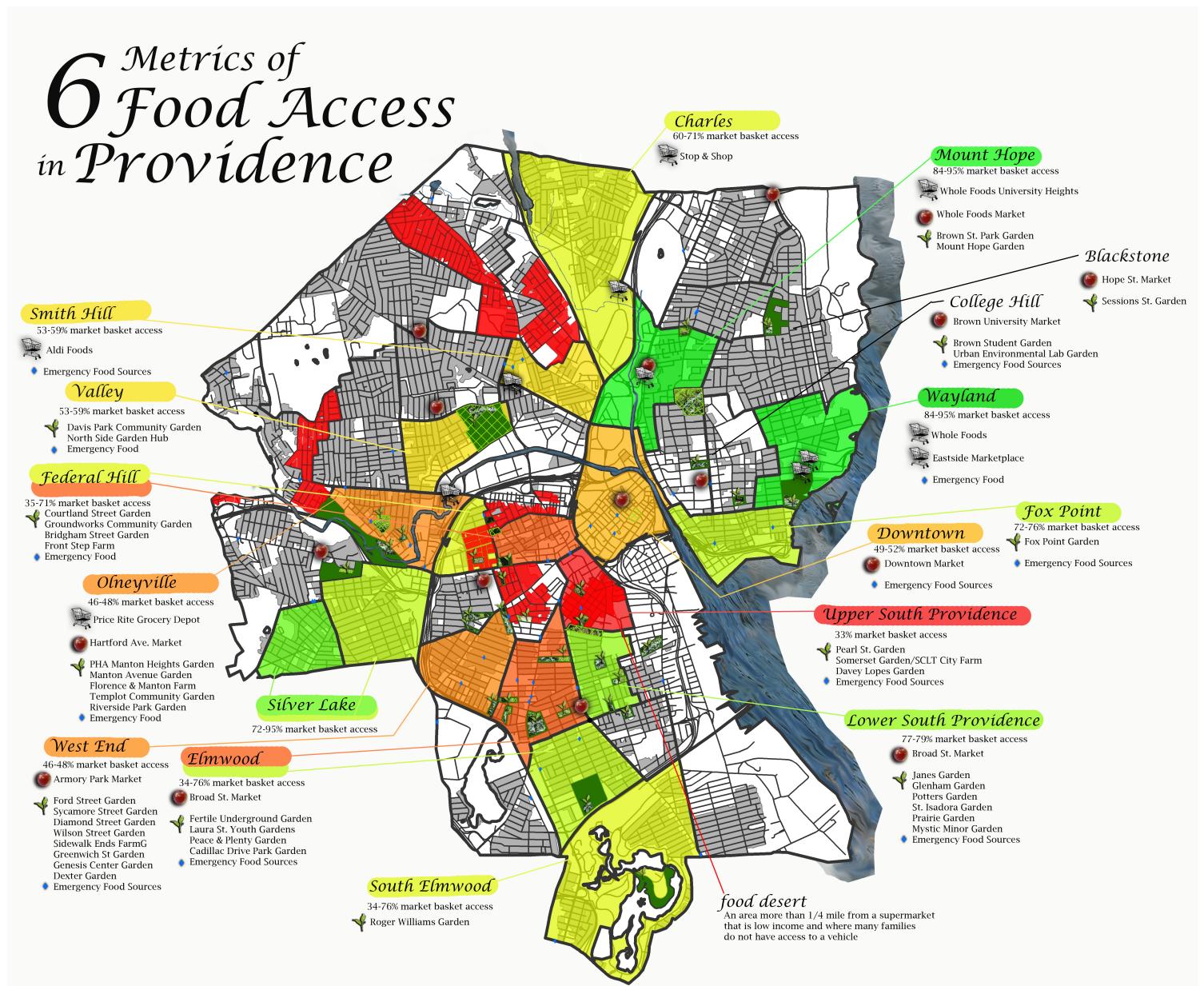


# Wondering in the Desert: Context, Cartography, and Visions of an Alternative Food Desert

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Thesis//Environmental Studies  
Brown University 2013



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This thesis "**Wondering in the Desert: Context, Cartography, and Visions of an Alternative Food Desert.**"

by Jessica Daniels has been accepted in partial fulfillment of the requirements for a Bachelor of the Arts in Environmental Studies Degree at Brown University.

**Signature of Advisor**

Date:

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## ABSTRACT:

This thesis explores the concepts and cartography of food access, beginning with “food deserts” and expanding beyond their prescribed definitions and portrayal. It begins with the United States Department of Agriculture’s Food Desert Locator, and works through a series of mapping projects to depict the food environment of Providence, Rhode Island. When mapped, “food deserts” create a diametric display of food access that does not include or speak to the context of the local community and food system. While the concept of “food deserts” has been challenged because it mislabels communities as void of all food resources, the depiction of food deserts has largely remained unquestioned. This thesis aims to apply analytical design and radical cartography to the issue of food access mapping, providing a parallel to utilizing geographic analysis and a food justice perspective to critique food deserts. Though the maps produced do not fully realize radical, collaborative, and analytical cartography, they provide a framework for expanding the indicators included in a food environment map. Ultimately, multiple food access metrics combine to create a “food topography” that describes areas of higher and lower levels of food access with nuanced and locally relevant features, recognizing that there is no true “desert” in Providence.

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## **Special thanks**

To all of the following people  
whose influence and support  
has been critical:

Kathy De Master, for encouraging and supporting this work as an advisor and in action

My parents, brother, and family, for their love and unending support

Friends & peers: all those involved with the Opportunities & Obstacles to Food Justice project for their inspiring work and brilliant passion for change; my cohort, teachers, and the many communities of International Honors Program Rethinking Globalization 2010-2011 for opening my eyes and heart to the truly converging forces of food, life, & politics; Jenn Shepard, Keally Cieslik, Lily Mathews, and Morgan Albertson whose generosity and kindness have kept me going

Financial, research, and review support from: the Center for Environmental Studies, Rhode Island GIS database, The Providence Plan, Southside Community Land Trust, Plant Providence, The Environmental Justice League of Rhode Island, Melina Packer, Mercedes Lyson, Molly Bledsoe, Dan Rejto

## INTRODUCTION

### *Finding Food Deserts*

In the Spring of 2011, United States Agriculture Secretary Tom Vilsak unveiled an online map that outlined the location of every food desert found and recognized in the United States (United States Department of Agriculture, Office of Communications 2011). This map, the United States Department of Agriculture's (USDA) Food Desert Locator (Ver Ploeg et al. 2011), is a neutral-colored canvas with the recognizable, illustrated image of the continental USA featuring scattered clusters of pink geometric shapes (see Figure 1). The pink shapes depict Census Tracts highlighted as “food deserts,” areas defined by the USDA as “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food” (Ver Ploeg et al. 2011). This means that these areas have limited to no access to the full offerings of a large supermarket, and the diet-related disease prevention such choices can provide (Ver Ploeg et al. 2011) The Food Desert Locator is a Geographic Information System<sup>1</sup>, and as the user zooms in manually or searches with the Find Address tool, each “food desert” becomes a clickable tile and each click offers a window of demographic and food access statistics.

The Food Desert Locator was released as a groundbreaking new look at the food environment and the culmination of a 2009 Report to Congress on “Measuring and Understanding Food Deserts and Their Consequences,” part of First Lady Michelle Obama’s *Let’s Move!* Initiative (Ver Ploeg et al. 2011). While its visualization is commendable and its geographic scope expansive, its presentation of food deserts both

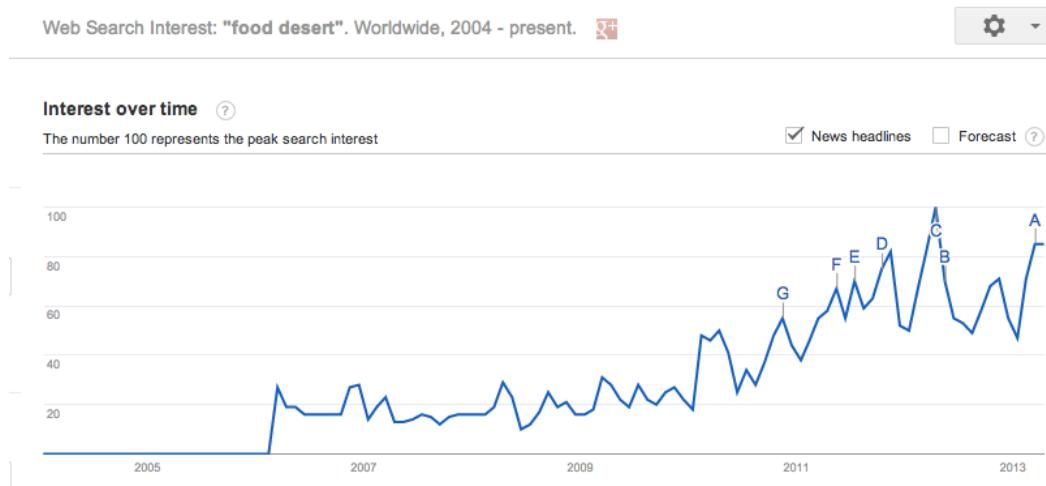
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<sup>1</sup> A *Geographic Information System* includes hardware and software that works with data to display information that is geographically referenced, such as the creation, management, and analysis of maps (ESRI 2013).

conceptually and realistically is limited. In the Food Desert Locator, the USDA uses distance to a supermarket as a proxy for food access (Ver Ploeg et al. 2011), yet one of the contributing factors to inequality in urban food access is the disappearance of large supermarkets due to race- and class-based development trajectories (Eisenhauer 2001). Without regard for or inclusion of local food environment features such as community gardens and farmers markets that provide fresh food (Karp Resources 2011), or corner stores that serve niche customers (Short et al. 2007), marking “food deserts” with pink boxes further isolates the “deprivation” (Whelan et al. 2002) and exclusionary “redlining” (Eisenhauer 2001) of these areas.

Indeed, “food deserts” are an environmentally-embedded socio-political categorization that has recently risen in academic prevalence and American cultural discourse:

**Figure 2:** Interest in “food deserts” as measured by search frequency in Google Trends (captured April 2013).



Food desert has become a buzzword across academic journals, editorials, and even funding grants. Progressive social and environmental blogs highlight urban

initiatives to green “food deserts” with mobile markets, community farms, and “healthy corner stores” as ways that fresh food can bring positive community change (see Tepper 2011, Peters 2013). In 2011, The New York Times reported a larger-scale attempt to “combat food deserts:” a partnership between First Lady of the United States Michelle Obama and several major retail chain stores to pledge 1,500 new “food oasis” stores that will provide fresh food to nearly half of the estimated “food desert” population (Walsh 2011). Yet while much of the publicity focuses on solutions, media coverage and academic papers alike continue to contest the existence of “food deserts.” In 2011, The Economist asserted that “[t]he unpalatable truth seems to be that some Americans simply do not care to eat a balanced diet, while others, increasingly, cannot afford to” (The Economist 2011). And in 2012, a study of California youth, published in the American Journal of Preventive Medicine, found “no robust relationship between food environment and consumption” when looking at the density and distance of retail establishments to schools and residential areas (Ruopeng et al. 2012).

Drawing attention to “oasis” initiatives, food deserts are visualized as isolated neighborhoods in need of rescue — note the language used in media coverage of the latest solution to “fix” or “eradicate,” “combat,” or “eliminate these areas” (Yaccino 2011; see also Thomas 2011, Peters 2013, Walsh 2011, Tepper 2011). Yet the term “food desert” originated as a label – the latest environmental health jargon (see Beaumont et al. 1995), not a community-sourced identity. Similarly, the presentation of food deserts on the USDA Food Desert Locator is a microscopic view of a map scattered with rose-colored boxes, placed on top of communities just like a label.

The purpose of both micro- and macro-view of food deserts may be to illuminate data and vulnerable populations, and the ramifications have served to support certain community needs, including the Healthy Food and Financing Initiative’s support of over \$150 million in both public and private investments “to create healthy food options in food deserts across the country” (U.S. Department of Health and Human Services, Administration for Children & Families 2011). Yet the diametric visualization obscures the diversity of food access. Not only is there a diversity of contributing factors that create the food landscape, but there is a diversity amongst areas labeled as “food deserts.”

### *Divine Providence*

Providence, Rhode Island, may be considered small as a city, but that hardly means it is homogeneous. Across its neighborhoods, demographics like income, race, age, and ethnicity vary (The Providence Plan 2011), and so does the distribution of resources — from the upper-middle class, largely Caucasian neighborhoods of the East Side, where Brown University and Rhode Island School of Design are located on College Hill, to the historic Federal Hill that is famous for its Italian-American commercial sector, to the predominantly Hispanic South Side neighborhoods (The Providence Plan 2011). Food access<sup>2</sup> is one such resource, yet unlike demographic features it lacks a single, measurable indicator. To address this, the USDA Food Desert Locator uses proximity to supermarkets as a proxy, adding income and access to a vehicle as factors

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<sup>2</sup> The literal and economic ability to meet one’s dietary needs in a manner that is culturally and physically appropriate and allows just and sufficient choice of food groups. Food access is achieved when a family or individual has economic and transportation means, as well as time and personal safety, and a food provider that serves them, whether as retail, wholesale, community grown, or through a trade economy.

that determine if an area is a food desert. However, approximating food access using only major grocery retailers overlooks the critical economic and cultural role that smaller markets play in communities. As Short et al. 2007 illuminate, corner stores and bodegas can offer a wide variety of food products at competitive prices while catering to neighborhood demographics, yet may not be large in square footage or revenue. Beyond overlooking small and medium-sized markets, pronouncing an area a “food desert” may mislabel it as void of any community landscape (Raja et al. 2008). Both criticisms can be addressed through more detailed and nuanced studies of an area, yet even the more refined views of food access are presented in nearly identical, bland “food desert” maps. As both advocates and academics take care to move beyond the categorical lens and label of “food desert,” are there ways to apply these more nuanced analyses to the visualization of food access?

As the concept of a food desert is challenged, why has its representation remained the same? Just as food access is a product of socio-economic and geo-political plurality (Trehaft 2010), so too maps chart the “converging forces” of a place (Solnit 2010, viii). The aim of this project was to assess and visualize food deserts using Providence, Rhode Island as a case study. It evolved as an exploration that embarked with a guiding question: How does the food environment differ across delineated food deserts? First, a geographically limited definition of “food desert” was used to produce a city-scale map of localized food deserts, which allowed for a comparison to the USDA’s delineated areas. The map’s shortcomings, both the singularity of the scope of data (which was based entirely on supermarkets) and its visual limitations (the stark proclamation of food deserts as red blocks) served as a starting point to explore more nuanced metrics in an

effort to look beyond the label of “food desert.” Ultimately, as I looked at a variety of metrics to produce a just analysis of food access, my data prompted the final research question: is there a way to create a visually accessible and layered view of the data that expands upon the plurality of this information?

To explore these questions, I created a series of maps that exhibit both conceptual and illustrative evolution. The foundation of the maps was created using GIS analysis of food access data and contributes to the current academic discourse surrounding urban food access metrics, but ultimately I turned to graphic design to illuminate the ways that both design presentation and analysis can contribute to an expanded view of “food deserts.” Though the maps I created fall short of realizing these critiques of food desert mapping, they are valuable in their incorporation of methods that provide community context and cartographic perspective. The USDA depiction of food deserts suggests that the map presents objective truth, but perhaps the greatest contribution of my study toward the concept of “food deserts” is the finding that power structures and procedure of mapping makes it anything but objective. The objectivity of mapping lends recognized authority to my artistic presentation of food access because it ties representational data to geographic reality (Mogel et al. 2008). In exchange, the artistic design and analysis frame the map in terms of individual perspective. Rather than asserting that the maps in this study fully locate and identify “food deserts,” they provide a tool to allow the viewer to explore the food environment through the metrics of food access that I found measurable, producible, and valid from my perspective.

Since this process called for a wider view of the contributing features (such as local and small-scale food sources) and representative factors (such as color scales and

evocative illustration) of food deserts, the outcome called for a broader term than “food desert.” Though “food desert” has garnered widespread media attention (see Figure 2) and governmental recognition of the issue of food access inequality (Ver Ploeg et al. 2009), its reductive expression of the converging forces that led to it create an isolated view and presentation of these issues. Rather than sensationalize areas of “deprivation,” the conversation should move toward a more inclusive and nuanced view of the “food environment”<sup>3</sup> that allows for greater local context and comparative perspective. To extend the metaphor, the food landscape, as I explored it, does not look like dry and deprived “deserts” punctuating “healthy” areas. Indeed, it looks more like quick-changing and densely populated “food topography,” complete with areas that reach the “peak” of food access metrics and are lush with a variety of options, and “valleys” that dip below measured levels of appropriate and just access to food. While the food access metrics create a scale of “food topography,” they can be placed in the food environment landscape alongside community features like green spaces (parks and gardens) and public transportation (bus routes) that situate food access cartography in the context of the much broader social, economic, and political picture.

## HISTORICAL TRAJECTORIES

### *A Brief History of the United States Grocery Landscape*

In the 1960s and 1970s, the American cultural landscape shifted as white, middle-class families moved their home surroundings from urban core areas to suburbia. Grocery

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<sup>3</sup> “Food environment” describes the food resources and atmosphere of an area, akin to a physical or natural environment, but relating to the human health, economic, cultural, geographic and other encompassing features of food.

retailers followed these family units (their target demographic), and adapted to the new physical and economic landscape. Retailers expanded physically, becoming *supermarkets* and chain stores, integrating distributors, as well as financially, following patterns of corporate consolidation (Treuhhaft 2010). As supermarkets grow in power and size, the food retail and service sector faces increasing competition, which in turn spurs market concentration (Martinez 2007). A competitive retail environment drives down food prices at competing stores as well as across the market through a ripple effect of distributors and suppliers (Martinez 2007). While lower food prices are theoretically beneficial to the consumer, the driving force behind price decrease is a market dominance to which consumers do not have equal access (McClintock in Alkon 2011, 109).

As of 2012, the top 10 Grocery retailers are all superstores and large chains with subsidiaries, according to *Supermarket News*. The #1 grocery retailer is Wal-Mart, and following behind it are Kroger, Costco, Target, Safeway, Supervalu, Loblaw Cos., Publix, Ahold USA, and C&S Wholesalers (*Supermarket News* 2012). This year marks the first in which all retailers on the publication's annual list of the "Top 75 Food Retailers and Wholesalers in North America" reported sales exceeding \$1 Billion (*Supermarket News* 2012). While "industry observers" chalk up this achievement in part to inflation, it demonstrates the remarkable size and scope of the food economy (*Supermarket News* 2012).

## LITERATURE REVIEW

*Abundance Without Access: A Question of Equality*

While major retailers are reporting record-breaking abundance, their consolidated market control and limited accessibility leaves many consumers with a lack of healthy food. A recent report by PolicyLink and The Food Trust called *The Grocery Gap: Who Has Access to Healthy Food and Why It Matters* looked at 132 studies undertaken in the past 20 years by academic Universities, policy research analysts, and advocacy organizations, and only two of these studies did not find inequities in access to healthy foods by income, race, and population density (Treuhhaft 2010). Due to the current United States obesity and diet-related disease epidemic, much research has focused on food issues and illustrated how they plague not only the body, but burden the economy, and weaken culture (Center for Disease Control and Prevention Adult Obesity Facts 2012).

Research also displays a direct correlation between access to a supermarket and/or fresh food, and the likelihood of obesity (PolicyLink 2008). Minority populations have significantly higher rates of obesity (Center for Disease Control and Prevention 2012), yet at the same time a large study across several states found that for every additional supermarket per census tract, produce consumption increases by 32% for African Americans, as compared to 11% for whites (Morland et al. “The Contextual Effect...” 2002).

In addition to economic exclusion in the marketplace, this disparity of food access can be seen as a violation of human rights, as argued by authors like Raj Patel, Vandana Shiva, and activists across the globe. The “Right to Food” was first acknowledged in the 1948 International Bill of Human Rights, then the International Covenant on Economic, Social and Cultural Rights (United Nations 1966), the Convention on the Rights of the Child (United Nations 1989) (Riches in Koc et al. 1999). International doctrines became

more food-specific with The World Declaration on Nutrition (adopted in Rome in 1992), the Declaration on Social Development (adopted at the World Social Summit in 1995), and the recent Rome Declaration on World Food Security (FAO 1996) (Riches in Koc et al. 1999).

In global and national politics, the right to food takes the form and terminology of “food security” which focuses on physical and economic accessibility. According to the World Food Summit of 1996, “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (“Food Security” Policy Brief 2006). By limiting food security to physical access and the market economy, this definition commodifies food security into a market exchange, which in turn undermines the concept of the right to food (Riches in Koc et al. 1999, 205).

As a concept, food justice extends food security from commoditized hunger to a true right to food—from an issue of adequate amount to one of equality. Gottlieb and Joshi trace the food justice movement to the late 1990s developments of the environmental justice movement (Gottlieb et al. 2010). Environmental justice movements and organizations can be seen and heard around the globe, fighting for “the right of all people to share equally in the benefits bestowed by a healthy environment” (Adamson et al. 2002, 4). Additionally, environmental justice initiatives “attempt to redress the disproportionate incidence of environmental contamination in communities of the poor and/or communities of color” (Adamson et al. 2002, 4). Following this groundwork of a rights-based approach to environmental assets and contamination, Gottlieb and Joshi “characterize food justice as ensuring that the benefits and risks of where, what, and how

food is grown and produced, transported and distributed, and accessed and eaten are shared fairly” (Gottlieb et al. 2010, 6). Considering the many, moving parts of the food system from production to consumption expands the people and places included in this characterization of food justice. In turn, each aspect of the food system allows for many junctures of change toward justice.

Food sovereignty is another expansion of and reaction to the commodified right to food. It is a rights-based framework that argues not only for change toward equal rights, but the right for communities to defend themselves against unwanted change. Food sovereignty

is the right of peoples to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent they want to be self-reliant; to restrict the dumping of products in their markets; and to provide local-fisheries-based communities the priority in managing the use of and the rights to aquatic resources. Food sovereignty does not negate trade, but rather it promotes the formulation of trade policies and practices that serve the rights of peoples to food and to safe, healthy, and ecologically sustainable production” (People’s Food Sovereignty Network, 2002, in Windfuhr and Jonsen 2005).

Quickly growing into a formidable worldwide political force, food sovereignty organizations like La Via Campesina are gaining attention in the hopes of making gains beyond food security— food rights security. While much of the food sovereignty movement revolves around producers and international trade policy, the concepts apply

more and more to developed nations, and to urban core areas especially. Urban communities with a history of retail discrimination (Eisenhauer 2001) and supermarket desertification (McClintock in Alkon 2011) can pose many of the same arguments as rural, land-based food sovereignty activists. As a way of parsing out these parallels, I employed graphic design tools (Adobe Illustrator CS6) to visualize an urban food sovereignty framework using Providence, Rhode Island as a case study.

As shown in Figure 3, I adapted the People's Food Sovereignty Network definition to Providence using personal knowledge and research of local resources, partnerships, and organizations that relate to the tenets of food sovereignty. Whether applied to an urban “food desert” or rural smallholder farms, food sovereignty provides protection and promotion of the health of local food economies, food-producing resources, and the community.

#### *Focus on “Food Deserts”: An Academic Obsession*

In 1995 Beaumont et al. originated the term “food desert” in a U.K. Department of Health “nutrition task force low income project team” report to describe the lack of food outlets they found in low-income areas (Beaumont et al. 1995). “Food desert” was a metaphor that captured contemporary discourse about poor nutrition, retail exclusion, and urban “deprivation” in the U.K. (Wrigley et al. 2003, 151). It was an imaginative term that served to compound issues and “encouraged a shift in health-promotional activity” – summing up a host of public health concerns with language that allowed for the re-imagining of a landscape (Wrigley et al. 2003).

This new terminology encapsulated economic, geographic, and public health issues and its introduction impacted academic research across a variety of disciplines. Since Beaumont et al. first published the “food desert” metaphor, research has focused on food access, the prevalence of fresh food, and geographic distribution, and the results have been articulated through many mapping techniques, from city-scale public health initiatives to technical geographic analysis, to the national Food Desert Locator Map (see 2012 Baltimore City Food Environment Map, Leete et al. 2011, Morland et al. “Neighborhood Characteristics...” 2002, Ver Ploeg et al. 2009; see “Comparative Mapping Methods of Food Deserts” section below). From urban studies, to public policy, planning and education, public health, and economics, the represented research fields highlight the intersectional nature of food deserts. The following studies are international in scope and look at both urban and rural instances of food access inequality.

After a 1996 U.K. Department of Health study on low-income populations brought to the surface the correlation of food access deprivation in areas of economic depression, researchers embarked on a project about “Food Deserts in British Cities.” As part of the project, one paper by Whelan et al. takes a qualitative view of “Life in a “food desert”” using focus groups (predominantly women) in Seacroft, Leeds (an identified “food desert”) to examine food purchasing and consumption attitudes and patterns. Using participant food diaries, interviews, and surveys the authors seek to “provide qualitative insights into the economic and physical access constraints perceived and experienced by disadvantaged consumers in an area of compound social exclusion and poor food retail

access” (Whelan et al. 2002, 2084) and found that food purchasing priorities differ among disadvantaged cohorts.

Mothers with younger children were swayed in their decision of where to shop based on their concern about the cost of food, which increased with factors such as single parent and smoker status, while elderly populations expressed that economic factors were less of a problem. A major finding was that limited physical access to a store, as measured by vehicle ownership, is less dire than the bigger picture of food mapping presents because at the individual level consumers “make do” with finding a ride” (Whelan et al. 2002, 2097). Such attitudes and capabilities were labeled food access “coping mechanisms” by the research team (Whelan et al. 2002, 2097).

Lastly, the food diary findings reinforce the theory that healthy eating is dependent on cultural food norms. Importantly, this study showed that food access is tied to food security because limitations can result in skipping meals and an inadequate intake (Whelan et al. 2002, 2098). This finding strengthens the connection between geographic and economic measures of food access and food security by suggesting that limited food access reduces food security. Since food deserts serve as the current representation of food access (Beaumont et al. 1995, Ver Ploeg et al. 2009), they become a geographic representation of food security, which in turn speaks to regional food justice.

The qualitative analysis of the paper by Whelan et al. 2002 is meant to complement and triangulate the findings of a “before and after” comparative study by Wrigley et al. 2002. The study does not focus on the politics of defining food deserts but on the diet and nutrition ramifications of a major grocery retail development in the previously identified food desert of Seacroft, Leeds (Wrigley et al. 2002, 2061-2). The

authors view the placement of a Tesco grocery store in Seacroft as a non-healthcare intervention because before the store opened 70-90% of the area's population was beyond walking distance from a fresh food marketplace (Wrigley et al. 2002, 2064). However, the findings showed that:

for low-income households, physical access does not necessarily imply economic access and that, despite the quality and range of 'healthy' foods that would be offered by the new store, some residents of the area might effectively see no improvement in their overall food access simply because they would not be able to afford to use the Tesco superstore.

(Wrigley et al. 2002, 2065)

Similarly, some residents would avoid the new store for its temptation to spend beyond means (Wrigley et al. 2002, 2065). The study methods relied on diaries and interviewed surveys 5 months before and 8 months after the store opened, and analysis used reported food consumption (in the form of a food journal) as a proxy for healthiness of diet.

The authors found that the participants with the demonstrated "poorest" diets both switched their purchasing habits to the new Tesco as the source of healthy food, and increased their consumption of fruits and vegetables (Wrigley et al. 2002, 2078). This significant finding led researchers to believe that physical access was, in fact, the major inhibitor to healthier diet (Wrigley et al. 2002, 2078). The establishment of physical access as a primary obstacle to a healthy diet served as the grounds for the development of studies that examine food access from a geographic perspective. At the same time, Whelan et al. 2002 illustrates that the grocery landscape is rich with interactions spanning economic, geographic, and social fields that are as diverse as the individuals it serves.

Though published in 2006, a University of Alberta research team examined supermarket access in Edmonton using 1999 data to determine if access is lower in urban core areas, as well as lower in “low income and other high-needs areas” such as those with vulnerable populations including the elderly, and low vehicular access (Smoyer-Tomic et al. 2006, 307). These “vulnerable populations” who have low access to stores face higher prices and worse selection of food due to limited store options. These stores are themselves excluded from economies of scale. The authors created a series of maps using data analyzed at neighborhood level but coded by vulnerable population characteristics (“seniors,” “low income,” “no vehicle,” and combinations of these factors) to show the distribution of and variety of people who have lower food access and “live in unsupportive local food environments and who have few resources for accessing supermarkets” (Smoyer-Tomic et al. 2006, 322). While the presentation of the data hinges on geographic distribution, the maps from this study acknowledge and address that food access is determined by multiple factors. Their choice of limiting factors reinforced the definition of food deserts as “vulnerable” places that lack grocery stores (Beaumont et al. 1995) and quantified the characteristics of a food desert into income and vehicle ownership as a proxy for food accessibility. By including influencing factors like population characteristics into their analysis of food access, Smoyer-Tomic et al. (2006) move beyond previous quantitative studies that look exclusively at geographic distribution of stores and populations

The Edmonton study of food access predated the largest study in the United States, the 2009 Report to Congress on Food Deserts (Ver Ploeg et al. 2009). The report was prepared by the Economic Research Service of the United States Department of

Agriculture as part of the Healthy Food and Financing Initiative by First Lady Michelle Obama. The focus of the report is public health, with an upfront recognition of the rise in obesity and diet-related disease in the United States and the report's impetus that "limited access... may be linked to poor diets" (Ver Ploeg et al. 2009, iii). The comprehensive report on nationwide food access and affordability includes eight chapters discussing the findings and analysis of the USDA Food Desert Locator Map and summarizing relevant studies. Topically, it spans the interdisciplinary issues involved in and related to food deserts. From regression models of household proximity to grocery store, to individual and household food purchasing habits, to supply chain and retail grocery location economics, the report includes data generated by researchers at the USDA. It also discusses the health impacts related and correlated to dietary choices, policy options, and initiatives ameliorating food deserts through the USDA Community Food Projects grant program.

The segments of the report allow it to follow through with its aim of "measuring and understanding food deserts and their consequences," by covering the breadth of issues and outcomes to a useful degree of fluency and depth. Each segment, however, maintains a distinct focus and language, which brings forth the distinctions between the varied disciplines utilized. For example, one chapter is on the economic analysis of food deserts, and another summarizes social movements receiving Community Food Program funding.

While the Report addresses background information and USDA work related to food deserts, it does not specifically analyze the Food Desert Locator Map, but set the stage for gathering the U.S. Census data that was used to generate the Food Desert

Locator map. The 2008 Farm Bill defines a food desert as an “area in the United States with limited access to affordable and nutritious food, particularly such an area composed of predominantly lower income neighborhoods and communities (Title VI, Sec. 7527)” (Ver Ploeg et al. 2009, 1). However, in the USDA Report to Congress, the authors recognize the enormity (scale) of measuring food access and thus use supermarkets as an indicator of affordable, nutritious food even though this may overlook adequate offerings at smaller stores (Ver Ploeg et al. 2009, 3-4). This, more than the aspects of the Report that cover economic analysis of food desert nutrition or community advocacy, sets the precedent for the perception of food deserts by defining supermarkets as a proxy of food access. Although the authors acknowledge that “the current state of research is insufficient to conclusively determine whether some areas with limited access have inadequate access” (Ver Ploeg et al. 2009, vi), the subsequent publication of the Food Desert Locator (Ver Ploeg et al. 2011) portrayed all areas with limited food access under the same statistical and visual category.

Undertaking the Food Desert Locator Map and a detailed yet readable report is a novel and highly commendable step for the USDA, which historically deals with agricultural research, regulations, and authorizations. The publication of these materials formalized the recognition of “food deserts” as underserved areas facing economic and health environment inequality, and a boost in political, public, and pop cultural conversation can be seen soon after (see Figure 1, Google Trends for the prevalence of “food desert” in the media). The major limitation of the report and its ramifications is the lack of discourse and analysis of the food justice and food sovereignty movements. In expanding its view of the issues surrounding food access (Ver Ploeg et al. 2009), the

USDA published a tool (Ver Ploeg et al. 2011) that codified “food desert” to the exclusion of other aspects of food access, such as a rights- or justice-based approach.

### *Comparative Mapping Methods of Food Deserts*

While the USDA Food Desert Locator has garnered the most widespread media attention (see Tepper 2011, Walsh 2011, The Economist 2011), there have been several prominent food desert studies and many maps published in the last decade. Academic and geographic studies have focused on urban areas or regions in both the U.K. (Smoyer-Tomic et al. 2006), and the U.S. (Morland et al. “Neighborhood Characteristics...” 2002, Sparks et al. 2011, Raja et al. 2008, 2012 Baltimore City Food Environment Map, Short et al. 2007, Leete et al. 2011). Though the selected areas and food desert indicators differ, the presentation of the data is based in mapping methods that employ Geographic Information Systems to survey and represent food access.

One outgrowth of the USDA Food Desert Locator is The 2012 Baltimore City Food Environment Map, created through a partnership of academic researchers from Johns Hopkins University’s Center for a Livable Future and the city’s Office of Sustainability (see Figure 4). This emulates the USDA map with urban-specific metrics, creating a more comprehensive lay of the land across economic, demographic, and geographic criteria<sup>4</sup>.

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<sup>4</sup> The Baltimore Map uses four main criteria (2012 Baltimore City Food Environment Map Methodology).:

1. Distance to Supermarket: The USDA map uses a metric of 1 mile, with greater than one mile meaning inadequate access. The Baltimore map adjusted this to  $\frac{1}{4}$  mile to better illustrate the urban landscape and lifestyle.
2. Poverty Measure: 185% of the Federal Poverty Level = “low income” was used because this is the same as qualification for the Supplemental Nutritional Assistance Program, a good measure of people who need improve access to good food.

What is useful about the Baltimore map is the greater variety of information displayed visually and the tailored definition and indicators of a food desert<sup>5</sup>. The site-specific map can provide policymakers and citizens with a more comprehensive view of their city's food environment, highlighting features that play a significant role in their community.

With the USDA Report to Congress and Food Desert Locator approaching food deserts nationally, and cities like Baltimore and Leeds, U.K., studying local-level data, the 2002 report by Morland et al. ("Neighborhood Characteristics...") fills in a perspective gap. The study examines data across 4 states: Maryland, Mississippi, North Caroline, and Minnesota, using the names and addresses of all available food outlets according to each state's department of health, and agriculture. Combining these sites with census tract-level information on wealth and racial segregation, the study showed that wealthier neighborhoods have greater access to all food outlets including supermarkets, gas stations, and convenience stores, while poorer neighborhoods have 3 times more places to consume alcoholic beverages.

The authors conclude that "without access to supermarkets, which offer a wide variety of foods at lower prices, poor and minority communities may not have equal

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- 3. 40% of households have no vehicle available (which can be a physical barrier to acquiring healthy food).
  - 4. Quality and Availability of Healthy Food: the Baltimore Foodshed Map went beyond the USDA Food Desert Locator by generating sociological data through Johns Hopkins University of Healthy Food Availability Index scores for each food outlet, using the Nutrition Environment Measurement Survey.

<sup>5</sup> The 2012 Baltimore Food Environment Map redefines food desert as: "An area where the distance to a supermarket is more than ¼ mile, the median household income is at or below 185% of the Federal Poverty Level, over 40% of households have no vehicle available, and the average Healthy Food Availability Index score for supermarkets, convenience and corner stores is low (measured using the Nutrition Environment Measurement Survey)" (2012 Baltimore City Food Environment Map Methodology).

access to the variety of healthy food choices available to nonminority and wealthy communities” (Morland et al. “Neighborhood Characteristics...” 2002, Abstract) The authors assertion that equality is driven by access to supermarkets suggests that food justice can be measured using food access as a proxy.

In 2008, Raja et al. used Erie County (City of Buffalo), New York as a case study to isolate factors such as income, and look only at the variation in food access between neighborhoods predominantly of color, and predominantly white neighborhoods. The study found that there are fewer supermarkets in predominantly black neighborhoods. However, the authors contest the term “food desert” for its misconception that there is an altogether void of food (Raja et al. 2008, 478).

Rather, the authors argue that minority neighborhoods have an “extensive network” of smaller markets. Though they found that the price for a USDA Thrifty Meal Plan Market Basket (see “Methods” for a description of market baskets) is higher at convenience stores, the bill is comparable at small grocery stores and supermarkets. This means that small markets, which are excluded from the USDA and many other food desert map food access surveys, are in fact price-competitive with larger markets and suggests that they are a viable source of food. Based on these findings, the authors determine that a productive planning tactic would, therefore, look to strengthen these markets as an existing asset and community food source, rather than look exclusively to supermarkets as an indicator of access (Raja et al. 2008, 478-9).

In 2007, a San Francisco-based study did just that. Short, Guthman, and Raskin used USDA Market Baskets as a survey tool to generate data about corner stores in selected neighborhoods in San Francisco and Oakland (Short et al. 2007). By elucidating

and comparing the options offered at these stores, the researchers found that small convenience stores are “specific units of the “foodscape”” that “meet many of the criteria for community food security (CFS) by providing a wide variety of relatively low-cost foods.” However, due to several key factors, they are not a “panacea” (Short et al. 2007, 352-3) of food access. The authors found disadvantages such as the uneven dispersal of corner stores within neighborhoods, and the stores’ dependence on the broader food system. Some of the stores do not address community food security because they are providing to an ethnic niche with a higher occurrence in immigrant neighborhoods, but do not offer foods for other demographic populations. These limitations may negate contributions to community food security as a goal.

While Short et al. (2007) offer a robust, community-focused approach to gathering food access data, it is also crucial to compare methods of visualizing the information. In Portland, Oregon, Sparks et al. (2011) enlist GIS methods to measure food access on the basis that there are three stages:

1. Identifying “vulnerable neighborhoods”
2. Surveying food access across neighborhoods using a standard measurement
3. Determining “designated threshold” for access—a cutoff point “below which access is deemed inadequate” (Sparks et al. 2011, 1715-6).

The study looks for patterns in food access based on Euclidean distance aggregation of grocery stores within all 243 Census tracts<sup>6</sup> of Portland, OR. They reference a similar study by Fan et al. (2009), which measures the number of grocery

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<sup>6</sup> Euclidean distance is a measurement function that calculates distance from the center of a source to the center of a surrounding cell along a diagonal line that forms the hypotenuse of a right triangle between the two (Environmental Systems Research Institute 2008). In this case, the distance from the center point of a grocery store to the center point of surrounding census tracts (an aggregation of blocks used to collect U.S. Census data), e.g. “as the crow flies” as opposed to mileage based on roads or topography.

stores within 1000 meters from the centroid of each neighborhood in Salt Lake City, Utah in Euclidean distance, and another study by Apparicio et al. (2007) that uses 1000 meters to grocery stores across street network distance (i.e. measured miles along streets) (Sparks et al. 2011, 1718).

Sparks et al. (2011) generate 4 different food access measures, examples of which are displayed in Figure 4: Measure 1 is the number of supermarkets within 1 km of each census tract; Measure 2 is a gray, gradated display of the distance to the nearest supermarket (in meters); Measure 3 is a map displaying the average distance to the three closest, distinct supermarkets (with different parent companies); Measure 4 uses the same metric as Measure 3 but does not take into account parent companies of the markets (Sparks et al. 2011, 1724-1725). Measures 2, 3, and 4 generate a consistent view of relative food access in Portland, and the authors then recommend that future researchers focus food desert measurement on two factors— a “coverage method” as in Measure 1, and a “distance measure” as in 2, 3, and 4 (Sparks et al. 2011, 1732). Per this recommendation, the authors posit that an accurate and accountable visualization of food access must take into account both density and proximity of features. Despite the complexity of using multiple factors to compare food desert analysis methods, no analysis was provided for the mapping presentation, which is shown in black and gray illustrations in Figure 5.

A second comparative study in Portland, Oregon, employs three distinct mapping methods previously identified and developed in other cities. The study uses them to replicate and compare GIS maps of urban food access (Leete et al. 2011). The authors present a succinct survey of existing methodologies and definitions for food deserts,

highlighting the variation in study design and the inability to compare city-scale assessments across cities.

The authors also introduce the phrase “food hinterland” to categorize suburban areas with low food access and vulnerable populations whose concentration does not meet the recognition or definition of food deserts. The methods utilized for food desert assessment include those from studies in Edmonton, Alberta (Smoyer-Tomic et al. 2006); Cardiff, Wales (Guy et al. 2004); and Montreal, Quebec (Apparicio et al. 2007) because the authors feel these are the only replicable definition and methodology.

After completing each method, using supermarkets listed by ReferenceUSA and verifying by online and phone research, the results were mapped in GIS and autocorrelated by spatial clusters to determine how much the methodologies overlap. Out of 15 census tracts identified as food deserts, 5 tracts were identified by two or more of the methods, and 1 census tract is congruent amongst all three applied methods. The authors explain that while most of the identified food deserts do not converge, they are regionally located. This implies that when multiple, varying food access surveys are employed in the same area (in this case, Leete et al. 2011 used methods developed by Smoyer-Tomic et al. 2006; Guy et al. 2004; Apparicio et al. 2007), exact geographic outlines may differ but the methods produce results that are equally accurate in highlighting disparities.

Importantly, this illustrates that city-specific, unique food access measurements are valuable despite variance in metrics, even if not they are not replicable across the country. In some cities or regions, one method of measuring food access may be more applicable because of zoning, city planning, or retail locations, while another city’s food

landscape may be more accurately analyzed using a different distance measure. While the results of two such unique food desert analyses may be technically incomparable, both measurement outputs are valuable for the purpose of highlighting food access disparities. What is powerful about this implication from Leete et al. (2011) is the suggestion that one, replicated food desert measurement for every community across the nation is not necessary. Rather, areas can employ research and analysis methods that best fit the geography, environment, and demographics, and still find accurate, true measurements of food access injustice.

#### *Place-based: Providence, Rhode Island Context*

In November of 2011, the Rhode Island Food Assessment was published by the Rhode Island Food Policy Council, a group of stakeholders including farmers, organizers, and policy-makers (Karp Resources 2011). Their vision is that “community food security will exist in Rhode Island when safe, nutritious, and culturally appropriate food is accessible and affordable in every community, and an increasing proportion of Rhode Islanders’ food is raised, caught and processed locally” (Karp Resources 2011,1). As of 2010, however, 14.7% of RI households were food insecure (Karp Resources 2011, 7), and there’s a significant statistical gap in statewide obesity rates: 23.3% of whites, 35.6% of blacks, and 30.9% of Hispanics are suffering from this diet-related disease (Karp Resources 2011, 8).

With obesity rates averaging one third of the population, it may not be surprising that the average purchasing of packaged sweets nearly rivaled fresh fruits and vegetable

purchasing (115 lbs/person sweets; 151 lbs/person fruits and vegetables) (Karp Resources 2011, 7). Yet at the Southside Community Land Trust City Farm in Providence, produce yields are reported as averaging 1 lb. per square foot (Karp Resources 2011, 13)—an efficient way to supplement fresh food intake or reduce market dependency. But growing produce is time- and resource-intensive in its own way, so other local options include Electronic Benefit Transfer use at farmers markets (redeeming Supplemental Nutritional Assistance Program money). The RIFPC Assessment found that within Providence, half of all farmers markets accept SNAP, and there was a 61% increase in EBT use between 2010 and 2011 (Karp Resources 2011, 20). To address food production in RI, the Food Assessment produced a “Vision for RI Agriculture 5-Year Strategic Plan,” and highlighted potential support for local, urban growers in the “Right to Plant” bill introduced into the RI General Assembly in 2011 (Karp Resources 2011, 26).

The RIFPC compiled several maps to provide a statewide view of food access and production, as seen in Figure 6. The map shows “Food Access and Insecurity with Median Household Income by Tract” and includes farm stands, farmers markets, small markets, and fast food restaurants that show a general clustering on Providence. The map was produced by The Providence Plan, or ProvPlan, the city’s leading source for cartographic data visualizations, using state-level data from a policy perspective. ProvPlan’s mission since its 1992 inception has been to promote city wide social and economic well-being by balancing “thinking” and “doing” by way of analysis and map production (The Providence Plan 2011). The organization was launched jointly by the City of Providence and the State of Rhode Island, and it follows that the maps, initiatives, and most recently, Data Stories, are focused on using the government data from the

Census, the Department of Health and the Department of Education to assess and analyze the needs and assets of the community.

Providence is also home to a host of food-related non-profit organizations, such as Farm Fresh Rhode Island, the Environmental Justice League of Rhode Island, and Southside Community Land Trust. Farm Fresh Rhode Island is “a hub for fresh, healthy food” that has grown from a network of farmers markets to a multifaceted powerhouse operating a wholesale produce delivery service, a job-readiness program for youth in the juvenile detention system, the new “veggie box” prescription program, and continued expansion of market locations and accessibility through EBT and WIC voucher acceptance (see Bledsoe 2012 for an analysis of EBT use at Providence markets). Farm Fresh Rhode Island has proven to be the most widely recognized local resource and umbrella organization for local food and continues to address food access and equality through grant-funded programs and outreach.

Other approaches toward food and environmental equality come from the Environmental Justice League of Rhode Island (EJLRI). Since 2007 the EJLRI has been a community leader in the fight for environmental justice, and in 2011 they moved toward food justice with the pilot Providence Healthy Corner Store Initiative (PHCSI). The PHCSI began with 3 corner stores in South Providence whose owners agreed to source more healthy options, local food, and participate in a market makeover in exchange for community promotion (Environmental Justice League of Rhode Island, “Healthy Corner Store Initiative” 2012). The initiative has since expanded into more stores in Providence and the neighboring city of Pawtucket, as well as involving “Fresh Produce Ally” stores that offer fruit cups as snack options. Contributing to these recent incarnations is the

EJLRI's Environmental Community Organizers or ECO-Youth, teens that take action on a variety of justice issues. This past year, ECO-Youth began their own food justice campaign called SWAGG Snacks, a promotional plea to teen peers to "feed your swag" with healthy food instead of "wack snacks" (EJLRI, "SWAGG Snacks" 2012).

Another form of food justice action takes place at community garden plots around Providence, such as the 16 included in the Providence Community Growers Network. This network is supported by Southside Community Land Trust (SCLT), an urban agriculture organization that has been producing food in Providence soil for over 30 years. The SCLT grows and sells food across the city at their City Farm location and other urban agriculture hubs, and also hosts workshops and plant sales (most recently through the offshoot organization Plant Providence: Grow Food Everywhere) (Southside Community Land Trust 2012; Plant Providence 2012). Since the RIFPC Assessment highlighted the productivity of these plots, they can be viewed as veritable fresh food access points.

While community garden plots serve those who want to grow food for personal consumption, a new network of urban farmers are changing the city greenery and its economic landscape. One example is the Little City Growers Cooperative, a Providence-based cooperative of 6 independent urban farmers (Little City Growers 2012). Many of the farms sell at farmers markets, as well as wholesale to local restaurants, and also have Community Supported Agriculture (CSA) programs. Two of the farms, Sidewalk Ends Farm and Front Step Farm, are located on small lots on the South and West Side of Providence so they combine their yields to offer a joint CSA with in-city pick-up (Sidewalk Ends Farm). As in many urban areas across the United States, the young

growers in Providence provide a resurgence of energy, and a bounty of urban produce. Notably, urban farming and gardening produce provides for the community beyond what is available at grocery stores—a food source not accounted for in standard access maps.

**Table 1:** Selected organizations in Providence, Rhode Island.

Organization	Description	Website
Southside Community Land Trust	Urban agricultural production and education, manages City Farm and community gardens.	<a href="http://southsideclt.org/">http://southsideclt.org/</a>
Rhode Island Food Policy Council	A stakeholder group of farmers, politicians, and community members working toward food security and assessing Rhode Island's food system.	<a href="http://www.rifoodcouncil.org/">http://www.rifoodcouncil.org/</a>
Environmental Justice League of Rhode Island	A non-profit organization focusing on advocacy to combat local environmental justice issues including food access, toxic sites, air and water quality, and youth activism.	<a href="http://ejlri.wordpress.com/">http://ejlri.wordpress.com/</a>
Farm Fresh Rhode Island	A local, fresh food hub connecting growers, consumers, and the community through markets and outreach programs.	<a href="http://farmfreshri.org/">http://farmfreshri.org/</a>
The Providence Plan	A data and mapping warehouse connecting the public and policy makers with social and economic information.	<a href="http://provplan.org/">http://provplan.org/</a>

The above table outlines some of the organizations in Providence whose work is immediately relevant to food deserts and food access maps. These organizations and their outreach present resources that are not included on traditional maps that focus on large retail supermarkets, individual vehicles, and homogenized demographics of “low income areas.” Looking at Providence on the Food Desert Locator shows several “food deserts” labeled as lacking healthy food access, yet neglects to reference the many organizations

working on food issues. From healthy, fresh food at community gardens, to food access advocacy, even local mapping initiatives – the national “food desert” map is itself lacking complete access to the Providence food environment.

### *From Fact to Map: Creative Cartography*

*“[T]he point of evidence displays is to assist the thinking of producer and consumer alike” (Tufte 9)*

As previously described, many food access studies present data in maps using geographic analysis. Geographic cartography provides a basis for analysis the distribution and concentration of markets (see Leete et al. 2011; Raja et al. 2008; Short et al. 2007; Sparks et al. 2011) yet stops short of incorporating analytical design. However, I found that the framework and elements of analytical design provide an untapped and informative resource for presenting food access data. In Beautiful Evidence, Edward Tufte, a foremost thinker and writer on the topic, provides a theoretical and technical framework for analytical design<sup>7</sup> around his base argument that “making an evidence presentation is a moral act as well as an intellectual activity” (Tufte 2006, 9). Tufte’s perspective is creative yet strict in its parameters as he outlines the requirements for

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<sup>7</sup> Most valuable are his Principles of Analytical Design, which he outlines in theory and then draws from direct examples:

1. Analytical design must compare, contrast, and show differences of its evidence through its display.
2. The design must provide explanation, causality, and structure for the data.
3. It is crucial to display multivariate analysis including data and supporting details across different dimensions.
4. There must be complete integration of evidence such as numbers, images, and diagrams.
5. The resulting analytical design must include full and proper documentation.
6. From the onset it must be content-driven to guide all technological and stylistic decisions (Tufte 2006).

successful, credible maps. According to Tufte, “mappings become more credible if constructed independent of a favored result” (Tufte 2006, 28-29). They also need “an explanatory tightness of the mapping theory in relation to the image” with specificity, testability, and coherence to be successful (Tufte 2006, 31).

Cartographic design may make the first impression on the viewer, but underlying the content is another key framework often unseen: power dynamics. An Atlas of Radical Cartography is a collection of essays and printed maps exemplifying and illustrating the principles of radical cartography – “the practice of mapmaking that subverts conventional notions in order to actively promote social change” (Mogel et al. 2010, 6). The maps range from practical cartographies to visualizations of global or local systems, yet all employ radical cartography in their sources and methods of transmitting information. These maps acknowledge and utilize the power of cartography-- of representing voices, narratives, facts, and global orders in a particular arrangement and presenting it as environmental or social geography. Unlike the factual, assumptive “truth” of say, Columbus’ map of the New World or the Mercator projection of the modern world, radical cartographies are “a departure point or a tool that can aid in analysis but do not speak for themselves,” according to Trevor Paglen (Mogel et al. 2010, 11).

Infinite City: A San Francisco Atlas is an eloquent and succinct title for an elaborate and expansive book of creative cartography. In this book of maps, Rebecca Solnit compiles a layered view of San Francisco and the surrounding Bay Area that describes how “what we call places are stable locations with unstable converging forces that cannot be delineated either by fences on the ground or by boundaries in the imagination— or by the perimeters of the map” (Solnit 2010, viii). Similarly, food access

is an issue created by “unstable converging forces” such as the market economy, local environment, and demographic vulnerabilities (see Gottlieb et al. 2010; Riches 1999; Whelan et al. 2002) tied to a community’s stable geographic location. Too often, maps of food access draw perimeters around a location without attempting to represent the “converging forces” and their ramifications, thus poorly depicting a place.

In Solnit’s “infinite” tome, each depiction combines several layers to create a unique perspective and all are woven together under the realm of an atlas as “a collection of versions of a place” (Solnit 2010, viii). In fact, Solnit selected distinct features to highlight the arbitrary nature of map-making and the inexhaustible resource that is any place (Solnit 2010, 2). The maps are beautiful creations that first draw attention for their color, title, layout, and clean editing, then for the fascinating details, text, and contextual narrative. The sixteenth map, “Death and Beauty” by Seigel (cartographer) and Herrington (photographer), stands out for the way it ties the intangible, relative concepts of death and beauty to specific data points—all of 2008’s murders and some of 2009’s Monterey Cypress. The resulting map allows for the reader to decipher trends, overlap, and spatial analysis while subtly drawing out larger cultural themes that can branch off in many directions. Indeed, the map is framed by shadowy silhouettes of Cypress limbs—a recognizable reference to their live beauty, but simultaneously a nod to the looming juxtaposition of death. Particularly poignant is the way Solnit positions the Atlas as a beginning, not a representative tome.

Another exemplary use of alternative, contemporary mapping is a Brooklyn, New York-based project, 596 Acres. The organization hosts a web-based map of all the publicly-owned, vacant land in New York City, and aims to facilitate its transformation

into “democratic community resources” (596 Acres 2013). The site and its outreach encourage people to “find the lot in your life” and offers networking and (free) publicity to connect people who want to take on a vacant lot as urban greenery, beautification, agriculture, or another form of community space. Though initially launched as a grassroots initiative in Brooklyn, 596 Acres has expanded into a multi-borough portal with the capacity for tangible change. Its impactful idea of reclaiming urban vacant lots has caught on across the country. In 2013, Providence announced the launch of a similar program called Lots of Hope to transform unused land into urban farms utilizing Southside Community Land Trust resources and \$100,000 of matched grant money (Providence Business News Staff 2013).

The lots are mapped simply in GIS with government land ownership data, and a database houses the numbers and corresponding details of each lot to allow interested parties to proceed with permission. The presentation of the map has a hand-drawn effect that carries through the organization’s undercurrent of communities taking vacant lots into their own hands. In some ways, this map is an alternate vision of food and the environment. Where a food desert map isolates communities by outlining areas in need without suggesting opportunities, 596 Acres uses mapping to promote access to community features and pairs it with the information needed for change. This is an example of how localized, resource-specific maps can speak about access in a different way.

As the above examples suggest, not all maps are created equal, or equally. In The Map as Art, artists submitted representative maps in alternative and mixed media. The concepts and data range from mapping personal narratives to making political statements

about maps. According to the author, “The language of maps as developed over time is a beautiful one, filled with artistic potential” and cartographers use “visual creativity to make their maps more compelling” (Harmon 1999, 9). Visual art and cartography also overlap in the sense that minimalistic aesthetics highlight the way cartographers are inherently selective in their display of information (Harmon 1999, 13). Whether labeled upfront or gleaned from careful observation, “maps act as backdrops for statements about politically imposed boundaries, territoriality, and other notions of power and projection” (Harmon 1999, 10).

## METHODS

When using the USDA Food Desert Locator to view Providence, Rhode Island, two census tracts are highlighted, covering the neighborhoods of Upper South Providence and Washington Park (see Figure 1). Below, Table 2 details the data presented by the Food Desert Locator from the two “food desert” neighborhoods.

**Table 2:** Summary of data from Providence food deserts, presented by the USDA Food Desert Locator (Ver Ploeg et al. 2011).

Demographics	Neighborhood	
	Upper South Providence	Washington Park
Percentage of Population that has low access (%)	32.3	83.2
Total Population (#)	868	4136
Number of people who have low access and are low-income (#)	385	565
Percentage of population who have low access and are low-income (%)	14.6	13.7
Percentage of children who have low access (%)	8.8	20.7
Number of children who have low access (#)	235	1029

Percentage of seniors ( >65 years old) who have low access (%)	8.2	4.9
Number of seniors ( >65 years old) who have low access (#)	220	243
Number of housing units with low access and without access to a vehicle (#)	144	133
Percentage of population living in housing units with low access and without access to a vehicle (%)	13.2	10.4

For the first phase of this map I wanted a foundation of analysis of food access using city-scale indicators and metrics. As I first explored alternatives to the USDA Food Desert Locator I found the Baltimore Food Environment Map. It was not a radical reinvention but a more refined view of localized food access that addressed one my main critiques of the USDA Food Desert Locator – the homogenization of population density and urbanization by using the same limits and indicators across both urban and suburban tracts (most notably, the use of a 1 mile radius as the proxy for access to a supermarket, while in urban areas neighborhoods can change drastically in one mile, both in terms of demographics and economic development). In a sense, creating an alternative food access or food desert map was, for me, a process of editing and (re)imagining. The first feature to address was spatial proportion – scaling the food desert features to fit the capitol city of the smallest state (without needing to take into account larger and less densely developed states). This first map changed the measure of distance but kept all other food desert metrics constant, resulting in a traditional GIS map of neighborhoods too far from grocery stores to be deemed “healthy” with regard to food access. While the results, seen

in Figure 7 clearly differed from the USDA's national map, they remained the same conceptual application of features to define food access: low income and distance from a large retail supermarket. The map successfully refined the scope of food deserts to fit the city of Providence, but did neither reimagine food access within the context of the local food environment, nor the visual presentation of "food deserts."

The data needed for the Providence Food Deserts map were available from both popular and census survey sources. The first feature added was the main metric for access to healthy food: major supermarkets within the city of Providence. For this measure, and as an overall reference point, the RI Food Policy Council maps were an invaluable resource. These maps, created by Karp Resources for the Rhode Island Food Assessment, examine much of the same material as this project, but on the state level (Karp Resources 2011). Figure 6 shows the RIFPC's map of Food Access and Insecurity with Median Household Income by Tract, which can be zoomed-in to verify the number of supermarkets classified as major supermarkets in Providence.

The business website manta.com was also used to verify that the estimated annual revenue was at least \$2 million per year, as outlined by the HFFI in their creation of the USDA food desert indicators (Ver Ploeg et al. 2011). This selection resulted in 9 supermarkets that were placed on the map as points identified by the shopping cart symbol and labeled by name:

1. Super Stop & Shop, 333 West River St.
2. Super Stop & Shop, 850 Manton Ave.
3. Whole Foods, 261 Waterman St.
4. Whole Foods, 601 North Main St.
5. Eastside Marketplace, 165 Pitman St.
6. Save-A-Lot, 700 Branch Ave.
7. Compare Foods, 863 Broad St.

8. Price Rite, 623 Atwells Ave
9. Aldi Foods, 539 Smith St.

A quarter mile was used as the dividing line that distinguished between areas within and outside the range of a quarter of a mile from each supermarket because urban planning research most often cites this as an acceptable walking distance (2012 Baltimore City Food Environment Methodology). In the USDA map, a one mile distance range is used, but the aim of this map was to recognize that one mile is a long way to travel carrying bags of groceries, and that one mile is a large range inconsistent the density of urban development.

The next two data features created the definitive dataset for the map. Using American Community Survey 5-Year data from 2006-2010<sup>8</sup>, I represented the percent of households per tract who are low income and the percent of households per tract who do not have a vehicle. For Poverty Status, the necessary information was the total number of households, households at or below 100% poverty level, and households from 100-149% poverty level. By creating new fields in GIS I was able to obtain a percentage of the total households that belong to either category of being below 150% of the poverty level. This characterization means that this measurement includes households who meet the income eligibility test for the Supplemental Nutritional Assistance Program (SNAP) public benefits (WorkWORLD Help/Information System).

Compiling the data for households with no vehicles was simpler because only two factors were needed: number of households with no vehicle, and total number of households. The resulting metric, percentage of households without a vehicle, was

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<sup>8</sup> See Appendix B for full GIS methodology

displayed on the map with increasing color saturation depicting higher percentages of the population at 150% below poverty or without a vehicle. By overlapping these two layers and making the one on top transparent it is easy to see the visual landscape of Providence communities with more and less money and vehicles. However, it can be misleading to see this information for the whole city when in reality there are large sections of Providence that are strictly industrial or commercial areas and do not have residential populations who are subject to these factors. For that reason, the poverty and vehicle layers were selectively clipped to a layer representing residential parcels, created by selecting for all residential and mixed-residential zones from an overall parcels data layer<sup>8</sup>.

With the above information joined together, it was possible to create a new field to highlight areas where the two factors coincide significantly. This was defined as blocks where more than 33% of total households were at or below 150% of the poverty level AND more than 25% of total households do not have a vehicle. These blocks are labeled as “low access” which means that they have a high percentage of households who are without a vehicle and eligible for SNAP, both of which are the main quantifiers recognized by the USDA as obstacles in obtaining healthy food. Once the “low access” blocks were displayed on the map, it was possible to identify which blocks are low access and beyond the quarter-mile range of the nine major supermarkets.

The 2008 Farm Bill defines a food desert “as an ‘area in the United States with limited access to affordable and nutritious food, particularly such an area composed of predominantly lower income neighborhoods and communities’ (Title VI, Sec. 7527)” (Ver Ploeg et al. 2009, 1). The USDA Food Desert Locator interprets this by marking

“food deserts” as census tracts with the prevalence of three features: distance from grocery stores, lack of access to a vehicle, and low income. As previously described, the Baltimore Food Environment Map refines this view to a city scale (2012 Baltimore City Food Environment Map Methodology), and similarly, I created a map of Providence through the lens of these city-scaled “food desert” definitions. Creating this map functioned like testing a hypothesis – a way to get a grasp of how accurately the federal definition of food desert applies to Providence by taking into account one of the national map’s preliminary limitations – the uniqueness of urban core areas. The USDA acknowledged that there is insufficient data on food access urban cores areas (Ver Ploeg et al. 2009, vi), so it was important for me to be able to see what an urban-specific map would look like if the rest of the USDA Food Desert Locator remained largely the same.

For the Providence map, the blocks fitting the characteristics of low-income, no access to a vehicle, and more than one-quarter mile from a supermarket fit the prescribed label and concept of “food desert” (2012 Baltimore City Food Environment Map Methodology; Ver Ploeg et al. 2011). One drawback to basing the definition of “food deserts” on statistics of households that do not have access to vehicles is that such a view does not represent the alternatives to independent transportation in urban areas such as sharing rides and other “coping mechanisms” documented by researchers in Leeds (Whelan et al. 2002, 2097), or public transit. To get a better picture of how residents in these and other areas of Providence have access to and acquire their food, I added the Rhode Island Public Transportation Authority (RIPTA) bus routes to the Providence Food Deserts Map (see Figure 7).

This map, seen in Figure 7, creates a visual and informational landscape that proves useful for assessing the impact or outreach of other initiatives and factors in the Providence food environment. The Healthy Corner Store Initiative is one such program to which this map is valuable. As “food deserts” gained notoriety around the launch of the Food Desert Locator, many areas quickly heralded Healthy Corner Store programs as solutions to the perceived lack of fresh food in food deserts (Healthy Corner Store Network 2012). The Environmental Justice League of Rhode Island (EJLRI) started the HCSI in 2009 and 2010 as a pilot program to address healthy food access by increasing and promoting the healthy food options available at participating corner stores in South Providence (Environmental Justice League of Rhode Island).

The stores currently involved in the HCSI are divided into two categories: Healthy Corner Stores, and Fresh Produce Allies. Healthy Corner Stores are those who participated in the features of the program such as a Market Makeover day and in-store publicity revamp, and offer healthy snacks like low fat chips, pretzels, fruit cups, and unsweetened water. Fresh Produce Allies are markets who are not offering these healthy snacks but do have produce for sale. Though the sample size and area are small, this characterization recognizes the cultural and economic role of small markets in urban neighborhoods, especially within Latino communities (Short et al. 2007).

To view the dispersal of these two types of stores across, and their interaction with or proximity, to Providence food deserts, their names and addresses were added the map. From a close-up of the Southside neighborhoods in which most of the stores are located, as seen in Figure 8 one can see that none of the markets are located in the blocks characterized as food deserts.

The results depicted in this new Providence Food Deserts map clearly delineate different deserts than the USDA Food Desert Locator. While the USDA Food Desert Locator worked exclusively at the census tract level, it singled out only two tracts as deserts while this map finds deserts in up to six census tracts. While both maps label Upper South Providence as a food desert, the Providence Food Desert map also includes parts of Elmwood, the West End, Federal Hill, Olneyville, Mount Pleasant, Wanskuck, and Smith Hill. Though the Providence Food Deserts map highlights and targets more blocks than the USDA Food Desert Locator map overall, it does not include Washington Park, a census tract where according to the Food Desert Locator 83.2% of the people have low access and 13.2% of the population is low-income and has low access (Ver Ploeg et al. 2011).

While the Providence Food Deserts map acknowledges the Healthy Corner Store Initiative program, its data and definition of food deserts was based off the concept that only supermarkets provide full food access. To delve further into the critique raised by Short et al. (2007), I wanted to feature a corner store Market Basket survey on the map in conjunction and contrast with food deserts.

The Market Basket map displays the percentage of a complete grocery list available for purchase in each neighborhood, as represented by a randomized sample Market Basket survey. A Market Basket is a data collection survey from the United States Department of Agriculture Community Food Security Assessment Toolkit that serves as a standardized grocery list. For this map, 38 Brown University students

from Kathy De Master's class<sup>9</sup> were randomly assigned to survey a grocery or corner store in Providence (which were selected from Google Maps "grocery" search results and factoring in spatial distribution). The students were given three weeks in October 2012 to complete a survey using the USDA's Thrifty Meal Plan Market Basket to determine the availability of items on the list. The Thrifty Meal Plan is a suggested shopping list for families who are on a tight budget because the plan allows for a family of 4 to meet their recommended nutritional needs at a low income that maximizes the Supplemental Nutritional Assistance Program (SNAP, formerly Food Stamps) (USDA Economic Research Service 2012).

The student surveys were filled out on individual trips to stores around Providence and the data were added to Google Spreadsheet templates that included calculations to summarize the findings. The number of market basket survey items found and recorded by students was divided by the total number of items on the market basket list (87) to create a value for the percentage of market basket completion. This value represents the percentage of a Thrifty Meal Plan shopping basket that a consumer could find at the surveyed store, and ranged from 24-98% in the class' randomized sampling of stores across Providence.

The Market Basket Survey also provided qualitative data about consumer experiences. While this data is not represented in the map, it does support the broader concept that "food desert" is an over-simplification and reductive term insofar as a food desert makes a single claim about a diverse area, while the students reported distinct

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<sup>9</sup> In the fall semester of 2012, Visiting Assistant Professor of Environmental Studies Kathy De Master taught the fourth iteration of Sustenance and Sustainability: Exploring the nexus of Agro-Food Systems, Society, and the Environment in the Center for Environmental Studies.

qualitative and quantitative experiences at stores in close proximity. For example, one small market surveyed on Broad St. in Providence had 44% of market basket items available while another had 89% of market basket items available (specific market identities are not revealed in the map so that the map will not serve as a price comparison tool or encourage discrimination against stores).

With a randomized sample of Market Basket data from stores around Providence, I plotted the market data and aggregated it to each neighborhood. Using GIS Analysis, I displayed the average percent of the total market basket shopping list that was found in each neighborhood (see Figure 9). While neither a complete nor exhaustive survey, this color-coded data guide is a valuable view of grocery access in Providence beyond big box supermarkets. The resulting map provides a visual for the brick-and-mortar retail environment of food access in Providence, but still did not include important community food security contributions like farmers markets, community gardens, and emergency food sources such as food pantries and soup kitchens.

Toward that end, I had access to data points representing Providence farmers markets, community gardens, and emergency food sources because they had been collected and utilized by past students in the Center for Environmental Studies who had worked with Kathy De Master or the Providence Foodshed Mapping Project<sup>10</sup>. Initially, I

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<sup>10</sup> The Providence Foodshed Mapping Project evolved into *Opportunities & Obstacles to Food Justice in Providence* as an innovative way of framing our food environment. This project has transformed from its conventional cartographic approach of a Foodshed Map to an interactive portal that visualizes and enables layered data from over 4 years of research. The data are interdisciplinary and rich; a unique view of Providence's agroecology, food service and labor sector, a case study of urban agricultural education at *Cultivating Hope*, on-the-ground tracking of sugar-sweetened beverage availability, advertising, and public perception, all woven together with narratives (audio and video) from Rhode Island farmers, refugees, and organizers. This information has been collected by hundreds of Brown students throughout 4 annual incarnations of the course Sustenance & Sustainability: Exploring the Nexus of Agro-Food Systems,

added these points to the Market Basket map and located their addresses. I matched the gardens to the lots on which they are located so that they are seen spatially instead of as points. ArcGIS is a very valuable tool to precisely match addresses and create accurate cartography, however its design and illustration features are limited. To get the illustrative component I was looking for, I switched into the Adobe Creative Suite and began a graphic design approach.

One commonality I have found between art-making and cartography is the need to edit and refine a piece both conceptually and materially. Some of my initial ideas for a creative cartographic view of food deserts revolved around photographic collages and were more akin to visual ethnographies. However, after more research for the literature review revealed comparative studies of food desert mapping such as Leete et al. 2011, I determined that it was still important that the map be driven by geographic data (as opposed to artistic or narrative observations) and bridge what I perceive as a gap between academic data presentation and visually-communicative community representation. The map needed to be data-driven and data-derived so that its presentation, results, and analysis could be part of the larger food access mapping conversation, which, as described in the literature review (p. 13), is predominately derived from GIS analysis.

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Society, and the Environment, and The context of *Opportunities & Obstacles to Food Justice* is embedded in the greater Providence community; its concept has been refined by students and Professor DeMaster; its labor is a collaboration of artists, designers, programmers, and academics. The final steps are in process to create a usable tool for the community that is a cohesively designed exploration of the food environment through the lens of food justice, which is a framework wherein the risks and benefits of the food system are shared equally. The team has explored a range of platform and design options to showcase in conjunction with a website, including open-source and crowd-source mapping, layered multi-media presentation, and a digital installation in a gallery. Ultimately, the form is guided by the research files and our food justice perspective, and we are confident that *Opportunities & Obstacles to Food Justice in Providence* will be a groundbreaking data visualization and display in both the academic and community realms of food systems mapping.

Thus the foundation of the map was produced in ArcGIS, but the overall visual presentation was added using creative design software. Given my technical capabilities this was the best way that I could explore the concept of adding a visually accessible evidence display lens to a statistically accurate, academically rigorous work.

My own artistic background is less technical and formal, and more intuitive and perceptive than statistical mapping methods. To learn ArcGIS software, I took a class at Brown University that covered the technical applications and procedures to create GIS maps, but to apply creative design to the map I experimented by working off a very basic knowledge of Adobe Photoshop and Illustrator. Outside of this project, my background in and passion for making art lies in multimedia work that is more tactile than digital work and usually three-dimensional, including the use of found and reclaimed materials such as fabric and metal, and practices of painting drawing, and sewing. For me, creating artwork is a way to express thought and observation processes through handmade processes and visual compositions. When it comes to map design, my work is similarly a manifestation of my point of view. The distinction I noticed between creating an analytical map and incorporating art and design practices and principles is that cartographic layout tools create passive presentation, as if the map is an objective view of the issue. Adding additional, purposeful design to map production shifts the viewer's gaze to acknowledge the subjectivity: this map is my (the artist's) point of view of food access. For the viewer, then, my hope is that the design of the map activates them to wonder about the manifestation of their own view of food deserts.

In approaching the design of the accumulated data I drew a lot of inspiration from Infinite City: A San Francisco Atlas by Rebecca Solnit, and my own knowledge of and

connection to Providence. Infinite City presents 22 maps created with a team of artists, designers, and cartographers who surveyed San Francisco and paired datasets through simple maps adorned with beautiful illustrations and clear labels. The results are stunning— both visually and as a portal into a new way to view the urban environment and its social, cultural, and geographic overlaps. Some portray memory (“Graveyard Shift: the Lost Industrial City of 1960 and the Remnant 6 A.M. Bars,” 78), or intangible cultural shifts (“Fillmore: Promenading the Boulevard of Gone,” 66); curiously contrasting inhabitants (“Monarchs and Queens: Butterfly Habitats and Queer Public Spaces,” 46), or political perspectives (“Right Wing of the Dove: The Bay Area as Conservative/Military Brain Trust,” 32); all include tangible urban features and themes that speak to the vitality of the place—the elements and essence that contribute and combine to create the sense of place, sometimes referred to as the “pulse” of a city. With this in mind I decided to work from the conceptual base that food brings life.

The discourse surrounding food deserts is predominantly one of deprivation and poverty (Yaccino 2011; see also Thomas 2011, Walsh 2011, Tepper 2011), and in that context food is often stripped of its fundamental nature: that which nourishes and sustains us. In one view, this makes food a crucial human right (of survival), and on the other, it ties food to human essence. Because people need food to survive, it becomes the basis of vitality – it brings life.

If follows, then, that representations of where to find food need to be portrayed in a way that connotes its vitality and make them visually accessible. Using Photoshop and Illustrator (CS5.1 and CS6) I explored the data features of Providence food access with more evocative representations of the metrics used, while keeping a clean, edited overall

view of the map. The first key feature I manipulated was the community garden data points. These were brought to life by transforming simple green color fields into actual photographs of Providence urban gardening in the background. Though the details are too small to see, the texture of the city's green growth is there, and when zoomed in the plots can be explored. To mark each of the specific food access points (community gardens, farmers markets, supermarkets, and emergency food sources), I selected colorful graphic symbols to make them stand out and create a sense of access patterns across the city. Farmers markets throughout Providence are highlighted with an apple, an iconic New England crop. Community gardens and farms are seen as sprouts, the source of energy and nourishment, and supermarkets are shopping carts for their role as selling a full shopping cart. Emergency food sources were the one feature whose symbol I did not illustrate because of their distribution throughout the city and my desire to not overcrowd the map.

One could argue that the food environment is so rich, that an overcrowded map could serve well the reality of food in a city. I think that would be valuable for another exploration of food access, but for this map, it was important to me that all the data be discernable and retain visual clarity. To that extent, it was critical for me to design and distribute labels that surround the city and offer an explanation of the data rather than rely on a detached legend. The labels do not detail every feature, but offer depth to most of the neighborhoods that I analyzed. Label text represents the neighborhood names as listed by The Providence Plan (The Providence Plan "Neighborhood Profiles" 2012) and the color is matched to the color of the market basket GIS availability analysis (where available). The market basket color fields move from red to green on a scale of limited to

lush food access, and the food source icons complement and question these attributes. The specific food sources in each neighborhood are listed below each of the neighborhood labels, cross-referenced via the Providence Community Growers Network (Providence Community Growers Network 2012), and Farm Fresh Rhode Island (Farm Fresh Rhode Island 2012). The final design decision for me was to situate the map of Providence within a depiction of the Providence River and Bay, with manipulated images of the local watershed running through the map.

## DISCUSSION

*“[B]eautiful evidence is about how seeing turns into showing, how empirical observations turn into explanations and evidence” (Tufte 9)*

When this project began I sought a critical analysis of the USDA Food Desert Locator and its view of Providence. What I came to realize was that, while the data points and statistical indicators could be adjusted, what needed the greatest shift was the presentation. I started with an attempt to refine the cartography of food deserts by limiting the data features, but found that making maps is far from cut and dry. Rather than reign in the view of food deserts, what I found was a need to develop a richer display of food access evidence.

Through exploring and illustrating multiple food access metrics, I found the term “food topography” to describe the city’s nuanced and distinct differences in food access. The map shows that some areas do indeed have limited food access, but that these areas are not entirely void of food. Rather, they can be seen as “valleys” in relation to neighboring “peaks” of food access. The juxtaposition of these areas brings forth the

concept of food justice – that the risks and benefits of the food system be distributed equally (Gottleib et al. 2010).

The Food Desert Locator is a valuable tool to see the national scope of food access and was impressively published by the USDA. It allows for a comparative lens of the indicators and data parameters set to define food deserts, which in turn allows for governmental assessment and potential financial support (United States Department of Agriculture, Office of Communications). Perhaps one of the greatest assets of this map is the federal legitimacy it lends in describing communities as underserved or underprivileged. The map provides a citation for communities seeking grant support (see Chapter on Community Food Grants in Ver Ploeg et al. 2009).

At the same time, one of my first questions about the map and its impact arose from the display of the food deserts. Are pink boxes on food deserts further “redlining” areas of “social deprivation” in a harmful way? Because the USDA Food Desert Locator focuses only on the statistical characteristics of the outlined food deserts and does not offer any exploration or representation of the many “converging forces” of a food landscape, it essentially frames and casts blame a blighted community by only representing the statistics of a “deprived” and “unhealthy” area without acknowledging societal and economic racism and classism that contribute to the problems (Guthman 2011). Not only is it an injustice that “food deserts” have formed and are largely areas of low income and ethnic minorities (Eisenhauer 2001; Trehaut 2010), but it is a further injustice to outline them as places void of a life-sustaining human right without community-level context (see Raja et al. 2008). The deprivation defined by the Food Desert Locator gains USDA recognition and continuity of measurement that allows

access to grants necessary to support community-initiated improvement, but it obscures communities in the first place, offering a transparent pink box in lieu of the vibrant food environment.

To delve deeper into the question of local accuracy and representation, I wanted to begin with a statistical exploration of Providence. Drawing on the methodology of The 2012 Baltimore City Food Environment Map (see Methods) because of its reproducibility and urban accuracy, I attempted to scale the USDA Food Desert Locator to Rhode Island's capitol city. The resulting map, seen in Figure 4, brought up new research questions regarding the accuracy of food desert delineation in describing and representing the food environment. Though the pink boxes were gone, the narrowed urban metrics (namely, a smaller supermarket radius to adjust for urban density) brought forth a multiplied colony of red "food desert" blocks that defined areas of low income, low access to vehicles, and long distance to supermarkets.

The obvious explanation for the difference between the maps is that they use different features within the same general indicators for defining a food desert. This is not meant as a discrepancy but rather a detailed complement to engaging the USDA's map at a local, site-specific level. When the USDA Food Desert Locator is used to view Baltimore, several tracts are highlighted but none are within the city itself—quite contrary to its community's assessment. The aim of this Providence Food Deserts map was not to refute the USDA's Locator but to embark on a complementary view taking into account more local features. The EJLRI's Healthy Corner Store Initiative is one such feature that begins to elaborate Providence's food environment, but there is a lot of potential for features and elements to be added to the map. The Food Desert Locator

came out of the Healthy Food Financing Initiative, which framed the concept of food desert mapping around potential ways to address human health. While food deserts represent the convergence of many factors, the focus and discourse on healthy food and diet-related-disease must be situated within other environmental factors affecting human health. Valuable additions to the map that will be added in the next editions are locations of greenspace such as parks, open space, bike paths, and especially community gardens. Such landscape “assets” not only beautify one’s surroundings but affect activity levels and can be a useful tool for surveying environmental equity across the urban terrain.

Conversely, brownfields, or remediated toxic sites, can be added to the map to display potential clusters of environmental burden and how this may interact with other disadvantages such as fewer parks and lower access to healthy food. Lastly, work by fellow students in Brown University’s Center for Environmental Studies has mapped the location of food pantries and food aid services, and farmers markets, which when combined with this map can offer a rich picture of Providence’s food access environment.

These food deserts (see Methods section), now seen throughout Providence, suggested that food access creates pockets of inequality within the city at large as well as within individual neighborhoods. Creating this map was, at the time, my largest cartographic effort yet, and one of the biggest takeaways for me was the bias and manipulation inherent in map-making. In mapping Providence “food deserts,” I selected the indicators and determined how much weight each carried and how they would be displayed, and most importantly realized that food access depends on how you look at it (see Methods section).

This made me realize the power of map-making that is often unacknowledged or assumed, and led me to wonder: where are these “food desert” lines being drawn and why? Having lived in Providence for a few years and acquired a geographic familiarity with it, I began to question the relevance of food deserts in a city so small. How much does proximity play into food purchasing decisions and how confined are people to their own neighborhood in terms of their daily life and environmental interactions? The hallmark case studies of food deserts in the U.K. (Beaumont et al. 1995) address the question of proximity, saying that proximity to grocery stores does matter, and since then, research cited in *The Grocery Gap* demonstrates that, in selected study areas, improved access to fresh produce increases consumption (Treuhhaft 2010). Within Providence, though, I looked specifically at my map as a comparison with the USDA Food Desert Locator and observed that in the city-scale version, Washington Park was not found to be a food desert, but Upper South Providence was confirmed, and its nearby portion of the West End was also highlighted.

From this observation I determined that Upper South Providence and the upper portion of the West End would serve as a valuable case study because they are an example of the variation in results depending on map attributes. As described in Leete et al. 2011, food deserts are measured in many ways. Though comparing the metrics does not yield objective results, it can create a nuanced view of categorization (for the authors, the development of the term “food hinterlands”). My interest in comparison collided with reading about the oft-overlooked role of small markets toward community food security. Reading Short et al. 2007 showed me an academic approach to the idea that the main food desert maps are missing out on small but key features of food access.

However my loftiest objective in proceeding with this exploration was the less measurable metric of justice. Food justice has been carried out in the urban core through initiatives like corner store makeovers and urban agriculture, but in exploring food desert mapping I came to learn firsthand the power of cartography itself. Food justice seeks to assure that the risks and benefits of the food system are shared equally among all participants (Gottlieb et al. 2010), and at first glance food desert mapping seems like a simple illustration of the distribution of risks (lack of food access is a “food desert”) and benefits (abundant food access is not a “food desert”). However, both assessing the validity of food access maps and exploring map-making demonstrated that maps are neither unbiased displays nor are they serve as exhaustive representations of a place. The contrast between high “peaks” of food availability and “valleys” of low access describes urban food injustice without “redlining” communities by labeling them “deserts.”

Initially, I wanted to address what seemed like a scale and accuracy issue – that, in my view, the Providence food environment was not justly portrayed by the USDA Food Desert Locator. After making a food desert map, I began to explore radical cartography and bring those tenets into conversation with data I had collected and presented. Employing a radical cartography lens made it clear that maps are based in power. In this sense, I perceived power to mean influence and ability, whether toward economic, social, or political ends.

While the power of mapping is often in the hands of the cartographers, it can also be used to subvert traditional power structures by involving unrecognized parties, voices, or stories, or by taking a radical approach to the attributes and display of the map. The

way radical cartography begins with an upfront understanding of power dynamics and follows through with an alternative approach to community representation mirrors the way food sovereignty has shifted the discourse around community food security.

“Community food security” is the preferred political jargon for the right to food (see literature review), and has more recently morphed into the tangible measurement of food access. Despite the nature of national and international discourse, “reaffirming the right to food is not simply a matter of technical feasibility... it is a profoundly political matter, raising significant questions about distributional justice” (Riches in Koc et al. 1999, 203). As such, any attempt at mapping the right to food is laden with politics and power. A “food desert” an environmental justice community because it is disempowered due to a greater burden of risk (Adamson et al. 2002, 4), yet when food deserts are depicted by people in more privileged and powerful positions, it is a reinforcement of food injustice.

As a Brown University student living in Providence, my positionality in the community and as a cartographer is not a radical one per se. Similar to the creation of many food desert maps before this one (see Short et al. 2007, Sparks et al. 2011, Raja et al. 2008, Leete et al. 2011), I am an academic, and I am mapping a whole city with specific focus on a disadvantaged community with which I do not directly identify. I think ideally the best form of food desert mapping would be a community-initiated and – led map, and I see ECO-Youth and the Rhode Island Food Policy Council as potential supporters of such a project. For the purpose of my own research questions, however, I decided to create a map as an exploration of tools that would address and speak to the food desert mapping concerns I discovered. Another motivation to undertake a

cartographic approach was the hope that this map might serve as a growing point of a collection of representations, or an atlas. In fact, the map will be featured in the forthcoming collection of data surrounding the theme of “Opportunities and Obstacles to Food Justice,” a project spearheaded by Kathryn De Master in Brown University’s Center for Environmental Studies<sup>9</sup>. The project has morphed from a clustered geographic map to a conceptual map presented in an online platform with generous support from Brown’s Creative Arts Council.

As described in the Methods section, I was torn at times between a very artistic rendering of the food environment and a map that would be driven and generated by food access data. Ultimately I elected to keep a foundation of statistical and geographical data and strive for a creative approach that would make the evidence beautiful (see Tufte 2006) and at least in part a more accurate representation of Providence’s on-the-ground food environment. Beauty, as I perceive it, is not only achieved through pleasing aesthetics, though balance of color, form, and proportion are elements – it is manifested by balancing and conveying complexity in a way that is apparent but rich with meaning.

Thus, the delineated food deserts from my previous Providence Food Deserts map are only one metric shown the final map. I included them for the sake of continuity and comparison with traditional food desert maps. Additionally, they serve as a subversive way to pose a question to the view—in light of the other metrics presented, would you select these areas as food deserts?

I wanted to keep the map readable and its symbols recognizable within the context of broader the food movement (see “Providence Context” in the literature review for more). While the indicators and their illustrations may not be revolutionary, their

layering in this map suggests a radical approach to food access that contextualize food deserts (the red boxes) in light of food sovereignty (urban agriculture and community gardens) and food justice (the distribution of food access points across the city), and begins to include small-scale markets who are excluded from a national-scaled maps. The multiplicity of metrics creates a gradient scale of food access, and together these indicators provide a visual “food topography” as a tool for viewing food justice in Providence.

With the above conceptual aspirations came the limitations of my abilities: I am neither a geographer, nor am I a graphic designer. Rather, I am an artist and an academic who values the cross-pollination of these fields. While I think that the map I created is a visual exploration of the ideas (concepts & caveats) I am approaching, I think ultimately it is an experimental offering; a contribution to what I see from my studies as an insufficient field and dialogue of food desert mapping.

## CONCLUSION

*“This atlas is a beginning, and not any kind of end, as a comprehensive representation might be. Such a representation is impossible anyway, for all cities are practically infinite”* (Solnit 2010, 9)

While by no means an exhaustive or in-depth view of the reality of food access in Providence, the multiple indicators displayed on the final map allow for a more nuanced needs assessment. Beyond the clear-cut categorization of food desert or not, the map allows the viewer to explore food availability and market features in an aesthetically rich depiction that can be termed a “food topography.” With a broader visible scope of food access (its higher points and lower points) comes the opportunity for the creation of a

broader dialogue and definition of terms such as food deserts, food access, and most importantly, what equality in food access looks like. As Solnit so eloquently remarks, this map is meant as a beginning. The map itself is an exploration in carrying out alternative metrics for food deserts. However the map and its creative process are missing a key component to alternative food cartography: community collaboration. Providence has several stakeholders that could carry forth a food atlas, including youth organizations like ECO Youth (through the Environmental Justice League of Rhode Island) and New Urban Arts, a youth art studio; Public Lab, an open-source technology group that disseminates tools like photo-capturing weather balloons for community mapping uses; and the Opportunities and Obstacles to Food Justice mapping project which may grow to include crowd-sourced maps and food access data.

Ultimately, food access is about community food security, and my greatest frustration with academic maps and GIS methods of measuring food deserts was the exclusion and invisibility of the community. Whether national or city-scale, the predominant food desert maps are statistics-driven, aerial views of communities that outline inequality with data points in shades of gray (or pink, as in the USDA Food Desert Locator). While such studies, including Morland et al. “Neighborhood Characteristics...” 2002, and Sparks et al. 2011, are important for establishing and illustrating the disparity in food access amongst racial and socioeconomic groups, they fail to truly acknowledge or elaborate on existing food access (as noted by Raja et al. 2008) The analysis and discussion of these maps often proves more sensitive to, and aware of, community features, yet they distinguish between visual representation and

“community voice.” Voice is presented in interviews and participant study, such as the U.K. study by Whelan et al.—not illustrated in the maps.

Thus perhaps “food topography” serves as “beautiful evidence” (Tufte 2006) of a nuanced and just view of food access inequality. It is critically important not to stop looking at environmental and food justice issues in our communities—not to let one label and one map provide close the conversation. Instead of relying on prescribed, diametric displays of food access, we can harness observation and creative presentation to bring about just and appropriate discourse and action, beyond what is possible with pink boxes and statistics alone.

When approaching the creative process of this food access map, my main objective was to examine and visually depict Providence’s food desert with a community-focused (as opposed to strictly statistics-driven) context. One influential tenet of radical cartography is subverting the power of map-making by challenging voice and representation throughout the creative process of the map. It is my hope that this map sparks an initiation for experimental food desert mapping in Providence by anyone who is an explorer, cartographer, and eater, to show how they see food access. Mapping is a potent and beautiful tool that has great potential be harnessed collaboratively and sponsored by communities to create a just and accessible view of food access. It is these processes and the iterations produced that will create cartography rooted in context.

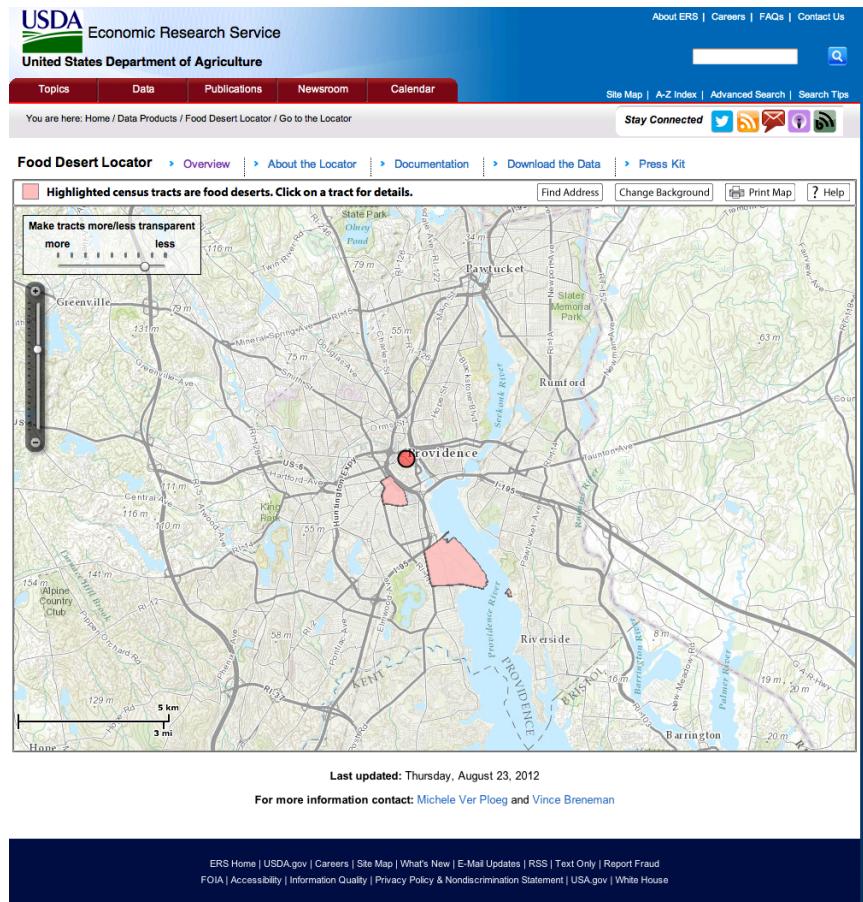
## APPENDIX A: GIS METHODS

Below are specific details of the ArcGIS methods used to create the Providence Food Deserts Map; see Environmental Systems Research Institute for further guidance

- Files and Formats Used:
  - The base layer of the map is Tiger streets clipped to Providence block groups, to encompass the political city boundaries and recognizable lay of the land.
- Sources:
  - The next two layers created the definitive dataset for the map. Using American Community Survey 5-Year data from 2006-2010, I represented the percent of households per tract who are low income and the percent of households per tract who do not have a vehicle.
- Processes:
  - To measure a quarter mile radius around supermarkets: the quarter mile range was generated by the Buffer tool for the Supermarket points, and displayed as its own layer.
  - To determine households without vehicles: Summary File Data Retrieval Tool to collect the files for “Place of Birth by Poverty Status,” and “Household Size by Vehicle Available,” brought these data through Access and created dBase files with tables of the necessary information.
  - To locate the supermarkets: store names and their corresponding addresses were then input into a dBase file in Microsoft Access, and subsequently the addresses were geocoded in ArcGIS with 100% matching.
  - To create low income and low access categorization: create new fields in GIS and obtain a percentage of the total households that belong to either category of being below 150% of the poverty level. This characterization means that this measurement includes households who meet the income eligibility test for the Supplemental Nutritional Assistance Program (SNAP) public benefits. Compiling the data for households with no vehicles was simpler because only two tables were needed to create the new field: number of households with no vehicle, and total number of households. Both new fields now containing percentages per tract were joined with the Providence Block Groups shapefile by TractID, and displayed on the map with increasing color saturation depicting higher percents of the population at 150% below poverty or without a vehicle.

## **APPENDIX B: CHARTS, FIGURES, & ILLUSTRATIONS**

**Figure 1a:** USDA Food Desert Locator view of Providence, RI



**Figure 1b:** USDA Food Desert Locator view of Providence, RI with food desert detail

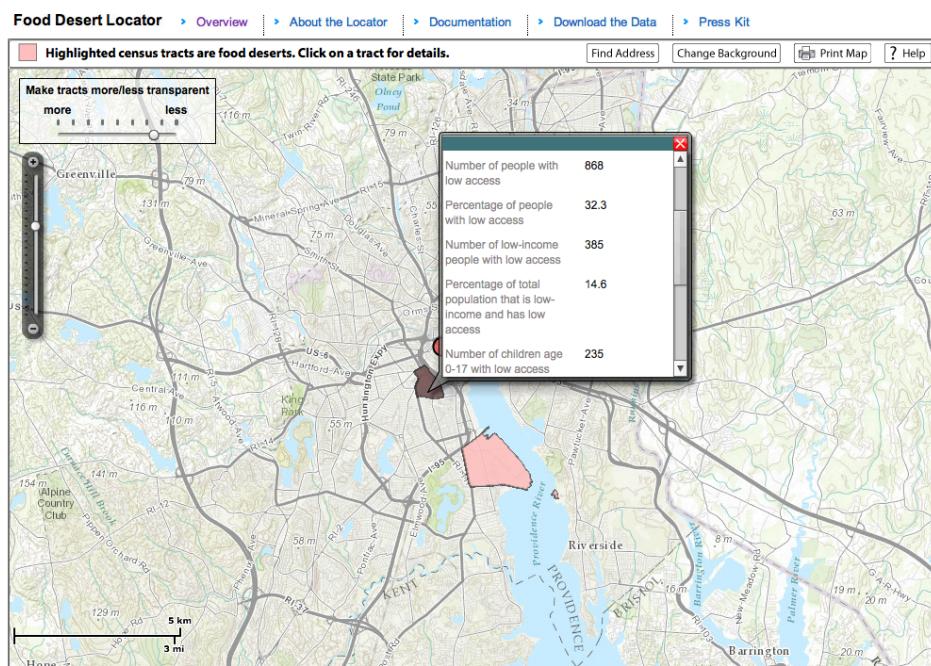
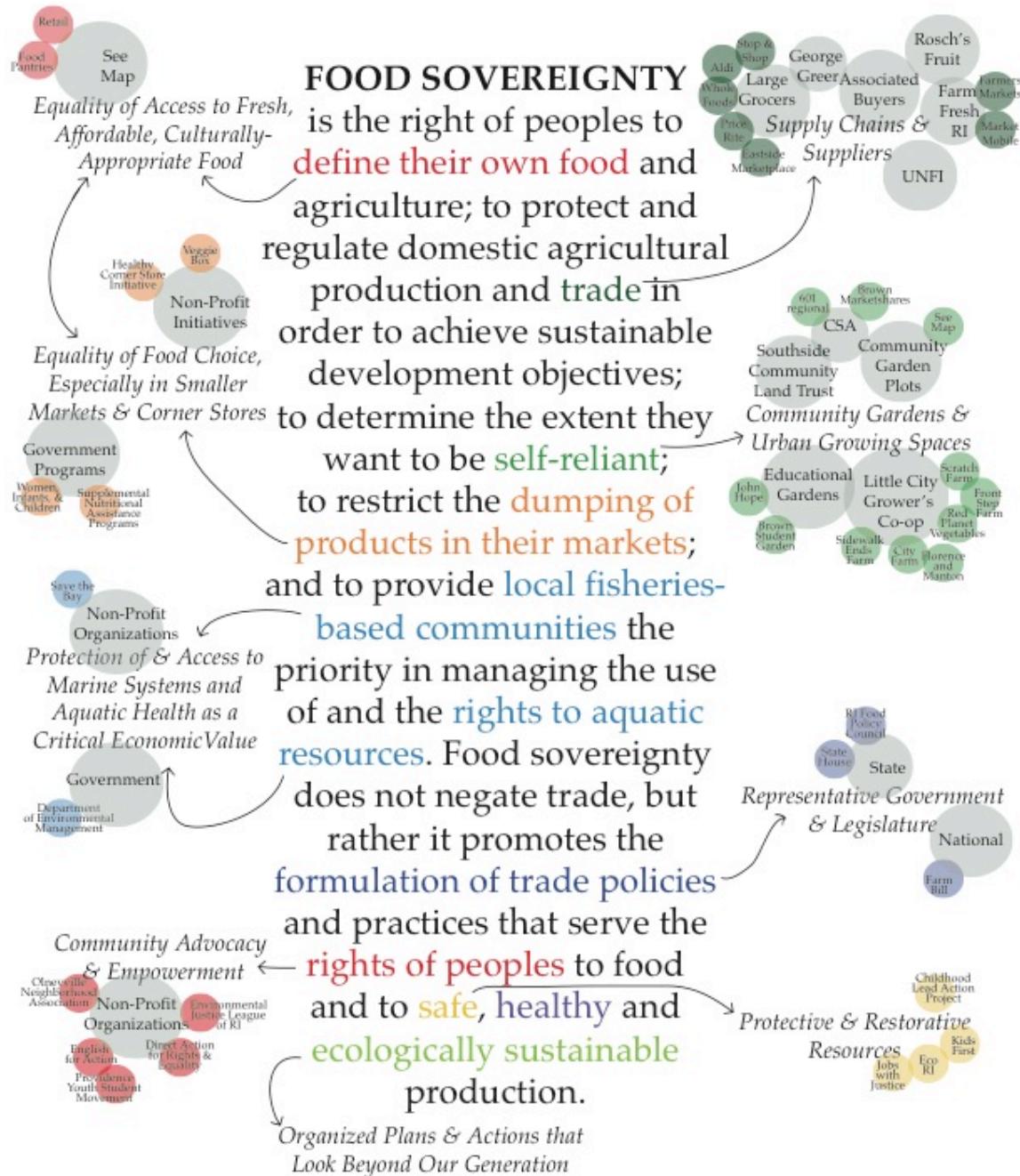


Figure 3: An illustrated guide to food sovereignty with a basic overview of its role and potential in Providence.



People's Food Sovereignty Network (2002) in Windfuhr and Jonsen

Jess Daniels  
2012

Figure 4: The 2012 Baltimore City Food Environment Map

### 2012 BALTIMORE CITY FOOD ENVIRONMENT MAP METHODOLOGY

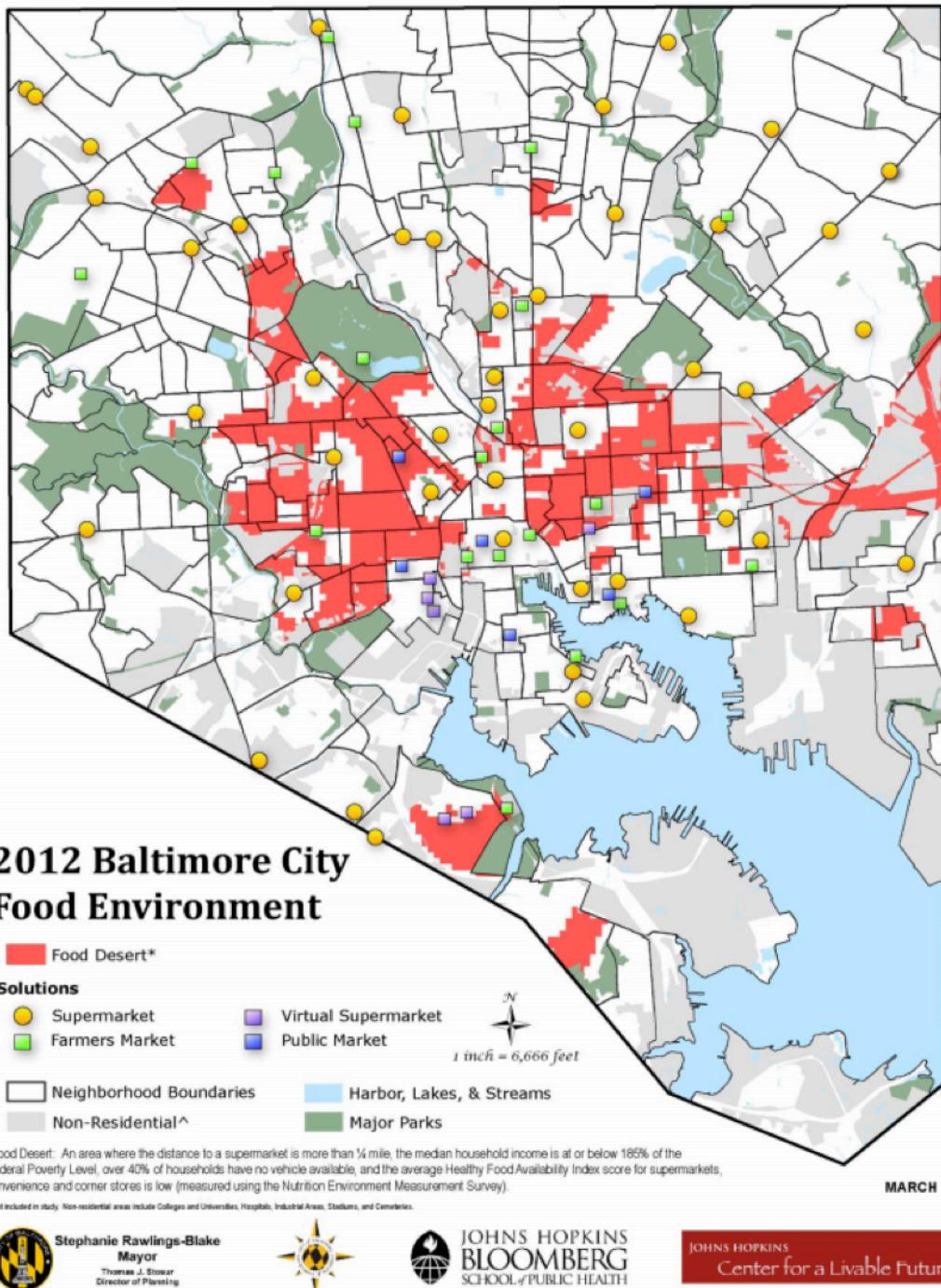


Figure 5: GIS maps from Sparks et al. 2011, provided as a reference point for illustration and design styles among food desert maps.

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Figure 2. Food access measure 1 for census tracts contained within Portland, Oregon's metropolitan urban growth boundary.



Figure 3. Food access measure 2 for census tracts contained within Portland, Oregon's metropolitan urban growth boundary.

Downloaded from [ajph.aphapublications.org](http://ajph.aphapublications.org) by guest on April 21, 2013

**Figure 6: Food Access and Insecurity with Median Household Income by Tract, a Rhode Island Food Policy Council Assessment map.**

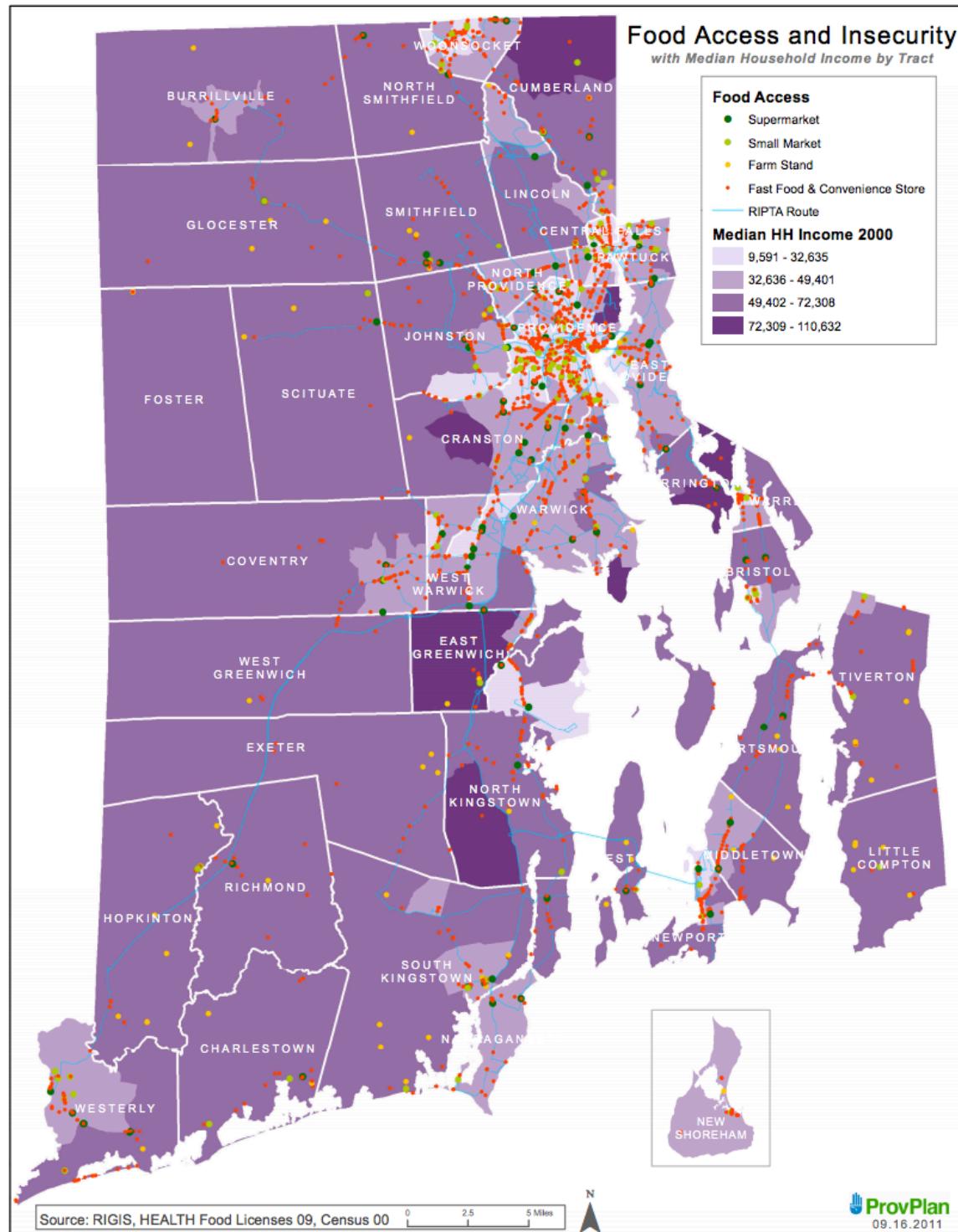
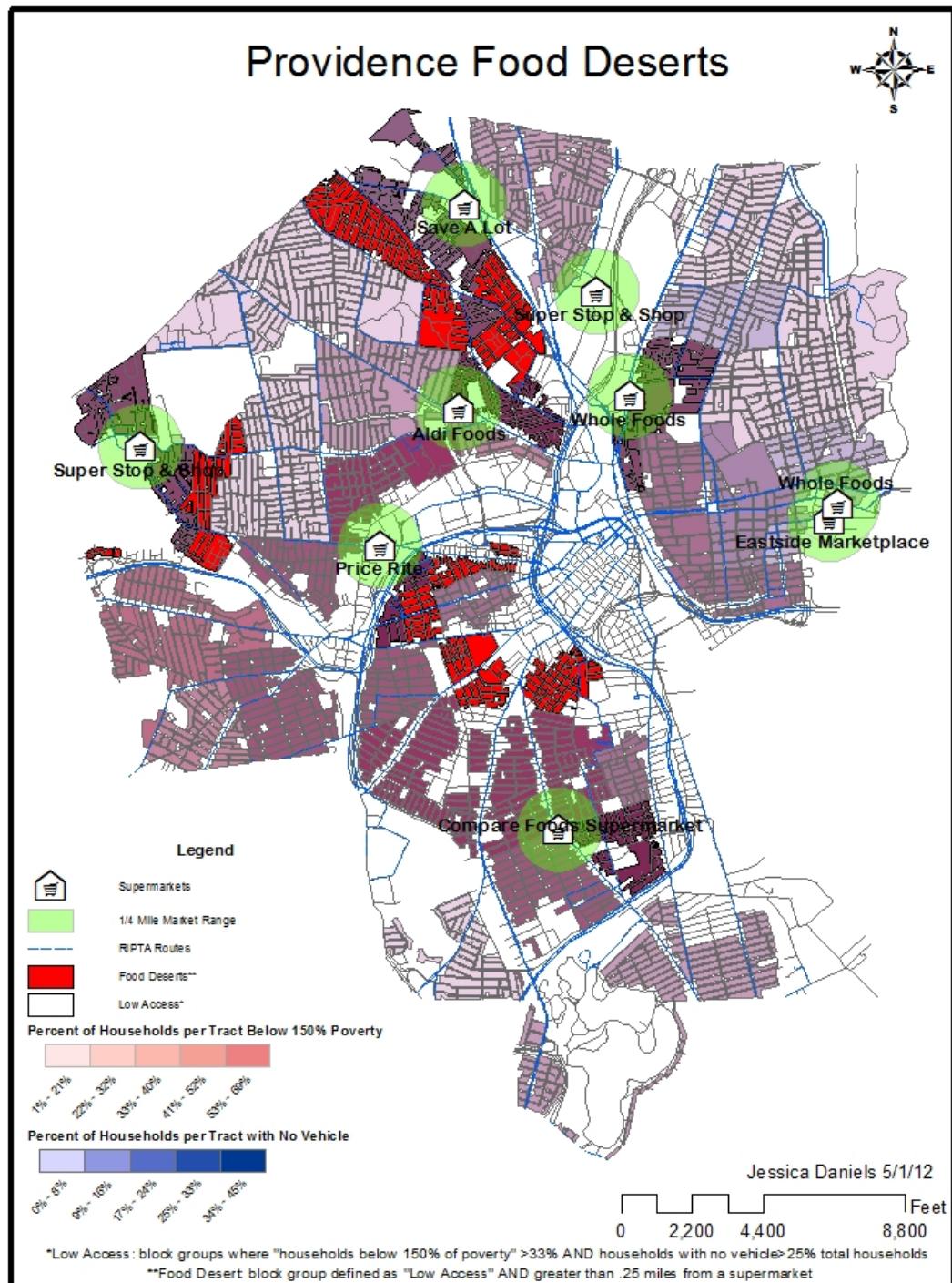
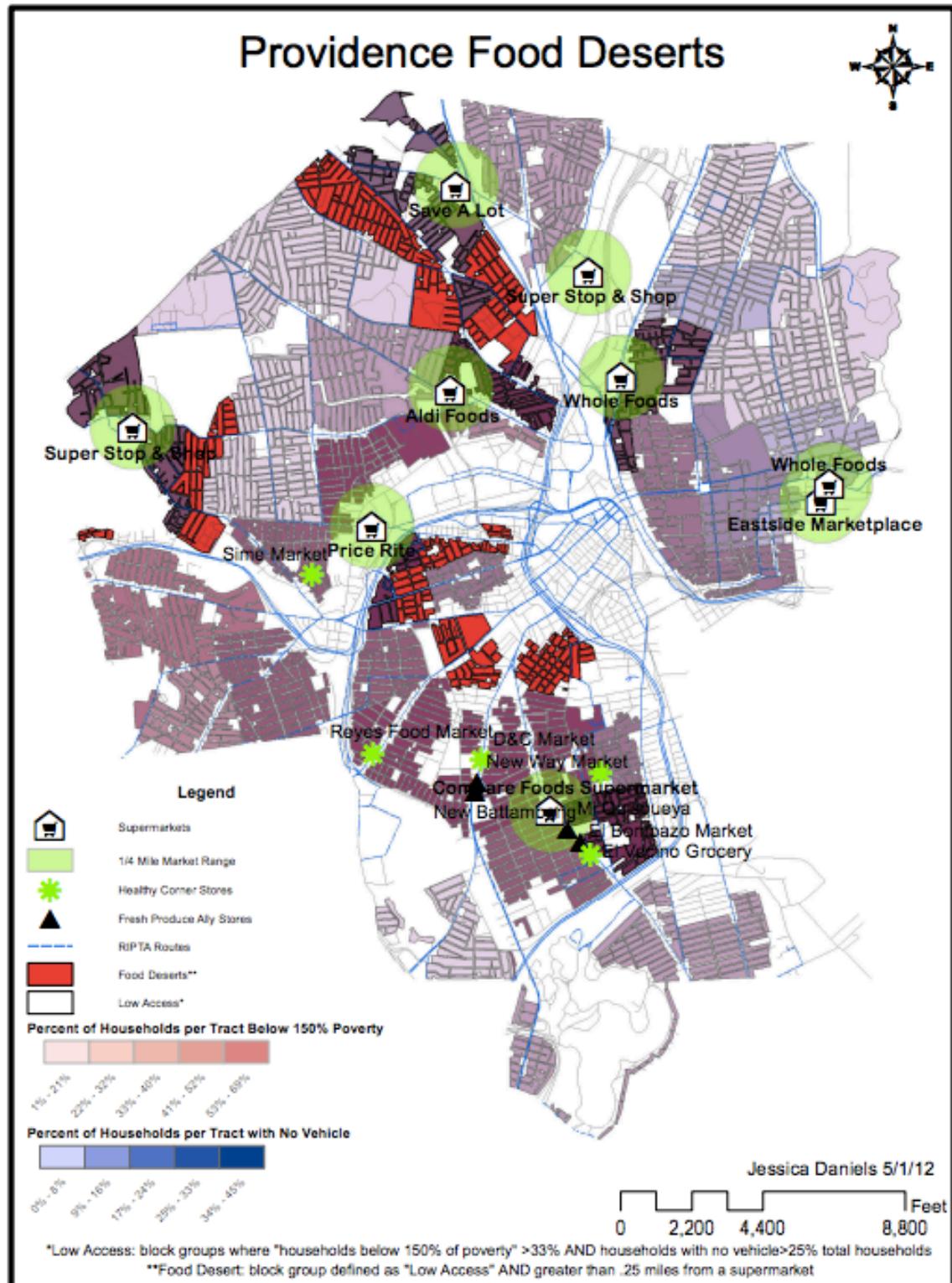


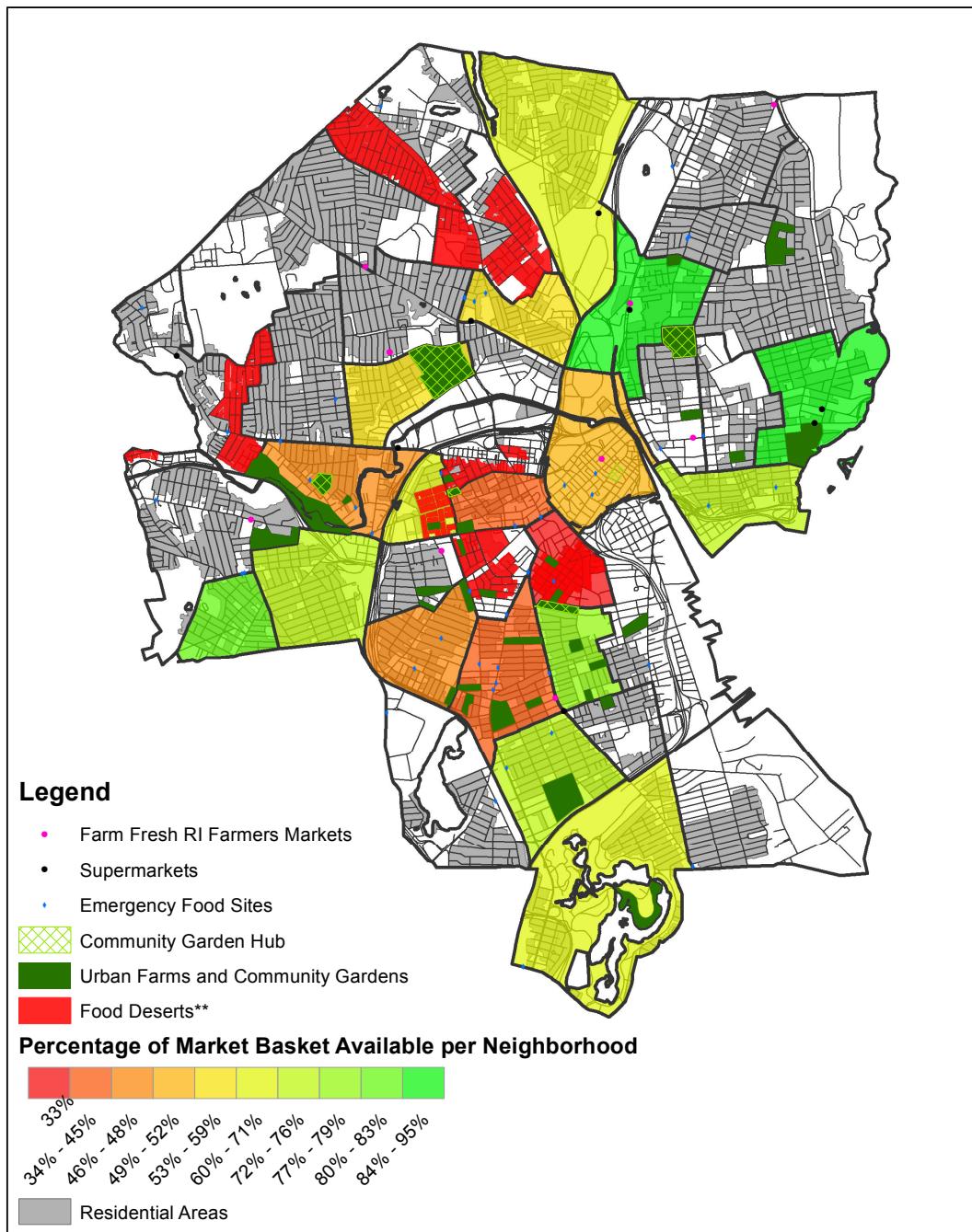
Figure 7: Providence Food Deserts, a map GIS & Public Policy map by Jessica Daniels.



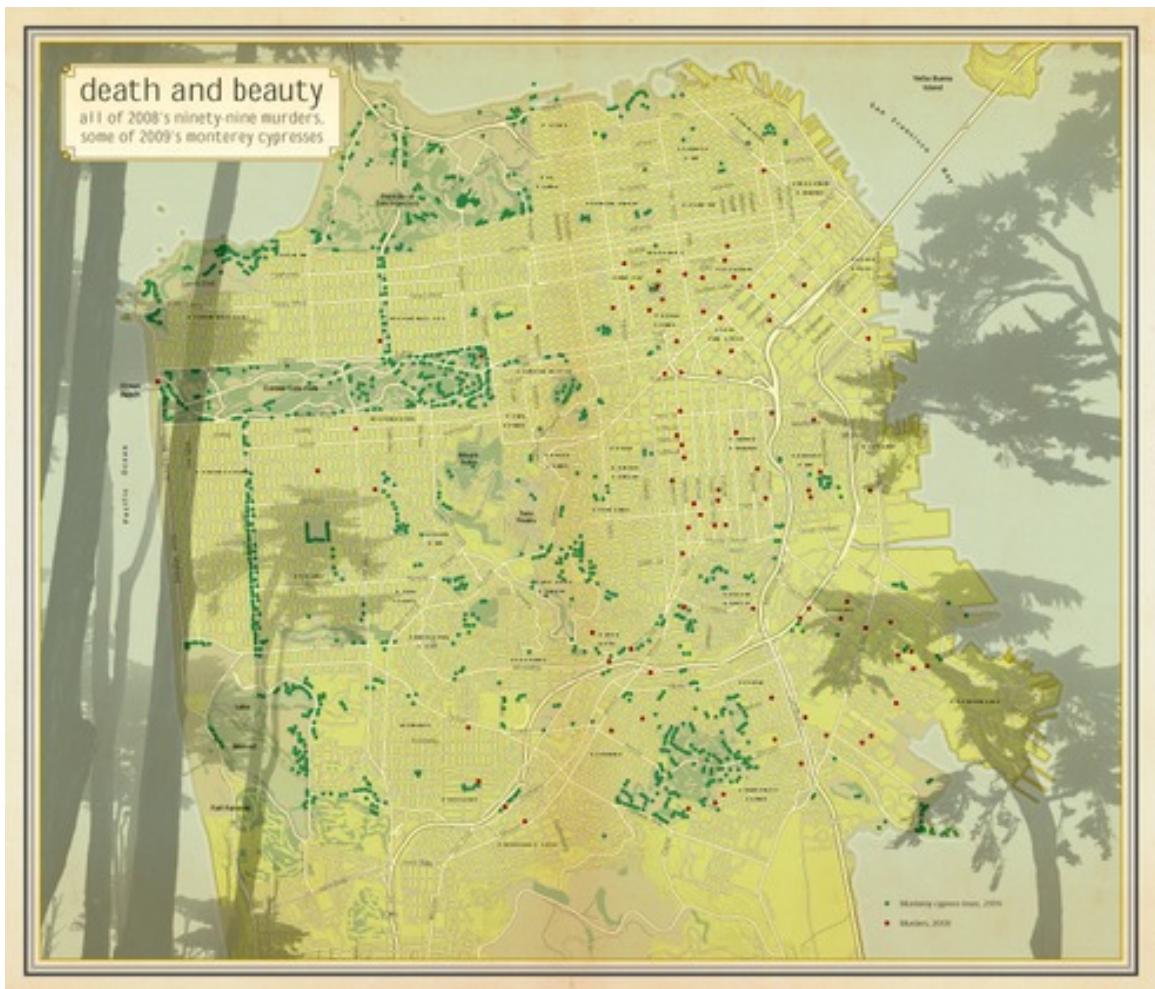
**Figure 8:** Providence Food Deserts with the Healthy Corner Store Initiative of the Environmental Justice League of Rhode Island, a map GIS & Public Policy map by Jessica Daniels.



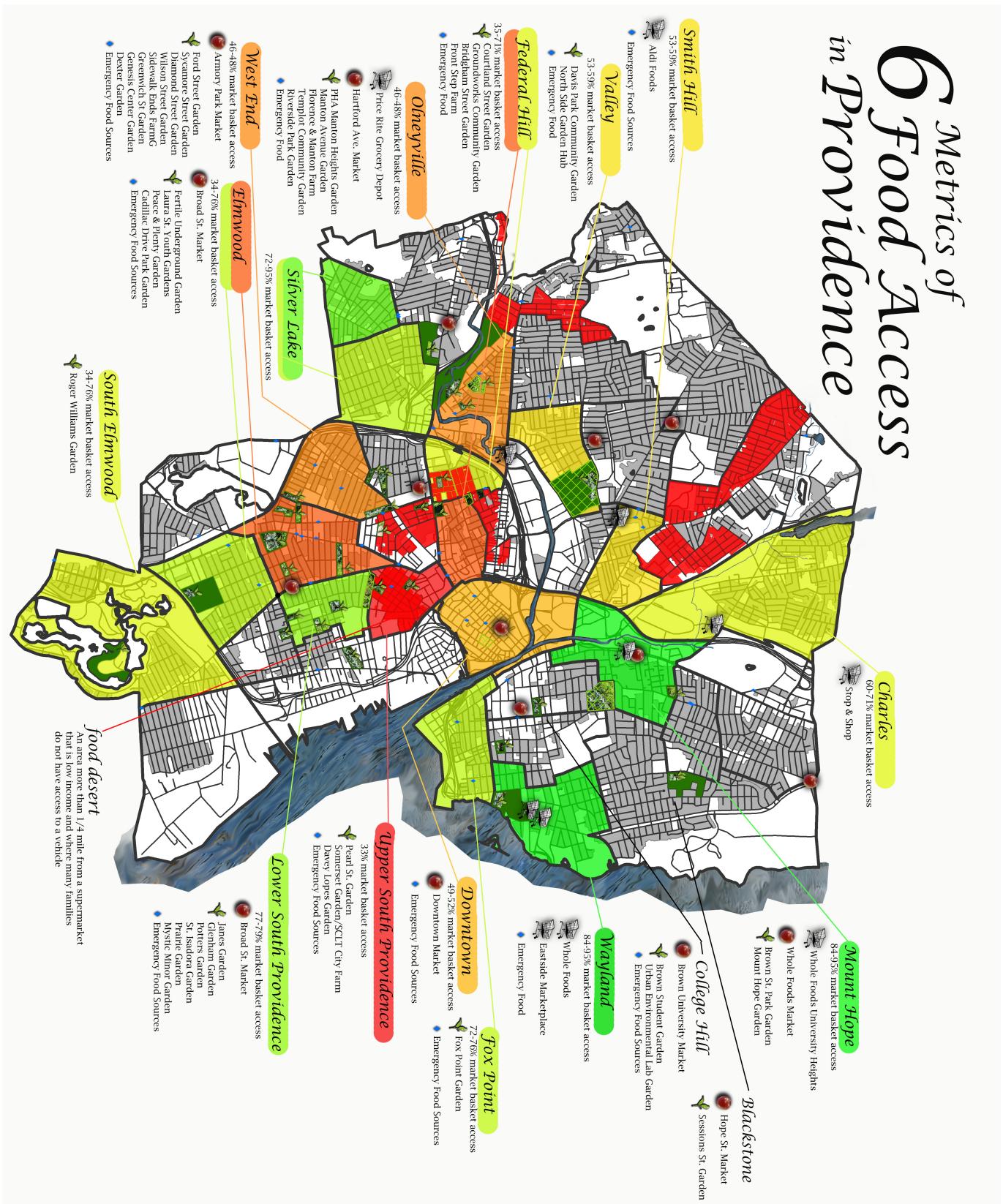
**Figure 9:** Randomized sample Market Basket data using the Thrifty Meal Plan from the USDA Community Food Security Toolkit at stores throughout Providence RI.



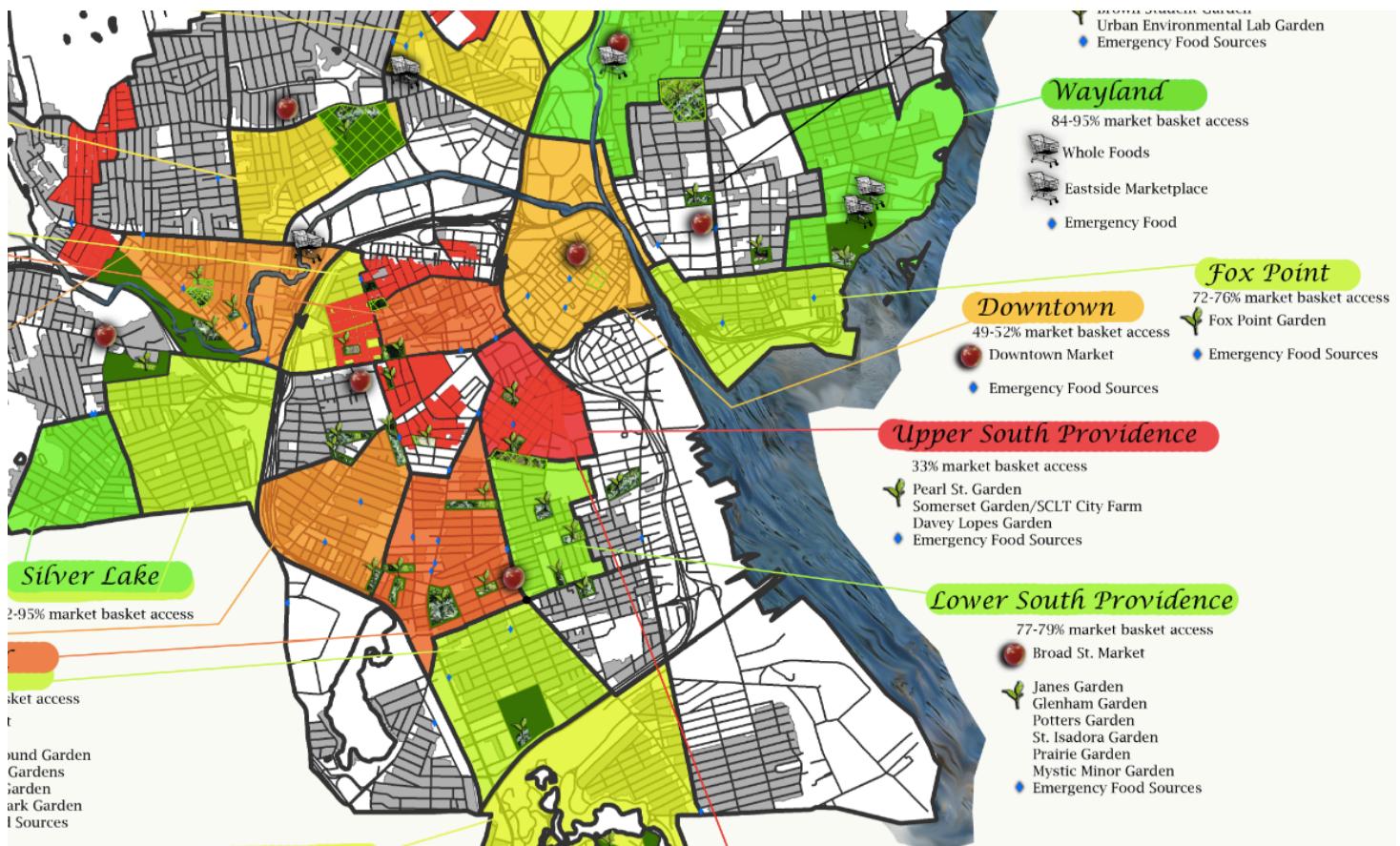
**Figure 10:** “Death and Beauty” from Infinite City: A San Francisco Atlas, p. 110.



# 6 Metrics of Food Access in Providence



**Figure 12:** Close-up view of the illustrated food access metrics map



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