities, such as Harlem, became a pretext to diversify neighborhoods for social and economic vitality. Furthermore, the 1980s were guided by the neoliberal economic principles developed by Margaret Thatcher and Ronald Reagan in an effort to make the economies of the U.S. and United Kingdom to become more competitive with Japan and other industrializing nations (Heynen, McCarthy, Prudham, and Robbins, 2007). Thus, gentrification became an essential tool to bring in middle class professionals in finance, business, and education sectors to revitalize the urban center, which is most extensively documented for New York City (Smith, 1996; Harvey, 2005).

Similarly, Chicago's urban transformation has attracted the affluent and middle classes closer to the city center. Chicago's Lincoln Park neighborhood experienced socioeconomic shifts in the 1970s when the formerly Puerto Rican neighborhood became gentrified by affluent Whites with the desire to live close to the lakefront and the downtown area. This affluent White gentrification had spill-over effects in nearby Lakeview, Ukrainian Village, Wicker Park and most recently, Humboldt Park (Betancur 1996; Betancur 2010). As a result, this led to one large area occupied by affluent White gentrifiers. Other notable areas of gentrification include Chicago's Little Village and Pilsen neighborhoods in the Southwest Side as well as Bronzeville on the Southeast Side. Little Village/Pilsen is predominantly Hispanic, while Bronzeville is a predominantly middle class Black neighborhood. These communities of color are experiencing gentrification by the affluent and upwardly mobile, including members of their own race and ethnicity (Anderson and Sternberg, 2012).

Since Chicago is also a global city, it is important to take into consideration the underlying motivations and mechanisms that drive public policy and urban planning to transform

the city. Thus, the creation of the “underclass,” institutionalized racism, zoning laws and ordinances, neoliberalism and the global city will guide the analysis of Chicago’s brownfield redevelopment sites (BRSs) and gentrification.

1.2 Environmental Justice

Environmental justice, a social movement and an academic field of inquiry, emerged on the national scene in the 1980s. However, people of color have dealt with environmental injustice issues since colonization. This occurred through the appropriation of indigenous lands by White settlers and elites. During the 1800s, Black slaves dealt with horrible housing on plantations and organized for better living conditions. In the 1960s, Filipino, Mexican, and Chicano farmworkers struck and organized grape boycotts to get better wages and to eliminate pesticide use and exposure in the fields (Taylor, 2000 p. 6-8). The environmental justice movement (EJM) works towards ending environmental racism or environmental discrimination. Taylor (2000) defines environmental racism and environmental discrimination as a process by which environmental decisions, actions, and policies lead to racial discrimination. This occurs through the interaction of three factors: 1) prejudicial belief and behavior; 2) having the personal and institution power to develop and implement policies and actions that reflect one’s prejudices, and 3) privilege; having unfair social advantages over others and the ability to prioritize one group over another.

A defining moment in the environmental justice movement occurred during the 1982 Warren County protests. The protests arose in response to the dumping of Polychlorinated Biphenyls (PCBs) in Warren County, North Carolina. The Warren County protests led to the commissioning of studies to examine the extent of environmental racism. In 1983, U.S.

Government Accountability Office (GAO) studied the relationship between the location of hazardous waste landfill and the racial and socio-economic status of communities within four miles from the sites. This report focused on EPA Region IV, which is comprised of eight southeastern states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.³ The GAO (1983) report found four offsite hazardous waste landfills within Region IV, where Blacks accounted as the majority in three out of the four communities within four miles of the sites. In addition, 26% of the population within the four communities was below the poverty level and the majority of this population is Black (GAO, 1983). Similarly, Bullard's (1983) study on solid waste sites in Houston, Texas, revealed that solid waste sites were more likely to be found in predominantly Black neighborhoods and in close proximity to Black schools. Bullard noted institutionalized racism in the housing market, ambiguity and lack of zoning laws, and decision-making processes led Houston Black neighborhoods to bear the brunt of becoming a dumping ground for solid waste.

GAO (1983) and Bullard's (1983) results were further supported by the United Church of Christ Commission for Racial Justice's *Toxic Wastes and Race in the United States* (1987) report, which examined the racial and socio-economic composition of communities near toxic waste sites across the U.S. The UCC (1987) found that race is the most important factor in determining where toxic waste facilities are sited, with Black and Hispanics bearing disproportionate environmental burdens. Furthermore, Mohai and Bryant's (1992) *Race and Incidence of Environmental Hazards* featured 14 papers, the majority of them written by scholars of color, who shed light on the disproportionate exposure prevalent in minority communities in the U.S. These landmark studies created the basis for environmental justice research and helped mobilize minority communities.

³ EPA Region 4 <http://www2.epa.gov/aboutepa/about-epa-region-4-southeast>

Twenty years later, environmental injustice is even more prevalent as revealed by *Toxic Wastes and Race at Twenty*, a national study of 413 environmental hazardous facilities and the demographic composition at or near the facility at the time of siting (Bullard, Mohai, Saha, Wright, 2007). The higher reported concentration of people of color around hazardous waste sites in the 2007 report compared to the 1987 study is a result of improved methodologies in GIS. The findings show that communities within 3 kilometers (1.8) miles of hazardous waste facilities are 56% people of color compared to 30% people of color in communities with no hazardous facilities. In addition, 18% of the population in host neighborhoods lives below the poverty rate compared to 12.2% of the population in non-host areas. Thus, these findings reveal that despite federal government attempt to address environmental justice via Executive Order (E.O.) 12898 and federal offices such as the USEPA's Office of Environmental Justice, environmental racism has not declined, it has increased.

According to the EPA, environmental injustice is defined as, “The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.”⁴ Thus, there is a difference between the government's definition on environmental justice compared to the one established by the environmental justice community. The main difference is that the government addresses only equal environmental protection in its environmental justice definition. In contrast, the EJMs

⁴ EPA Environmental Justice Definition
<http://www.epa.gov/environmentaljustice/>

definition of environmental justice not only encompasses ethnicity and income, but also culture and religion, and its objective is to eliminate environmental hazardous exposure for all.

One of the core areas of environmental justice research is the question of “who gets what, why, and how much?” in regards to the siting of industrial facilities (Pastor et. al, 2001; Morello-Frosch et al 2002; Maantay 2000). This is often explored through geospatial analysis of environmental hazardous facility distribution and demographics of communities in close proximity to these hazards (UCC, 1987, Bullard et. al, 2007). Although these national scale geospatial analyses have elevated the environmental justice discussion at the federal level, study of environmental justice disparities at the city and local level lend themselves to more in-depth understandings of the political, social, and economic underpinnings of environmental injustices via the integration of quantitative and qualitative empirical research.

As one examines communities that experience environmental injustice, the social and ethical questions lead one to ask: How can this injustice be remedied? How can we establish equity? But, what is equity? Bullard (2001) breaks down equity into three categories: 1) procedural equity, 2) geographic equity and 3) social equity. Procedural equity is the question of “fairness,” the extent that governing rules, regulations, evaluation criteria, and enforcement are applied equally upon communities in a nondiscriminatory way. Geographic equity refers to location and spatial configuration of communities and their proximity to environmental hazards. Social equity assesses the role of sociological factors on environmental decision-making (Bullard, 1994).

Taylor (2000) and Keuhn (2000) expand upon Bullard’s equity definitions to focus more broadly on the different aspects of justice that environmental justice encompasses. Taylor (2000) highlights the change in rhetoric from ‘environmental equity’ to ‘environmental justice,’ which

emerged out of the 1991 First National People of Color Environmental Leadership summit. The rhetorical shift occurred as activists felt the term ‘justice’ was more inclusive and on par with the movement’s concerns: a) distributive justice and b) corrective/communicative justice, the way in which individuals are treated during a social transaction (Taylor, 2000, pp. 537). Keuhn (2000) elaborates on Bullard’s environmental equity definitions and proposes four categories of environmental justice issues: 1) distributive justice, the equal protection from environmental risks (not the redistribution of pollution or risk, but cessation of environmental hazards); 2) procedural justice, the right to treatment as an equal; 3) corrective justice, the fairness in punishment for breaking the law and addressing damages brought upon individuals or communities; and 4) social justice.

The taxonomy of environmental justice is relevant to the study of brownfield redevelopment and gentrification as brownfield redevelopment aims to improve the environment and promote economic development, while at the same time exercising the Environmental Justice Executive Order 12898. These taxonomies guide the assessment of Chicago’s Brownfield Redevelopment Projects, particularly distributive justice as it relates to the redevelopment of brownfields benefiting everyone. Specifically, I am interested in finding out whether brownfield redevelopment benefits existing residents, not just those who can afford to pay for environmental amenities and upgrades.

1.3 Public policy

Kraft and Furlong (2007) define public policy as a course of governmental action or inaction in response to public problems. Public problems refer to the issues the public perceives as unacceptable, thus requiring governmental intervention via regulation, standards, or

prohibition. Thus, the identification of a problem sets the public policy agenda. The problem then guides the policy formulation process, which is guided by creating a solution that reflects effectiveness, efficiency, and equity.

Effectiveness is the likelihood of a current or proposed policy will achieve its goals. Efficiency refers to what a policy or proposal costs in relation to its expected benefits to society. Equity examines how a program's costs and benefits are distributed among citizens (Kraft and Furlong, 2007 pp.27-29). Policy adoption occurs when policy makers formally agree on a policy solution, which leads to its implementation by the corresponding governmental agencies. In theory, policy evaluation occurs subsequently after policy implementation to analyze the extent to which a policy is meeting its goals. The evaluation process then recommends revisions in the formulation of policy or its implementation if it is not reaching the goal. However, policy evaluation is often lacking due to limited human resources and funding. In this section, I introduce three relevant policies and guiding policy instruments for environmental justice and brownfield redevelopment.

Executive Order 12898

As a result of the EJM bringing together communities of color who experience environmental injustices and scholars who elevated the discussion to the national level. On February 11, 1994, President Clinton signed Executive Order (E.O.) 12989: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This executive order requires all federal agencies to: 1) Make achieving environmental justice part of their mission; 2) Foster non-discrimination in federal programs that impact human health or the environment; and 3) Give minorities and low-income communities greater opportunities for

public participation in, and access to public information on, matters relating to human health and environment (Clinton, 1994).

E.O. 12898 is relevant to this research since it is the only explicit federal document on environmental justice. However, during President George W. Bush's administration, the executive order was for the most part ignored, and thus not implemented. It was not until 2009, when President Obama appointed Lisa Jackson as Administrator of the EPA that environmental justice reemerged in the executive branch via the implementation of the Interagency Working group on Environmental Justice.⁵ Although the environmental justice conversation and practice of implementation is occurring at the federal level, it is unclear whether it is reflected in its regional offices.

Brownfields

From Superfund to Brownfields

Although brownfields result from abandoned industrial sites and site contamination, the main source of the problem stems from CERCLA of 1980 also known as Superfund policy. CERCLA was created as a result of community residents' discovery of contamination in Love Canal, NY (Salzman and Thompson, 2010). The community, which was low-income and predominantly White, observed unusual cases of illnesses and birth defects in children, which led them to investigate the environmental quality of their community. Love Canal was a former abandoned industrial site where toxic waste was dumped in the 1940s. In the late 1950s the area was redeveloped into the Love Canal community. After resident's discovery of contamination in Love Canal, they successfully organized and collaborated with public officials to create

⁵ Environmental Justice Interagency Working Group Reconvened on September 22, 2010
<http://blogs.justice.gov/main/archives/980>

CERCLA, which helped relocate homeowners. However, relocation was inequitable as the majority of homeowners were White, leaving Black renters behind in the process.

The purpose of CERCLA is to establish prohibitions and requirements on closed and abandoned hazardous waste sites, provide liability of responsible parties for the release of hazardous waste, and establish a trust fund to provide cleanups when no responsible party is identified. When potentially responsible parties (PRPs) are identified, USEPA either decides to negotiate with the PRP in regards to clean up methods and costs or USEPA uses prosecution as a means to fund the clean-up with federal funds and then charge the identified PRPs (Church, 2003). However, it is difficult to clean up a contaminated site when a PRP is unidentifiable due to multiple parties that could be responsible for the cleanup, inability to find the PRP, or PRPs going out of business. Thus, these abandoned former industrial sites with unidentifiable PRPs turns into a brownfield. Prior to the creation of brownfield revitalization programs, developers did not want to buy brownfields and develop them due to CERCLA's liability. Under CERCLA, owners of contaminated land, regardless of whether they contaminated the land, are just as liable as those who caused contamination. Due to the liability issue, developers were not interested in buying brownfields because they feared they could be prosecuted.

In an attempt to mitigate the unforeseen consequences of CERCLA and brownfields, the USEPA launched Brownfield Revitalization and Redevelopment program in 1992, which sells brownfields land to developers at a low cost and provides supplemental funds for the cleanup of the site. Thus, developers had an incentive to revitalize and redevelop a brownfield because it is significantly cheaper. According to Salzman and Thompson (2010), brownfields create environmental injustice rather than bring justice to communities. Most communities with

brownfields are in economically depressed urban neighborhoods where former industrial activity occurred.

Although brownfield's revitalization incentivizes developers, it can further create environmental injustice if the brownfield is not completely cleaned up. Brownfields have different types and levels of contamination. Often times, developers do not fully cleanup the site and remediate the soil only up to USEPA's thresholds. Additionally, community participation may or may not be included in the planning face for redevelopment. Community participation is important to examine in order to find out the demands residents had for brownfield redevelopment and whether or not the community's voices were taken into consideration. Additionally, the type of redevelopment and the audience it will cater to is important. If luxury condominiums or high end commercial business is built on brownfields, then these developments may not cater to the needs of the community, thus attracting a higher socioeconomic group into the neighborhood.

Brownfields Revitalization Act 2002

The Small Business Liability Relief and Brownfields Revitalization Act, signed into law by President George W. Bush on January 11, 2002, amends CERCLA by providing up to \$200 million per year for brownfield assessment and cleanup. The act authorizes up to \$200,000 for sites eligible for inventory, assessment, and cleanup. This allows the USEPA to provide grants to communities to assess brownfields for contamination, cleanup of site, establish funds for others to clean the site, job training for local residents, fund state brownfield programs, and provide technical assistance. Further, the Small Business Liability Relief and Brownfields Revitalization Act of 2002 offers liability protection to contiguous property owners, bona fide prospective purchasers, innocent landowners, and brownfield grant recipients. As a result, more than 14,000

properties have been assessed nationally, 1,000 cleaned up, and more than 54,000 jobs have been created for cleanup, construction, and redevelopment of sites (Davis, 2012). However, there are no statistics available on how many brownfields have been redeveloped to date since the USEPA has not tracked all of the sites for follow-up and evaluation.

Since environmental hazards and brownfields are located in disadvantaged communities, which are likely to have high percentage of renters, then how will the economic development and increased property value outcome benefit the low-income communities and communities of color in Chicago, This is important because such communities are vulnerable to displacement.

Through the application of geospatial analysis, this thesis presents an alternative narrative to the dominant economic development rhetoric of brownfields literature.

CHAPTER 2

BROWNFIELD REDVELOPMENT AND GENTRIFICATION LITERATURE

Introduction

Economic development is the predominant theme in brownfield redevelopment literature (DeSousa et. al, 2009; Leigh and Coffin, 2010; Linn, 2012; Jones and Sun, 2012; Conference of Mayors, 2010). As a result, economic development has become the main justification to forge ahead with brownfield redevelopment and revitalization in inner cities with an industrial history (Conference of Mayors, 2010). In essence, brownfield redevelopment intersects with environmental sustainability and economic development. Thus, brownfield redevelopment is justified under a sustainability framework to revitalize the inner-city environment and economy, but fails to highlight its impacts on society and equity. This chapter explores the sustainability justifications for brownfield redevelopment, the economic development driven literature on the subject matter, and the emerging grassroots-oriented alternative narrative in order to provide a full perspective.

2.1 Sustainable Re/development

Brownfield redevelopment as a mechanism for inner-city revitalization gained momentum in the early 1990s. At the 1993 U.S. Conference of Mayors in New York City, former Chicago Mayor Richard M. Daley brought Brownfield redevelopment to the forefront of policy discussion as he led a group of Mayors to meet with then USEPA administrator Carol Browner to discuss the issue of brownfields (U.S. Conference of Mayors, 2010). In the era of post-industrialization, inner cities experienced White flight and divestment as services were prioritized in the suburbs, which were predominantly White middle class. The inner city

deteriorated as services, such as the maintenance of public housing declined. In addition, vacant and abandoned industrial sites added to neighborhood decline, as these sites were associated with urban blight, crime, prostitution, and drugs. In an effort to revitalize the nation's cities, the USEPA awarded grants for brownfield redevelopment projects. Chicago was one of the first cities to receive these grants (U.S. Conference of Mayors, 2010).

Elected officials and policymakers nationwide began to view brownfield redevelopment as a way to eliminate urban blight. The redevelopment of these vacant and abandoned industrial spaces was supported by the emerging sustainability rhetoric. A year before the 1993 US Conference of Mayors, environment and development sustainability issues were brought to the forefront at the United Nations Earth Summit '92 in Rio de Janeiro. Although much of the discussion focused on environmental and economic challenges in the developing world, the Earth Summit '92 and its sustainability goals influenced how the U.S. would address sustainability and incorporate it into its political and policy agenda.

The end result of Earth Summit '92, is Agenda 21, a non-binding and voluntary implementation action plan for government and non-profit organizations (NGOs) to achieve sustainable development in the 21st century at the local, national, and global level (United Nations, 1992). Hence, this document spearheaded sustainability initiatives worldwide.

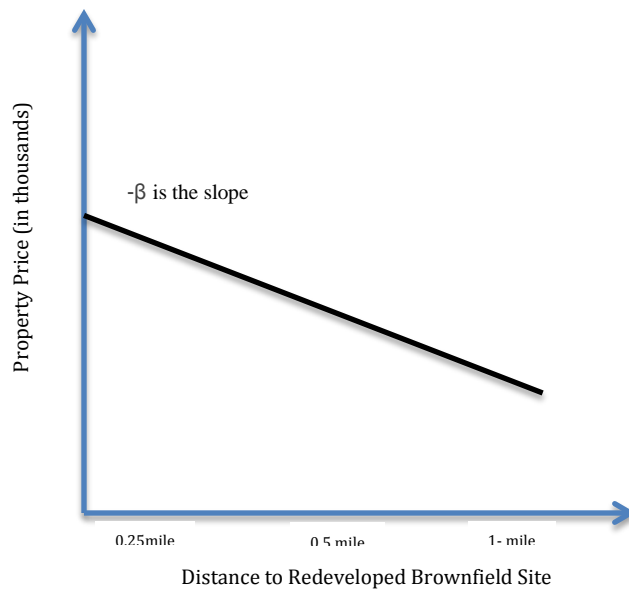
2.2 Economic Development as a Dominant Theme

The majority of the brownfield redevelopment literature is driven by economic theory and economic development themes (DeSousa et. al., 2009; Leigh and Coffin, 2010; Linn, 2012; Sun and Jones, 2012; Conference of Mayors, 2010). This branch of literature tends to focus on the environmental amenities created as a result of brownfield cleanup as well as brownfield

redevelopment. Economists, government and NGO economists have studied the relationship between environmental disamenities/amenities and property values using the hedonic pricing models. Other scholars have conducted change analysis using geographical information systems to study how environmental disamenities/amenities impact property values.

The Hedonic pricing model is the predominant method employed in brownfields redevelopment studies and is widely used among economists in this field (DeSousa et. al., 2009; Leigh and Coffin, 2012; Linn, 2012). The premise of the hedonic pricing method is that the characteristics and services of a good are reflected in its marketed price. In other words, it assesses the attributes that affect the price of a residential home and its associated property. In theory, when β yields a negative slope ($B < 0$), the price of a house increases as the distance to a redeveloped brownfield, an environmental amenity, decreases. This method is widely applied to study the variation in housing prices that reflect the value of environmental amenities and/or disamenities, such as water quality, air quality, noise pollution, green space/parks, superfund sites, and brownfields. Data on housing values and environmental amenities/disamenities is collected for regression analysis, which allows evaluation of the marginal willingness to pay.

Figure 4: The Hedonic Price Model



Source: Berck and Hefland. (2010). *The Economics of the Environment*.

One of the most widely cited studies in brownfield redevelopment literature is DeSousa, Wu, and Westphal's (2009) assessment of the effects of publicly-assisted brownfield redevelopment on surrounding property values. In this study, DeSousa et. al. measured and compared the impacts of publicly-assisted brownfield redevelopment projects for green space, industrial, commercial, and residential use on nearby residential property values and real estate conditions in Milwaukee, Wisconsin and Minneapolis, Minnesota. Using qualitative and quantitative methods, DeSousa et. al. applied the hedonic price method to quantify nearby property value effects before and after redevelopment between 1996 and 2004. DeSousa et. al. also interviewed public, private, and nonprofit sector stakeholders to understand the perceived impacts of brownfield redevelopment unrealistic conditions.

DeSousa et. al.'s hedonic price model analysis for Milwaukee revealed a significant negative influence on the value of properties in close proximity to underdeveloped brownfields.

After brownfield redevelopment, there was no significant effect on nearby property values. However, the opposite was true for Minneapolis where undeveloped brownfields had no positive significant impact on nearby property values before development, but in post-redevelopment there was a significant impact on property values. The interviews revealed 61% of interview respondents believed the impact of undeveloped brownfields on residential property are negative due to urban blight, soil contamination, and a poor quality of life in the community (DeSousa et. al., 2009). When asked if there were any problems associated with brownfield redevelopments increasing value of surrounding properties, 44% of interview respondents mentioned issues related to gentrification and the rising cost of rent (DeSousa et. al., 2009). However, the authors do not examine gentrification in greater depth other than this brief mention in the results. Furthermore, it is difficult to conduct a comparative analysis for two cities with different global economy scales and status in the global network economy.

Similarly, Leigh and Coffin (2010) and Linn (2012) use the hedonic price models to study the relationship between environmental amenities/disamenities and property values. Specifically, Leigh and Coffin sought out to answer whether labeling a site as a brownfield stigmatized and devalued surrounding non-brownfield properties in Atlanta, Georgia and Cleveland, Ohio. No specific reasons were given for selecting these two sites for comparative study other than the authors' familiarity with these cities. The results of the study revealed that the brownfield label has a negative impact on nearby non-brownfield property.

Linn (2012) is one of the few scholars to use the hedonic price model to explore the relationship between brownfields and property values in one state, in this case, Illinois. This study focuses on the Site Remediation Program (SRP) and evaluates the effect of brownfield certification on nearby property values. The Illinois SRP program administered by the Illinois

Environmental Protection Agency (IEPA) began in 1989 as a voluntary program. The program incentivizes property owners to assess their land for contaminants and provide access to funding for remediation if contamination results deem it necessary. If the testing results reveal no contamination or if the property remediates the land successfully, then the IEPA certifies the property owner with a No Further Remediation (NRF) letter, which declares the site clean and releases the owner from liability under CERCLA. Within Cook County, which includes the city of Chicago, there are 2,254 registered SRP sites totaling 11,126 acres.⁶ Linn's study found that brownfield NRF certified sites 0.25 miles away raised property values by one percent. In aggregate, brownfield NRF certification increased nearby property values by two percent.

Similar to the hedonic price studies conducted by DeSousa et. al. (2009) and Linn (2012), Greenstone and Gallagher (2008) applied the hedonic price model to study the local welfare impacts of Superfund-sponsored clean-ups across the nation. The study specifically studied the first 400 hazardous waste sites chosen for Superfund clean-up as well as the 290 sites that missed hazardous ranking score cut-off to make the list. The study compares the housing markets near a 1 mile and 3 mile radius of the superfund site between 1980 and 2000. The study finds small, but statistically insignificant changes in residential property value, rental rates, housing supply, and total population living near the sites (Greenstone and Gallagher, 2008). Although the authors conduct a robust economic analysis, the study does not differentiate between rural and urban areas. Furthermore, the study is ahistorical and apolitical; it does not take into consideration the various geographies, histories, and politics surrounding the superfund clean-up sites. In order to better understand whether brownfield redevelopment or superfund clean-up impacts the housing market, it is imperative to study each case carefully.

⁶ Chicago Metropolitan Agency for Planning. Existing Conditions for Site Remediation Program 1996-2007 <http://www.cmap.illinois.gov/strategy-papers/brownfields/existing-conditions>

Urban geographers have shed light on brownfield redevelopment, economic development, and increase in property values as a positive outcome for society. At the 2012 Association of American Geographers Conference held in New York City, the Applied Geography Specialty Group sponsored a brownfield redevelopment panel. The panelists represented the following regions: European Union, Latin America (Brazil), and North America (U.S.). Although the panelists showcased the latest quantitative and qualitative research in brownfield redevelopment literature, the common thread was the use of brownfield redevelopment as a mechanism for capital generation.

Among the panelists, Jones and Sun (2012) conducted a GIS and spatial analysis assessing the effect of brownfield redevelopment projects on surrounding residential property values in Milwaukee. Using multi-scale spatial and statistical analysis, they reveal how the spatial patterns of residential property values and their changes are impacted by nearby brownfield redevelopment projects. Jones and Sun (2012) found brownfield redevelopment projects have a significant positive impact on surrounding property values. They argue that these findings not only contribute to existing knowledge of brownfield redevelopment's impact on property values, but also the potential for this research to encourage local governments to attract funding for brownfield redevelopment.

The studies highlighted in this section reflect the dominant narrative in brownfields literature. Economic development and increase in property values are framed in a positive light. They justify and support brownfield redevelopment as a mechanism to reduce urban blight, revitalize the city, and accumulate wealth for homeowners as residential property is one of the greatest investments. However, environmental justice literature reveals that toxic waste and industrial facilities (disamenities) are located in low-income communities and communities of

color (UCC 1987, Bullard et. al. 2007). What happens in communities where the majority of residents are not homeowners, but renters? The next section in this chapter sheds light on the societal issues that are often overlooked by the dominant brownfield redevelopment narrative.

2.3 From the Ground Up: The Emerging Grassroots Alternative Narrative

A growing body of literature has emerged to provide an alternative narrative to the dominant brownfield redevelopment discourse (Quastel, 2009; Porter, 2009; Pearsall, 2010; Abel and White, 2011; Checker, 2011; Hamilton and Curran, 2012). This new literature sheds light on the decision-making processes and market economy's influence in transforming neighborhood character and shifting demographics. A majority of this literature is based on qualitative case studies that study a particular community or city that is has experienced or is undergoing brownfield redevelopment. In addition, recent studies have applied GIS and spatial analysis to examine economic and social change in neighborhoods within close proximity of brownfield redevelopment. This section synthesizes the methods and findings of this different approach to the study of brownfield redevelopment.

Quastel (2009), Checker (2011), and Hamilton and Curran (2012) conducted case studies of cities and communities that experienced or are undergoing brownfield redevelopment and gentrification. Their work espouse three common themes: neoliberalism, sustainability rhetoric, and eco-elitism. Quastel (2009) explores the political ecology of gentrification in Vancouver, British Columbia in Canada where brownfield redevelopment policies transformed the city and resulted in the juxtapositions of poor neighborhoods and expensive high-rise condominium complexes. Checker (2001) documents the changing urban landscape and lack of community input in the brownfield redevelopment of New York's Harlem neighborhood. Hamilton and

Curran (2012) also study New York, but focus on Brooklyn. More specifically, Hamilton and Curran study the challenges as well as mutual benefits shared among long time community residents and gentrifiers.

Procedural equity and social equity are central to Quastel (2009), Checker (2011), and Hamilton and Curran (2012) case studies. The authors claim that the lack of procedural equity and social equity in their case studies is due to neoliberal driven brownfield redevelopment policies and initiatives, which disproportionately benefit the upper and middle class. For example, Checker illustrates the procedural and social inequality by conducting ethnographic research in Harlem, where she found Harlem's neighborhoods changed after hard-fought battles were won against Manhattan's toxic waste. However, Harlem's gentrification began to peak after Mayor David Dinkins designated Harlem as an Empowerment Zone under the rationale to promote economic self-sufficiency in economically depressed areas. As a result, the empowerment zone propelled large-scale commercial developments by major retailers and chain stores, such as Old Navy and Modell's Sporting Goods. Checker (2011) argues that sustainability planning is a part of a post-political agenda to revitalize, which is based on technocratic, deliberation, and consensus. This policy approach limits meaningful community involvement and raises questions on whether brownfield redevelopment can achieve environmental justice.

Hamilton and Curran (2011) conducted a qualitative study of Brooklyn in which they interviewed long-time community residents, gentrifiers, and elected officials to better understand the social challenges of brownfield redevelopment as the community experienced an influx of upper-middle class Whites. The researchers shed light on the Coast Guard's discovery of an oil plume in Brooklyn's Greenpoint community in the 1978 and the slow government response for cleanup. In 1990, the New York State Department of Environment entered into a consent decree

with Exxon Mobil, the PRP for the oil plume. However, in 2002 the oil plume is rediscovered and residents form the Newtown Creek Alliance to fight for clean up. Between 2004-2006 community residents filed suit against Exxon Mobil with the objective of seeking monetary compensation and health monitoring in the Greenpoint. In 2007, the state of New York took action as Attorney General Andrew Cuomo filed suit against Exxon Mobil.

Hamilton and Curran (2012) poignantly describe why lawsuits and government support for clean up and redevelopment occurred more than 15 years after the first oil plume discovery in the following excerpt from an interview with a long-time Brooklyn resident,

“Up until 2000, it was a community of a lot of immigrants and people who were blue-collar workers and even low income, and so it was easy for the agencies to throw things at them... There's no one to really fight for them. They don't vote... People were working really hard, you know, to buy their home and to stay in their home without really realizing what was happening to them... I really feel that many things are probably happening because of gentrification... I think that if we were all still the old timers, I don't think we would have gotten the [Attorney General's] lawsuit. ... I mean, there was stumping since 1950-something, how all of a sudden we got united, we have all of these groups coming in, and why? Because there were more people coming in... different people, different factions. More votes coming in, more money. You will see when you look at the next census, this is going to be a different neighborhood. And therefore, people demand different things.”

This excerpt is an example of long-time community residents' perception on brownfield redevelopment. The excerpt also highlights the evolution in New York's changing approach to addressing cleanup and redevelopment. The change coincides with more affluent groups moving into the neighborhood. As a result, this observation raises questions of procedural and social equity in brownfield redevelopment, but also sheds light on disproportionate political status and power. The authors claim that community revitalization is occurring as result of "gentrifier-enhanced" environmental activism. Although gentrifiers do contribute technocratic skills and can have more political power due their socioeconomic status, the success of Brooklyn's Greenpoint neighborhood is not only due to the gentrifiers' skills and power, but also local community knowledge and anecdotes of the oil plume discoveries, consent decree and lawsuits. Thus, both groups benefited from mutual exchange of knowledge and resources, gentrifier-enhanced and community enhanced. Therefore, I propose to define this work as "mutual exchange" environmental activism as it acknowledges the strengths of both groups rather than implying a hierarchical relationship.

Sustainability is a theme that is critiqued in Quastel (2009), Checker (2011), Hamilton and Curran (2010), and Pearsall (2010). The authors criticize the sustainability rhetoric because it tends to exclude the social component of sustainability, thus leading to the application of economic frameworks in the name of environmental sustainability. Furthermore, the products and services are geared towards affluent classes. For example, Checker (2010) describes redevelopment in Harlem as gearing towards entertainment as reflected by large-scale development of a nine-screen movie theater and major retailers on 125th street, Harlem's commercial artery. Furthermore, Checker highlights an advertisement for Harlem's first silver LEED-certified townhouse,

“You don’t have to pretend to be environmental friendly anymore; with ownership of although this truly landmark you are entitled. You can now live in decadence and snub your nose to all when you purchase this GREEN masterpiece.” (Checker, 2011 pp. 223)

The advertisement’s use of the word “entitled” and use of the phrase “snub your nose,” connotes privilege and arrogance. Therefore, the advertisement suggests that only the wealthy and affluent class can purchase Harlem’s LEED-certified townhouse. This advertisement and behavior is what Checker (2011) defines as eco-elitism. Eco-elitism is the catering of green products and services to satisfy upper-middle class demands (Checker 2011).

Checker’s concept of eco-elitism is echoed by Quastel (2009) and Chitewere and Taylor (2010). Quastel describes Vancouver’s Chinatown as a poor neighborhood close to the Downtown Eastside. Union Street, in the heart of Chinatown and Downtown Eastside is the construction site for Onni V6A, a condominium complex development. Quastel uses the Onni Garden as an example of new consumption practices and policies, which he attributes to the sustainability rhetoric that emerged from Agenda 21 at the Earth Summit ’92 where sustainability was defined in terms of production and consumption. Thus, the goal of Agenda 21 is to achieve sustainable consumption. In this case, housing is a good whose increase in value depends on its amenities. Quastel (2001) argues that sustainability provides new ways for governments to plan urban revitalization projects and frame them as “green” initiatives, which rationalize the undertaking of such projects and attract affluent groups. This eco-elitism is also reflected in USEPA’s Chicago Brownfield Revitalization showcase, which highlights redevelopment of brownfield into mixed-income housing and retail (City of Chicago, 2003).

Chitewere and Taylor's (2010) case study on sustainable living and community building in Ecovillage at Ithaca (EVI) explores how an ecovillage community conceptualizes and practices sustainability, and whether and how EVI integrates equity and social justice. Through ethnographic fieldwork and semi-structured interviews, the authors found that there is a split among those who want to cater sustainability living solely to the middle and upper class, and those who advocate for equity and social justice practices, such as providing affordable housing. Although these are divergent perspectives, the two groups have a common goal to create a more sustainable way of life in the U.S.

Agyeman, Bullard, and Evans (2002) shed light on the clash between the greater sustainability movement and the environmental justice movement. Similar to Taylor's (2000) comparison of the issues covered in the 'new environmental paradigm and the 'environmental justice paradigm, Agyemen, Bullard and Evans point out that the sustainability movement's paradigm and discourse is not accessible or tangible to the environmental justice movement. This is due in part to the sustainability movement's tendency to focus on planning the future instead of addressing current issues and intersecting them into the sustainability framework (Agyeman, Bullard, Evans, 2002). However, Agyeman, Bullard, and Evans (2000) highlight that environmental justice groups and mainstream environmental organizations have been successful in cooperative initiatives to address sustainability issues, such as food security and just transportation. Thus, the authors suggest governments must incorporate sustainability and environmental justice to achieve the core of the sustainability model based on social, economic, and environmental equity.

Although Agyeman, Bullard, and Evans (2002) reveal some examples of successful sustainability and environmental justice initiatives, stakeholder interests vary and may place

sustainability's key components of social, economic, and environmental equity at odds with each other. Campbell (1996) names this conflict "The Planner's Triangle: Three Priorities, Three Conflicts," which analyzes each sustainability component at odds (See Figure 5). The first, property conflict, deals with the conflict between economic growth and equity. Second, the resource conflict places tension between economic utility in the industrial society and ecological utility in the natural environment. The third, development conflict, places social equity and environmental protection at odds. Campbell (1996) speculates whether sustainability is a useful concept and highlights the field's vagueness in defining sustainability, as well as the varying interests that are brought to sustainability discussions since sustainability's key features are more compartmentalized than integrated conceptually and on the ground. .

Figure 5: The Planner's Triangle: Three Priorities, Three Conflicts



Source: Campbell (1996). Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development. Journal of the American Planning Association, 62 (3), 296-312.

Scholars have also taken a quantitative approach to study environmental justice issues of brownfields and redevelopment. One of the most prominent quantitative methods in environmental justice is the integration of Geographic Information Systems (GIS), spatial and

statistical analysis. These methods facilitate the assessment of distributional and social equity. Porter (2009) examines the people and land values in the areas surrounding properties in New York's voluntary brownfields clean-up program (BCP). Using property assessment data and the 2000 Census, Porter (2009) tests the hypothesis that in New York City the BCP exacerbates environmental injustice as it encourages development in areas with strong real estate markets, which are occupied by affluent White residents. The results of Porter's study reveal that sites enrolled in the BCP are located in close proximity to high property values. Furthermore the average rent and home values within a half-mile, one-mile, and two-mile of BCPs, and the average assessed land values for lots in the same distances were higher than the average vacant manufacturing lots in New York City (Porter, 2009).

In Pearsall's (2010) study, Pearsall uses an analytical vulnerability approach to assess the distributional impacts in procedural aspects of sustainable brownfield redevelopment initiatives in New York City, and identifies populations vulnerable to the negative impacts of brownfield redevelopment, which include the elderly, renters, and residents who receive government assistance. Pearsall studied 36 redeveloped and 36 non-redeveloped sites and the demographics of census block groups within a half-mile of each site. The demographics examined include property value, median household income, and median gross rent from 1990 to 2000. If one of these gentrification indicators was significantly higher than the non-redeveloped group demographics, then Pearsall considered the neighborhood as gentrified. The study found half of the neighborhoods experiencing gentrification in New York City were associated with brownfield redevelopment.

In a similar method, Abel and White (2011) studied the advantages of integrating air toxic risk screening with gentrification research to better understand health equity analysis and

methods. Using GIS and spatial analysis, they studied census block group proximity to air toxics and demographic characteristics such as race and median household income. The results found an air toxics cluster in South Central Seattle, which has predominantly working class and minority neighborhoods. These results are consistent with environmental justice research (UCC 1987, UCC 2007) and mirror the findings of literature that study environmental disamenities.

In conclusion, the brownfield redevelopment and gentrification literature explored in this chapter provides an overview of the current academic landscape and discourse. This literature sheds light on the divergent perspectives on the successes and pitfalls of brownfield redevelopment. Economic development driven research, which is mostly conducted by economics scholars, frames brownfield redevelopment as a positive opportunity for the expansion of capital as abandoned sites are given use through revitalization. Environmental justice and urban geography research has taken a step further to examine the impacts of brownfield redevelopment in communities through qualitative research comprised of interviews and ethnographies. In some cases, the environmental justice and urban geography research applies GIS and spatial analysis to study distributional and societal inequities.

A significant amount of brownfield redevelopment and gentrification research focuses on New York City, a global city that works continuously to meet global demands and remains a key node in the global network economy. As Chicago advances its global city status, it is important to take into consideration New York City and Brooklyn's challenges and strategies to gentrification resistance and environmental justice victories in order to respond to similar scenarios.

CHAPTER 3

HISTORY OF CHICAGO: URBAN PLANNING AND SEGREGATION

Chicago is one of the largest metropolitan cities in the U.S. with 2.7 million residents and is rising as a global city in the global network economy (U.S. Census 2010). Chicago's aspirations for global city status are reflected in its most recent role as host of the North Atlantic Treaty Organization (NATO) summit and the Chicago Carbon Exchange. What does Chicago's status as an emerging global city have to do with brownfield development? Brownfield redevelopment is a justification for new development in the city to meet the demands of the new upper-middle class and world economy. This thesis examines brownfield redevelopment and gentrification in Chicago, a city with a rich industrial past. Therefore, it is important to provide a synthesis of Chicago's industrial history, urban planning, and segregation, as well as its rise as a global city.

3.1 The First and Second Nature

Historian and urban geographer, William Cronon, documents Chicago's transformation from the rural frontier to a metropolitan city. In his book, *Nature's Metropolis*, Cronon shares a history of Chicago's role in the Great West and its transformation into a metropolis. Cronon introduces the concept of a site and a situation. Site is defined as the relationship between a city and the physical environment and landscape in which it is located (Cronon, 1992). Situation is defined as the relationship between a city and the rest of the urban system in which it is embedded (Cronon, 1992).

Cronon (1992) also introduces the concept of first nature (original) and second nature (artificial nature). In the first nature, the most important flows are energy flows and natural complexities that make prediction difficult. In contrast, the second nature's most important flows are cash flows. During the mid 19th century, Chicago competed with St. Louis for the role of the

leading city in the West. However, Chicago's dominance over St. Louis was not due to its first nature characteristics, such as the Great Lakes and Chicago River. Rather, its successes are attributed to its second nature's spatial linkages in the industrial area, including corridors, canals, and radial accessibility to railroads that moved lumber and other goods to the west and east. Therefore, these characteristics attracted entrepreneurs and investors who took advantage of the low cost rail shipping in the summer and its wide railroad network. However, Cronon notes that much of Chicago's development came at the expense of Native Americans whose land and resources were confiscated and commoditized. The accumulation by dispossession narrative is mirrored in the case of brownfields and gentrification as low-income long-time residents are dispossessed from their social networks and environmentally improved community as a result of the market forces.

3.2 The Great Chicago Fire

On Sunday, October 8, 1871, Chicago was ablaze in what is known as one of the nation's worst tragedies: The Great Chicago Fire. The source of the fire began in a working class neighborhood on Chicago's Southwest side in Patrick and Catherine O'Leary's barn when their cow kicked over a lantern Sunday evening. The conflagration burned unabated for three days, resulting in Seventy-three miles of streets, and 17,500 buildings destroyed (Taylor, 2009 pp. 330-336). The Chicago Fire created an empty canvass, an opportunity to rebuild and plan the city. The elite and businessmen were quick to take advantage of rebuilding the city as they feared they would share space with the poor. Furthermore, the Chicago Fire led the city government to implement fire-prevention ordinances, which included a ban on building wooden structures (Taylor, 2009 pp. 335). This had a significant negative impact on the poor, as they could not afford to rebuild their home in the city.

3.3 The Plan of Chicago

In 1893, Chicago hosted the World's Columbian Exposition, which attracted 21 million visitors. The World's Columbian Exposition provided Chicago the opportunity to become a renowned city and compete with cities like Paris, who had previously hosted the fair. Paris left a lasting impression on the world with the architecture of the Eiffel Tower, the fair's attraction. In an attempt to outcompete Paris, Chicago built the first Ferris wheel, which remains an attraction at Chicago's Navy Pier. The World's Columbian Exposition provided Chicago the impetus to reconfigure its city infrastructure so as to facilitate transportation flows for business, tourism, and residents.

Daniel Burnham, a 26 year-old Chicago architect, took on the role as Director of Works for the World's Fair. He was sponsored by Chicago's Commercial Club to create *The Plan of Chicago* with architect Edward Bennett. The Plan of Chicago revolved around the Second Nature, the cash flows: transactions and capital accumulation. Thus, the plan served two purposes: 1) to facilitate transportation of goods and services and 2) to attract visitors to Chicago's entertainment attractions, which generate revenue for the city as experienced with the World's Fair.

The Brunham Plan proposed six developments for Chicago: 1) The improvement of the Lakefront. 2) The construction of highways to facilitate access to the city. 3) Enhancement of the railway terminals and the development of a traction system for freight and passenger rail. 4) attainment and maintenance of an outer park system and parkway circuits, such as the boulevards. 5) The systematic planning and redevelopment of streets and avenues, also known as the grid system, to facilitate flows to and from the business district. 6) The creation of central hubs for intellectual life and of civic administration in an effort to maintain city coherence

(Brunham and Bennett, 1906). Although the Burnham Plan was not implemented in its entirety, it transformed the city's infrastructure, and designated separate space for industry and business, which would impact the social fabric of the city

3.4 Industrialization, Segregation, and Urban Revitalization

As Chicago became more interconnected with other business hubs in the nation, its industrial revolution heightened in the late 18th century and early 19th century. As a result of the rise in industry, such as Chicago's steel industry and the stockyards, there was a demand for labor. This demand prompted an influx of European immigrants (i.e. Irish, Czech, Polish), and African-Americans from the Great Migration. As these groups competed for jobs, housing, and resources, racial tensions and institutionalized racism segregated the city.

As summarized in Chapter 1, Massey and Denton (1993) studied segregation and the making of the underclass in the U.S. Through institutional racism such as redlining and rent seeking, policy makers, who were comprised of the elite, designed and controlled the urban social fabric. In this way, immigrants and African Americans lived in the ghettos as the city prioritized services to residents in affluent areas, who owned and managed Chicago's business sector. Massey and Denton's segregation study examined thirty cities for Black isolation within neighborhoods. Massey and Denton's findings reveal that in 1930, Chicago's index of Black isolation was at 70.4, exceeding the 31.7 index average for a Northern city at the time. The results for 1970 reveal that Chicago's Black isolation index increased to 89.2, also exceeding the 1970 average index at 73.5 for a Northern city. Black isolation and Black-White segregation would increase after the 1970s as White flight occurred and industries moved overseas, thus leading to divestment in working class neighborhoods of major cities like Chicago and New York.

As documented in environmental justice literature, environmental hazards and disamenities are located in close proximity to low-income communities and communities of color. Taking into consideration the environmental justice literature, Chicago's industrial history and hypersegregation, it is no coincidence that brownfields are located in predominantly working class Latino and Black communities. Although the findings of Linn's (2012) study of brownfield sites in Illinois support the argument that brownfields are a disamenity that negatively affects property values, there is no study that takes a closer look at Chicago's brownfields, its social fabric, and the urban landscape transformation outlined in Chicago's Plan for Transformation spearheaded by former Mayor Richard M. Daley.

Similar to the goals of *The Plan of Chicago*, Mayor Daley sought to revitalize Chicago to attract more investors, businesses, and tourists in an attempt to rise as a global city and expand capital. However, it is important to note the difference of scale between *The Plan of Chicago* and *Chicago's Plan for Transformation*. The Burnham Plan sought to facilitate accessibility to and from the city with the goal of expanding its cash flows to the west and east of the United States. As Chicago aims for global city status and key node in the global economy network, its goal is to facilitate cash flows within the U.S. and internationally via transportation (i.e. airports, rail, waterways) and the technological network. Therefore, the study of Chicago's urban revitalization and its sustainability rhetoric is important in order to understand the city's motivations as well as community resistance to the changing urban landscape.

As the study of brownfield redevelopment and gentrification in Chicago continues in the future, it is important to note the shift in city power and new political agendas. After Mayor Richard M. Daley's 22-year term as mayor ended in 2011, Rahm Emanuel, President Obama's

former Chief of Staff, became mayor.⁷ This resulted in changes in city staffing and city departments. The Chicago Department of Environment was eliminated. This led to the loss of institutional knowledge held by Mayor Daley's staff. In addition, the Chicago Department of Housing and Economic Development now addresses brownfield redevelopment.

Moreover, Chicago recently shut down two coal-fired power plants in the Little Village and Pilsen communities on the southwest side, which may undergo a process of remediation and redevelopment. The remediation and redevelopment of this land will set the precedent for future coal-fired power plant closures in the nation. Chicago will remain at the forefront of post-industrial redevelopment. Therefore, it is important to understand Chicago's history.

⁷ Richard M. Daley's father, Richard J. Daley was also Mayor of Chicago. He served 21 years, from 1955-1976.

CHAPTER 4

DATA AND METHODS

Data Acquisition and Manipulation

This study employs a quantitative and cross-sectional study approach. This type of approach studies what is happening on the ground without influencing or altering the data collection process since this method uses existing records. Existing records are limitless and readily available in the form of archives and public records. The use of existing records ensures the data is nonreactive and is more economical than developing and implementing a survey (Montello and Sutton, 2006, pp. 95-103). Additionally, census data has a uniform format and provides complete coverage, except for income variables, which were not included in the 2010 U.S. census. The U.S. Census and brownfield datasets used in this study contain interval-ratio data, which facilitates quantitative research and analysis.

The target population in this study are people living within a 1-mile, 0.5 mile, and 0.25 mile radius from a BRS in the city of Chicago. This population was chosen in order to zoom in on demographic shifts occurring at the smallest neighborhood area to better understand the population dynamic with environmental upgrade and amenities. This study focused on the following variables: number of each racial group living in neighborhoods studied (i.e White, Black, and Hispanic), median household income, median home value, and median gross rent. The study only examined these three racial/ethnic groups as they are the largest racial/ethnic groups in Chicago.

Hedonic price model studies typically apply distance buffers to conduct economic analysis. Gallagher and Greenstone (2008) and Porter (2009) used 1-mile and 3-mile radii in their Superfund clean-up national study. Whereas, Linn (2012) applied a 0.25 mile buffer to

study brownfield site impacts on property values. Furthermore, quantitative environmental justice studies that focus on cities traditionally use a 1-mile or 0.5 mile radius (Saha and Mohai, 2005; Pearsall, 2010; Lee and Mohai, 2011). Thus, the unit of analysis in this study is at the 1-mile, 0.5 mile, and 0.25 mile around each BRS to examine if there are any significant demographic shifts occurring at the 0.25 mile. Since Chicago is a densely populated city, the 0.25 mile will shed light on what type of individuals reside closest to BRSs.

U.S. Census block group level shapefiles from 1990, 2000, and 2010 for Cook County, which contains the city of Chicago, were retrieved electronically from the U.S. Census Topologically Integrated Geographic Encoding and Referencing (TIGER/Line) datasets. Data at the U.S. Census block group geographic unit was chosen because it is the smallest geographic unit of analysis readily available to compare decennial demographic data for 1990, 2000, and 2010. These shapefiles create the foundation to extract population data within 1 mile, 0.5 mile, and 0.25 mile buffers using areal apportionment methods, a spatial analysis process explained later in this chapter.

U.S. Census demographic data for 1990, 2000, and 2010 was gathered from Social Explorer, a database accessible through the University of Michigan Library. Social Explorer has readily available historical U.S. Census data and demographic information from 1790 to 2010. Thus, this study uses the 1990, 2000, and 2010 decennial U.S. census to acquire data on race and Hispanic/Non-Hispanic. Median household income, median home value, and median gross rent were gathered for 1990 and 2000 from the decennial U.S. census demographic information.

Brownfields information was obtained from the Chicago Office of Economic and Urban Development. This information contained brownfield redevelopment program summary documents from the U.S. Environmental Protection Agency and a spreadsheet of 1,545 non-

redeveloped brownfield sites in the City of Chicago. A list of brownfield redevelopments was created from the information in the brownfield redevelopment program summary documents. Since the EPA, Illinois EPA, and City of Chicago do not regularly monitor brownfield redevelopments, this study relies on a 2003 program summary report, which is the latest document listing brownfield redevelopments in Chicago. As a result, 18 sites were compiled from the program summary report (See Appendix I). This facilitates observation across three decennials to observe if gentrification has occurred around redeveloped sites by comparing and contrasting pre-redevelopment in 1990 and post-redevelopment in 2010.

The majority of studies focus on temporal changes across two decades. The only study that looks at three decades is Greenstone and Gallagher (2008) who examine the real estate market from 1980 to 2000. Therefore, this thesis examines three decennials to observe population changes before and after redevelopment.

Transportation data was gathered from the City of Chicago Data Portal, which contains a data library of GIS shapefiles. Chicago Transit Authority (CTA) train lines and train stop shapefiles were downloaded from the Chicago Data Portal to allow for spatial analysis of brownfield redevelopment proximity to mass public transit to downtown, which is an amenity. Similarly, a shapefile for U.S. highways was retrieved from the U.S. Department of Transportation Federal Highway Administration, which allows for spatial analysis of brownfield proximity to highways with access to downtown.

Using ArcMap 10.1, the 1990, 2000, and 2010 decennial census block group shapefiles were projected using the North American Datum 1983 (NAD 1983) Geographic Coordinate System (GCS). Census demographic data obtained from Social Explorer was converted from a comma-separated values format into a dBase database format to facilitate the joining of each

corresponding census block group shapefile to its decennial demographic data (i.e. 1990.shp to 1990census.dbf). Each pair of census block group shapefiles and decennial demographic data was joined by the Federal Information Processing Standard (FIPS) code, which is a unique geographic identifier. Census block groups have a 12-digit FIPS code shown in Table 1.

Table 1: Census Block Group 12 Digit FIPS Code

AABBCCCCCD

- A** = State (2 digit FIPS code)
- B** = County (3 digit FIPS code)
- C** = Tract (6 digit FIPS code)
- D** = Block Group (1 digit FIPS code)

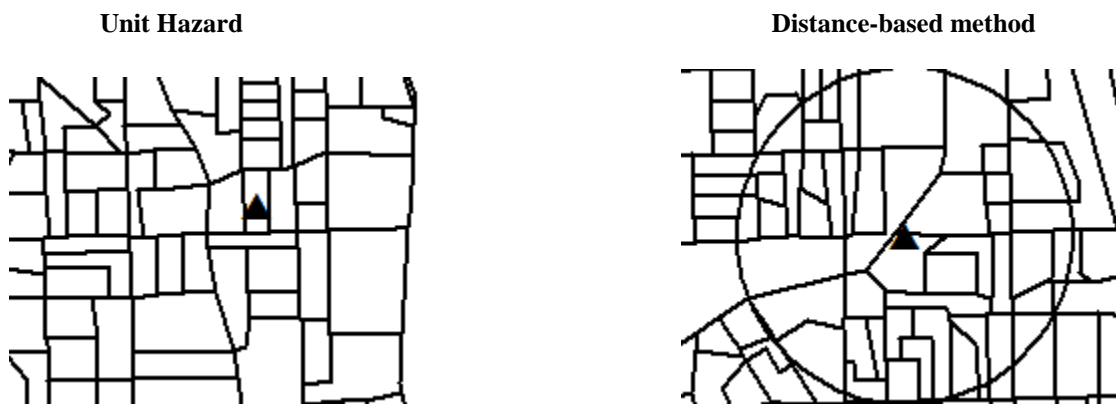
The joining of the shapefiles to their corresponding decennial demographic merges the datasets, which allows spatial data visualization and analysis. Subsequent to the data join, an area variable was added in the shapefile's attribute table to calculate the area of each census block group. This calculation is important for the implementation of the areal apportionment method.

Geocoding the addresses of the non-redeveloped and redeveloped brownfields in the city of Chicago is the last step in preparation for the areal apportionment method. Geocoding is the process of converting street addresses into geographic coordinates, often expressed as longitude (X) and latitude (Y). Using ArcMap 10.1 Geocode Addresses tool, the built in address locator scans street addresses to latitude and longitude points with precision. All brownfield addresses in this study were matched to their corresponding geographic coordinates with 98 percent precision. After this process, choropleth maps were created to visualize spatial changes in the 1990, 2000, and 2010 decennial data.

Methods

Distance-based methods are typically applied to study racial and economic environmental disparities in environmental justice literature. This spatial analysis method draws a radius or buffer on a data point, such as a brownfield site. The distance-based approach is effective in analyzing environmental disparities because it is focused on distance to the location of a site, but not the site's exact location within the unit. As outlined in Mohai and Saha (2006), the fallacy of the host unit method is that it does not take into account the effects of hazardous sites on adjacent census block groups or tracts. Additionally, distance based methods do not assume that populations in large host units are in close proximity to environmental hazards. For the purposes of this study, an areal apportionment distance-based method was applied. The areal apportionment method takes into account all census block groups within the established buffer, including those that lie within a proportion of a buffer.

Figure 6: Visual Comparison of Unit Hazard and Distance-based Method



Mohai and Saha. (2006). Reassessing Racial and Socioeconomic Disparities in Environmental Justice Research. *Demography*, 43(2) Pp. 383-399

To begin the areal apportionment method, a 1 mile, 0.5 mile, and 0.25 mile radius was created using the Buffer tool under the Analysis tool in ArcToolbox by setting the input to the brownfields point shapefile and the output as "BrownfieldBuffer." The linear unit and buffer

distance was set to 1 mile, 0.5 mile, 0.25 mile for each variable, following the buffer units from previous environmental justice studies (Mohai and Saha, 2006; Pearsall 2010; Abel and White, 2011; Lee and Mohai, 2011). In the census block group shapefile, a new field is added to the attribute table to calculate geometry in square miles. Then, using the Intersect tool under the Analysis tool in ArcToolbox, the census block group shapefile and the newly created buffer shapefile are inputted together to generate an intersected shapefile as an output. In the Intersected shapefile's attribute table two new fields were added; one field to calculate the area of the intersection in square miles, and the second field to calculate percent. The percent is calculated using Field Calculator tool to divide the area field from the intersected file by the area of the census block group shapefile.

To calculate the population within each buffer, a new field for each census variable is added to the intersected file attribute table. Using the field calculator tool, the population is calculated by multiplying the population of the census block group times the percent of the census block group that falls within the buffer zone. The last and final step involves the Dissolve tool under Data Management in ArcToolbox. The Dissolve tool adds the census blocks groups and its proportions that lie within the buffer. This creates a new shapefile with an attribute table containing census data information of the population within a 1-mile radius of each brownfield. This process is repeated for all decennial data. After the dissolve tool aggregates the census block group demographic data within the 1-mile radius of each buffer, a new shapefile and dBase file is created. The dBase file converted into comma-separated values format to facilitate statistical analysis. Following the calculations described above, a master file was created to compare and contrast changes in race/ethnicity within 1-mile of each BRS. Thus, percent change was calculated between decennials for each variable.

CHAPTER 5 | RESULTS

Overview

This thesis seeks to answer two questions: 1) Does brownfield redevelopment increase property values? 2) Is brownfield redevelopment associated with racial and socio-economic change in affected neighborhoods? What is the nature of that change? Historically, Chicago is one of the most segregated cities in the U.S. As explained in Chapter 2, this is due to rampant institutionalized racism via zoning laws, real estate market, redlining practices, and restrictive covenants. Taking this into consideration, it is essential to analyze Chicago's urban transformation through a geospatial lens as history, space, and place matter. This chapter is organized as follows.

The first section provides an overview of Chicago and BRSs, their clusters, and proximity and accessibility to downtown. The second section provides the preliminary geospatial analysis of Chicago's BRSs with an overlay displaying the spatial distribution of median home value, median gross rent, race/ethnicity, and median household income variables for three sequential decennials: 1990, 2000, and 2010. In addition, an overlay of average household income by race data from the American Communities Survey is included for 1990 and 2000. No data for average household income by race was available for 2010 while conducting this thesis. The third section provides a closer look at demographic shifts and brownfield redevelopment between 1990-2010 through the results of the areal apportionment method for 1-mile, 0.5-mile, and 0.25 mile radius from each BRS. This is achieved by focusing on brownfield redevelopment clusters. The fourth section provides a discussion and analysis of the key findings, their implications and limitations.

Spatial Distribution of Brownfields and Brownfield Redevelopments in Chicago

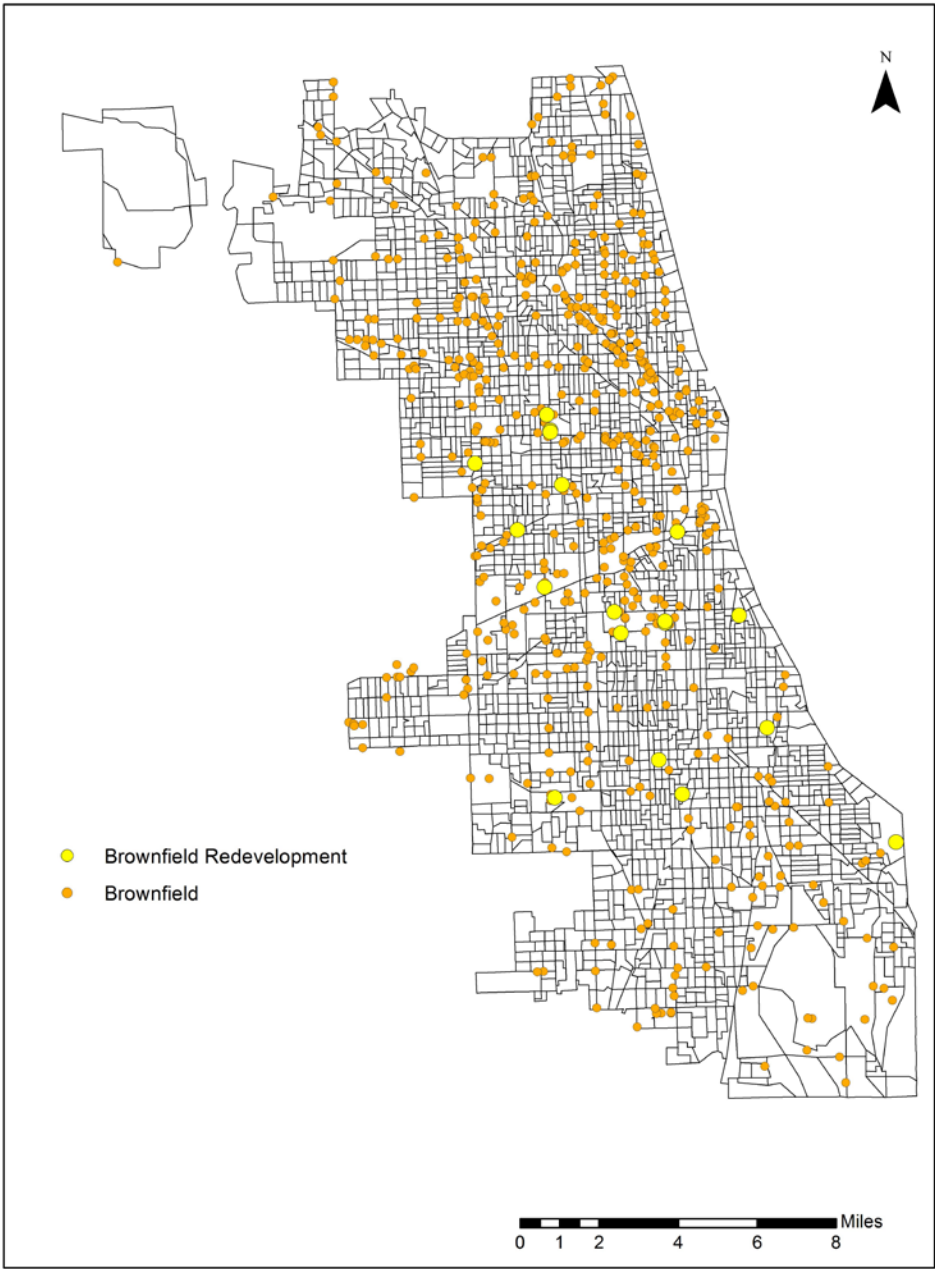
Figure 7 shows the spatial distribution of 574 EPA designated brownfield sites in the city of Chicago and 18 BRSs. As the figure shows, the majority of brownfields are clustered near the city center, close to Chicago's downtown and central business district. A second cluster is found in the Far South Side, distant from downtown. Furthermore, it is important to note BRSs are not occurring in the North Side. Although this is not central to the research question, it is important to note that a substantial amount of brownfield sites are located in this part of the city. This is due in part to the presence of industrial corridors.⁸ Figure 8 displays Chicago's industrial corridors. As one observes the map in Figure 8, brownfield sites tend to cluster near or on industrial corridors. Furthermore, large industrial corridors are located along the Chicago River on the Southwest Side, and in the Far Southeast Side.

Spatial Distribution of Brownfields, Brownfield Redevelopments and Public Transportation

Since proximity and accessibility to downtown is the focal point of Chicago's urban transformation, the Chicago Transit Authority (CTA) train lines and stations were overlaid with the BRSs map as shown in Figure 9. All CTA train lines make train stops in downtown, with the exception of the CTA Yellow line, which functions as an express train between Skokie, IL and Howard St., the last stop on the north end of the CTA Red Line. In Figure 9, we can see that most BRSs are located in close proximity to a CTA train station. Only 2 out of 18 BRSs are not within a mile from a train station: Gateway Park Industrial Complex and Parnell Place Safe Homes for Kids, both of these sites are located in the Far South area.

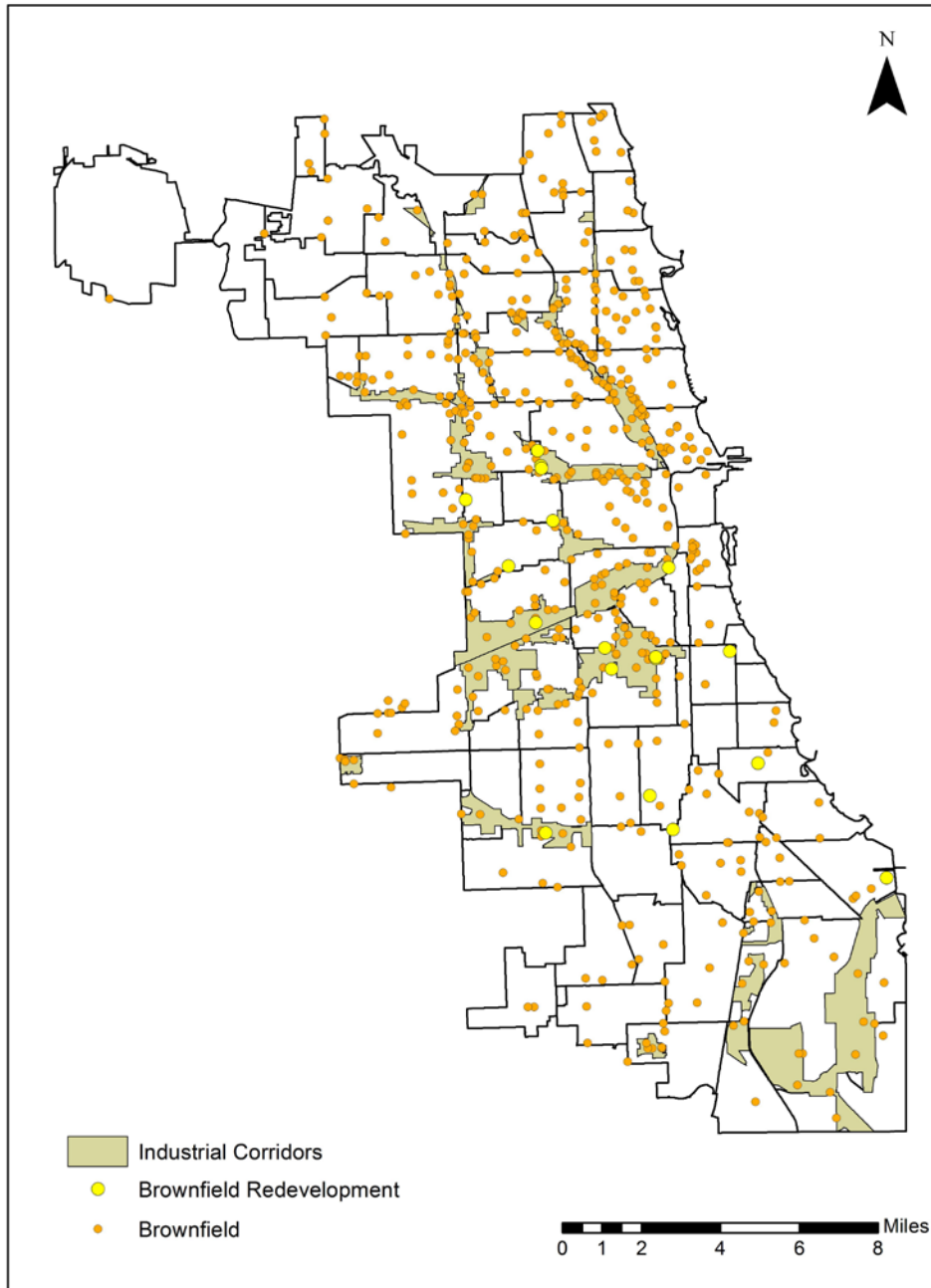
⁸ Industrial Corridors were first designated in 1992 in an attempt to maintain the few industries that remain, encourage new industries to come to the city and create jobs, and to prevent zoning changes from industrial to residential. http://articles.chicagotribune.com/1992-03-13/news/9201230789_1_factories-conversion-industrial-corridors

Figure 7: Map of Chicago Census Block Groups, Brownfields, and Brownfield Redevelopments



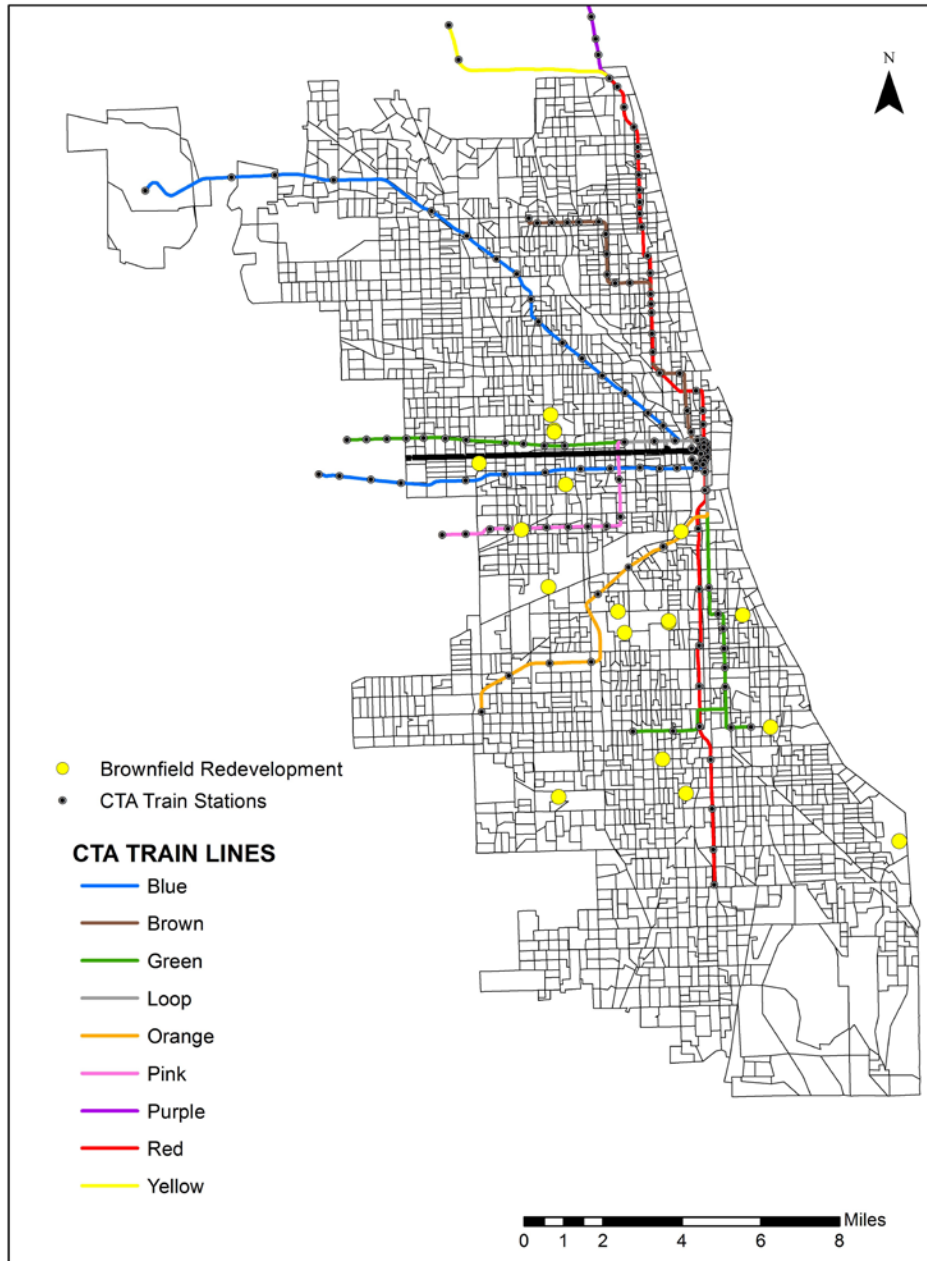
Source: City of Chicago

Figure 8: Map of Chicago Brownfields, Brownfield Redevelopments and Industrial Corridors



Source: City of Chicago

Figure 9: Map of Chicago, Brownfield Redevelopments, and Public Transportation

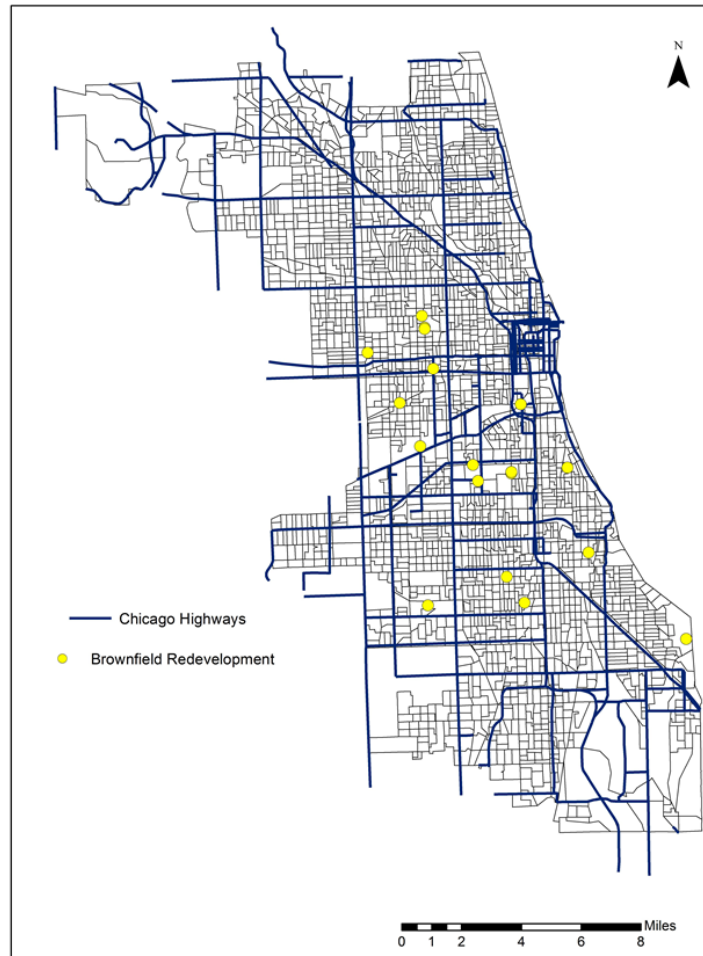


Source: City of Chicago

Spatial Distribution of Brownfields, Brownfield Redevelopments and Highways in Chicago

Figure 10 illustrates highways and expressways overlaid on the map of BRSs in Chicago. As one can observe, all brownfield sites are in close proximity to highways. However, shapefiles and coordinates for entrance and exit ramps were not available from the U.S. Department of Transportation. Thus, BRS proximity to a highway or expressway is insufficient to conclude accessibility to downtown, unless entrance and exit ramp locations are included in this spatial observation.

Figure 10: Map of Chicago Brownfields, Brownfield Redevelopments, and Highways

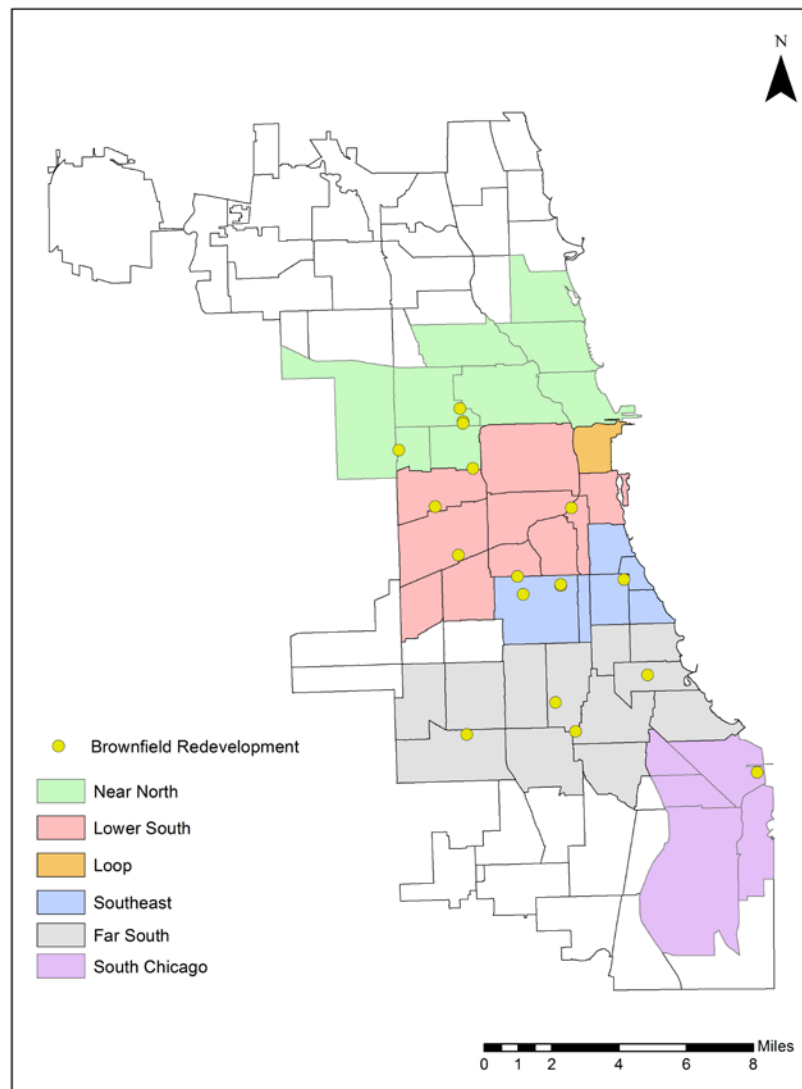


Source: City of Chicago and
U.S. Department of Transportation

Chicago Community Areas

Figure 11 shows the spatial distribution of brownfield and BRSs on a map of Chicago's community areas and downtown, also known as 'the Loop'. In addition, the map highlights the areas where BRSs are clustered: Near North, Near South, Southeast, Far South, and South Chicago.

Figure 11: Chicago Community Areas and BRS Clusters



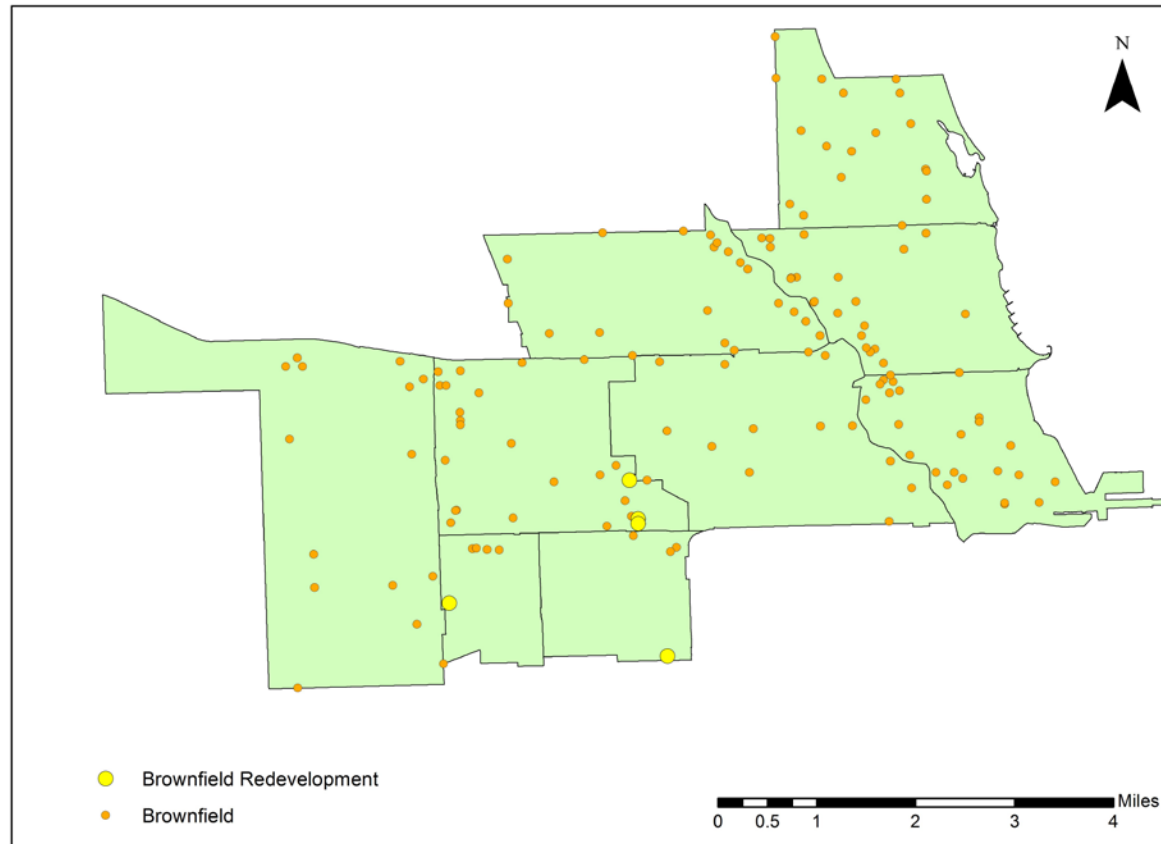
Source: City of Chicago

The Near North Side

The Near North side area is comprised of nine community areas: Logan Square, Humboldt Park, West Town, West Garfield Park, East Garfield Park, Near North Side, Lake View, and Lincoln Park (see Figure 12). Five BRSs are located within the Near North side area: 3042 W Chicago Ave, Kilbourn and Ferdinand, California Avenue Business Park, Chicago Center for Green Technology, and Scott Peterson Meats (see Appendix I). Since the California Business Park is located on the border of the Near North and Near South areas, it is included in the analysis of both Chicago geographic areas.

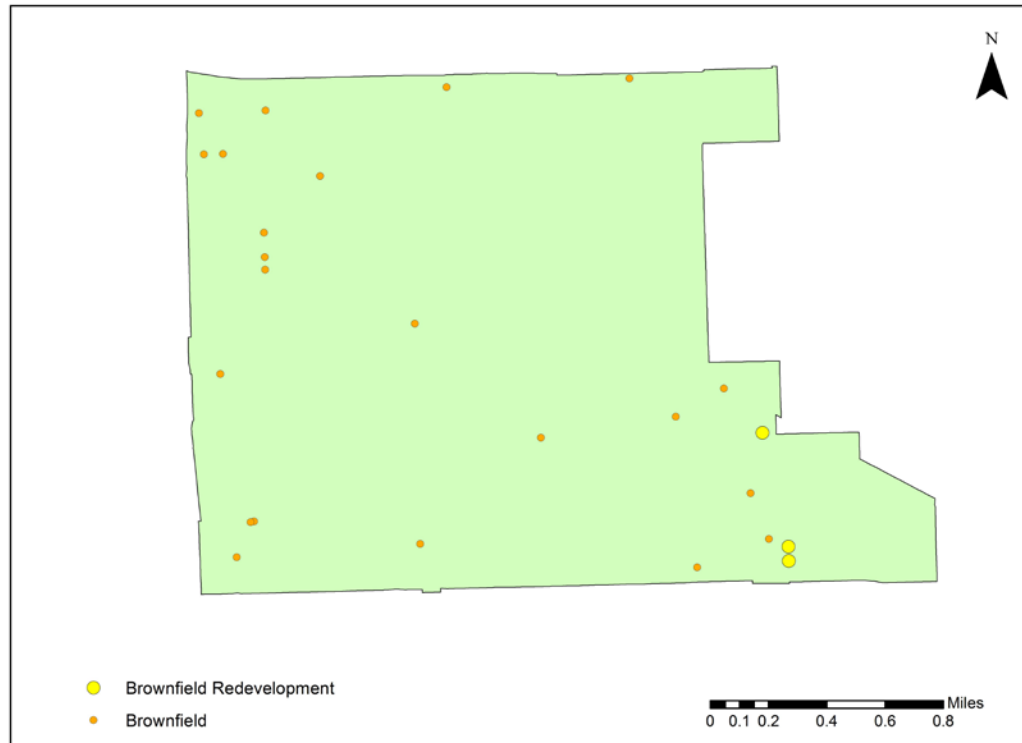
Three of the five BRSs are located in Humboldt Park: 3042 W Chicago Ave, Kilbourn & Ferdinand, and Center for Green Technology (see Figure 13). Although BRSs are not located in Logan Square, Lakeview, Lincoln Park, and Near North Side community areas, they are included in the map because gentrification by the White affluent residents and displacement of people of color occurred in the late 1970s. This shift occurred as communities along the lake and in close proximity to Chicago's downtown became desirable neighborhoods (Betancur, 1996; Wilson and Grammenos, 2005; Betancur, 2010). Thus, these areas were transformed into an agglomeration of affluent neighborhoods. These continue to spread across Chicago's Near North Side. For example, in the early the 1970s Lincoln Park was a predominantly Puerto Rican community, but was gentrified into an affluent community by the late 1970s (Betancur, 1996; Wilson and Grammenos, 2005; Betancur 2010). This had a ripple effect in adjacent neighborhoods along the lake. The Hispanic population in lakefront communities was displaced. As a result, several of these displaced Puerto Ricans moved to Humboldt Park (Betancur, 1996; Wilson and Grammenos, 2005; Betancur 2010).

Figure 12: Map of Chicago's Near North Area



Source: City of Chicago

Figure 13: Map of Humboldt Park and Three Brownfield Redevelopment Sites

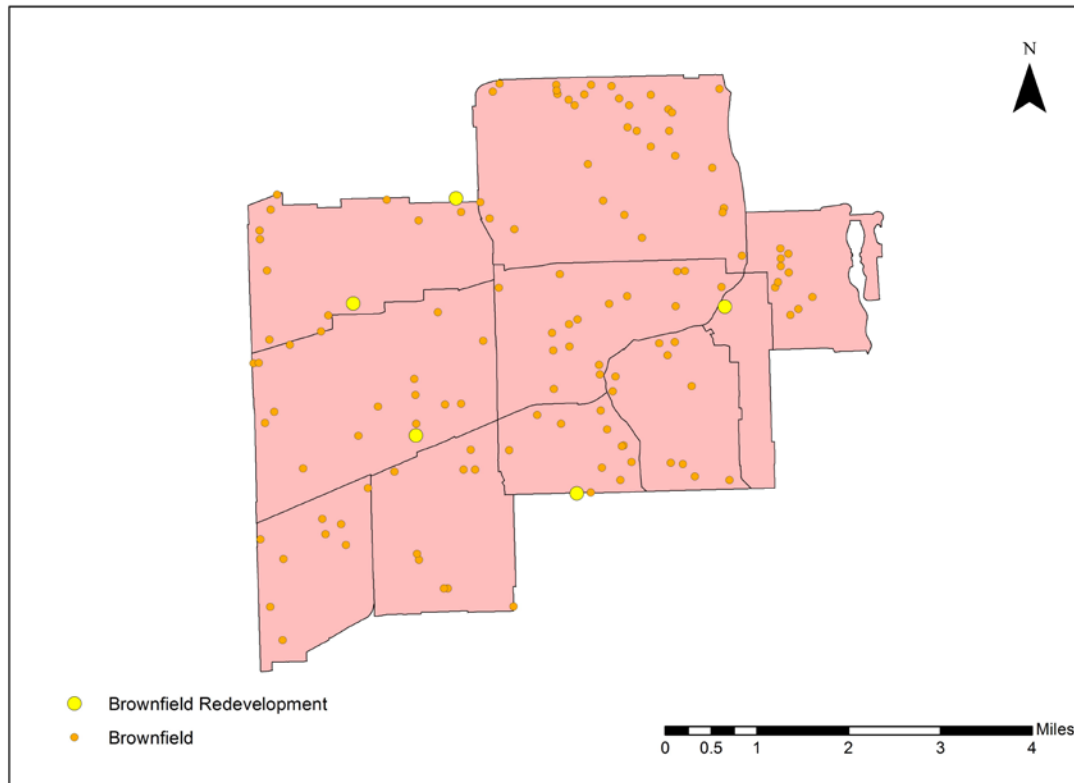


Source: City of Chicago

The Near South Area

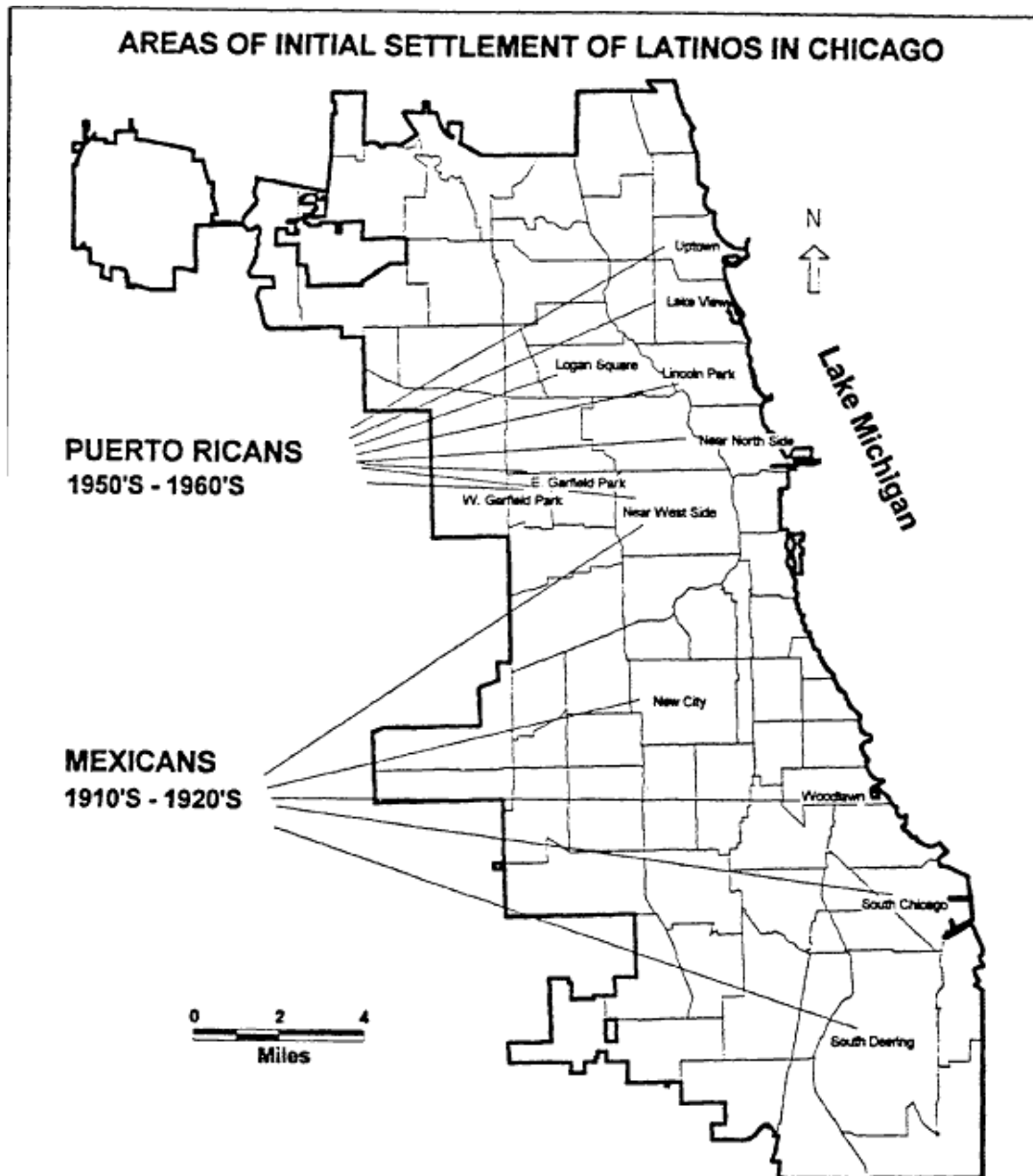
The Near South area encompasses ten community areas: North Lawndale, South Lawndale, Archer Heights, Brighton Park, McKinley Park, Bridgeport, Armour Square, Lower West Side, and Near South Side (see Figure 14). Five brownfields redevelopment sites are located within the Near South area. These include: International Union of Operating Engineers, Job Corps, Carole Robertson Center for Learning, Chicago Board of Education, and the California Avenue Business Park (see Appendix I). The Near South area is a predominantly Hispanic area, which includes the second largest Mexican community outside of East Los Angeles, Pilsen and Little Village (formally known as Lower West Side and South Lawndale community areas). It is important to highlight that while Humboldt Park is also a Hispanic community, it is mostly comprised of Puerto Ricans. In contrast, Pilsen and Little Village's Hispanic population is predominantly Mexican. The nature of this spatial distribution and segregation of Puerto Ricans and Mexicans in Chicago is due to the formation of cultural and social networks as immigrants migrated throughout different periods to Chicago as depicted in Figure 15 (Betancur 1996).

Figure 14: Map of Chicago's Near South Area



Source: City of Chicago

Figure 15: Areas of Initial Settlement of Latinos in Chicago



Source: Betancur, J. J. (1996). The settlement experience of Latinos in Chicago: Segregation, speculation, and the ecology model. *Social Forces*, 74(4), 1299-1324.

The South East Area

The Southeast area is composed of six community areas: New City, Fuller Park, Grand Boulevard, Douglas, Oakland, and Kenwood (see Figure 16). The Southeast area also has five BRSs: 43 Paulina, Board of Education, Boyce Park, Bronzeville, and the International Amphitheater (see Appendix I). Within Grand Boulevard and Douglas is Bronzeville neighborhood. Bronzeville, is a historically middle-class Black community widely known as the ‘Black Metropolis’ and one of the nation’s most significant landmarks of Black history (Anderson and Sternberg, 2012).

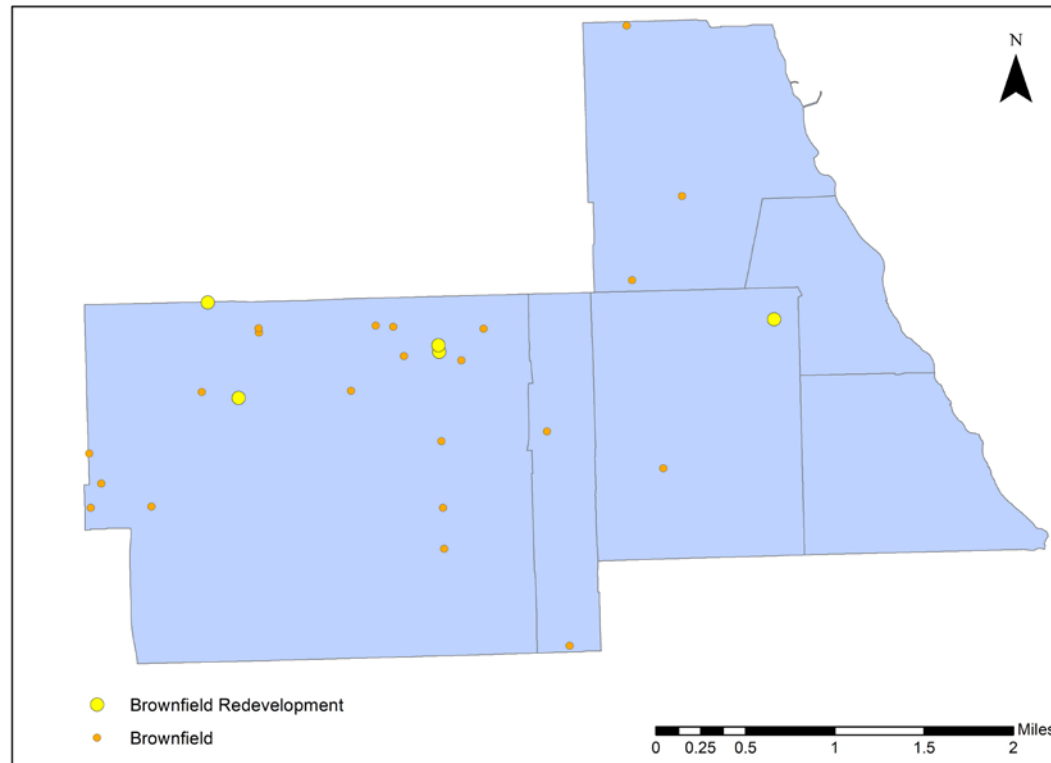
The Far South Area

The Far South area consists of 12 community areas: Washington Park, Hyde Park, Woodlawn, South Shore, Chatham, West Lawn, Chicago Lawn, West Englewood, Englewood, Greater Grand Crossing, Ashburn, and Asburn Gresham (see Figure 17). Four BRSs are located in the Far South area: Gateway Park Industrial Complex, Parnell Place Safe Homes for Kids, Salvation Army Red Shield Center, and Columbia Pointe (see Appendix I).

The South Chicago Area

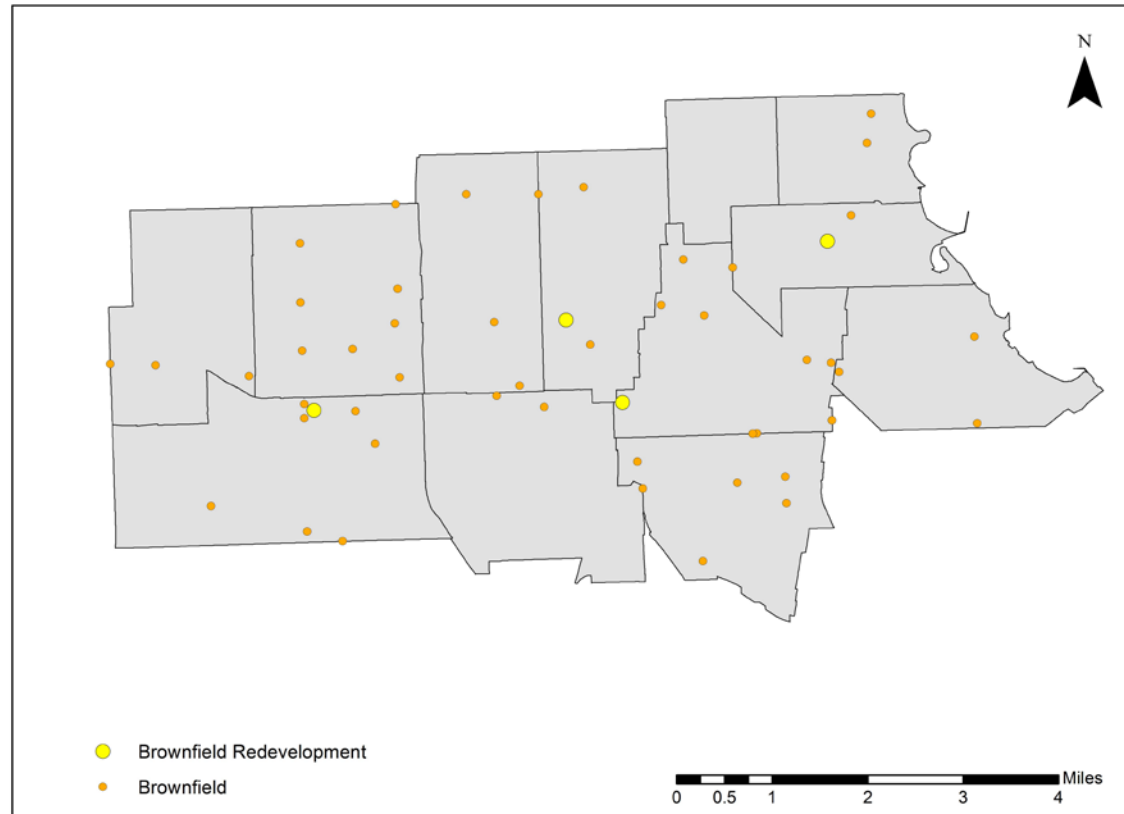
The South Chicago area includes six community areas: South Shore, Avalon Park, South Chicago, Calumet Heights, South Deering, and East Side (see Figure 18). Only one brownfield redevelopment is located in this area: South Chicago & South Works, which was the largest abandoned and vacant lot in Chicago. It is former home to one of the largest steel mills in the country, U.S. Steel South Works mill. Historically, a working class area with a large Mexican population, the South Chicago area’s economy declined since the closure of U.S. Steel in the 1980s, leading to divestment, abandoned properties, and urban blight (Betancur, 1996).

Figure 16: Map of Chicago's South East Area



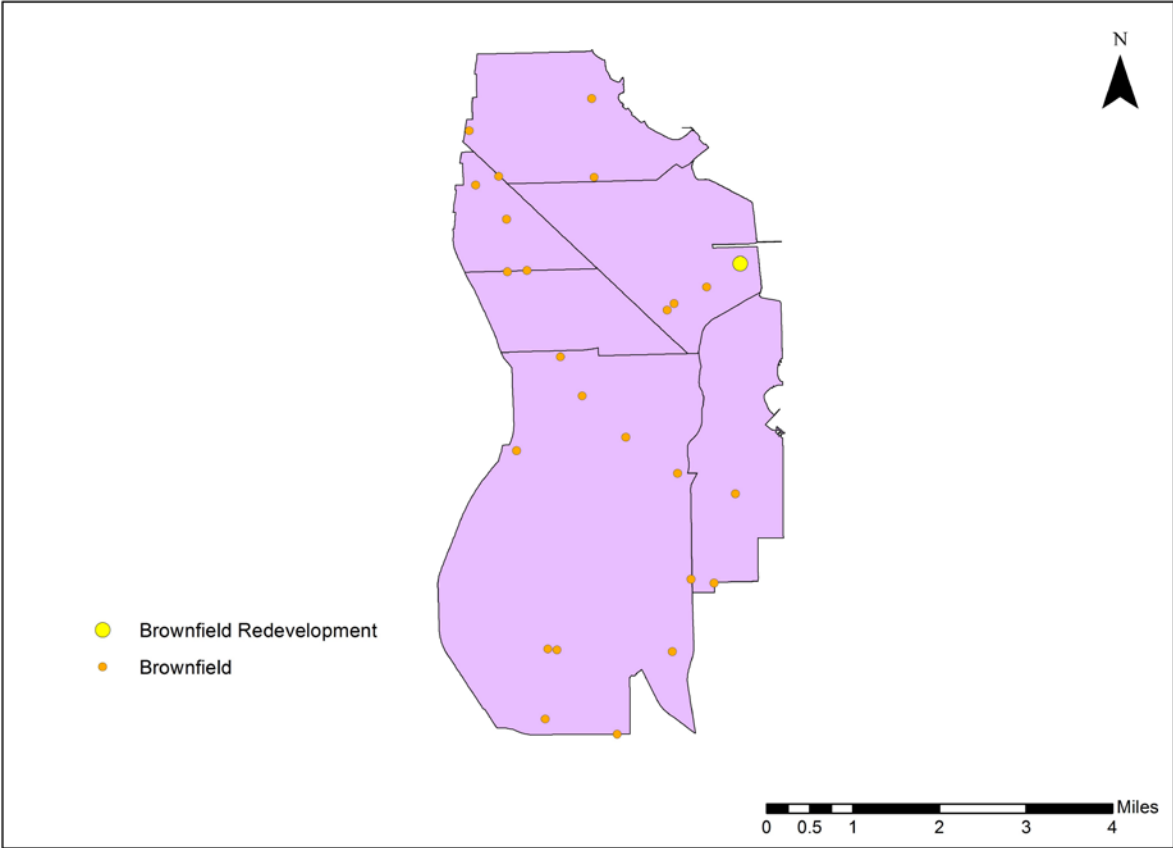
Source: City of Chicago

Figure 17: Map of Chicago's Far South Area



Source: City of Chicago

Figure 18: Map of Chicago's South Chicago Area



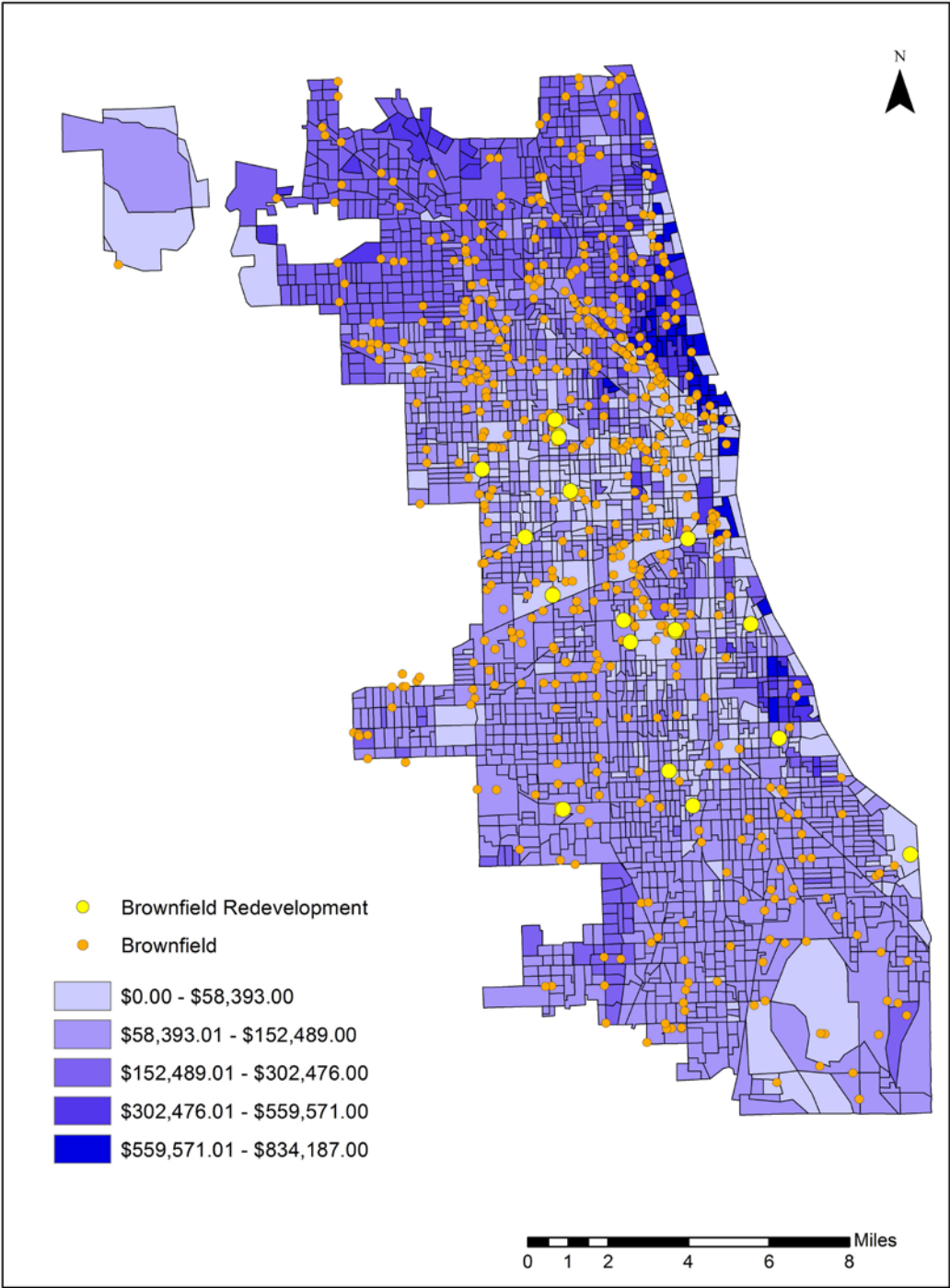
Source: City of Chicago

Mapping Median Home Value and Median Gross Rent

Figures 19-21 display median home value at the census block group unit of analysis for 1990, 2000, and 2010 respectively. Between 1990 and 2000 (see Figures 19-20), census block groups containing BRSs experienced an increase in median home value. Prior to development in the early 1990s, census block groups containing BRSs had a Median Home Value in the two lower intervals, thus the highest median home value in 1990 for a host block group was \$152,489. Between 2000 and 2010 (see Figures 20-21), median home value appears to steadily increase in the Near North and Near South area. However, in the Far South, median home values decrease to the lower two intervals.

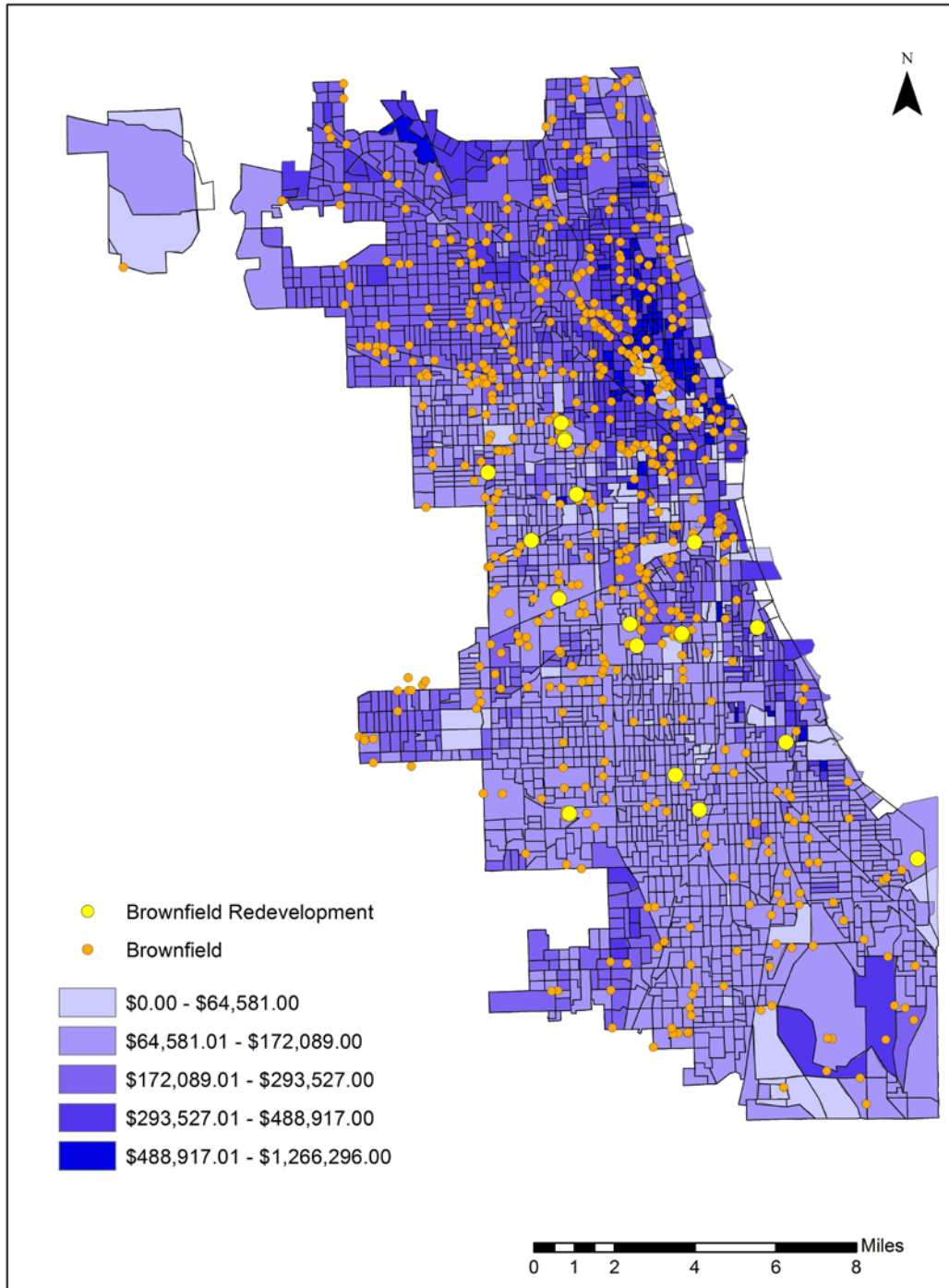
Figures 22-24 present median gross rent at the census block unit of analysis for each decennial: 1990, 2000, and 2010. From 1990-2000 (see Figures 22 and 23), one can observe an increase in median gross rent occurring in the Near North area, particularly in census block groups near downtown. Median gross rent in census block groups with BRSs experienced a slight increase in the Near South and South East areas by up to two intervals. In contrast, median gross rent in census block groups in the Far South appears to decrease over the three decades from the second interval \$59,393 - \$152,489 in 1990 and 2000, and the decreasing in some census block groups to the 1st interval \$0-\$142,987. Interestingly, median gross rent increases between 1990-2000 from the first interval to the second interval, and then decreases one interval between 2000-2010 in the census block group containing BRS#16 in the South Chicago area (see Figures 23 and 24).

Figure 19: Map of Median Home Value by Chicago Census Block Groups in 1990



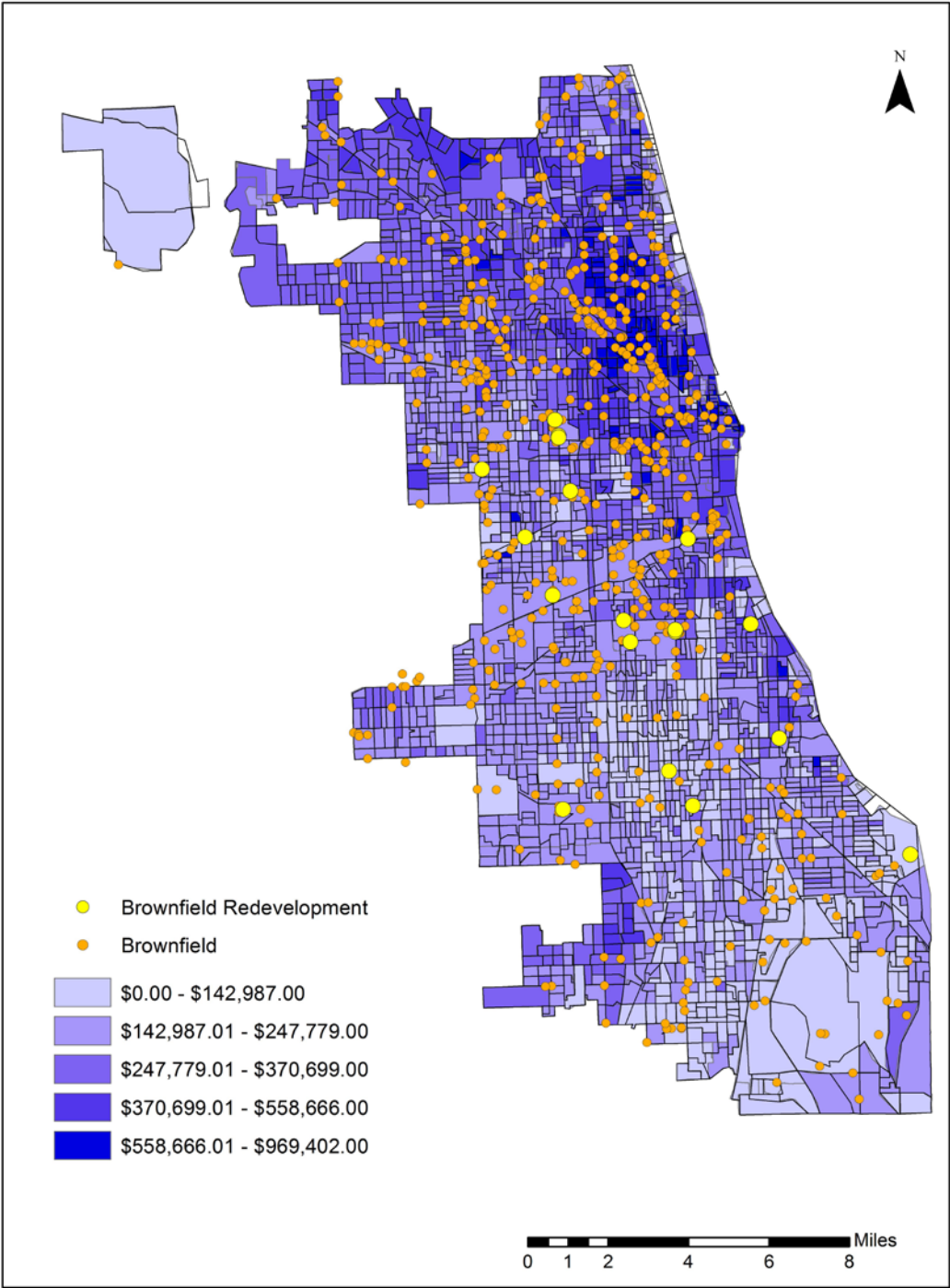
Source: City of Chicago and U.S. Census Bureau

Figure 20: Map of Median Home Value by Chicago Census Block Groups in 2000



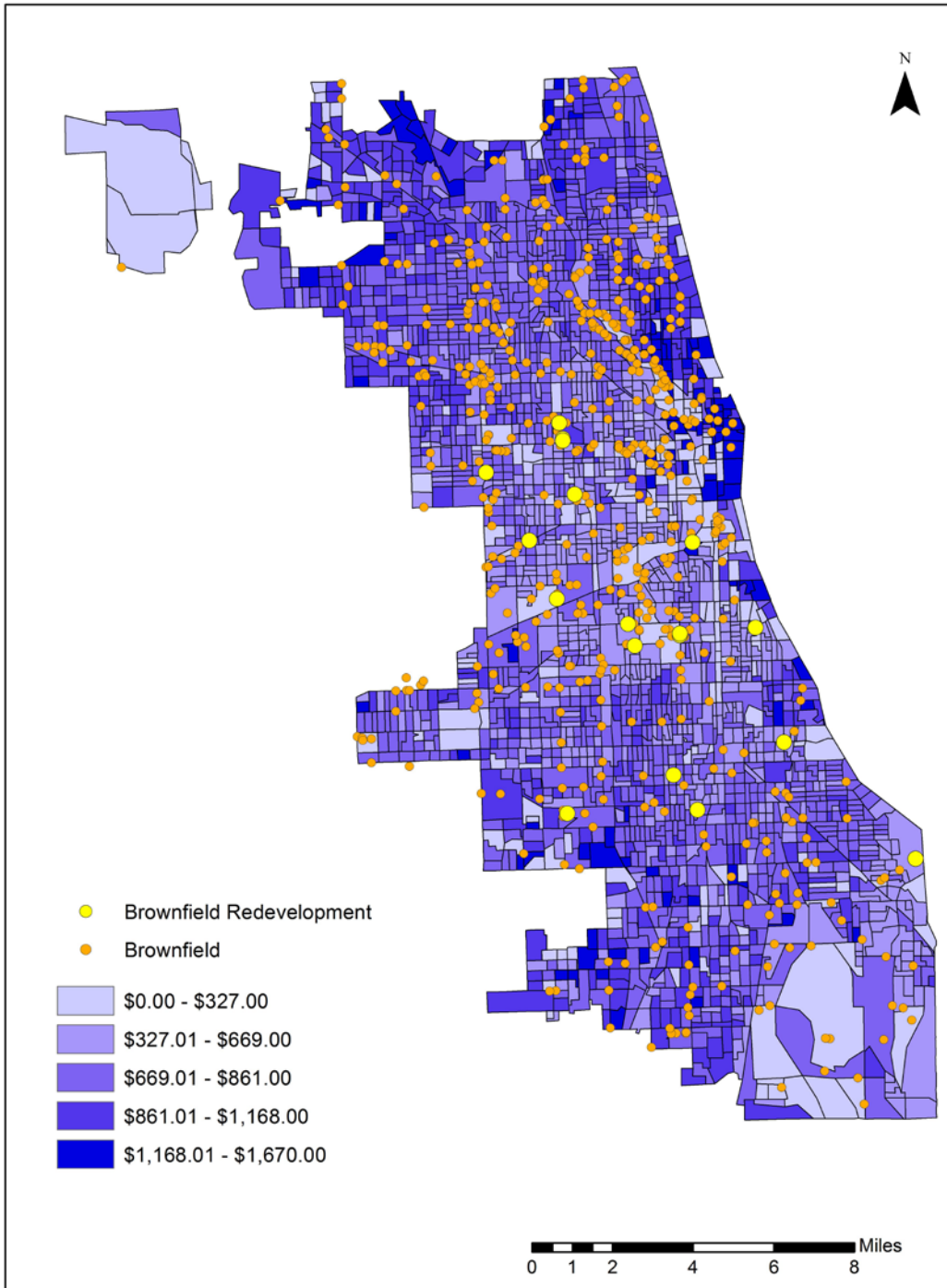
Source: City of Chicago and U.S. Census Bureau

Figure 21: Map of Median Home Value by Chicago Census Block Groups in 2010



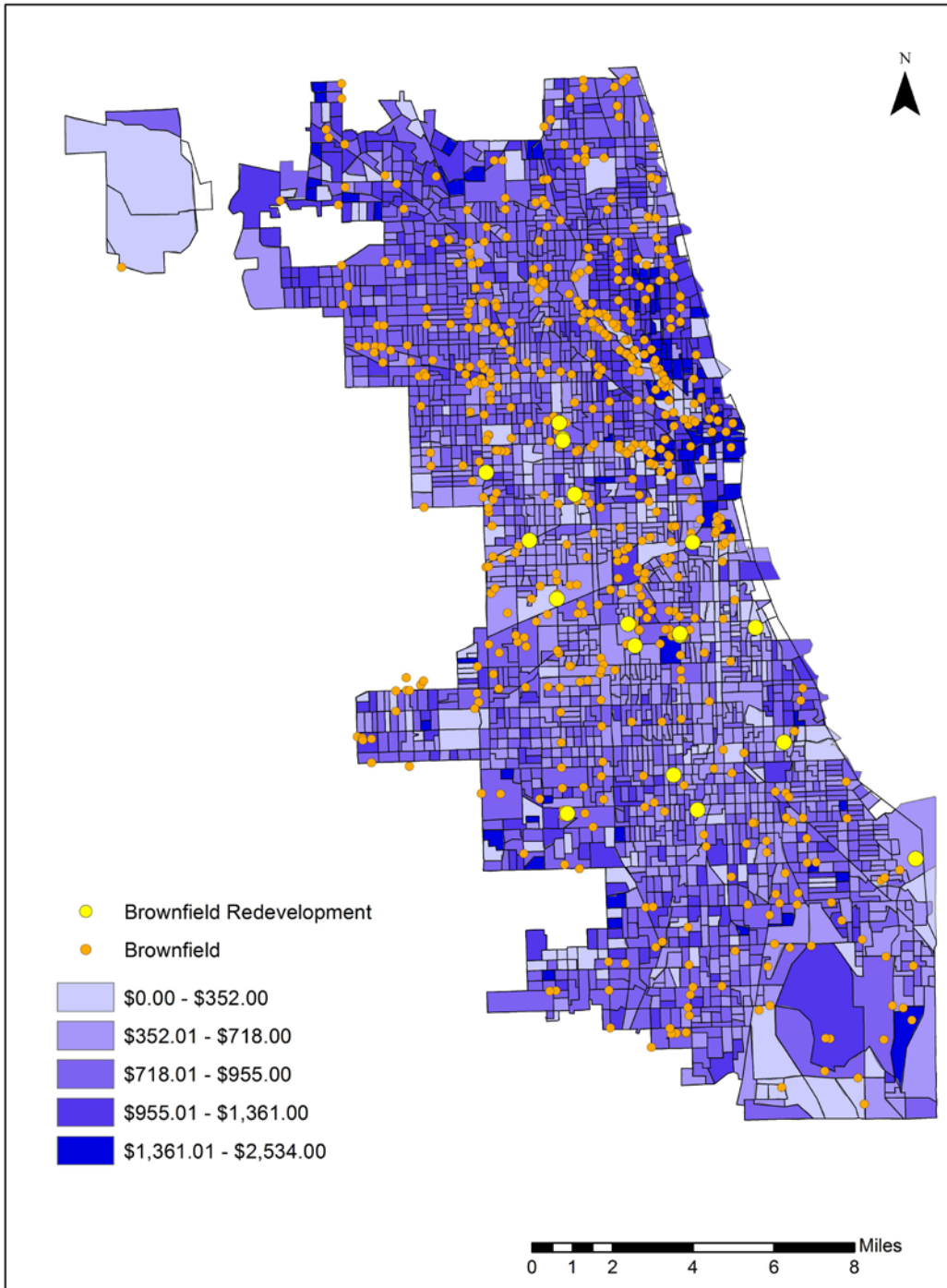
Source: City of Chicago and U.S. Census Bureau

Figure 22: Map of Median Gross Rent by Chicago Census Block Groups in 1990



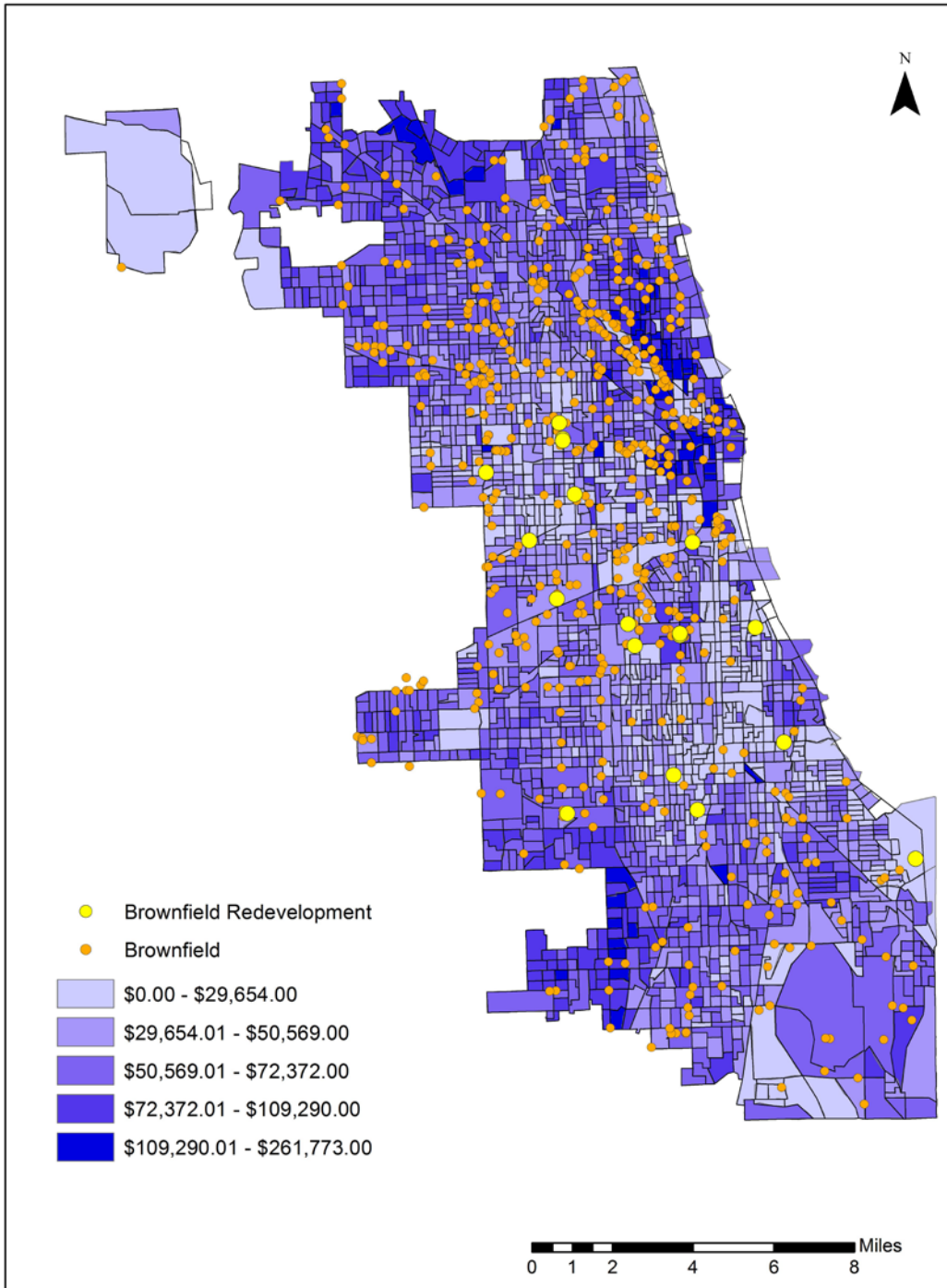
Source: City of Chicago and U.S. Census Bureau

Figure 23: Map of Median Gross Rent by Chicago Census Block Groups in 2000



Source: City of Chicago and U.S. Census Bureau

Figure 24: Map of Median Gross Rent by Chicago Census Block Groups in 2010



Source: City of Chicago and U.S. Census Bureau

Mapping Race and Ethnicity: White, Black and Hispanic

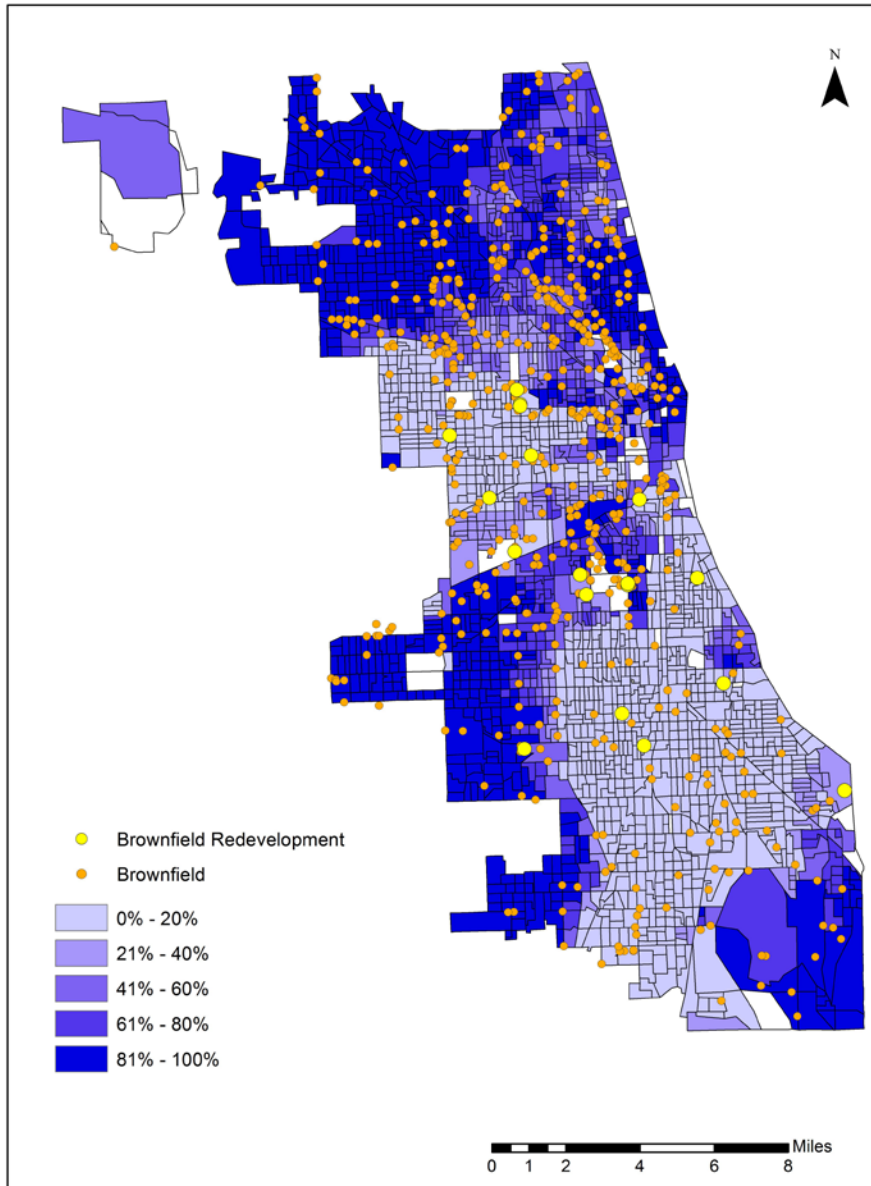
Figures 25-27 show the percentage of Whites in the total population within each census block group with an overlay of BRSs for 1990-2010. Across each census period, the spatial decline of the White population is striking. Between the 1990 and 2000 decennial census, a drastic decrease is observed in the Near South area and South Side at large, a striking visual example of White flight's tail end. Furthermore, the spatial distribution of the White population appears to decrease further towards the southwest and southeast city limits over the three time periods.

Figures 28-30 spatially illustrate the percentage of Blacks in the total population within each census block group with an overlay of brownfield and BRSs for 1990-2010. As one can observe, Chicago's Black population is mostly located in the northwest and southeastern portions of the city. Furthermore, 13 out of 18 BRSs are located within census block groups in which Blacks comprise more than 81% of the block group population. In addition, The Southeast area appears to have a slight decrease in the percentage of Black population between 2000 and 2010, from 81-100% to 61-80% percent range. Also, South Chicago's percentage of Black population increased over the three periods being studied.

Figures 31-33 reflect the percentage of Hispanics from the total population within each census block group with an overlay of brownfield and BRSs for 1990-2010. The growth of the Hispanic population is spatially represented over the three decennials, particularly in the Near South area. An interesting observation occurs in the Near North area where the Hispanic population appears to shift further towards Chicago's northwest end over the three time periods and also shifting away from the brownfield redevelopments in the area. In addition, an increase in the Hispanic population in the South Chicago area occurs between 1990-2010. However, it is

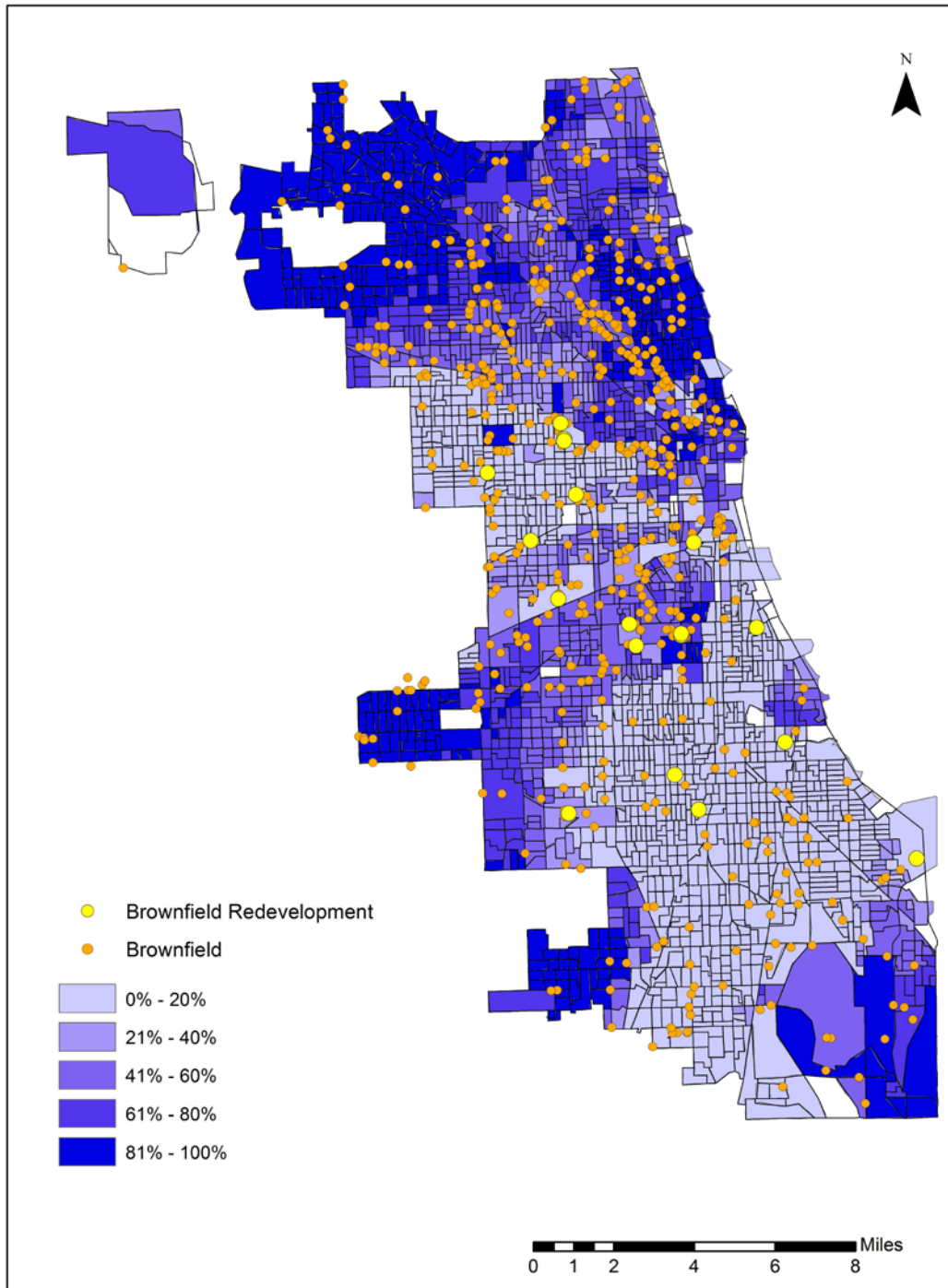
important to note that as this increase occurs, the census block group containing the brownfield redevelopment experiences a drastic decline in the Hispanic population.

Figure 25: Map of Percent White from Total Population in Chicago Census Block Groups 1990



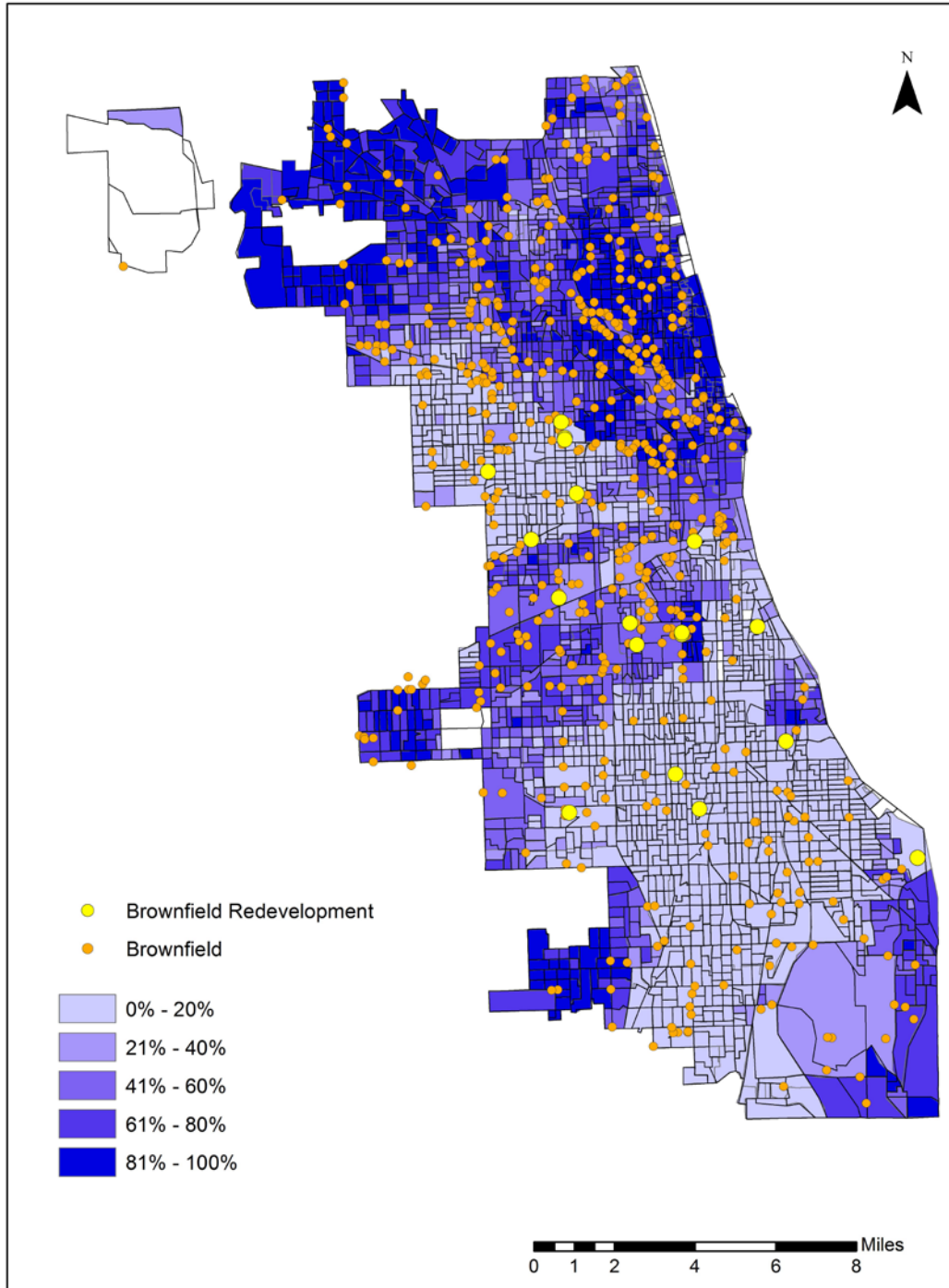
Source: City of Chicago and U.S. Census Bureau

Figure 26: Map of Percent White from Total Population in Chicago Census Block Groups 2000



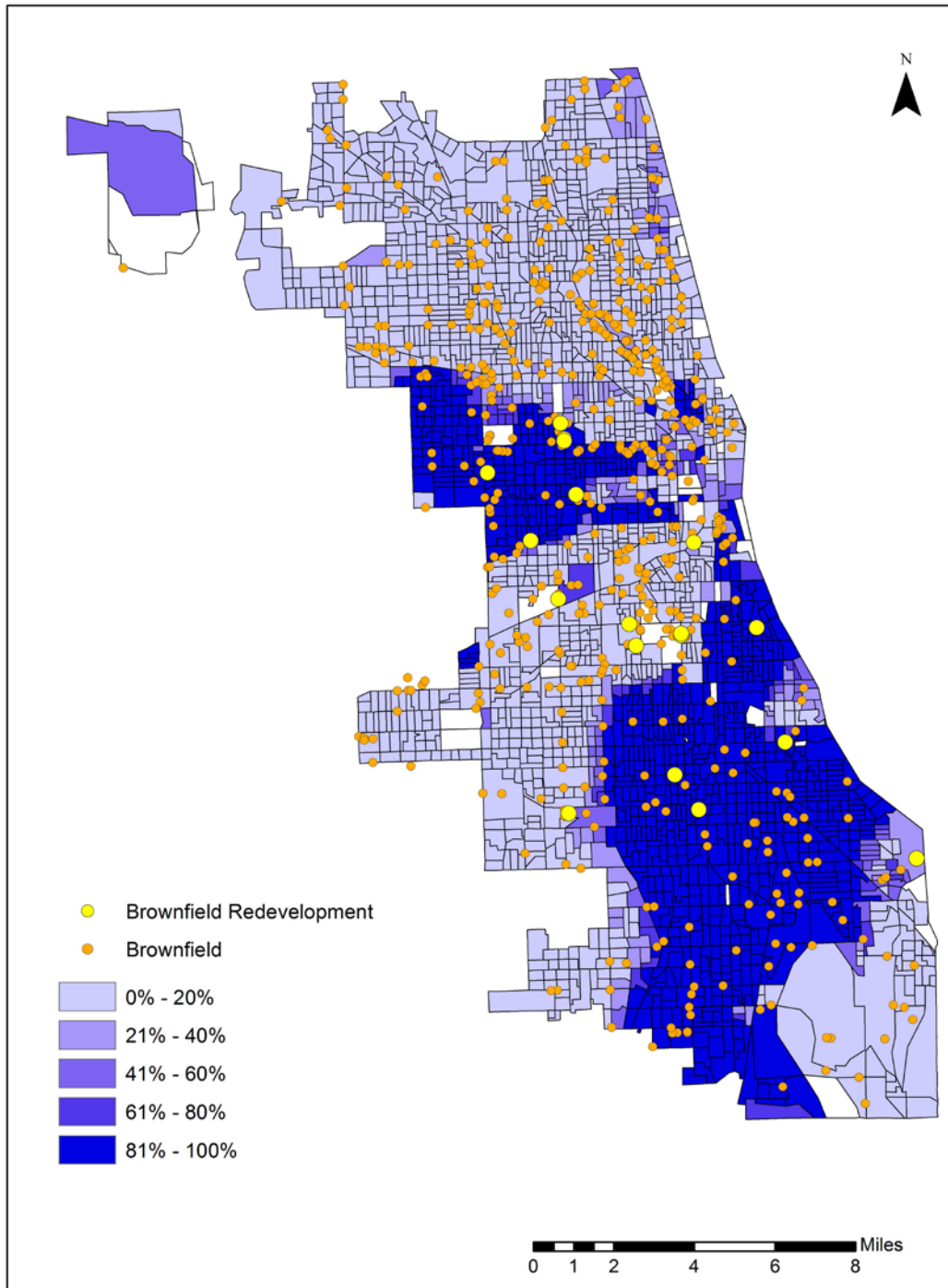
Source: City of Chicago and U.S. Census Bureau

Figure 27: Map of Percent White from Total Population in Chicago Census Block Groups 2010



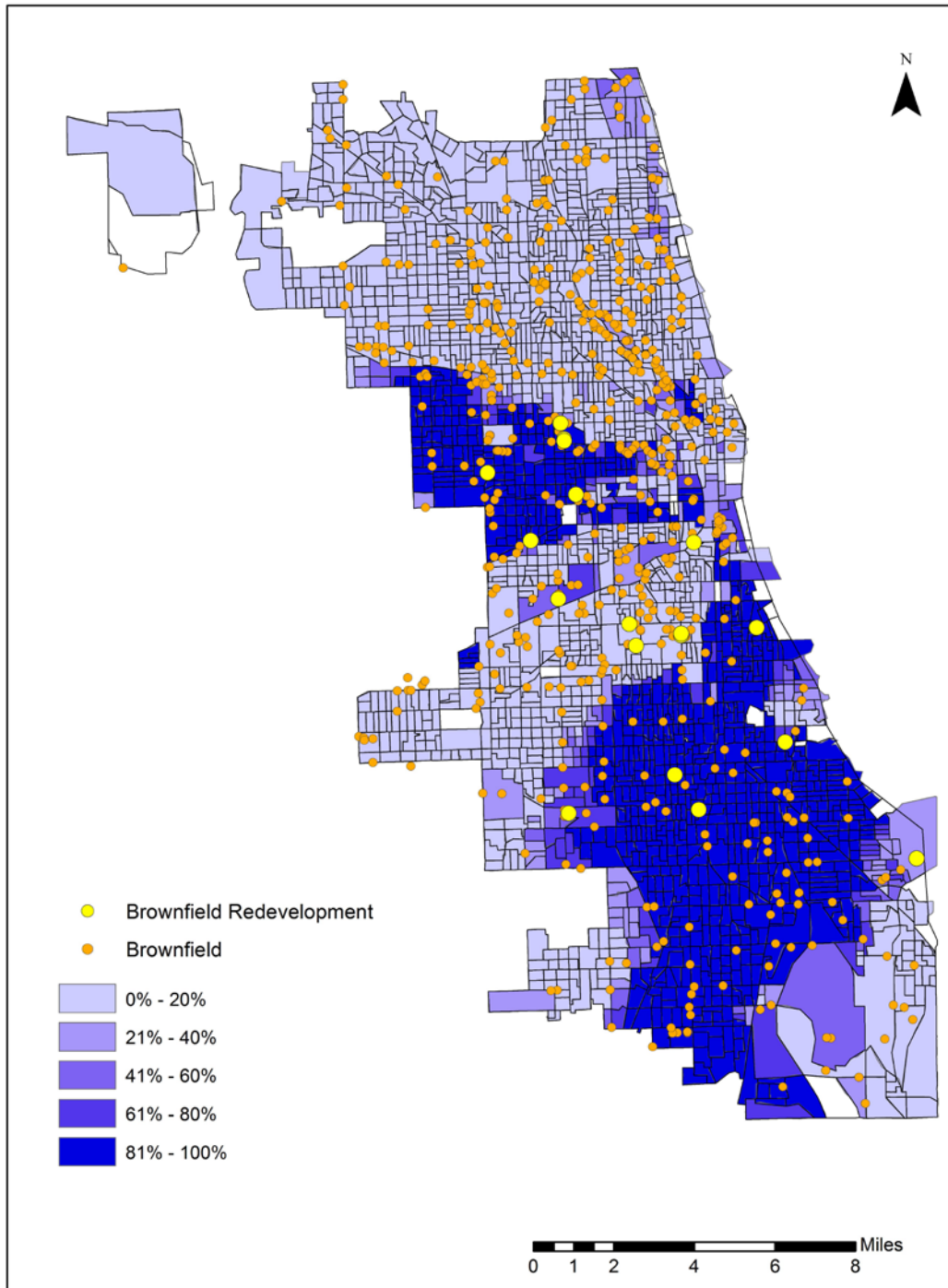
Source: City of Chicago and U.S. Census Bureau

Figure 28: Map of Percent Black from Total Population in Chicago Census Block Groups 1990



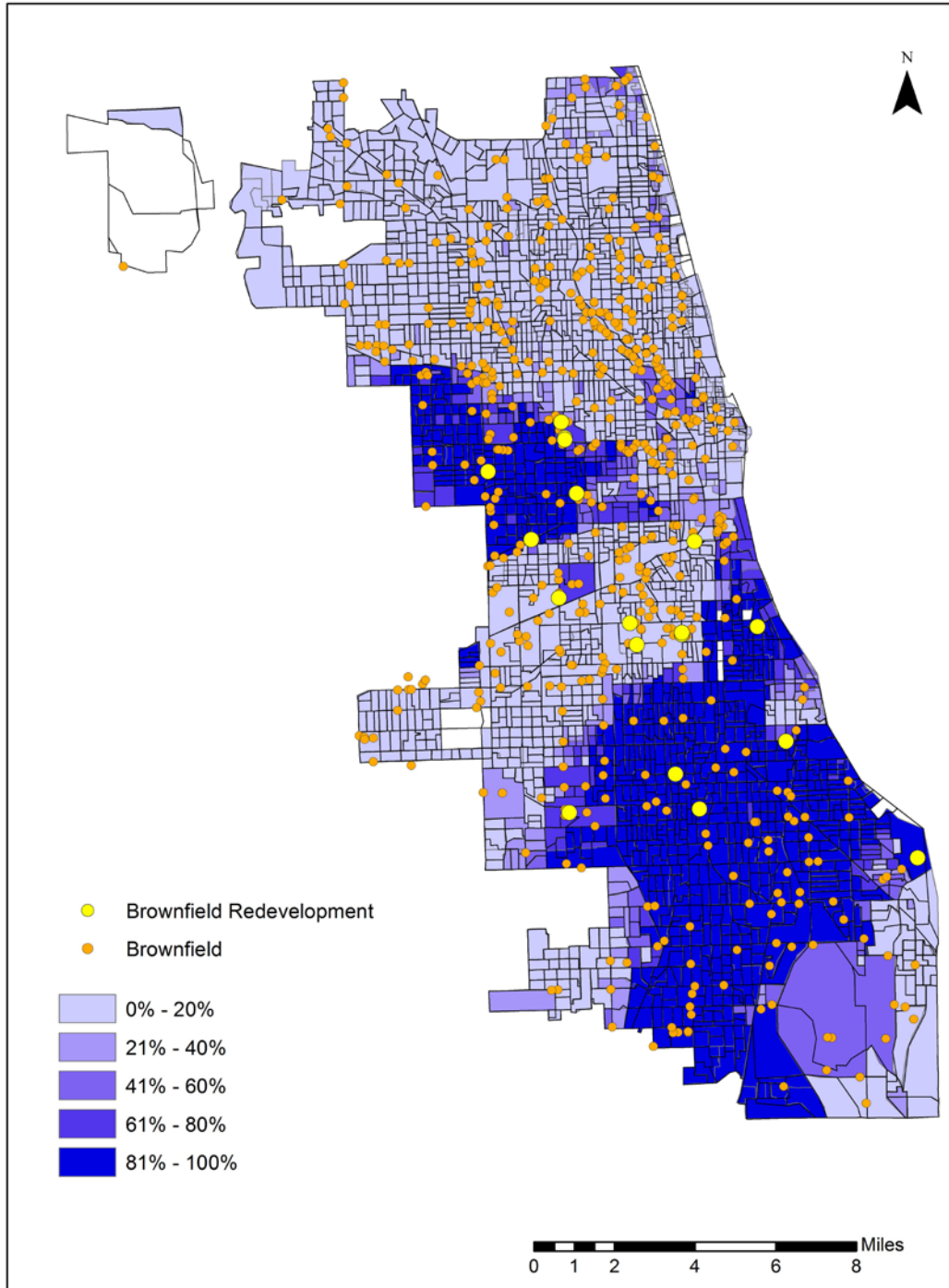
Source: City of Chicago and U.S. Census Bureau

Figure 29: Map of Percent Black from Total Population in Chicago Census Block Groups 2000



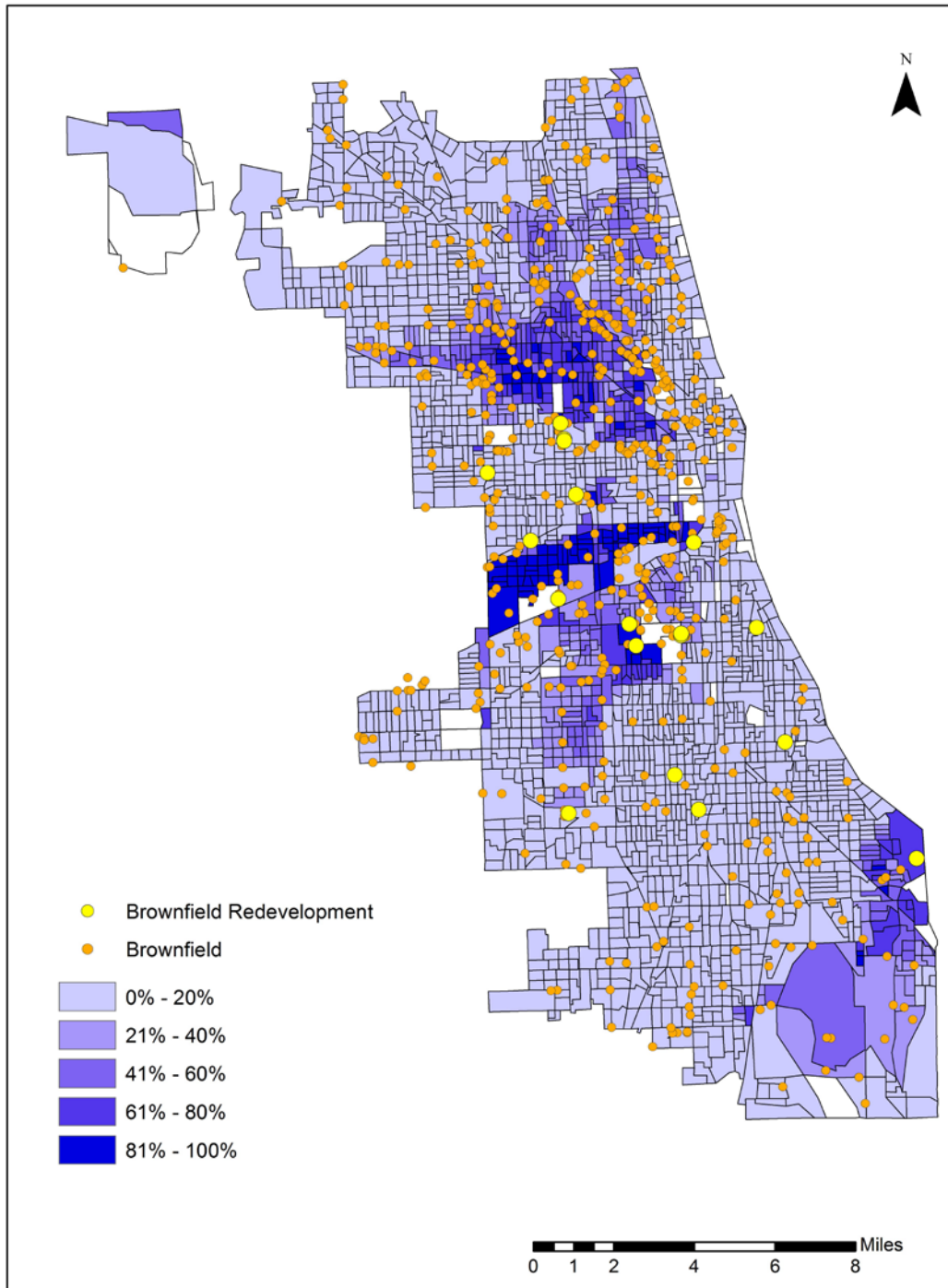
Source: City of Chicago and U.S. Census Bureau

Figure 30: Map of Percent Black from Total Population in Chicago Census Block Groups 2010



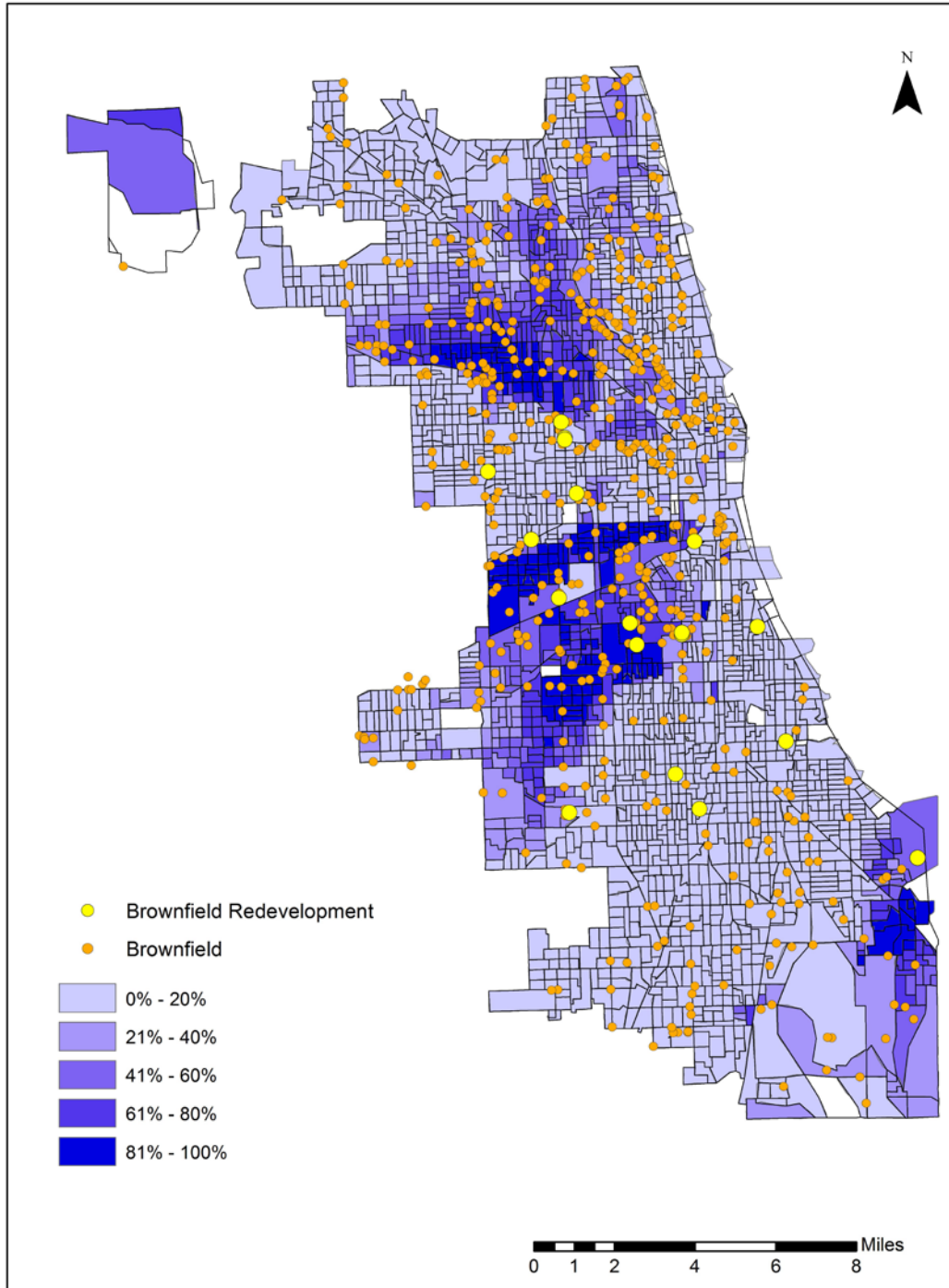
Source: City of Chicago and U.S. Census Bureau

Figure 31: Map of Percent Hispanic from Total Population in Chicago Census Block Groups 1990



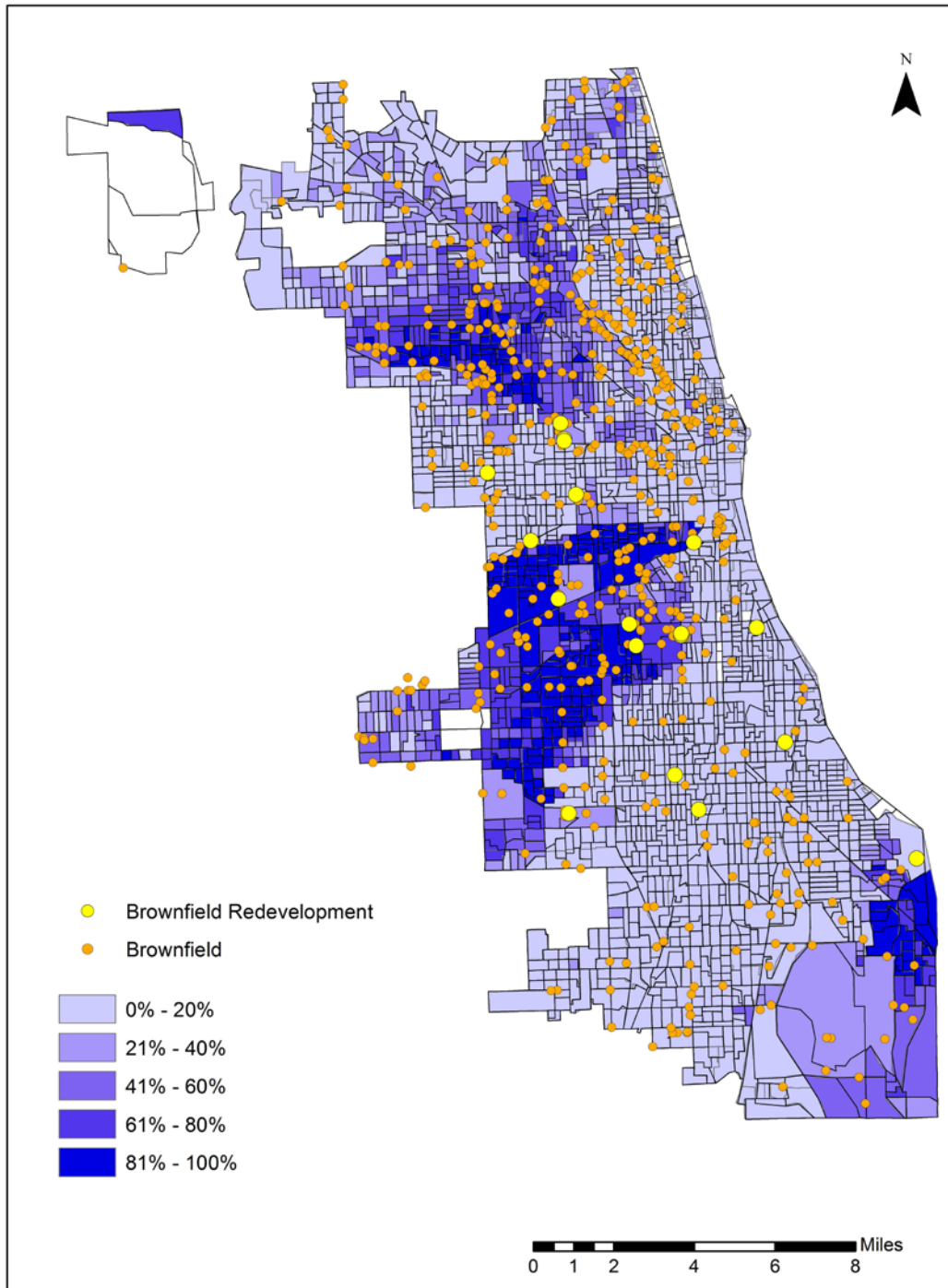
Source: City of Chicago and U.S. Census Bureau

Figure 32: Map of Percent Hispanic from Total Population in Chicago Census Block Groups 2000



Source: City of Chicago and U.S. Census Bureau

Figure 33: Map of Percent Hispanic from Total Population in Chicago Census Block Groups 2010

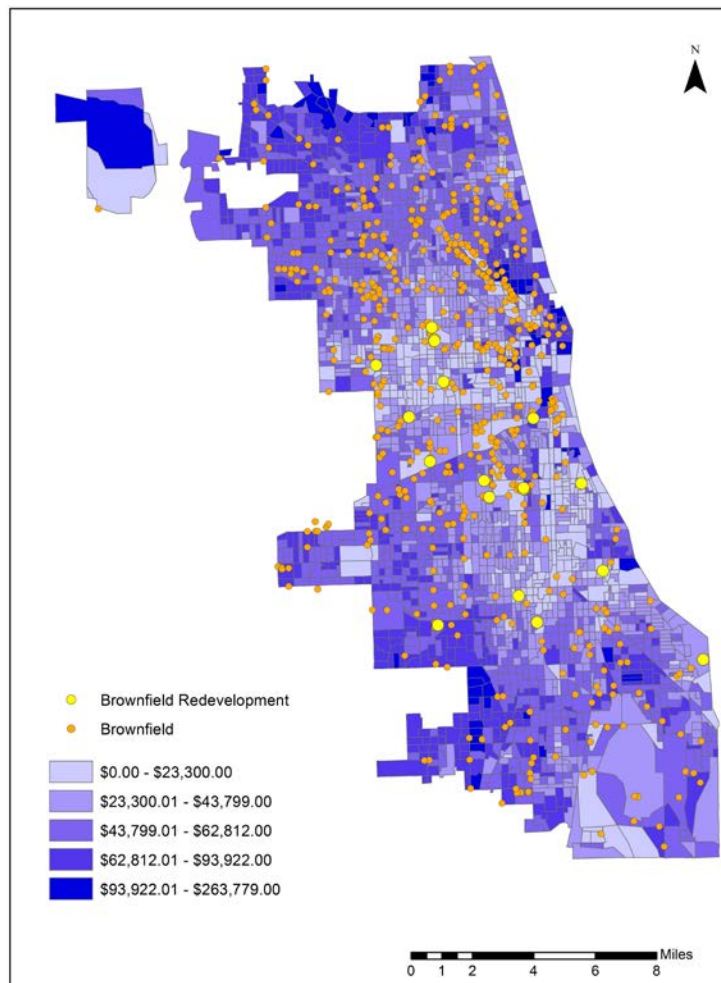


Source: City of Chicago and U.S. Census Bureau

Mapping Median Household Income

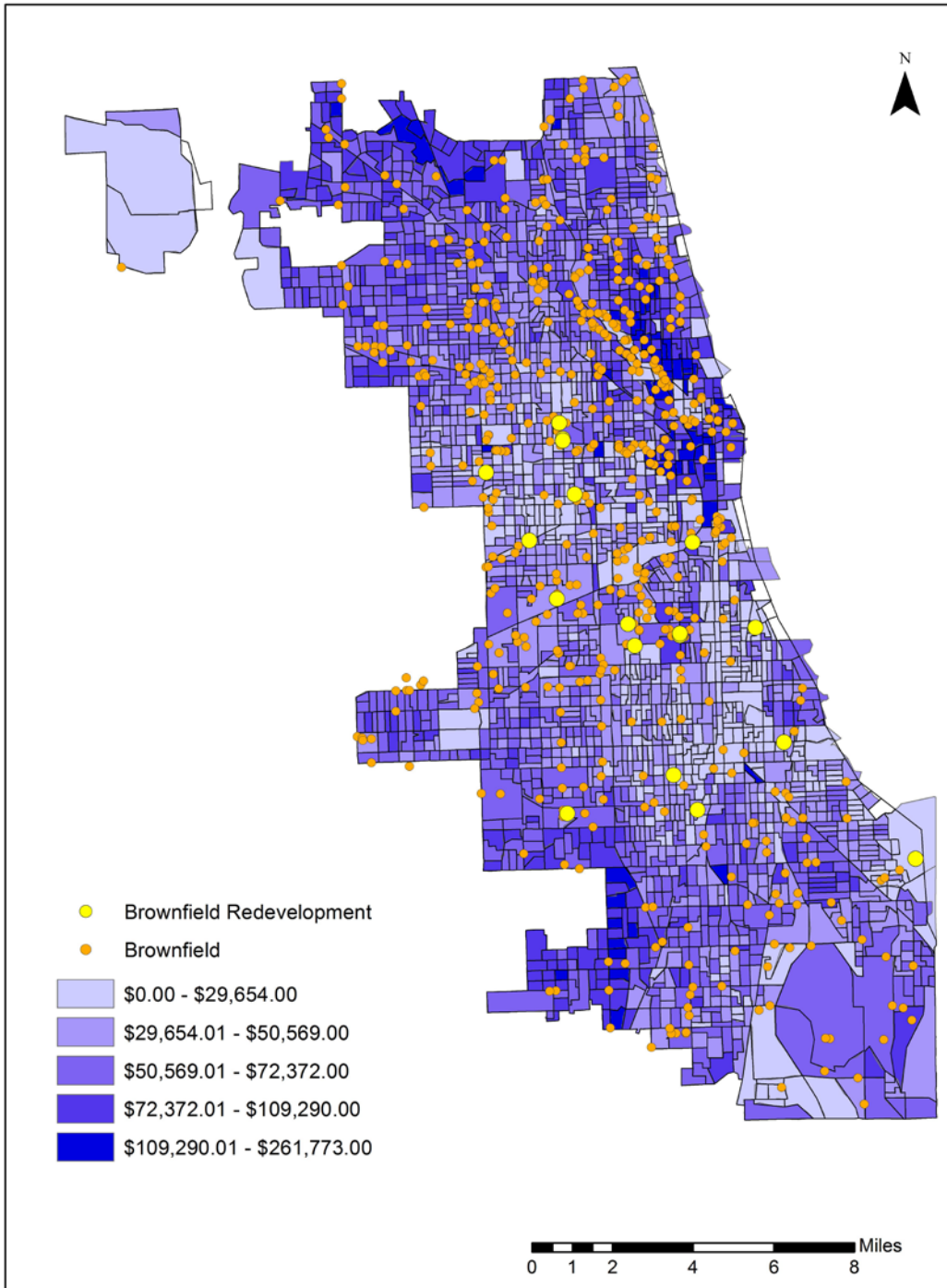
Figures 34-35 display the median household income for Chicago's census block groups with an overlay of brownfield and BRSs for 1990-2010. Between the 1990 and 2000 census, the median household income appears to increase from the first interval to the second interval range for the Near North, Near South, and Southeast. Data on median household income for 2010 is not available from the U.S. Census since income was not a variable included in the 2010 decennial survey. As a result, the total population's income cannot be displayed.

Figure 34: Map of Median Household Income by Chicago Census Block Groups in 1990



Source: City of Chicago and U.S. Census Bureau

Figure 35: Map of Median Household Income by Chicago Census Block Groups in 2000



Source: City of Chicago and U.S. Census Bureau

Data Analysis of Demographic Shifts by Chicago Area

Near North Area | White Population

Figure 36 and Tables 2 and 3 show the distribution of the White population within a 1-mile, 0.5 mile, and 0.25 mile radius from five BRSs in Chicago's Near North area. Overall, the White population increased between 1990, 2000, and 2010 around a 1 mile, 0.5 mile, and 0.25 mile radius. Between 1990 and 2000, the White population increased by 9% within 1 mile, 11% within 0.5 mile, and 31% within 0.25 mile from a redeveloped brownfield site (see Tables 2 and 3). Between 2000 and 2010, the White population increased by 22% within 1 mile, 47% within 0.5 mile and 72% within 0.25 mile of a redeveloped brownfield site (see Tables 2 and 3).

Although the White population increased across each decennial at the 0.25 mile, the population size is rather small. For example, the White population near BRS #7, the California Avenue Business Park, was 23 in 1990, 26 in 2000, and 83 in 2010 at the 0.25 mile. Furthermore, the White population within 0.5 miles of BRS#7 experienced a 172% increase between 2000 and 2010 with a population of 473 in year 2000. In 2010, the White population in BRS#7 rose to 1,290. The White population had the largest population increases near BRS #3, #4, and #8. The latter two sites are industrial, and BRS #8 is home to Chicago Center for Green Technology, a green jobs training center.

Figure 36: Total White Population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs

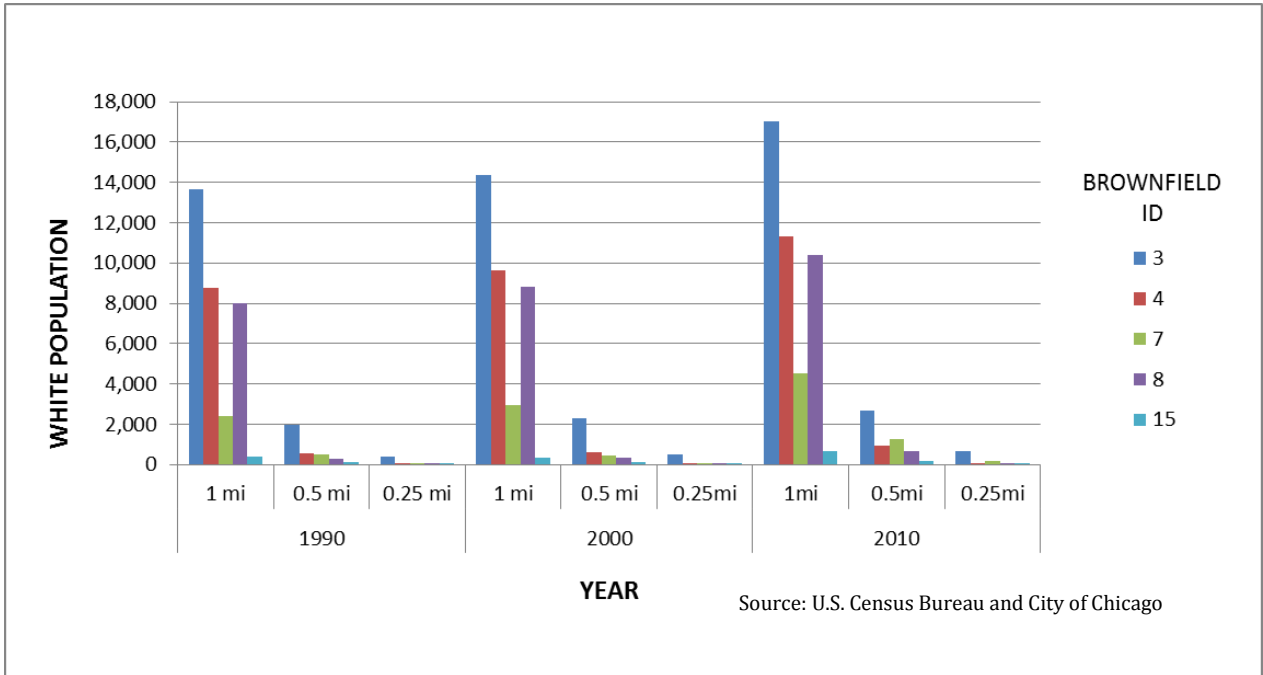


Table 2: Total White population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
3	13663	1964	406	14359	2322	505	17055	2656	674
4	8761	566	6	9661	630	22	11303	937	73
7	2416	528	23	2955	473	26	4508	1290	187
8	8001	309	7	8824	347	22	10408	666	83
15	420	126	19	338	107	29	686	161	21
Total	33261	3492	460	36136	3879	605	43959	5709	1039

Source: U.S. Census Bureau and City of Chicago

Table 3: Percent Change of White population in Near North Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
3	5%	19%	25%	18%	14%	35%	24%	33%	66%
4	10%	17%	29%	11%	49%	66%	291%	227%	1181%
7	22%	53%	87%	-10%	172%	145%	12%	634%	721%
8	10%	18%	30%	12%	92%	115%	240%	272%	1167%
15	-20%	103%	63%	-15%	51%	28%	55%	-28%	11%
Total	9%	22%	32%	11%	47%	63%	31%	72%	126%

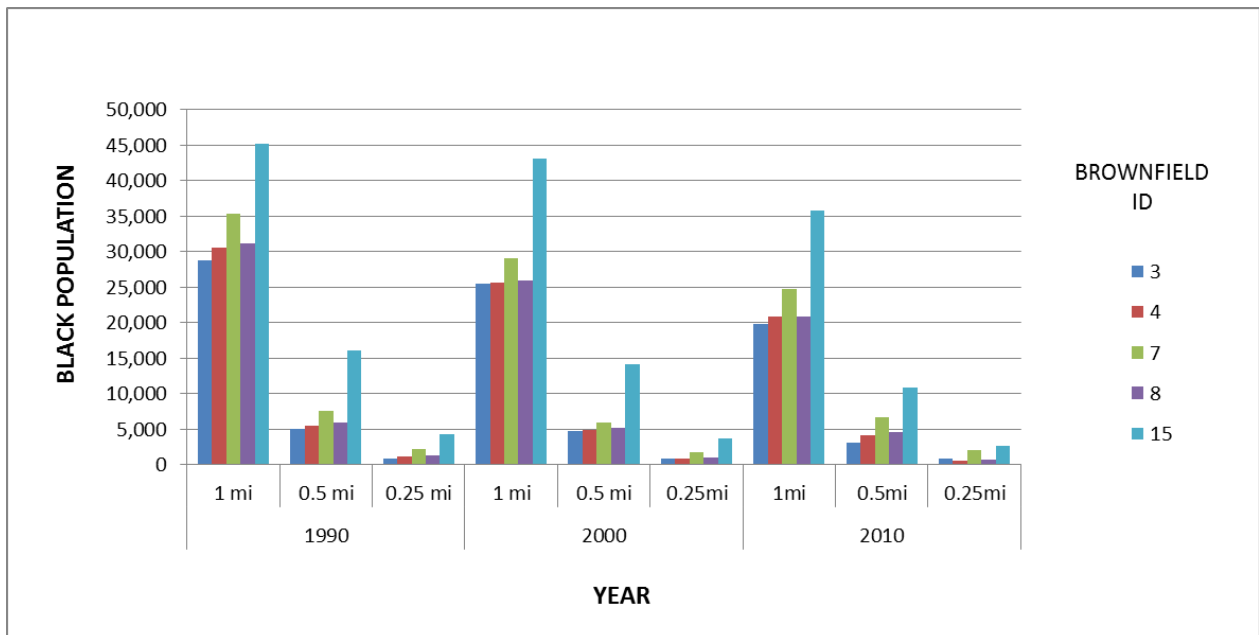
Source: U.S. Census Bureau and City of Chicago

Near North Area | Black Population

Figure 36 and Tables 4 and 5 reveal the Black population within a 1 mile, 0.5 mile, and 0.25 mile radius from five BRSs in Chicago’s Near North area. In contrast to the White population increase over the three time periods in the Near North area, the Black population decreases. This is reinforced by Table 5, which shows negative percent changes, except for the percent change between 2000 and 2010 at the 0.5 mile and 0.25 mile radius from BRS #7, the California Avenue Business Park.

Overall, between 1990 and 2000, the Black population in the Near North area declined by 13% within 1 mile and 0.5 mile, and decreased by 15% within 0.25 miles of a redeveloped brownfield site. Between 2000 and 2010, the Black population decreased by 18 percent within 1 mile, declined by 16% within 0.5 mile, and continued to decline by 18% within 0.25 mile of a redeveloped brownfield site in the Near North area (see Tables 4 and 5).

Figure 37: Total Black Population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs



Source: City of Chicago and U.S. Census Bureau

Table 4: Total Black Population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
3	28805	5063	765	25523	4638	870	19823	3032	802
4	30498	5449	1075	25622	4878	839	20791	4168	580
7	35299	7579	2238	29062	5852	1735	24731	6641	1947
8	31097	5840	1230	25854	5111	1008	20907	4521	681
15	45160	16107	4266	43141	14157	3641	35839	10877	2622
Total	170859	40038	9574	149203	34636	8093	122090	29238	6632

Source: U.S. Census Bureau and City of Chicago

Table 5: Percent Change of Black Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Near North Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
3	-11%	-22%	-31%	-8%	-35%	-40%	14%	-8%	5%
4	-16%	-19%	-32%	-10%	-15%	-24%	-22%	-31%	-46%
7	-18%	-15%	-30%	-23%	13%	-12%	-22%	12%	-13%
8	-17%	-19%	-33%	-12%	-12%	-23%	-18%	-32%	-45%
15	-4%	-17%	-21%	-12%	-23%	-32%	-15%	-28%	-39%
Total	-13%	-18%	-29%	-13%	-16%	-27%	-15%	-18%	-31%

Source: U.S. Census Bureau and City of Chicago

Near North Area | Hispanic Population

Figure 38 and Tables 6 and 7 display the distribution of Hispanic Population within a 1 mile, 0.5 mile, and 0.25 mile radius from five BRSs in Chicago's Near North Area. As was the case with the Black population, the Hispanic population within close proximity to most brownfield redevelopments in the Near North area also declined over the three time periods. This finding is strengthened by the percent change between 1990 and 2000, and between 2000 and 2010 for BRS#3, #4, and #8. The negative percent change is more pronounced in the 1 mile and 0.5 mile radius as BRSs #4, #7, and #8 demonstrate high and positive percent change. Overall, between 1990 and 2000, the Hispanic population declined by 11% within 1 mile, 9% within 0.5 mile, and 15% within 0.25 mile of redeveloped brownfield sites in the Near North area. Between 2000 and 2010, the Hispanic population declined by 23% within 1 mile, increased by 7% within 0.5 mile, and continued to increase by 31% in the Near North area.

Figure 38: Total Hispanic Population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs

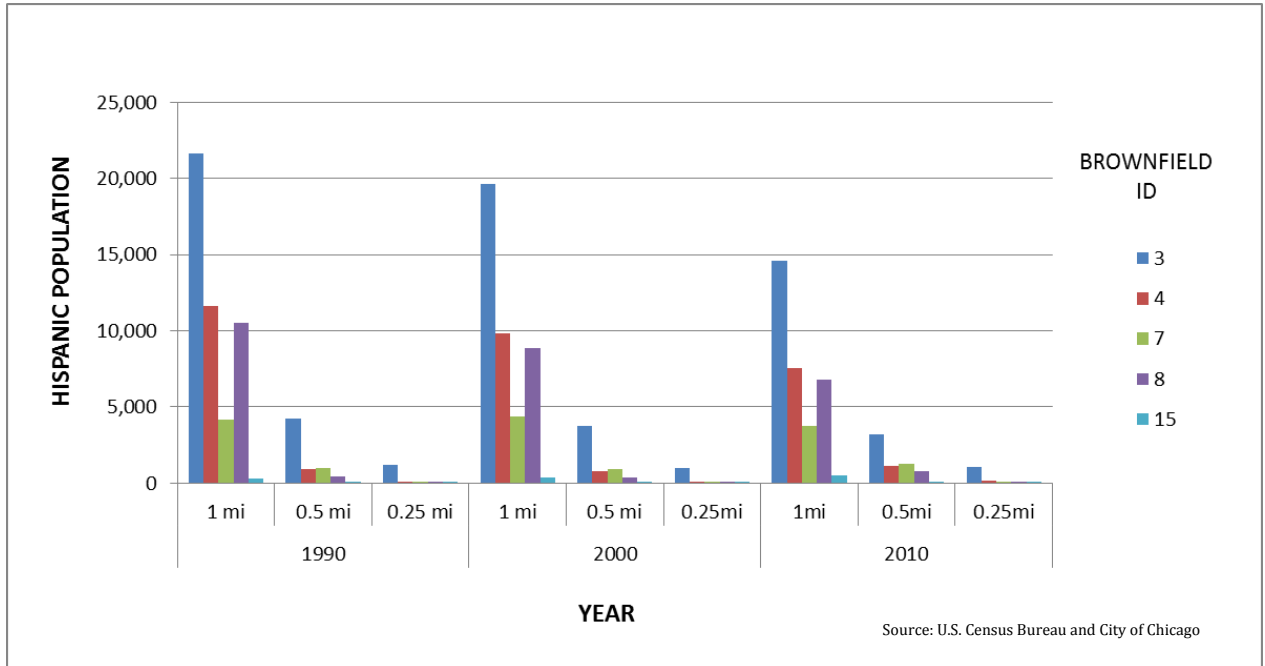


Table 6: Total Hispanic population in Near North Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
3	21618	4214	1229	19664	3731	984	14579	3218	1055
4	11651	891	7	9851	784	26	7534	1105	127
7	4193	974	13	4350	944	29	3776	1268	125
8	10511	437	7	8859	398	32	6813	780	123
15	301	65	14	346	113	25	485	43	2
Total	48274	6581	1270	43071	5969	1094	33188	6415	1431

Source: U.S. Census Bureau and City of Chicago

Table 7: Percent Change of Hispanic population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Near North Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
3	-9%	-26%	-33%	-11%	-14%	-24%	-20%	7%	-14%
4	-15%	-24%	-35%	-12%	41%	24%	264%	394%	1698%
7	4%	-13%	-10%	-3%	34%	30%	115%	334%	834%
8	-16%	-23%	-35%	-9%	96%	79%	357%	289%	1677%
15	15%	40%	61%	74%	-62%	-33%	77%	-94%	-89%
Total	-11%	-23%	-31%	-9%	7%	-3%	-14%	31%	13%

Source: U.S. Census Bureau and City of Chicago

Near South Area | White Population

Figure 39 and Tables 8 and 9 illustrate the movement of the White population within a 1 mile, 0.5 mile, and 0.25 mile of BRSs in Chicago's Near South Area. As observed in Figure 39 and Table 8, the White population increases gradually across the three census periods. The percent change is more pronounced between 2000 and 2010 where most sites document a percent change higher than 25% (see Figure 39). The only exception is BRS #2, as it reveals a negative percent change across the three periods and radii size. BRS#2 was the former Chicago Board of Education headquarters. The site is now used as a storage facility for the City of Chicago.

Overall, between 1990 and 2000, the White population increased by 12 percent within 1-mile, 2% within 0.5 mile, and declined by 6% within 0.25 mile of a redeveloped brownfield site. Between 2000 and 2010, the population increased by 26% within 1 mile, 29% within 0.5 mile, and 21% within 0.25 mile of a redeveloped brownfield site.

Figure 39: Total White Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs

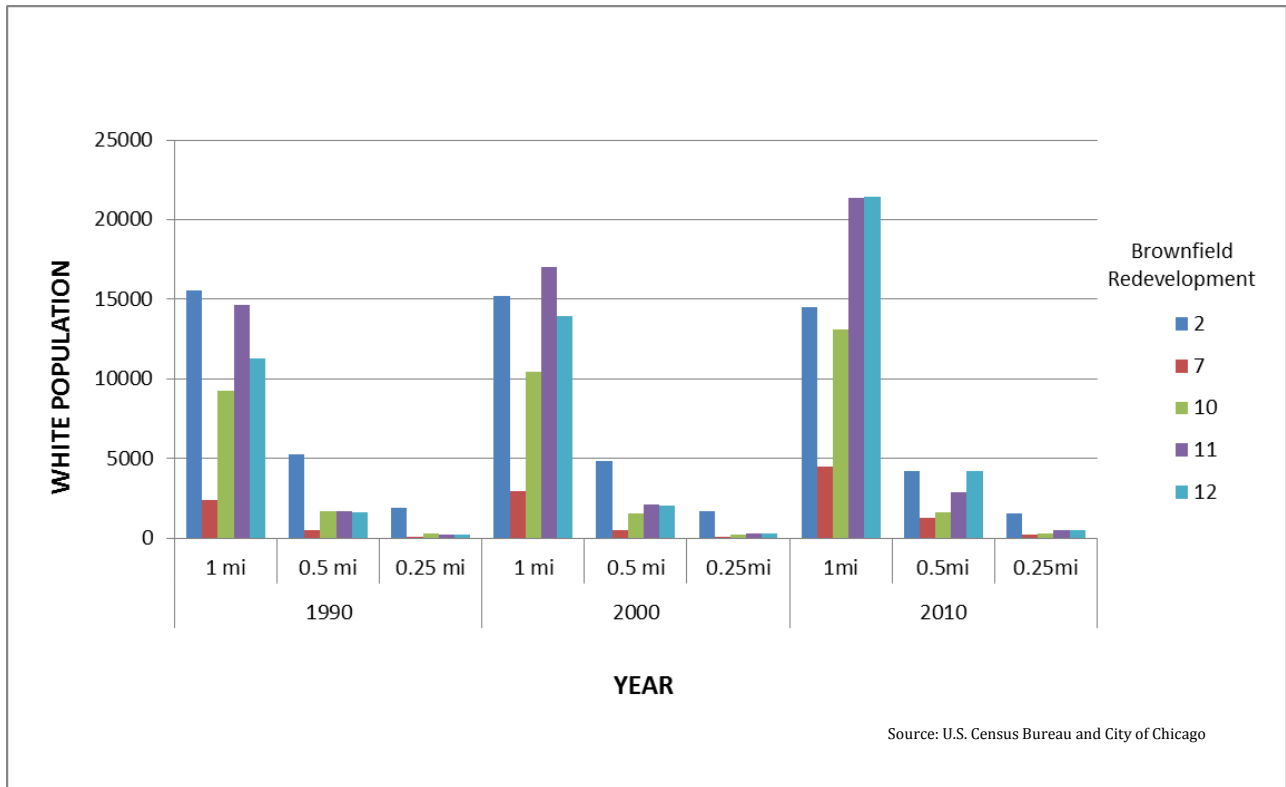


Table 8: Total White Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
2	15551	5272	1919	15189	4806	1656	14517	4232	1552
7	2416	528	23	2955	473	26	4508	1290	187
10	9226	1694	254	10447	1549	201	13126	1611	281
11	14642	1700	183	17032	2117	278	21383	2851	472
12	11284	1594	215	13921	2067	288	21448	4210	474
Total	53119	10788	2594	59544	11013	2448	74981	14194	2967

Source: U.S. Census Bureau and City of Chicago

Table 9: Percent Change of White Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Near South Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
2	-2%	-4%	-7%	-9%	-12%	-20%	-14%	-6%	-19%
7	22%	53%	87%	-10%	172%	145%	12%	634%	721%
10	13%	26%	42%	-9%	4%	-5%	-21%	40%	11%
11	16%	26%	46%	25%	35%	68%	51%	70%	157%
12	23%	54%	90%	30%	104%	164%	34%	65%	121%
Total	12%	26%	41%	2%	29%	32%	-6%	21%	14%

Source: U.S. Census Bureau and City of Chicago

Near South Area | Black Population

Figure 40 and Tables 10 and 11 document the shifts in the Black population within a 1 mile, 0.5 mile, and 0.25 mile of BRSs in Chicago's Near South Area. Overall, the Black population reflects a decrease during the three time periods and radii distances. Between 1990 and 2000, the Black population declined by 9% within 1 mile, 7% within 0.5mile, and 9% within 0.25 mile of redeveloped brownfield sites. Between 2000 and 2010, the Black population declined by 20% within 1 mile, 10% within 0.5mile and 13% within 0.25 mile of redeveloped brownfield sites (see Table 11). These decreases are most apparent in BRS#7 and BRS#12, Carole Robertson Center for Learning. However, BRS#11, Job Corps training center, reveals an increase in Black population within a 1 mile radius. The population increased from 3,782 to 7,954 between 1990 and 2000, but declined in 2010 to 6,599, resulting in a -17% change between 2000 and 2010 (see Table 11).

Figure 40: Total Black Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

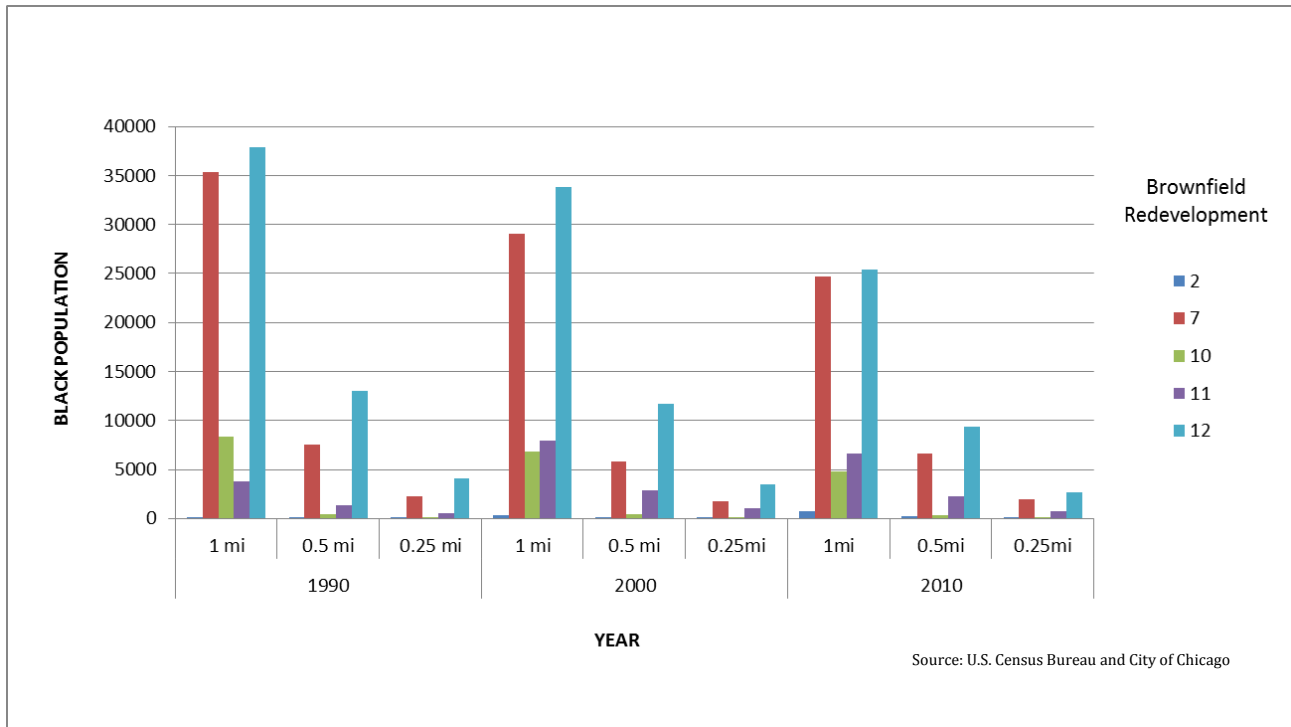


Table 10: Total Black Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
2	42	11	2	359	116	33	704	212	78
7	35299	7579	2238	29062	5852	1735	24731	6641	1947
10	8361	425	177	6794	410	131	4763	291	67
11	3782	1394	524	7954	2866	1055	6599	2244	779
12	37851	13050	4108	33870	11705	3441	25445	9388	2663
Total	85335	22458	7049	78038	20949	6395	62242	18776	5534

Source: U.S. Census Bureau and City of Chicago

Table 11: Percent Change of Black Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Near South Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
2	745%	96%	1561%	1003%	83%	1917%	1398%	134%	3409%
7	-18%	-15%	-30%	-23%	13%	-12%	-22%	12%	-13%
10	-19%	-30%	-43%	-3%	-29%	-32%	-26%	-49%	-62%
11	110%	-17%	74%	106%	-22%	61%	101%	-26%	49%
12	-11%	-25%	-33%	-10%	-20%	-28%	-16%	-23%	-35%
Total	-9%	-20%	-27%	-7%	-10%	-16%	-9%	-13%	-21%

Source: U.S. Census Bureau and City of Chicago

Near South Area | Hispanic Population

Figure 41 and Tables 12 and 13 reveal the changes in the Hispanic population within a 1 mile, 0.5 mile, and 0.25 mile of BRSs in Chicago's Near South Area. In some cases, the Hispanic population increased as seen in the 1 mile, 0.5 mile, and 0.25 mile from BRS #11, Job Corps, and BRS #12, Carole Robertson Center for Learning. However, this increase is only observed between 1990 and 2000 as the Hispanic population near BRS#11 declines between 2000 and 2010 from 36,503 to 32,751 Hispanics, resulting in a -10% change (see Table 12 and 13). Overall, between 1990 and 2000, the Hispanic population increased by 19% within 1 mile, 27% within 0.5 mile, and 45% within 0.25 mile of a redeveloped brownfield site in its pre-development phase. Between 2000 and 2010, the Hispanic population decreased by 15% within 1 mile, 8% within 0.5 mile, and 12% within 0.25 mile of a redeveloped brownfield site in its post-redevelopment.

Figure 41: Total Hispanic Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

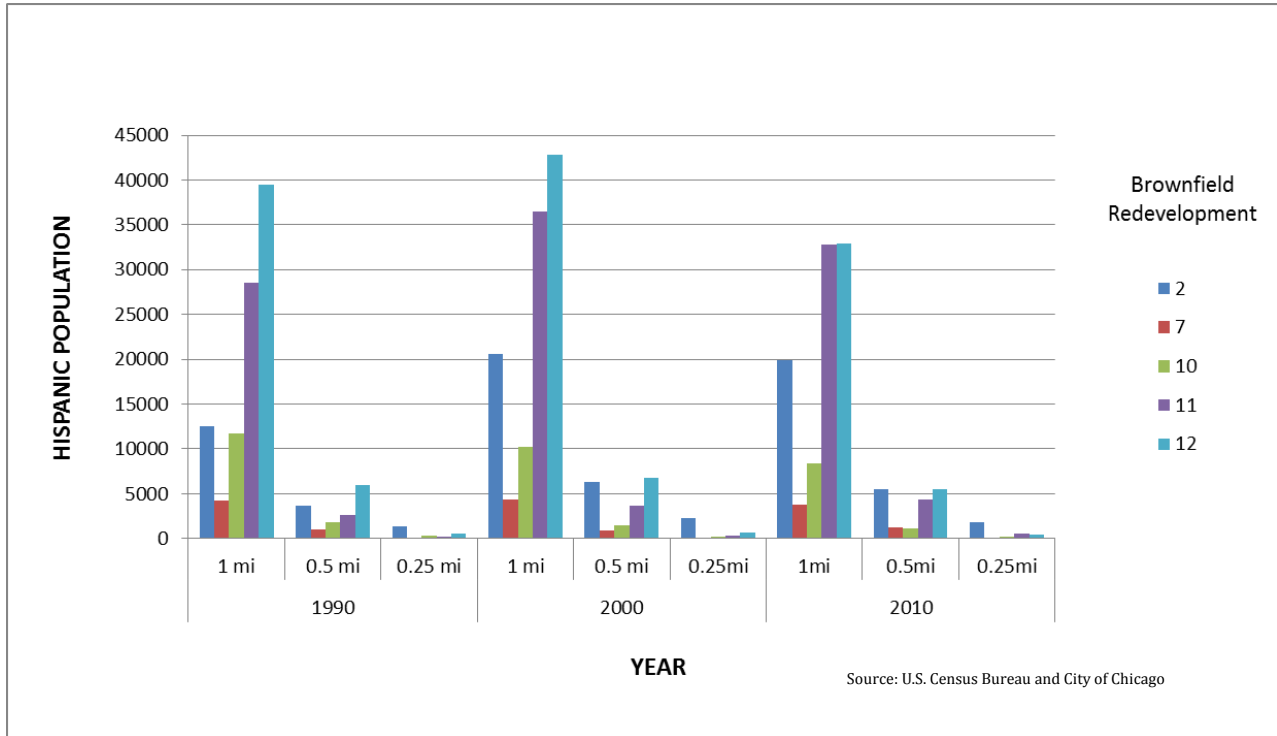


Table 12: Total Hispanic Population in Near South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
2	12578	3701	1313	20613	6342	2224	19917	5547	1822
7	4193	974	13	4350	944	29	3776	1268	125
10	11677	1803	320	10235	1442	252	8417	1180	151
11	28524	2676	185	36503	3666	296	32751	4295	502
12	39428	5945	580	42846	6814	693	32930	5454	471
Total	96400	15099	2411	114546	19208	3494	97791	17744	3070

Source: U.S. Census Bureau and City of Chicago

Table 13: Percent Change of Hispanic Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Near South Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
2	64%	-3%	58%	71%	-13%	50%	69%	-18%	39%
7	4%	-13%	-10%	-3%	34%	30%	115%	334%	834%
10	-12%	-18%	-28%	-20%	-18%	-35%	-21%	-40%	-53%
11	28%	-10%	15%	37%	17%	61%	60%	70%	172%
12	9%	-23%	-16%	15%	-20%	-8%	19%	-32%	-19%
Total	19%	-15%	1%	27%	-8%	18%	45%	-12%	27%

Source: U.S. Census Bureau and City of Chicago

Southeast Area | White Population

Figure 42 and Tables 14 and 15 display the White population within a 1 mile, 0.5 mile, and 0.25 mile from five BRSs in Chicago's Southeast area. As seen in Figure 42, the population distribution appears steady across the three time periods. Between 1990 and 2000, the total White population within 1 mile of a redeveloped brownfield site did not experience change. Between 1990 and 2000, an increase of 2% was observed within 0.5 mile and a 6% increase within 0.25 mile of a redeveloped brownfield site. Between 2000 and 2010, the White population decreased by 1% within a 1-mile and 0.5 mile, and decreased by 2% within a 0.25 mile from a redeveloped brownfield site (see Table 15).

A closer look at Tables 14 and 15 confirms that the White population for BRS #1, #2, and BRS# 18 does not experience significant changes. Although not visible at scale in Figure 42, a closer look at Table 14 shows that BRS #6, Bronzeville Housing redevelopment, experiences an increase in the White population at all radii distances, albeit for a small population number.

Figure 42: Total White Population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

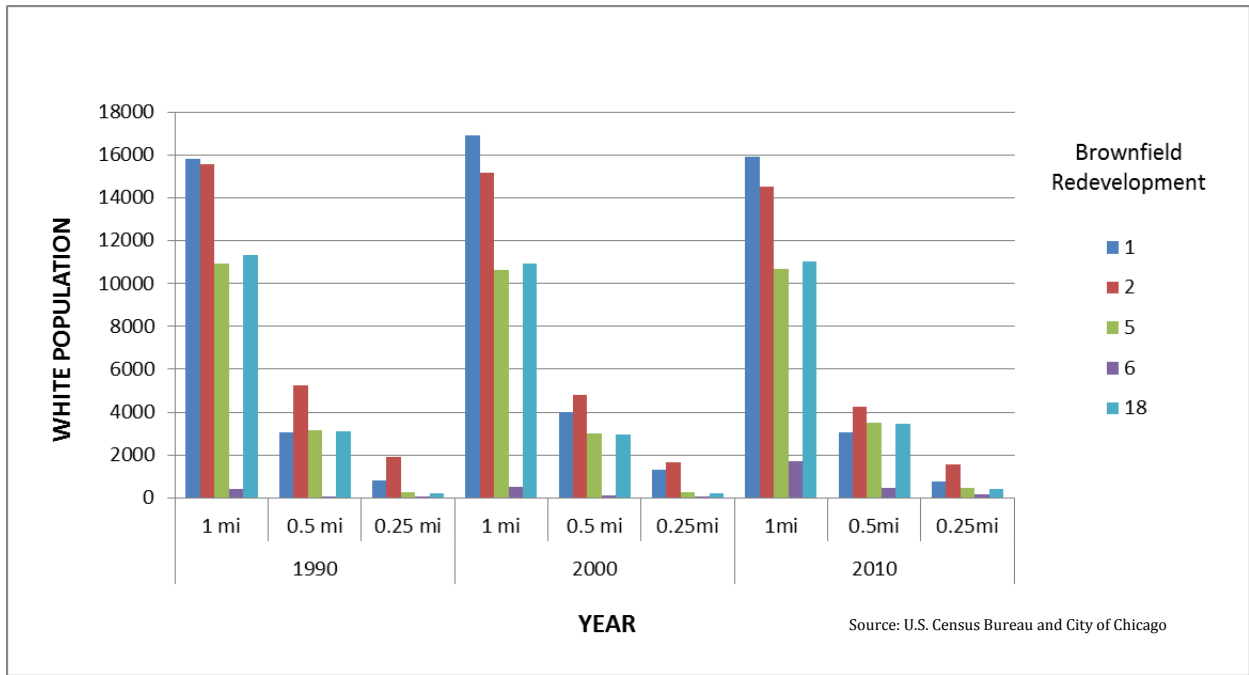


Table 14: Total White Population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
1	15798	3069	830	16938	3992	1292	15933	3076	776
2	15551	5272	1919	15189	4806	1656	14517	4232	1552
5	10923	3134	260	10617	2998	257	10667	3485	470
6	398	54	10	497	92	26	1705	463	141
18	11313	3098	224	10908	2964	220	11010	3475	427
Total	53983	14626	3243	54148	14852	3451	53832	14731	3368

Source: U.S. Census Bureau and City of Chicago

Table 15: Percent Change of White Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South East Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
1	7%	-6%	1%	30%	-23%	0%	56%	-40%	-6%
2	-2%	-4%	-7%	-9%	-12%	-20%	-14%	-6%	-19%
5	-3%	0%	-2%	-4%	16%	11%	-1%	83%	81%
6	25%	243%	328%	70%	405%	760%	167%	439%	1342%
18	-4%	1%	-3%	-4%	17%	12%	-2%	95%	91%
Total	0%	-1%	0%	2%	-1%	1%	6%	-2%	4%

Source: U.S. Census Bureau and City of Chicago

Southeast Area | Black Population

Figure 42 and Tables 16 and 17 illustrate shifts in Black Population within a 1 mile, 0.5 mile, and 0.25 mile of five brownfield redevelopments in Chicago's Southeast area. As one may observe, the results in Figure 42 are striking as BR #6 is the only site with a substantial amount of Black population at each radii distance. In addition, Tables 16 and 17 indicate the Black population near BR#6 experienced a decrease in the past three decennials. From 1990 to 2000, the Black population within 1 mile of BR#6 experienced a -21% percent change, and a -14% percent change between the 2000 and 2010 decennial. Furthermore, BRS #6 has the largest Black population within 0.25 mi of a brownfield redevelopment in Chicago's Southeast area compared to single and double digit Black population counts for all other brownfield redevelopments in the area (see Tables 16 and 17).

The total percent change of the Black population in the Southeast area between 1990 and 2000 declined by 21% within 1 mile, 24% within 0.5mile, and 30% within 0.25 mile of a redeveloped brownfield site. Between 2000 and 2010, the Black population declined by 20% within 1 mile, 25% within 0.5 mile, and increased by 28% within 0.25 mile of a redeveloped brownfield site (see Table 17).

Figure 42: Total Black Population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

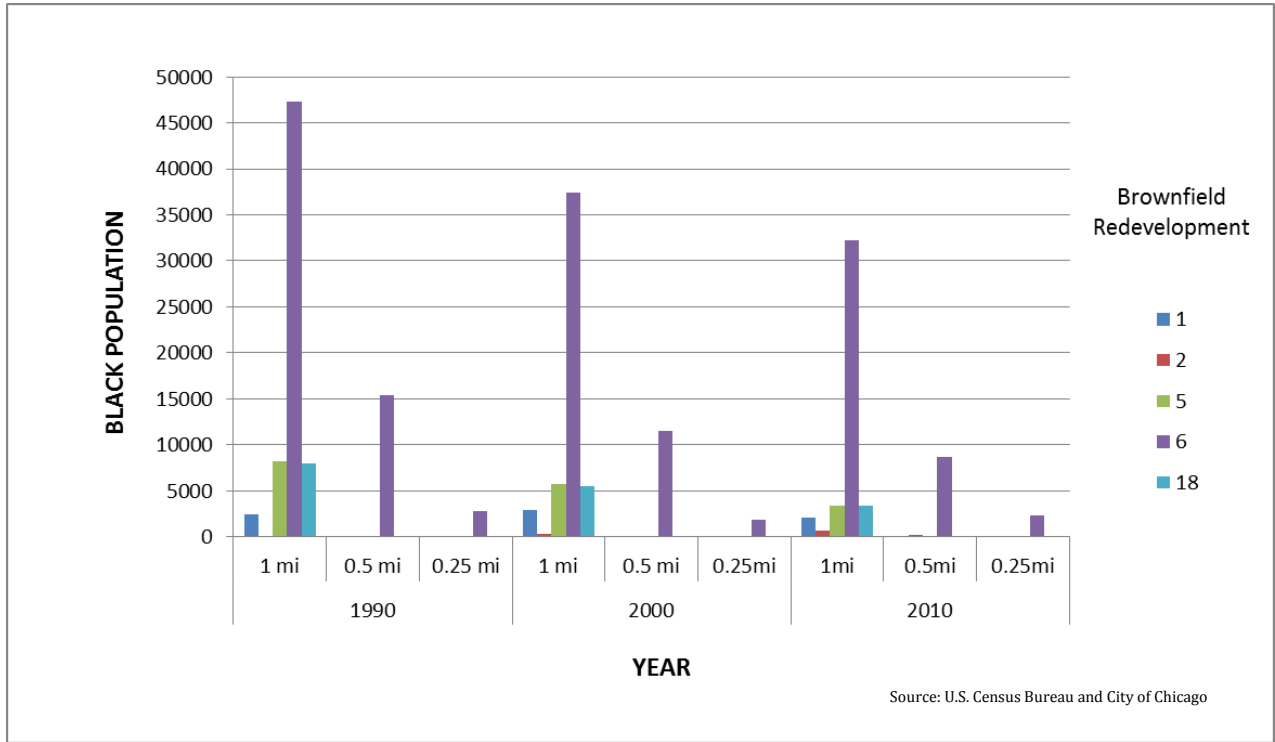


Table 16: Total Black Population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
1	2506	28	9	2942	163	51	2118	94	28
2	42	11	2	359	116	33	704	212	78
5	8193	98	0	5770	111	3	3415	5	1
6	47260	15449	2771	37397	11483	1862	32285	8710	2393
18	7965	98	0	5575	110	3	3347	6	1
Total	65966	15684	2783	52042	11983	1953	41871	9027	2501

Source: U.S. Census Bureau and City of Chicago

Table 17: Percent Change of Black Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South East Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
1	17%	-28%	-15%	488%	-43%	238%	477%	-45%	217%
2	745%	96%	1561%	1003%	83%	1917%	1398%	134%	3409%
5	-30%	-41%	-58%	13%	-95%	-95%	4694%	-72%	1258%
6	-21%	-14%	-32%	-26%	-24%	-44%	-33%	29%	-14%
18	-30%	-40%	-58%	12%	-94%	-94%	-	-72%	-
Total	-21%	-20%	-37%	-24%	-25%	-42%	-30%	28%	-10%

Source: U.S. Census Bureau and City of Chicago

Southeast Area | Hispanic Population

Figure 44 demonstrates the Hispanic population within 1 mile, 0.5 mile, and 0.25 mile of five brownfield redevelopments in Chicago's Southeast area. Table 18 shows the majority of Hispanics in Chicago's Southeast Area are within 1 mile of BRS #1 and BRS #2, which are located near the border with the predominantly Hispanic Near South area. BRS #1 had a 46% percent change at 1 mile, 24% increase at 0.5 mile, and 23% increase at 0.25 mile between 1990 and 2000 decennial. In contrast, BRS#1 had a 15% decrease at 1 mile, 28% decrease at 0.5 mile, and 35% decrease at 0.25 mile between the 2000 and 2010 census (see Table 19). A similar pattern is observed for the percent change in Hispanic population near BRS #2.

Overall, between 1990 and 2000, the Hispanic population in Chicago's Southeast area increased by 46% within 1 mile, 37% within 0.5mile, and 41% within 0.25 mile of redeveloped brownfield sites. Between 2000 and 2010, the Hispanic population decreased by 5% within 1 mile, 11% within 0.5mile, and 20% within 0.25 mile of a redeveloped brownfield site (see Table 19).

Figure 44: Total Hispanic Population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

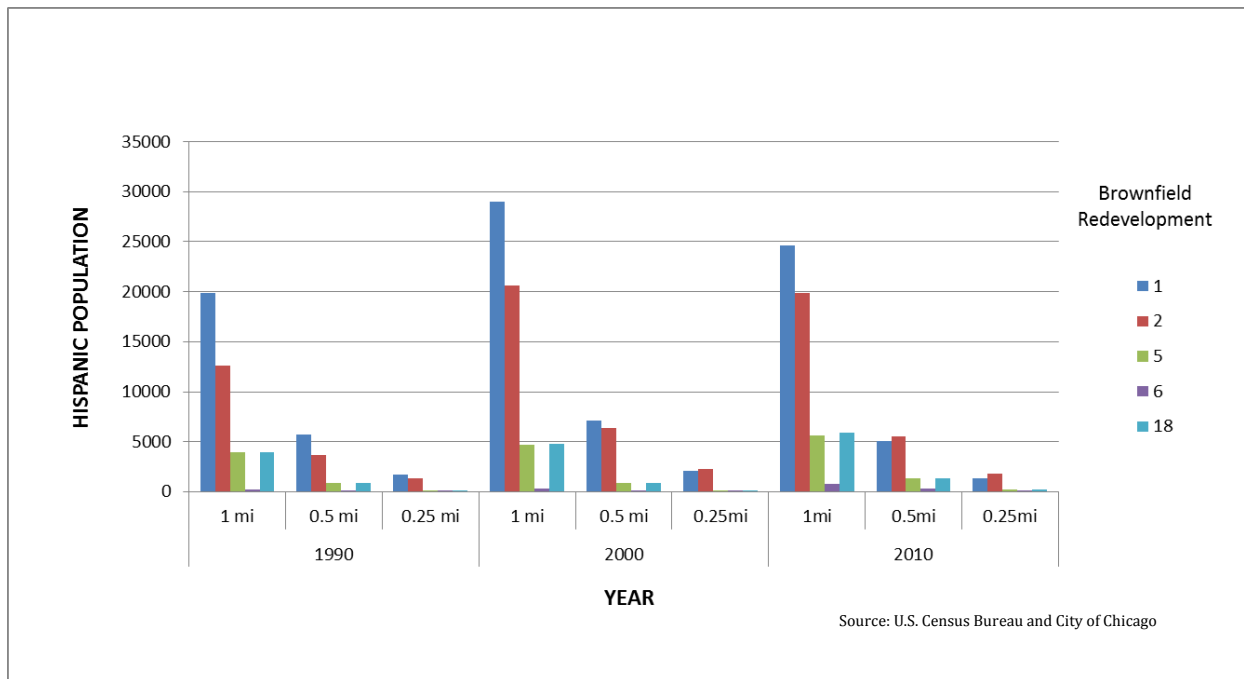


Table 18: Total Hispanic population in South East Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
1	19904	5704	1709	29043	7069	2100	24669	5062	1346
2	12578	3701	1313	20613	6342	2224	19917	5547	1822
5	3972	838	76	4700	852	83	5605	1339	208
6	213	65	14	330	96	13	739	269	37
18	3988	846	65	4791	881	68	5860	1383	195
Total	40654	11154	3177	59475	15239	4488	56790	13600	3607

Source: U.S. Census Bureau and City of Chicago

Table 19: Percent Change of Hispanic population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South East Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
1	46%	-15%	24%	24%	-28%	-11%	23%	-36%	-21%
2	64%	-3%	58%	71%	-13%	50%	69%	-18%	39%
5	18%	19%	41%	2%	57%	60%	8%	151%	172%
6	55%	124%	247%	47%	180%	312%	-7%	172%	153%
18	20%	22%	47%	4%	57%	64%	5%	188%	201%
Total	46%	-5%	40%	37%	-11%	22%	41%	-20%	14%

Source: U.S. Census Bureau and City of Chicago

Far South Area | White Population

Figure 45 shows the White population within a 1 mile, 0.5 mile, and 0.25 mile distance from four BRSs in the Far South Area. These brownfields include the Gateway Park Industrial Complex, Parnell Place Safe Home for Kids, Salvation Army Red Shield Center, and Columbia Pointe housing. As shown in Tables 20 and 21, between 1990 and 2000, the White population decreased by 50% within 1 mile, by 53% within 0.5mile, and by 47% within 0.25 mile of a redeveloped brownfield site in pre-development. Between 2000 and 2010, the White population continued to decrease by 17% within 1 mile, and 5% within 0.5mile of a redeveloped brownfield site. However, it observed a small increase by 2% within 0.25 mile of a redeveloped brownfield site.

The decline in White population is most evident within 1 mile of BRS #9, the Gateway Park Industrial Complex. Between 1990 and 2000, the White population dropped from 18,499 to 6,944, a 62% decrease resulting in a total decline of 11,555 White residents. This is not a surprising finding given that Chicago was experiencing the tail end of White flight in the early 1990s as affluent whites moved to the suburbs. This resulted in divestment and increased urban blight in the city.

Figure 45: Total White Population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

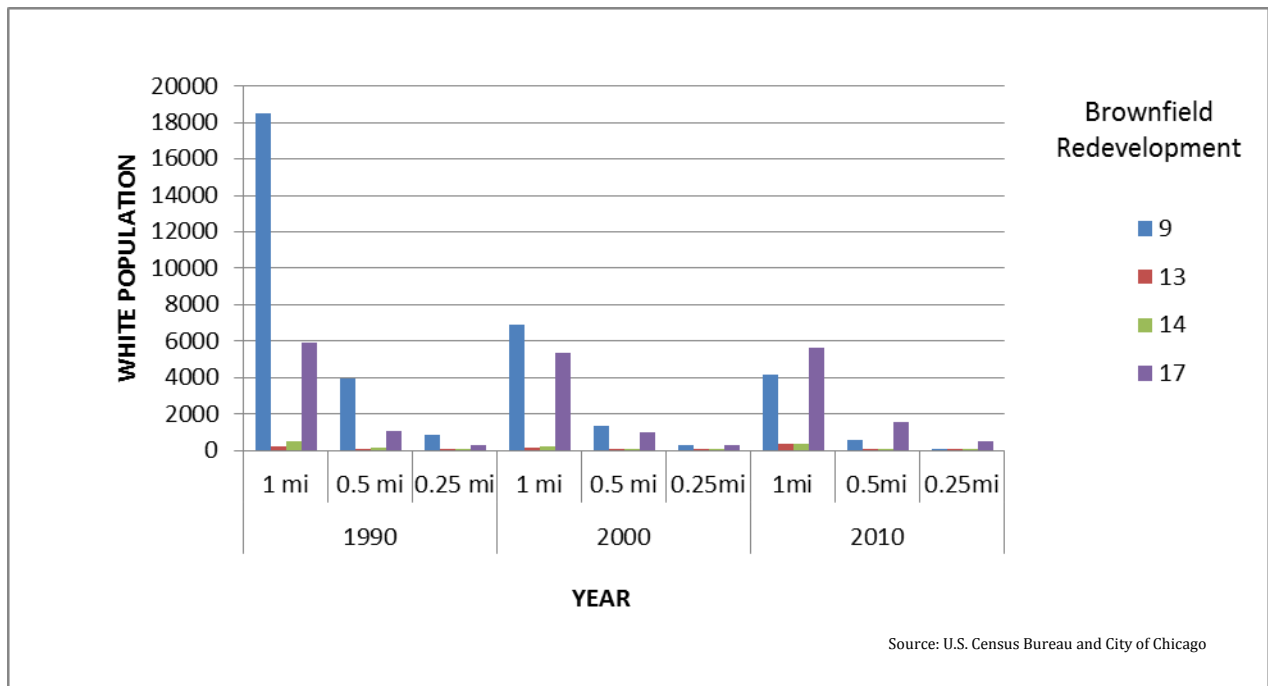


Table 20: Total White population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
9	18499	3987	857	6944	1334	305	4136	576	73
13	253	58	14	169	44	12	397	118	37
14	540	179	30	221	53	12	394	76	13
17	5958	1044	276	5385	1026	290	5663	1566	512
Total	25250	5268	1178	12719	2457	620	10590	2336	634

Source: U.S. Census Bureau and City of Chicago

Table 21: Percent Change of White population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Far South Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
9	-62%	-40%	-78%	-67%	-57%	-86%	-64%	-57%	-91%
13	-33%	135%	57%	-24%	167%	102%	-15%	167%	157%
14	-59%	78%	-27%	-70%	43%	-57%	-60%	43%	-56%
17	-10%	5%	-5%	-2%	53%	50%	5%	53%	85%
Total	-50%	-17%	-58%	-53%	-5%	-56%	-47%	2%	-46%

Source: U.S. Census Bureau and City of Chicago

Far South Area | Black Population

Figure 46 displays the Black population within a 1 mile, 0.5 mile, and 0.25 mile from four BRSs in Chicago's Far South Area. The Black population experiences a steady decline within 1 mile, 0.5 mile, and 0.25 mile of BRS #13, #14, and #17, with the majority of this decline occurring between 2000 and 2010 as reflected in the percent changes in Table 23.

For example, BRS #14 Black population within 1 mile of the site experienced a 14% decrease between 1990 and 2000, and a 18% decrease between 2000 and 2010, leading to a total population decline of 16,267 residents between 1990 and 2010 (see Tables 22 and 23).

Furthermore, an interesting observation occurs at the 0.25 mi radius from BRS #9 where the Black population increases significantly from 30 residents in 1990 to 655 residents in 2000. In 2010, the Black population within 0.25 mi radius of BRS #9 dropped to 459, but still remains higher than the 1990 Black population level. A possible reason for this population increase may be attributed to the type of brownfield redevelopment and its use. BRS #9 is the Gateway Park Industrial Complex, which may have attracted working class Blacks into the area for jobs.

Overall, between 1990 and 2000, the Black population does not experience change within 1 mile of redeveloped brownfield sites in the Far South Area. However, a decrease of 4% and 5% are observed within a 0.5mi and 0.25 mi of redeveloped brownfield sites respectively. Between 2000 and 2010, the Black population decreased by 14% within 1 mile, 19% within 0.5mile, and 20% within 0.25 mile of redeveloped brownfield sites.

Figure 46: Total Black Population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

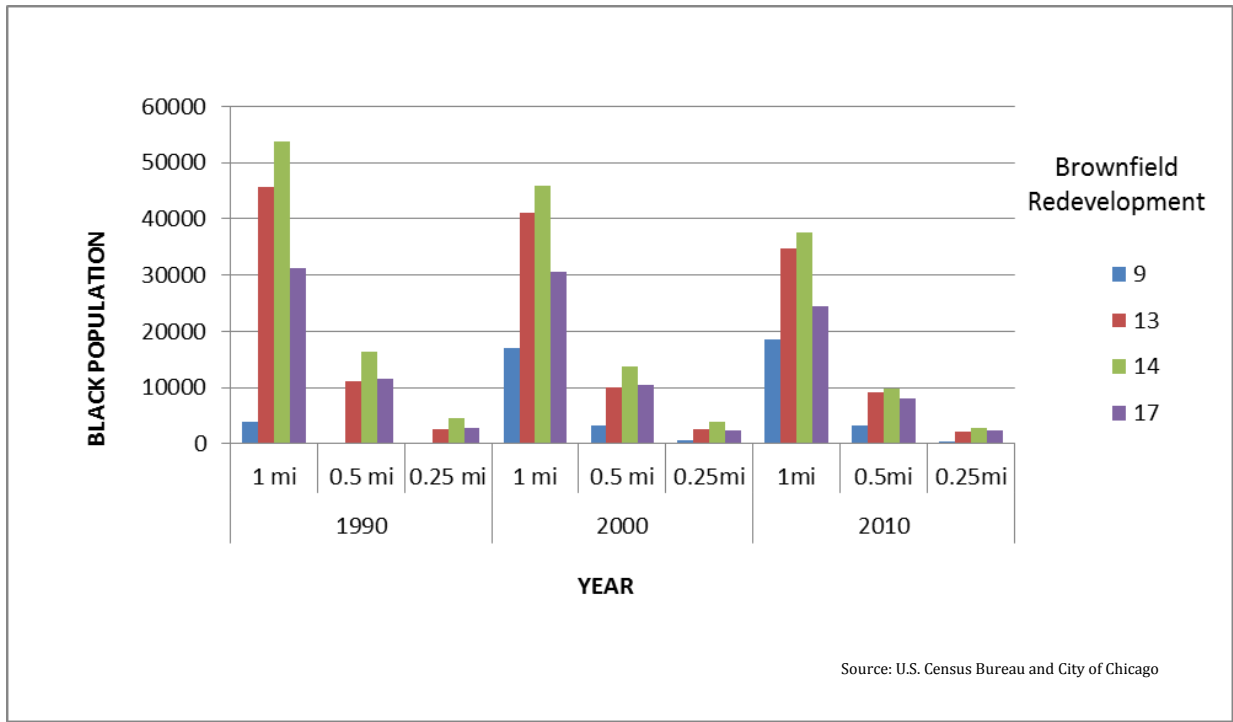


Table 22: Total Black Population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
9	3969	273	30	17053	3250	655	18527	3285	459
13	45593	11201	2611	41139	10119	2670	34780	9196	2219
14	53743	16292	4601	45963	13654	3835	37476	9770	2786
17	31215	11491	2855	30527	10480	2443	24416	8088	2253
Total	134520	39256	10097	134682	37503	9603	115200	30339	7716

Source: U.S. Census Bureau and City of Chicago

Table 23: Percent Change of Black population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Far South 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
9	330%	9%	367%	1092%	1%	1105%	2069%	-30%	1420%
13	-10%	-15%	-24%	-10%	-9%	-18%	2%	-17%	-15%
14	-14%	-18%	-30%	-16%	-28%	-40%	-17%	-27%	-39%
17	-2%	-20%	-22%	-9%	-23%	-30%	-14%	-8%	-21%
Total	0%	-14%	-14%	-4%	-19%	-23%	-5%	-20%	-24%

Source: U.S. Census Bureau and City of Chicago

Far South Area | Hispanic Population

Figure 47 shows the Hispanic population within a 1 mile, 0.5 mile, and 0.25 mile radius of four BRSs in Chicago's Far South Area. Similar to the trend observed for the Black population, the Hispanic population experiences a steady population increase within 1 mile of BRS #9 over the three time periods. Although the increase is not at the same scale as the Black population, it is important to note that the Black and Hispanic population increased over the census periods. In contrast, the White population within 1 mile of BRS #9 declined significantly decreased over the study period. Tables 24 and 25 show the raw population numbers and percentage changes that occurred between 1990 and 2000, 2000 and 2010, and 1990 and 2010. As one can observe, the largest percentage change occurred within 1 mile of BRS #9 at 70% percent change. Between 1990 and 2000 Hispanic population within 1 mile of BRs #9 increased from 3,221 to 5,490.

Overall, between 1990 and 2000, the Hispanic population increased by 61% within 1 mile, 30% within 0.5 mile, and 46% within 0.25 mile of a redeveloped brownfield site. Between 2000 and 2010, the Hispanic population increased by 38% within 1 mile, and decreased by 4% and 20% within 0.5 mile and 0.25 mile of a redeveloped brownfield site respectively.

It may appear that Blacks and Hispanics are displacing whites, but highlight white flight and why it happened. Cheaper and lower rents attract the working class.

Figure 47: Total Hispanic Population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

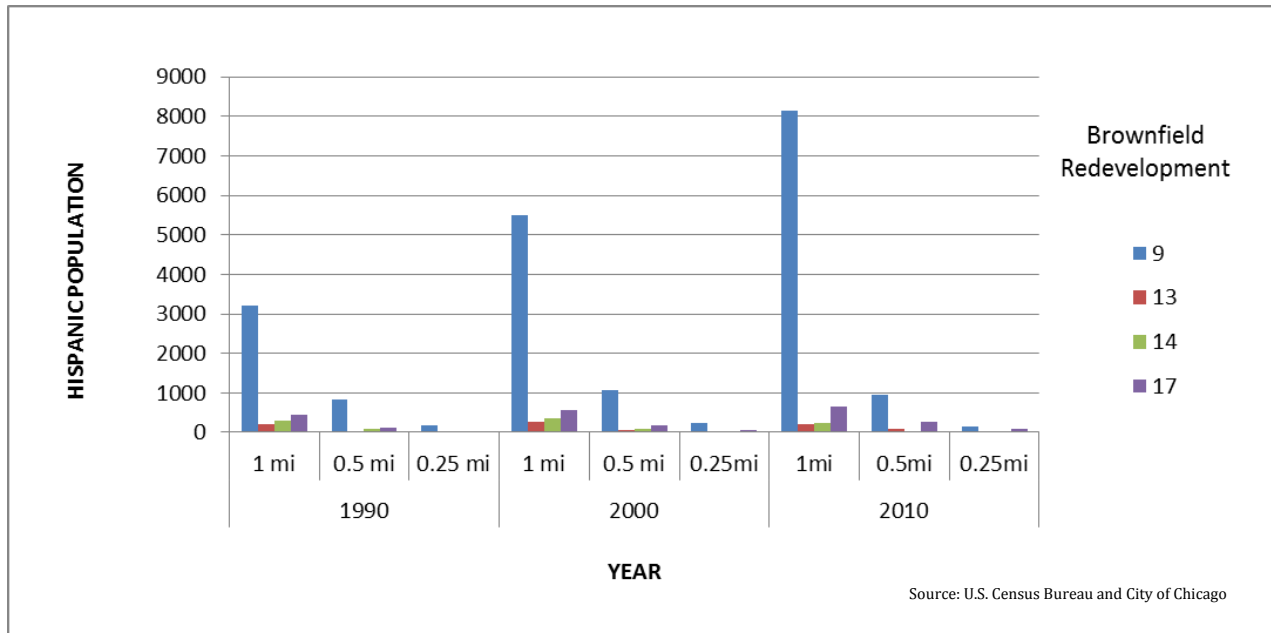


Table 24: Total Hispanic population in Far South Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
9	3221	820	173	5490	1063	244	8138	950	154
13	192	38	8	258	47	11	210	89	28
14	293	90	30	364	88	30	233	18	8
17	431	103	24	561	172	59	656	256	86
Total	4137	1052	235	6672	1369	343	9237	1313	274

Source: U.S. Census Bureau and City of Chicago

Table 25: Percent Change of Hispanic population within 1 mile, 0.5 mile, and 0.25 mile of BRSs Far South Area 1990-2010

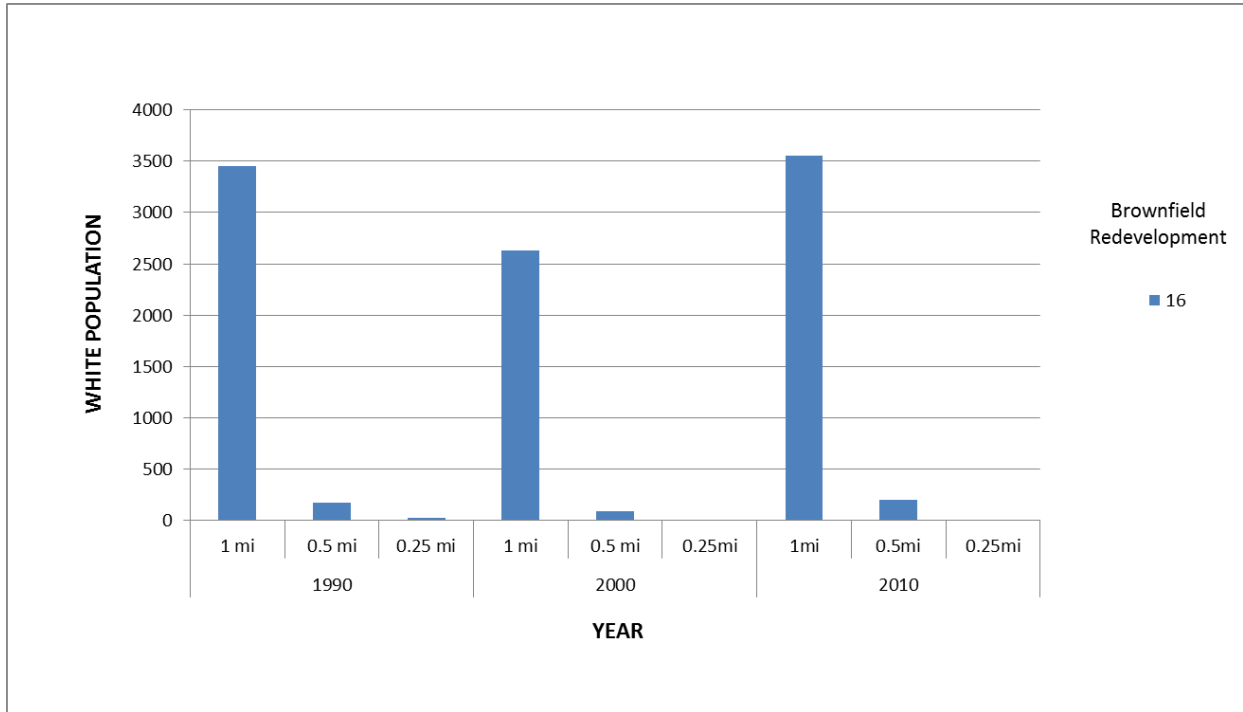
Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
9	70%	48%	153%	30%	-11%	16%	41%	-37%	-11%
13	35%	-19%	9%	23%	89%	133%	32%	156%	239%
14	24%	-36%	-20%	-2%	-80%	-80%	-1%	-75%	-75%
17	30%	17%	52%	66%	49%	148%	142%	45%	251%
Total	61%	38%	123%	30%	-4%	25%	46%	-20%	16%

Source: U.S. Census Bureau and City of Chicago

South Chicago | White, Black, and Hispanic Population

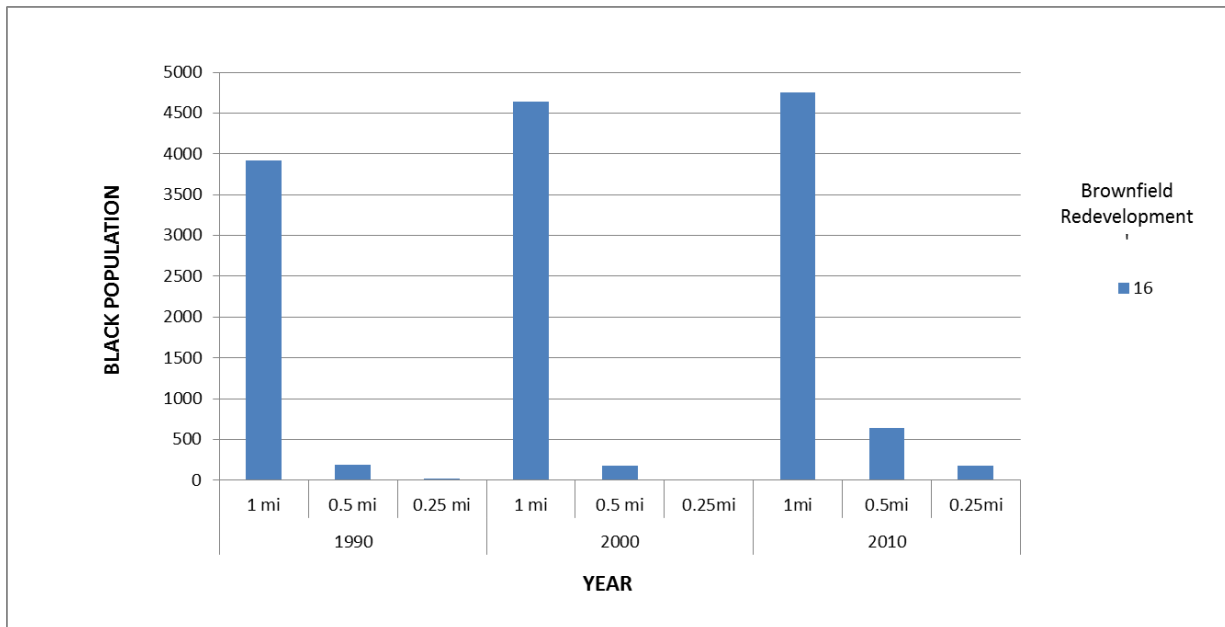
Figures 48, 49 and 50 display the White, Black, and Hispanic population within a 1 mile, 0.5 mile, and 0.25 mile radius from BRS #16 in the South Chicago area. As observed in Figures 48-50, different trends occur among the White, Black, and Hispanic population near BRS #16 across the three decennials. The White population experiences a 24% decline between 1990 and 2000 as the population dropped from 3450 to 2633 at the 1 mile radius (See Table 27 and 28). However, the White population experienced a 35% increase in the population within 1 mile of BRS #16 between 2000 and 2010, going from 2633 to 3553 in 2010, slightly higher than the 1990 White population (see Tables 27 and 28). Different patterns are observed between the Black and Hispanic population near BRS #16 across the three periods. Figure 50 displays a decline in Hispanic population between 1990 and 2010. The Hispanic population within 1 mile radius from BRS #16 declined from 7283 in 1990 to 5811 in 2000 and 4484 in 2010. In contrast, the Black population reflects a slight population increase between 1990 and 2010 as shown in Figure 49. The Black population within 1 mile of BRS #16 increased from 3922 in 1990, 4644 in 2000, and 4748 in 2010. An interesting observation occurs at the 0.5 mile radius from BRS #6 where the Black population increased from 192 in 1990 to 177 in 2000 and 637 in 2010. Similarly, the Black population experiences an increase in population within the 0.25 mile radius of BRS #16 increasing from 19 in 1990, decreasing to 9 in 2000, and increasing to 183 Black residents in 2010. In contrast, the White and Hispanic populations at the 0.5 mile and 0.25 mile radius of BRS #6 decreases.

Figure 48: Total White Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010



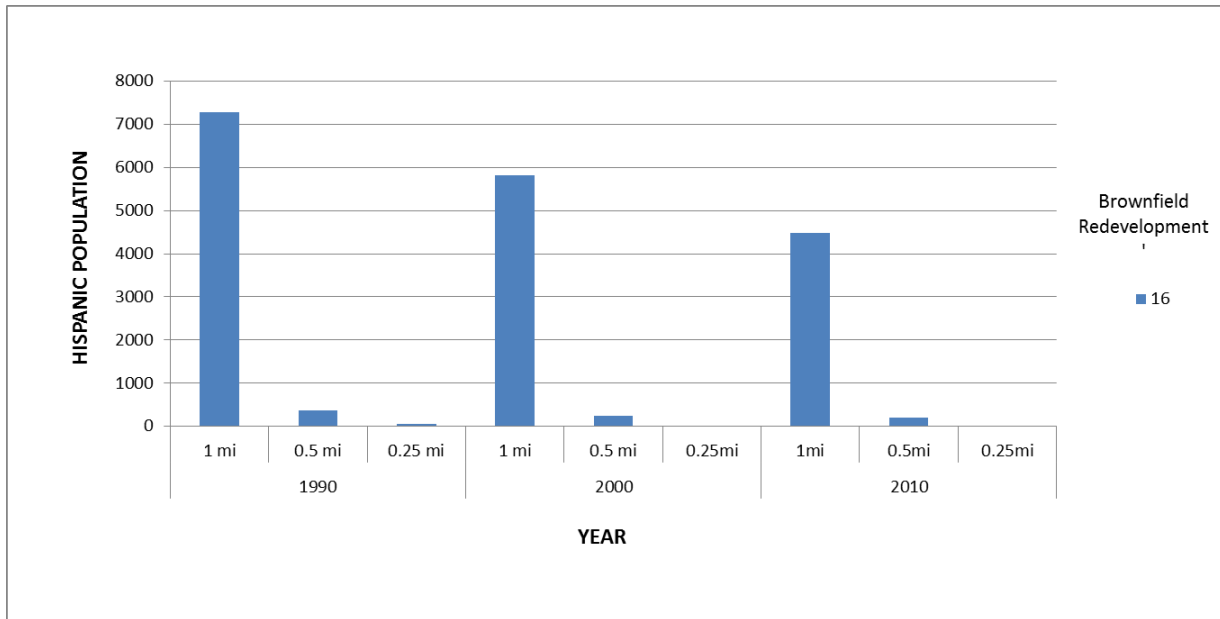
Source: City of Chicago and U.S. Census Bureau

Figure 49: Total Black Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010



Source: City of Chicago and U.S. Census Bureau

Figure 50: Total Hispanic Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010



Source: City of Chicago and U.S. Census Bureau

Table 27: Total White Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
16	3450	175	23	2633	94	4	3553	204	8

Source: City of Chicago and U.S. Census Bureau

Table 28: Percent Change of White Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South Chicago Area 1990-2010

Brownfield ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
16	-24%	35%	103%	-46%	117%	17%	-81%	81%	-65%

Source: City of Chicago and U.S. Census Bureau

Table 29: Total Black Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfield ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
16	3922	192	19	4644	177	9	4748	637	183

Source: City of Chicago and U.S. Census Bureau

Table 29: Percent Change of Black Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South Chicago Area 1990-2010

Brownfie Id ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
16	18%	2%	121%	-8%	260%	232%	-51%	1856%	851%

Source: City of Chicago and U.S. Census Bureau

Table 30: Total Hispanic Population in South Chicago Area at 1 mile, 0.5 mile, and 0.25 mile of BRSs 1990-2010

Brownfie Id ID	1990			2000			2010		
	1 mi	0.5 mi	0.25 mi	1 mi	0.5 mi	0.25mi	1mi	0.5mi	0.25mi
16	7283	360	47	5811	234	14	4484	204	5

Source: City of Chicago and U.S. Census Bureau

Table 31: Percent Change of Hispanic Population within 1 mile, 0.5 mile, and 0.25 mile of BRSs South Chicago Area 1990-2010

Brownfie Id ID	Percent Change 1mi			Percent Change 0.5 mi			Percent Change 0.25 mi		
	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
16	-20%	-23%	62%	-35%	-13%	-43%	-70%	-63%	-89%

Source: City of Chicago and U.S. Census Bureau

Discussion and Analysis

This thesis sought to answer two questions: 1) Does brownfield redevelopment in Chicago increase property values? And 2) Is brownfield redevelopment associated with racial and socio-economic change in affected neighborhoods? What is the nature of that change? Through geospatial analysis, choropleth maps aided the analysis of demographic shifts that occurred near BRSs across three time periods: 1990, 2000, and 2010.

Choropleth maps for median home value and median gross rent were created to analyze the spatial distribution and variation of these values across Chicago. The choropleth maps reveal that median home value increased across each time period by at least one interval category. Furthermore, property value increased mostly near the downtown area. In comparison, median home values decreased to the bottom two intervals in the Far South and South Chicago area between 2000 and 2010. During this same period, the Black population increased within 0.25 mile radius of BRS #16, the International Amphitheater brownfield site which is now a manufacturing facility for Solo Cup (City of Chicago, 2003). Thus, the decline of median home values in the South Chicago area coincides with the increase in Black and White population.

In the case of median rent, a negative shift appears in the Near North area between 1990 and 2000, but increase an interval in 2010. Furthermore, the census block groups near BRSs in the Near South area experience an interval increased between 2000 and 2010, yet the rent in this area is one interval below the interval observed in the Near North (i.e. \$377.01-\$793.00 dollars in Near South median gross rent interval compared to \$793-\$1,021 dollars in 2010).

Although choropleth maps helped to show the spatial distribution of median home value and median gross rent, they do not provide statistical strength to make conclusions. Furthermore, currency variables pose a challenge when applying areal apportionment method because they are

not raw counts like population variables. Thus, future study of the impact of Chicago brownfield redevelopment on property values and rent must use real estate data and apply the hedonic price model for a robust analysis.

Similarly, the median household income variable posed a challenge for areal apportionment method. Median household income was mapped to show the spatial distribution in Chicago. The exercise reveals median household income in the Near North and Near South areas grew steadily, while the South East, Far South, and South Chicago show a decline in median household income between 1990 and 2000. Since the U.S. Census did not include household income in the 2010 decennial survey, comparison across three decades for median household income of Chicago's population is not possible. Therefore, this spatial analysis is limited to the 1990 and 2000 decennial U.S. Census data.

Regarding to race, the choropleth maps, areal apportionment, and percent change calculations reveal population shifts in post-redeveloped neighborhoods. Racial shifts are more pronounced in the Near North area, Near South, and Far South areas. In the Near North area, the White population experienced significant increases in population within 1 mile, 0.5 mile, and 0.25 mile of BRSs between 2000 and 2010 (see Figure 36). In contrast, during this same period, the Black and Hispanic population declined (see Figure 37 and Figure 38). Although Black and Hispanic population outnumbered the White population, it is steadily growing in this area. This finding is supported by Betcanur (1996, 2010) and Wilson (2005) who have studied gentrification in Chicago's Humboldt Park community area and the Near North side. Betcanur (2010) highlights that gentrification and displacement can destroy social networks, systems of support, and exchange and reciprocity of social fabrics. Betcanur documents the gentrification of Lincoln Park and displacement of the Puerto Rican during the 1970s, which created several

gentrified communities on the Northside along the lakefront. This conglomeration continues to expand westward and currently threatens to displace Puerto Ricans in Humboldt Park (Wilson, 2005; Betancur, 2010). Therefore, if this race-based gentrification and displacement trend continues in the Near North area, the benefits and environmental amenities of brownfield redevelopment will only be attainable to the affluent white class that comprises the Near North affluent white conglomerate.

In the Near South area, the White population reflects a substantial increase between 2000 and 2010, particularly within a 1-mile, 0.5 mile and 0.25 mile radius from BRSs, with the exception of BRS #2 (see Figure 39). On the contrary, the Black and Hispanic population reveal a general decline between 1990 and 2010 at the 1-mile radius from BRSs. However, the Hispanic population does reflect an increase at the 0.25 mi radius for BRS #7, the California Avenue Business Park and #11, Job Corps. The Near South is different from the Near North because it does not have a conglomerate of gentrified and long established affluent whites.

In the Southeast area, the White population within a 1-mile, 0.5 mile, and 0.25 mile from BRSs is at a relative constant across the three decennials. However, the Black population shows a decline across the three census periods, but more evident between 1990 and 2000 as seen with the Black population within 1 mile of BRS #6 in Bronzeville, which documents a 21% decrease in population, resulting in a loss of 9,863 residents. The Hispanic population in the Southeast area shows a general population increase between 1990 and 2000. Although there is a decline between 2000 and 1990, the Hispanic population in 2010 is higher than the one observed in 1990.

In the Far South area, the effects of the end of White flight are dramatic between 1990 and 2000. For example, BRS #9, The Gateway Industrial Park reflects significant population

decline at the 1-mile, 0.5 mile, and 0.25 mile. At the 1-mile radius from BRS #9, the White population was 18499 in 1990, 6944 in 2000, and 4136 in 2010. Thus, the 1-mile radius from BRS #9 experienced a loss of 11,555 White residents between 1990 and 2000, a 62% decrease. In addition, 2808 residents left the from the 1-mile radius between 2000 and 2010, A 40% decrease. Although the Black population in the Far South area remained dominant in the three time periods, it also experienced decline, particularly within 1-mile, 0.5 mile and 0.25 mile from BRS #13, BRS #14, and BRS #17. The Hispanic population shows significant increase within 1-mile of BRSs between 1990 and 2000 (see Tables 24 and 25). However, it is important to note that as the Hispanic population increases within the 1-mile radius, the Hispanic population within a 0.25 radius of BRSs experienced a population decline between 1990 and 2000.

In South Chicago, the White population within a 1-mile radius from BRS #16, experienced a 24% decline between 1990 and 2000 as the population dropped from 3450 to 26333. However, the population increased between 2000 and 2010, surpassing the base set by the White population in 1990. The Black population experienced an increase in population within the 0.25 mile radius of BRS #16 between 2000 and 2010. The Black population within 0.25 miles of BRS #16 decreased in 1990 from 19 to 9 in 2000, and increased to 183 Black residents in 2010. In contrast, the White and Hispanic population at the 0.5 mile and 0.25 mile radius of BRS #6 decreased,

The Hispanic population within 1 mile radius from BRS #16 declined from 7283 in 1990 to 5811 in 2000 and 4484 in 2010. Betancur (1996) highlights that South Chicago had a large Mexican migrant community that worked in the steel mills and on rail. In contrast, the Black population reflects a slight population increase between 1990 and 2010 as shown in Figure 49. In contrast to the environmental gentrification and Chicago gentrification studies, the demographic

data for South Chicago does not show significant signs of affluent gentrification as is the case in the Near North and Near South areas. However, a recent National Public Radio report on South Chicago highlights the tensions between incoming affluent residents who want to redevelop along the lake front and build a world-class cycling velodrome, and those who want to see more affordable housing.⁹

This thesis' findings reveal that race continues to play a significant role in the demographic characteristics of the city. More importantly, race-based gentrification and brownfield redevelopment is most prevalent in the Near North and Near South areas, which are the closest to Chicago's downtown and with access to public transportation. The Near North and Near South areas reveal a gradual increase in the White population, while the Black and Hispanic population decline. However, population shifts are also observed in the Southside, especially between 1990 and 2000 where the data reveals a drastic decline of the White population. This finding could be a reflection of the end of White flight.

The results of this study are in tune with Pearsall's (2010) and Porter's (2009) findings. Pearsall's study of 36 brownfields in New York City revealed that 50% percent of the brownfield redevelopment sites experienced gentrification within 0.5 miles of the site post-redevelopment. Similarly, 50% of Chicago's brownfields are located in the Near North and Near South areas, which document an increase in the White population while simultaneously experiencing a decline in the Black and Hispanic population. Porter's study of New Yorks City's voluntary BCP program revealed that the average rent and home value within a 0.5 mile, 1 mile, and 2 mile , and the average assessed land values for lots in the same distances were higher than the average vacant manufacturing lot in the city (Porter, 2009). Porter's (2009) resonates with the findings

⁹ Lydersen, Kari. Southeast side: Will new community rise on old South Works steel site? *National Public Radio*. May 31, 2013. <http://www.wbez.org/sections/art/southeast-side-will-new-community-rise-old-south-works-steel-site-107443>

observed in Chicago's Near North and Near South side as these two areas are more desirable than the Far South Side due to easy public transit access and close proximity to downtown (see Figure 9).

Although this study does not employ fieldwork and survey instruments, Quastel (2009), Checker (2011), and Hamilton and Curran (2012) reveal the benefits of employing this research approach as it provides a deeper understanding of what is happening on the ground and why, such as the juxtaposition of buildings and level of community engagement in the policy making and implementation process. Thus, future study of brownfield redevelopment and gentrification in Chicago should integrate place-based qualitative research better understand the demographic patterns observed in spatial analysis.

Limitations

This study faced some limitations. Comparing the mean difference of demographics among the pre-redevelopment and post-redevelopment creates a temporal dilemma. Although there is consistency with decennial analysis, the problem lies in the fact that brownfield redevelopments do not occur during the same year. Thus, there may brownfield redevelopment towards the end of a decade, which may not reveal substantial data to determine if gentrification occurred during post-redevelopment.

A more ideal way of observing pre-redevelopment and post-redevelopment change is through data that chronicles the beginning of the redevelopment and end of redevelopment; and analyzing population data based on those years. Unfortunately, the U.S. census does not provide demographics for each year. Thus, it is not possible to accurately track pre and post brownfield redevelopment. Since the 2010 U.S. Census did not include household income questions in the

decennial survey, this study is limited to median household income for spatial analysis between 1990 and 2000 only. Additionally, median home value and median gross rent are not adequate variables to conduct areal apportionment. Furthermore, the hedonic price model is better suited to analyze and understand the effects of brownfield redevelopment on property values. Thus, future study on Chicago and brownfield redevelopment should consider obtaining real estate data to conduct a hedonic price model. This will allow for comparisons between similar housing units.

In addition, the presence of undeveloped brownfields within the brownfield redevelopment buffers cannot be ignored. The presence of these undeveloped brownfield sites may impact property values and population shifts depending on the history of the undeveloped brownfield, contaminants, level of contamination and type of remediation if applicable. Thus, controlling for the effects of brownfield redevelopments on property values and demographic shifts presents a challenge. Therefore, causation cannot be strongly supported.

This study is also limited in spatial analysis. To better understand how and why demographic shifts occur near brownfield redevelopment sites, place-based qualitative research can aid to reveal the nature of the brownfield redevelopment, level of key stakeholder involvement and decision-making, and public opinion on brownfield redevelopment and gentrification.

Chapter 6

CONCLUSION

This study is the first of its kind to study brownfield redevelopment and gentrification in the city of Chicago. Although Chicago is the pioneer on brownfield redevelopment, literature on New York City brownfields redevelopment and gentrification is more abundant. This may be due to New York City's vital network node in the global political economy (Sassen, 2001). The purpose of this study is to answer two questions:

- 1) Does brownfield redevelopment increase property values?
- 2) Is brownfield redevelopment associated with racial and economic change in affected neighborhoods?

The spatial analysis used in this study employed a distance-based approach that is effective in analyzing environmental disparities because it is focused on proximity to a point rather than the unit-hazard method, which only takes into consideration the host unit (i.e. census tract). The findings in this study reveal an influx of White population in brownfield redevelopment areas near the city center, such as the Near North and Near South areas. This study also found that 50% percent of Chicago's BRSs are located in the Near North and Near South areas. These results are consistent with Pearsall's (2010) findings of his study on 36 brownfield redevelopment sites and gentrification in New York City. In addition, this thesis reveals that the population living within a 1-mile, 0.5 mile, and 0.25 mile radius of brownfield redevelopments in the general Southside of Chicago is predominantly Black and Hispanic.

The spatial analysis of median household income reveals the disparity in wealth between Chicago's Northside and Southside at-large. In addition, an interesting observation occurs in the South Chicago area where the Black population within 0.25 miles of a BRS increased from a

population of 19 Black residents in 1990 to 183 Black residents in 2010. If this thesis had relied on using only 1-mile radius, this finding would not have been observed. Thus, this finding encourages future study of what is happening on the ground at the closest proximity to BRSs in urban areas as they tend to be more densely populated. This is an important finding for environmental justice researchers to pay attention to, especially when studying densely populated urban areas.

This study faces some limitations. First, undeveloped brownfields are also located near brownfield redevelopment sites, which may also impact property value and demographic shifts. Thus, causation cannot be strongly supported in the study of brownfield redevelopment and gentrification in Chicago. As a result, brownfield redevelopment and gentrification can only yield supporting evidence for correlation.

Comparing the mean difference of demographics among the pre-redevelopment and post-redevelopment creates a temporal dilemma. Although there is consistency with decennial analysis, the problem lies in the fact that brownfield redevelopments do not occur during the same year. Additionally, median home value and median rent are not adequate variables to conduct areal apportionment. Furthermore, the hedonic price model is better suited to analyze and understand the effects of brownfield redevelopment on property value. Therefore, the spatial visualization of median home value, median rent, and median household income are not sufficient to make conclusions on how brownfield redevelopment in Chicago has impacted these variables. Thus, future study on Chicago and brownfield redevelopment should use real estate data to conduct a hedonic price model, which can provide a stronger analysis.

The results of this master's thesis will influence the direction of my future research. Because of the lack of income data in the 2010 U.S. Census, new approaches will be needed. Thus, to better understand demographic shifts near BRSs, a qualitative approach using fieldwork, surveys, and stakeholder interviews may help fill this data gap. Ultimately, this thesis is a step towards integrating quantitative and qualitative methodological approaches in the future to understand why gentrification is occurring in neighborhoods with brownfield redevelopments near the city center.

Appendix I: Redeveloped Brownfield Sites in Chicago from 1990-2003

Brownfield ID	Name	Size	History	Contaminants Removed	Type of Redevelopment
1	43 Paulina	11,250 sq ft	n/a		Residential
2	Board of Education	13.2 acres, 5 parcels	This property has 7 buildings constructed in 1918 by the U.S. army. The Chicago Board of Education owns the properties since 1981.		City storage
3	3042 W Chicago Ave	19,000 sq ft	Former machine shop previously owned by Homer Furniture Manufacturers.		Industrial
4	Kilbourn & Ferdinand	6 acres	Former industrial and heavy railroad use site. The site included car repair shops, paint and varnish shops, transfer pits, and solvent storage areas.		Industrial
5	Boyce Park	51,000 sq ft	Early use of this site included auto garage and blacksmith shops. Between 1950-1990 the property was used as a meat processing plant, animal food plant, and then as a warehouse.		Recreational / Green Space
6	Bronzeville	1.5 acres	Residential area contaminated with arsenic from a nearby gas plant. 5,900 tons of contaminated soil were removed.	5,900 tons of contaminated soil	Housing
7	California Avenue Business Park	37 acres	Formerly mixed use land with diversity of ownership. Up to 65 parcels. This site had a presence of PNAs, PCBs, heavy metals, lead, underground storage tanks.	964 tons of contaminated soil and 11 Underground Storage Tanks	Business
8	Chicago Center for Green Technology	27 acres	n/a	250,000 cubic yards of debris and 589 tons of concrete	Community center
9	Gateway Park Industrial Complex	62 acres	Silver Shovel. Contaminated with arsenic.	600,000 cubic yards of debris	Industrial
10	International Union of Operating Engineers	6.3 acres	Former printing facility. Contaminated with radioactive waste. 2,900 tons of contaminated soil were removed.	2,990 tons of contaminated soil (radioactive soil). Underground storage tanks	Training Facility
11	Job Corps	17.5 acres	Several parcels owned by State of IL Dept of Corrections; Illinois Central Gulf Railroad, and Metropolitan Water Reclamation District of Greater Chicago.		Training Facility
12	Carole Robertson Center for Learning	1 acre	22 hydraulic lifts. 3,700 tons of contaminated soil, and 2 underground storage tanks.	3,700 tons of contaminated soil, 22 hydraulic lifts, and 2 underground storage tank	Community Center
13	Parnell Place Safe Homes for Kids	7 acres	During the 1880s, this was an industrial site, also a warehouse. After a fire, the structure and site were classified as hazardous. Contaminants on site included hazardous lead, arsenic, PNAs, organic compounds, and trichloroethylene.	2,300 tons of contaminated soil removed	Housing
14	Salvation Army Red Shield Center	6 acres	PNAs present in the soil.		Community
15	Scott Peterson Meats	1.5 acres	This site was a bus station barn and an illegal indoor landfill		Parking lot
16	South Chicago & South Works	573	This site was U.S. Steel property. It was the largest vacant site within city limits.	-	Manufacturing
17	Columbia Pointe	5.5 acres	Underground Storage Tanks	2,245 tons of contaminated soil, 1 underground storage tank	Housing
18	International amphitheater	12 acre	This site is located within Chicago's stockyards area, now an industrial corridor.	520 linear feet of asbestos-containing pipes	Manufacturing

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