Network Analysis of Local Food in California: A Study of Farmers' Markets in Los Angeles and Their Farm Supply Chains

Luke Drake
California State University, Northridge

Abstract

This paper examines the geography of local food through a spatial analysis of farms and farmers' markets. It draws on two themes in the geographical literature on local food, which focus on territorial and proximity definitions on one hand and on relationality on the other. Through GIS analysis, this paper explores spatial patterns of ninety-one farmers' markets in Los Angeles County, California, USA; spatial patterns of 282 farms that supplied a sample of thirty-three markets; and intra-urban patterns of those supply chains. The results show an uneven geography of farms across California that supplied the sampled markets, but also show that farms travel just as far to markets in working-class neighborhoods as to wealthier neighborhoods. Conclusions explain how integrating territorial and relational conceptions of local food provide insights into the complex spatiality of production and consumption, and how local food can be understood as an interdependence between places.
Key Words: spatial analysis, relational place, local food

Introduction

The question "where does your food come from?" is by now a mainstay in much of the popular discourse around local food. It is invoked as a prelude to numerous themes among diverse advocacy groups from sustainability to education, among others. This paper emerged in part from a puzzle that the *where* in this question is often defined in multiple ways. In a strict sense of spatial proximity, those in the locavore movement aim to constrain their food purchases by setting the maximum distance from which that food has traveled (Dunne et al. 2011). Others, however, want to know how and by whom their food was made when they ask where it comes from (Schnell 2013). The website seedmap.org also poses the question to stress the importance of knowing the evolutionary, not spatial, origins of food crops. Science policy and education advocates also simply want people to know that food comes from farms (sciencenetlinks.com). For many people, it is important to teach others not only to answer the question, but also to ask

the question in the first place (Guthman 2008). Clearly, there are multiple meanings to this geographical concept of *where* when it comes to local food. This paper takes a spatial perspective on this question by examining the connections between farms and farmers' markets through Geographic Information Systems (GIS).

Farmers' markets provide opportunities to study the spatial flows of local food because of their direct, producer-to-consumer nature. As locations where multiple farms sell produce, farmers' markets are a form of shortened food-supply chains that aim to remediate the social and environmental costs of conventional food systems (Renting, Marsden, and Banks 2003; Feagan 2007). In terms of food production, farmers' markets support farm viability by providing consistent returns to farmers at higher profit rates than standard distribution channels (Feenstra and Lewis 1999; Conner et al. 2010). On the consumer side, farmers' markets also make a direct connection to topics such as food access. They have been examined as places that provide (uneven) food access to residents of surrounding areas, and as interventions to improve food security (Guthman, Morris, and Allen 2006; Ruelas et al. 2012; Lawson, Drake, and Fitzgerald 2016). Farmers' markets have also been studied as places in their own right—whether as sites where processes of exclusion and inclusion unfold or as the source of community and identity of localities in which they are located (Slocum 2008; Ruelas et al. 2012; Aucoin and Fry 2015). While previous research has contributed knowledge on how farmers' markets link the production of local food in rural areas and the urban contexts of consumers, there is less knowledge about the spatial relationships between farms and farmers' markets.

The objective of this paper is to examine spatial patterns of farmers' market supply chains in order to contribute a network perspective to knowledge of local food systems. More specifically, the paper uses GIS to examine neighborhood patterns in which ninety-one farmers' markets are located in Los Angeles County, and a network analysis of a sample of thirty-three farmers' markets and the 282 farms that supplied them. I set out not only to identify the locations of farms that supplied farmers' markets but also to compare the supplier networks between neighborhoods according to demographic variation. The paper identifies and explores spatial patterns, and thus aligns with extensive research design (Sayer 1992). The paper accomplishes these objectives by addressing the following research questions: how do farmers' market locations compare to neighborhood demographics? Where are the farms located that supply farmers' markets with food, and which farms are linked with which markets? Are there intra-urban spatial patterns to farmers' market supply chains—in other words, are there spatial patterns that differentiate the supply networks between markets in different types of neighborhoods? The project is driven by a theoretical approach that understands place as relationally viewed through connections to other places (Massey 2011), which I elaborate below. As such, I argue that the geographical concept of foodshed, which is typically constructed as a spatial container, can be more richly understood by revealing the place-to-place connections in a local food system.

Socio-Spatial Aspects of Local Food

Scholarship on local food often works to define *local* and understand its meanings, and discussions have focused on two categories. The first is based on territorial or proximity understandings of *local*. Concepts such as foodshed are illustrative of this—broadly understood as an area, territory, or region in which a market receives it local food (Feagan 2007; Aucoin and Fry 2015). Foodsheds tend to be operationalized as spatially bounded systems or a spatial container that gives form to a place in which local food circulates. This can be visualized as a contiguous boundary around a central location such as a farmers' market (Aucoin and Fry 2015). Doing so follows what Trivette (2015) calls "local by proximity." In this sense, local is defined by distance or a constraining political or administrative boundary—anything within it is local, and anything outside is not (Dunne et al. 2011). However, other scholars have argued that local is not only determined by distance, as is discussed next.

A second understanding of local is based on social and environmental relationships rather than territories or distance. In this sense, terms such as "shortened food chains" refer not only to short distances but also to a reduction in the steps between production and consumption (Renting, Marsden, and Banks 2003; Feagan 2007). Local is understood through the ways in which the processes of production, distribution, and consumption are simplified relative to conventional agri-business. In doing so, consumers may gain more information on farming practices and gain trust about food production. This definition of local is socially constructed through the meanings imbued through the varieties of actors engaged in local food (Conner et al. 2010; Aucoin and Fry 2015; Trivette 2015). From a geographical perspective, this relational understanding of local is thus framed around place—local food re-embeds the relationships between producer and consumer in place, in contrast to conventional food that erases those ties.

Integrating Territorial and Relational Definitions of Local Food

There have been efforts to integrate both proximity and relational understandings of local food within empirical studies. Although much local food research has been done through qualitative methods because the meanings of "local" are contingent on many factors from individual perceptions to market forces (Turner and Hope 2015), recent work to quantitatively examine both the proximity and relational approaches to local food are providing new insights. In a study of local food actors in New England, Trivette (2015) used two measures to examine local food-system dynamics: straight-line distance between retailers and their local farm suppliers, and the number of connections between retailers and farms. The distance that food traveled from farm to retailer was strongly influenced by the number of economic ties between local food actors. If a farm or retailer had higher numbers of connections to other local food actors, then the size of the local food territory was larger. Conversely, farms and retailers with fewer ties to other local food actors had shorter distances.

Another way that the relational side of local food can be combined with proximity is by studying how spatial factors contribute to sense of place. In a study of Dallas, Aucoin and Fry (2015) mapped the foodsheds of three farmers' markets by identifying the locations of farms that attended those markets and the locations where those markets' customers lived, and they combined this with qualitative analysis in order to understand how local food contributes to place-making and community building. In doing so, they found that local food involved a respatialization of food by linking producers and consumers enclosed within the contours of a foodshed. The proximity aspect of local food was represented in the delineation of foodsheds and marketsheds rather than statistical analysis of distance, and the relational aspect was assessed via qualitative data.

Given a large spatial dataset, one can also make relational claims based on proximity data between farm and market. In one example, a large-scale project examined farmers' market supply chains across the U.S. by using market managers' estimates of the distances that farms traveled to their markets (Lohr et al. 2011). A nationwide picture of farmers' market "competitiveness" was developed through spatial analysis. This was meant to indicate how strongly farms were attracted to selling in farmers' markets in metropolitan areas around the country. One conclusion was that farmers may be "willing to travel farther to markets they perceive to be more profitable, and market managers may have to compete more aggressively for limited numbers of vendors" (Lohr et al. 2011, 5). In that study, for example, Los Angeles was rated in the highest tier of competitiveness nationwide, meaning that there were higher numbers of farmers' markets in Los Angeles and that farmers have more choices of which markets to attend. If profitable markets are likely to draw farms from farther away, then one takeaway from their work is that one may hypothesize that farmers' markets in higher-income neighborhoods, where farms can charge higher prices, will draw farms from farther away than markets in lower-income neighborhoods.

While these examples point out some ways in which spatial analysis of local food has used relational approaches to go beyond just using distance, there are opportunities to expand this work both methodologically and theoretically. On the one hand, this previous work has prioritized the identification of the outer boundaries of foodsheds, a theoretical approach that views place or region as a territorial entity with contiguous boundaries. In the study by Aucoin and Fry (2015), qualitative data on the experiences of farmers' market consumers provided deeper meanings of sense of place than quantitative data alone could have done, but those meanings were evaluated by placing them within constructs of foodsheds as spatial containers. In the work by Trivette (2015), both proximity and relational variables were quantitative, but the objective again was to identify the boundaries of local food systems. Given the persistence of relational theories of place and region, there is room to explore other ways to investigate foodsheds.

On the other hand, there were methodological limitations that could have skewed results: the use of Euclidean instead of actual driving distances between farms and markets (Trivette 2015), or the reliance on market managers' estimates of the proportion of farms that traveled from each of five distance categories instead of empirical data on actual distances traveled (Lohr et al. 2011). Additionally, while this latter study was less concerned with identifying foodshed boundaries, methodological limitations prevented analysis of intra-urban patterns. The study used counties as the unit of analysis; for example, the conclusion that Los Angeles was a competitive farmers' market zone was based on data that had been aggregated to the level of Los Angeles County, and intra-urban spatial patterns could not be examined. Since farmers' markets function at neighborhood or urban scales, greater spatial precision in terms of the data can provide a more nuanced spatial analysis of local food systems even when using quantitative data.

Project Design

This paper builds on previous research by using a many-to-many GIS database to examine proximity aspects of local food and through a poststructural theoretical lens to explain the relational aspects of the spatial dataset. It draws on GIS because there is a spatial aspect to local food; farms are located somewhere, and their workers transport the food to farmers' markets. The paper also draws on poststructuralism because of a concern with the effects of representations, and particularly the common idea that local food is understood in a strictly bounded way, which thus works to enforce a logic in which one side of a boundary is local and the other is not local.

I built a GIS dataset that linked individual farmers' market locations to the locations of the individual farms that supplied them. The many-to-many database provided several advantages. This allowed me to use driving distances between farm and market locations, rather than using Euclidean or estimated distances (Lohr et al. 2011; Trivette 2015). This GIS database structure also provided flexibility in the unit of analysis; supply chains were able to be analyzed at the individual market level, as well as through aggregation by neighborhood demographic and by the entire sample. This enabled evaluation of intra-urban spatial patterns.

In theoretical terms, this project operationalized GIS-based spatial analysis through poststructural theory on relational space and place in order to explore other spatialities of local food beyond those centered on boundedness. While relational aspects of local food refer to re-embedding food relationships in place and in building trust between producer and consumer (Feagan 2007), my aim is to draw on broader relational theory in geography to understand spatial patterns that bring places of production and consumption into relationships with each other. In other words, my conceptual goal is to develop a spatially explicit way to examine how places are relationally constituted.

I draw on relational geographical theory in which places are constituted through their connections with other places (Murdoch 2006; Massey 1991, 2005, 2011), and the argument that the concept of interdependence is an entry point to advancing economic and environmental ethics (Gibson-Graham 2003). In this perspective, it is clear that a container or territorial view of space may reveal certain spatial limits to a foodshed; however, a conventional view also hides the spatial relationships within it. This approach underpins much sustainability and local food discourse, for example, with geographical terms like *self-sufficiency*, which invoke the concept of a spatial container (Mougeot 2006; Colasanti and Hamm 2010; Crush, Hovorka, and Tevera 2011; MacRae et al. 2012). Instead, I argue that GIS can help reveal the spatial relations within a region that may go unacknowledged in the conventional foodshed concept.

Methods

Location patterns of ninety-one farmers' markets in Los Angeles were analyzed, followed by further analysis of a sample of thirty-three farmers' markets and 282 farms that supplied them. This data was collected from March to July 2016. There were ninety-one markets in Los Angeles County that participated in the California Department of Food and Agriculture (CDFA) Certified Farmers' Market program during data collection. This list of farmers' markets was used because in order to participate in the program, all sellers of fresh produce at these markets must be the growers of that food. Farms undergo periodic inspections by CDFA staff to remain certified. As part of these requirements, farm locations must be publicly displayed at the markets. Sampled farmers' markets represent a cross-section of income and race/ethnicity in Los Angeles, with wealthy, middle class, and working class; and white, Latino, and African American demographics evident in the sampled markets' neighborhoods (Turner and Allen 2010).

Data collection was done mostly through fieldwork, with supplemental collection online. After the sample frame of nintey-one markets was identified, the current farms that attended each of the thirty-three sampled markets was needed. Farmers' market websites were first searched, but it was not known from these materials whether all of the farms were listed, and since many websites did not provide market dates, it was unclear whether lists of farms were up-to-date. The unreliability of website-based farm listings was confirmed through telephone calls with market managers and fieldwork. Thus, to collect farm data for each market, fieldwork was conducted. The name, city, and ZIP Code of each farm at each farmers' market was recorded by visiting each farm's table at each market for visual observation of their CDFA-required public signage indicating farm location, and through short interviews with farm staff.

Data processing involved creating GIS data of farm and market locations and the construction of a database to link each market with the farms that served them. First, our team digitized and geocoded farmers' market and farm locations in GIS. A feature class of farms was created by geocoding farm locations according to city names; however, farms with Los Angeles or Riverside locations were geocoded by ZIP Code due to the large number

of ZIP Codes and farms within these two areas. Another feature class was created of the market locations. To link the markets and farms in a database, we first created thirty-three spreadsheet tables, one for each market, of the names and locations of the farms for each market. Farms and markets were given unique identifiers to account for farms that attended more than one market in the sample. These data were combined into one junction table that listed each farm-market connection. A many-to-many database was created in ArcGIS using this junction table as a relationship class that linked the shapefiles of the farms and farmers' markets.

GIS analysis compared the data to U.S. Department of Agriculture (USDA) food desert criteria and ESRI geodemographics. The USDA Economic Research Service provided data through its Food Access Research Atlas on census tracts throughout the U.S. that meet various indicators of limited food access: proximity to food retailers; income; and vehicle availability rates. ESRI geodemographics came from its proprietary Tapestry Segmentation data, which classifies neighborhoods by combining race, income, education, and other data from the U.S. Census and consumer research. The broadest categories within Tapestry Segmentation were called Life Mode groups, which we used to characterize tracts in this study. Descriptions of these categories are available from ESRI and are elaborated in the results below.

Three sets of analyses were conducted. First, the geographic distribution of all ninety-one farmers' markets in Los Angeles County were assessed for patterns according to food desert criteria and ESRI geodemographics. Second, the thirty-three-market sample's supply chain was analyzed to identify spatial patterns in the farms that supplied the entire sample. Regional distributions of the sample's farms were identified using agricultural district boundaries of the National Agricultural Statistics Service (NASS). The number of farms in each California county that supplied the sampled markets were then compared to the total number of farms in each county, which were obtained from 2012 U.S. Census of Agriculture. Getis-Ord General G test was applied to the entire sample of farms in order to test whether there was spatial clustering of farms that supplied the thirty-three markets.

The third set of analyses identified patterns at the individual market level and compared farm-market connections between neighborhood types. Sampled farmers' market locations were categorized by USDA food desert criteria and by ESRI geodemographic categories at the census tract level. The farm locations that supplied markets in each of these categories were combined in order to characterize regional distributions of farms that supplied

the neighborhood categories. By using network analysis and county and district boundaries, this study combined relational and territorial notions of local food.

Results

Location Analysis of Ninety-One Farmers' Markets in Los Angeles County

Spatial patterns were first evaluated of the locations of ninety-one farmers' markets in the county, which were located across 2,401 census tracts; this is the population from which the thirty-three sampled markets were drawn. Comparing market locations with USDA food desert indicators, eleven of ninety-one markets (twelve percent) were located within tracts that met food desert criteria related to income, proximity to food retailers, and vehicle access (Table 1). Forty-eight markets (fifty-three percent) were located in tracts that were at least one-half mile from food retailers, but these tracts were not low income or low vehicle-access tracts. Four markets were in tracts that were at least one mile to a food retailer, but these tracts were also high income.

Table 1. Distribution of the Ninety-One Total Farmers' Markets in Los Angeles County by USDA Food Desert Indicators.

Food Desert Indicators		Number of Markets	% of Markets
	Low Income and Low Access; at least 0.5 miles to nearest food retailer	11	12%
	Low Income and Low Access; at least 1 mile to nearest food retailer	1	1%
	Low Income and Low Rates of Vehicle Access	4	4%
	Low Access only; at least 1 mile to nearest food retailer	4	4%
	Low Access only; at least 0.5 miles to nearest retailer	48	53%
	Low Vehicle Access only	7	8%

Sixty-four percent of the ninety-one markets were located in three ESRI Life Mode groups. ESRI describes these groups as (1) prosperous white married couples who are homeowners (Upscale Avenues); (2) young, successful, single white millennials (Uptown Individuals); and (3) working-class Latino families who are renters (Next Wave) (Table 2). Although around twenty percent of the markets were located in each of these three categories, there

was a disparity between them in terms of the percentage of census tracts within each category that contained at least one farmers' market. Only two percent of Next Wave tracts in Los Angeles County had a farmers' market, whereas eight percent of Uptown Individuals tracts—a fourfold increase—had a farmers' market.

Table 2. Distribution of the Ninety-One Total Farmers' Markets in Los Angeles County by ESRI Life Mode.

ESRI Lifemode	Description	N of Markets	% of Markets	% of Tracts with at Least One Market
Uptown Individuals	Single white millennials	22	24%	8%
Next Wave	Working-class Latinos	19	21%	2%
Upscale Avenues	Wealthy and highly educated whites	17	19%	4%
Affluent Estates		7	8%	4%
Ethnic Enclaves	Young, diverse family households	8	9%	2%
Senior Styles	Low-income to middle-class senior citizens and retirees	8	9%	17%
Middle Ground	Middle-class whites	6	7%	3%
Other		4	4%	15%

Spatial Patterns of the Supply Chain of the Sample

Analysis was done on the sample of thirty-three farmers' markets and the farms that supplied them. Descriptive statistics were calculated on the 282 farms with verified addresses that supplied the thirty-three markets in this study during spring and summer 2016 (Figure 1). First, we defined market size as the number of farms present at each market. The median market size was thirteen farms per market (range: 2–71 farms). The average distance between farm and market was 107 miles. Of the 282 farms, the median number of markets in the sample that each farm visited was two (range: 1–14 markets).

Regional patterns were identified by aggregating farms into National Agricultural Statistics Service (NASS) districts. Sixty-seven percent of the farms that served the sampled markets were located in NASS District 80, which is comprised of eight counties in Southern California (Figure 2). The San Joaquin Valley, an eight-county area making up District 51, was home to

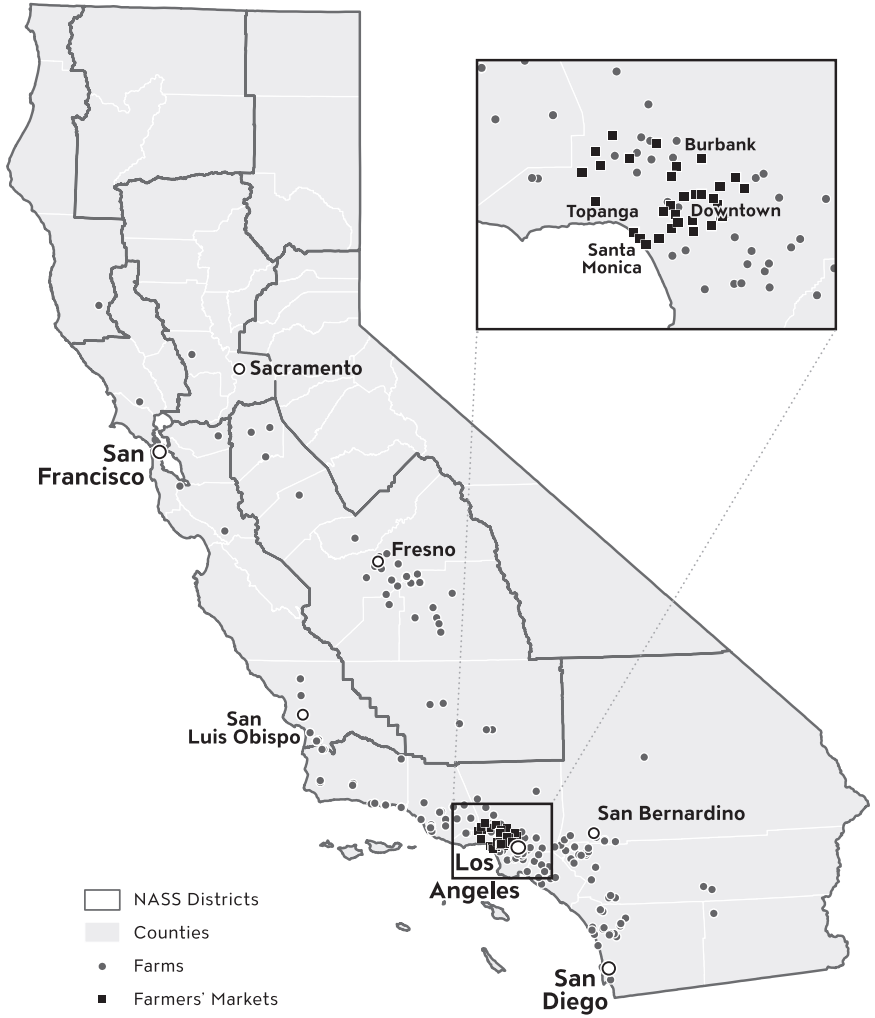

Figure 1.—Locations of 282 farms that supplied the thirty-three sampled markets.

twenty-four percent of the farms. Eight percent were located along or near the central coast of California (District 40), and less than one percent (two farms) were in Northern California.

A finer-grain analysis was done at the county level. In terms of total number of farms that supplied the thirty-three markets, two San Joaquin Valley counties (Tulare and Fresno) contained similar numbers to counties in Southern California. However, the proportion of farms in each county that supplied the market sample is higher in Los Angeles and Orange Counties than elsewhere. For instance, 4,931 farms operated in Tulare county, a

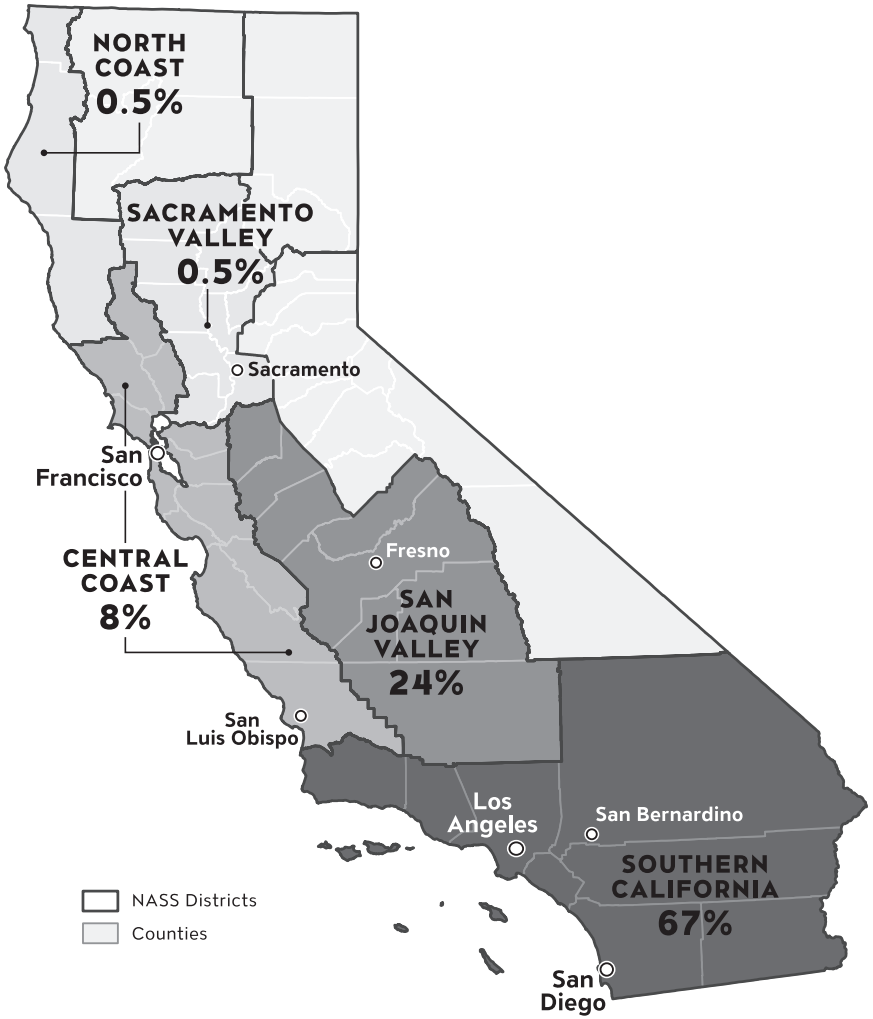

Figure 2.—The percentages of farms supplying the sampled markets that were located in each National Agricultural Statistics Service district.

largely agricultural area, but only twenty-four (0.5%) supplied the sampled markets. In contrast, while only ten farms in Orange County supplied the thirty-three markets, this represented over three percent of the total farms in Orange County. Out of the 1,294 farms operating in Los Angeles County, forty-six (3.5%) supplied food to the markets in the sample. These county-based spatial patterns were also tested for statistical significance through the Getis-Ord General G test; there was clustering of high proportions of farms per county that supplied the market sample (Observed: 0.1; Expected: 0.05; $z = 3.36$; $p < 0.01$), as well as clustering of high numbers of farms per county that supplied the sample (Observed: 0.08; Expected: 0.05; $z = 2.25$; $p < 0.05$). Clearly, local food supply chains are not evenly distributed within a foodshed's outer boundaries.

Spatial Patterns at the Neighborhood and Individual Markets Level

Since the database contained individual pairs of each farm that supplied each of the thirty-three markets, farmers' markets were grouped to identify whether any intra-urban patterns existed. Just one of the thirty-three sampled markets was located within a tract that met the criteria of any of three types of income-based USDA food desert indicators (Table 3). One market was located in a tract designated as low food access and low vehicle access. Nine markets were in tracts that were at least one-half mile from food retailers but did not meet income or vehicle access thresholds; in other words, they were more than one-half mile from food retailers but were higher income and/or had higher vehicle ownership rates. The remaining twenty-four markets were located in tracts that did not meet any USDA indicator of food desert or limitations in access.

The sampled markets were distributed across eight ESRI categories (Table 4). Sixty-nine percent of the markets were located within four categories. These four types of neighborhoods include tracts that were characterized as wealthy, highly educated white homeowners (Affluent Estates and Upscale Avenues); working-class Latino renters (Next Wave); and single white millennials (Uptown Individuals). Additional neighborhoods represented in the sample were characterized as middle-class white families (Middle Ground); low-income to middle-class senior citizens and retirees (Senior Styles); college students (Scholars and Patriots); and racially diverse millennials (Midtown Singles).

In terms of the types of neighborhoods the 282 farms supplied, ninety-seven percent of these farms targeted neighborhoods that were white homeowners or single white millennials. Farms distributed mainly to markets within four ESRI categories. This latter category (Uptown Individuals) was the destination of sixty-five percent of the farms, by far the largest demographic segment. The second largest proportion of farms (thirty-two percent) went to markets in wealthy, highly educated tracts. Three groups attracted similar proportions of farms—senior citizens and retirees (sixteen percent of farms), working-class Latinos (fifteen percent), and middle-class whites (twelve percent). Much smaller proportions of farms went to markets in neighborhoods of college students and racially diverse millennials (three

percent and two percent of farms, respectively), but there was only one farmers' market in each of these groups.

If we look across these neighborhood typologies, the proportion of farms coming from each NASS district was remarkably consistent. Across each ESRI category in our sample, between two-thirds and seventy percent of farms that served the tracts in our sample were from Southern California, between twenty percent and twenty-five percent of farms were from the San Joaquin Valley of central California, and between seven percent and twenty percent were from the central coast area. Between eighteen percent

Table 3. Distribution of Sampled Farmers' Markets and Farms by USDA Food Desert Tract Criteria.

			Number of farms in each agricultural district									
	N of Markets	N of Farms	Southern California	%	Central Valley	%	Central Coast	%	North Coast	%
Low Income/Low Access at 0.5 miles	1	5	3	60%	2	40%	0	0%	0	0%
Low Access at 0.5 miles	11	112	78	70%	24	21%	9	8%	1	1%
Low Vehicle Access	1	17	14	82%	2	12%	1	6%	0	0%

Table 4. Distribution of Sampled Farmers' Markets and Farms by ESRI Life Mode.

	N of Markets	%	N of Farms	%	Southern California	Central Valley	Central Coast	North Coast	Sacramento Valley
Affluent Estates	2	6%	31	11%	68%	19%	13%	0%	0%
Upscale Avenues	4	12%	59	21%	71%	20%	7%	2%	0%
Next Wave	6	18%	42	15%	67%	24%	7%	0%	2%
Uptown Individuals	11	33%	182	65%	70%	21%	9%	0%	0%
Middle Ground	4	12%	35	12%	71%	20%	9%	0%	0%
Senior Styles	4	12%	46	16%	63%	26%	11%	0%	0%
Scholars and Patriots	1	3%	8	3%	38%	50%	13%	0%	0%
Midtown Singles	1	3%	5	2%	60%	20%	20%	0%	0%

and forty percent of the farms came from outside the Southern California NASS district.

Discussion and Conclusions

Empirically, this paper revealed spatial patterns of ninety-one farmers' market locations and the locations of farms that supplied thirty-three markets in Los Angeles. The geographic patterns of market locations are more diverse than perhaps commonly thought; although many markets were in trendy or middle- to higher-income places, there is a substantial number of markets in lower-income, diverse neighborhoods. Previous research has critiqued

farmers' markets as spaces that favor middle-class whites over working-class minorities (Slocum 2007; Zukin 2008; Kern 2016), and while most farmers' markets in Los Angeles County align spatially with those conclusions, it should also be noted that markets were located in working-class minority neighborhoods. Still, given the large number of low-income tracts, there is an undersupply of markets in those neighborhoods.

The regional patterns of farms supplying the markets in this sample suggest that Los Angeles is an attractive area for farms, even for those markets located within lower-income neighborhoods. Although the majority of the farms in this study were located in Southern California, one-fourth to one-third of farms came from outside Southern California. This was consistent across a variety of categories of analysis within USDA food-desert criteria and ESRI geodemographics. Notably, markets located in lower-income neighborhoods attracted farms from as far away as markets in higher-income neighborhoods. This differs from the argument previously made by Lohr et al. (2011), who concluded that farms would travel farther to be in markets with higher potential sources of income. Assuming that markets in higher-income neighborhoods would offer higher potential sales, then markets in lower-income neighborhoods would attract fewer farms from farther away. This was not the case in this study. The difference between neighborhoods was not the distance that farms traveled, but the number of farms that served the markets.

The findings here suggest that farmers' markets—at least in Los Angeles—are equally attractive for farms regardless of the type of neighborhood in which the market is located. A greater question that can be examined in future studies is: Given the draw of farmers' markets for farms to Los Angeles, why are there not more farmers' markets in other low-income neighborhoods? Likewise, while the distance farms traveled did not vary much between categories, the size of the markets did; future research should examine farmers' decision-making processes as to why they go to certain markets.

Both territorial and relational concepts of local food were evident in this project. However, the emphasis on relationality allowed me to look at local food in terms of flows first, and regions second. I was less concerned with identifying the outer boundaries of these markets' foodsheds—which is legally the State of California, according to the Certified Farmers' Market Program—and more with the spatial connections within the state. By tracing these connections, I was able to identify regional characteristics of the supply chains and also look for differences between individual markets and neighborhood types. Notably, these regional characteristics do not lead to clearly delineated foodshed boundaries or evenly distributed farms within a foodshed; the farms were located unevenly across California.

In theoretical terms, a relationally informed spatial analysis underscores the way in which local food joins many places together. These place-to-place connections can become hidden in certain foodshed concepts in which a location of consumption (e.g., a farmers' market) sits within a spatial container. Although this study summarized the data through NASS districts for visual clarity of these place-to-place connections (Figure 2), its foundation was to treat the farm and market locations equally in the database (Figure 1). This approach also reminds us that local food means more than appealing to consumers' tastes and more than providing stable incomes for farmers (Allen 1999), that rural and urban well-being are linked, and that urban farms play a role in food security. A relational view of local food systems can thus be oriented around the entry point that places are interdependent. This is a way of rethinking local scale as contingent upon ethical connections instead of as being constrained by distance (Gibson-Graham 2003). To be clear, this is still very much geographical, only it emphasizes the interdependence of places more than distance. This conceptual move thus mitigates the "scale trap" that has been a sustained critique of localism (Born and Purcell 2006).

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Notes

1 http://doc.arcgis.com/en/esri-demographics/data/tapestry-segmentation.htm; https://www.esri.com/library/fliers/pdfs/tapestry_segmentation.pdf

2 The farms identified in this study could have also visited other markets outside the sample, so this number should not be interpreted as the total markets that each farm visited.

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