

The Geography of US Peri-Urban Agricultural Adaptation¹

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Abstract

The geography of modern agriculture in the United States has been dramatically shaped by broader changes in the agri-food system, including standardization, commodification, vertical integration, globalization, and increasing concentration in the ownership and control of farm and food production. In peri-urban areas, these sectoral forces of change are compounded by a complex array of land use pressures – including competition for land, increases in land prices, landscape fragmentation, neighbor conflicts, and other urbanization pressures. In this urbanizing context, farmers, farm households, and landowners must decide how to allocate their scarce land, labor and capital inputs to accomplish their household and business goals within this changing environment. Their decisions produce diverse agricultural trajectories, including growth, intensification, on-farm and off-farm diversification, deintensification and decline.

Utilizing farmer and landowner surveys from five distinct peri-urban farming regions across the United States, we characterize the diverse trajectories of agricultural change and examine different theories of agricultural structural change. Our results provide an empirical profile of the types and geography of US peri-urban agriculture and the most common adaptive strategies employed by farmers at the urban-rural interface. We also compare these patterns to predictions of alternative agricultural geography models.

Keywords: agricultural geography, farmer adaptation, peri-urban, rural-urban interface

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Introduction

Since the beginnings of agricultural industrialization in the 1920s, industrial capital has been finding ways to infiltrate, standardize, and ‘capitalize’ agriculture (Mooney 1988). The industrialization of agriculture has resulted in increased labor productivity, increased types and amounts of capital investment and machinery use, crop specialization and the appearance of very large investor-owned farm corporations (Roberts 1996). Technology was a driving force in improvements in machinery and animal and plant innovations (Gardner 2002). As a consequence, the importance of ‘off-farm’ sectors, such as gene selection and seed production industries or manufacturing of products using industrial labor, are greater now in the overall commodity chain (Whatmore 2002). These structural changes have resulted in farmers competing for increasing smaller profit margins (Cochrane 1992). In addition, these changes in agriculture pose challenges for farmers. As a result, adaptations to compete in a capitalist restructuring of agriculture have included reducing dependence on nature (e.g., using high-technology inputs to offset the effect of unpredictable weather conditions), increasing market size and value of products through industrialization (Whatmore 2002), and managing market risks via contracting with processors or by developing new niche markets.

These challenges are even more acute in ever-changing peri-urban areas as agriculture competes with other sectors for one of its main inputs – land. Farmers in the peri-urban landscape simultaneously face pressures from both the broader restructuring of agriculture *and* the growing residential consumption of rural spaces. Interestingly, evidence suggests that farms in these settings are not just hanging on, but can even be dynamic and successful. Because of the importance of agricultural lands on the margins of most urbanizing areas, the decisions of landowners and farm operators can have a significant impact on the future of the peri-urban landscape. Their adaptive behaviors also help shape the character and trajectories of future urban food systems.

The motivation behind this study is quite simple. Our goal is to better understand agricultural restructuring in peri-urban areas, where a complex combination of processes converge: the ongoing capitalization of farming; the globalization of food production and consumption commodity chains; and the localized conflicts and opportunities increasingly created in peri-urban areas. Given the continued importance of peri-urban agriculture, it is critical that researchers have a better understanding of the trajectories of peri-urban agriculture and the dynamics and influences of farm household adaptations in these urbanizing landscapes if researchers are to be engaged in policy debates and discussion of contemporary urban food systems. Furthermore, it is important to focus on the economic opportunities and rural development potential that may abound in our exurbanizing metropolitan areas. At the same time, there is a dearth of empirical studies to ground our understanding of the behaviors underlying these processes. Finally, the research that has been conducted has not empirically examined questions of adaptation across regions and study sites. In this paper we hope to address these gaps.

The rest of this article is organized as follows: The next section provides briefly addresses agriculture in the peri-urban context. This is followed by a brief review of agricultural geography models and the themes/factors used to explain the apparently uneven evolution of agricultural spaces. A key focus will be an assessment of alternative conceptualizations for the

types of adaptations pursued by landowners and farmers. After outlining our core research questions and expectations, we describe our research methods, present our preliminary results, and discuss the implications of our findings.

Agricultural Change in the Peri-Urban Context

Although macro-forces of change in the global agri-food system are pervasive, they have not necessarily resulted in the homogenization of the agricultural landscape. Several factors help explain why agricultural modes of production are still articulated unevenly across space. Foremost, research has shown that agriculture is not always a purely capitalistic venture for many farming households (Bennett 1982; Reinhardt and Barlett 1989). The opportunities and constraints are different for each farm decision-making unit, as not only the constitution of each farm's basic components of land, labor and capital vary, but the current system of economic and social relations in which each farm is engaged differs dramatically. As a result, some farmers choose to engage in the globally competitive agriculture regime, while others choose to create new spaces of engagement out of either necessity or a desire to reframe their farm's sphere of competition. Several researchers would argue that these opportunities to create new spaces are more apparent at the urban fringe (Bryant and Johnston 1992), where peri-urban farmers must compete with other sectors for increasingly scarce land resources.

Furthermore, despite, or because of, these challenges, farming remains a significant land use and economic activity in America's urban landscapes. In 2002, for example, the metropolitan counties in the US comprised 34 percent of all counties, but produced 41 percent of all agricultural sales. As peri-urban areas are continually being brought into the urban system through residential development on formerly agricultural or natural areas (Fulton, Pendall et al. 2001; Heimlich and Anderson 2001; Irwin and Bockstael 2006), farmers' responses to the unique problems and opportunities in this complex peri-urban landscape will help shape the future of agriculture in most industrialized societies.

Studies have shown that the peri-urbanization process typically results in the growth of low-density, non-agricultural, urban-dependent forms of development (Clark, McChesney et al. 2005). Urban development is fueled by many processes that often act in tandem: increasing household income, flight-from-blight, the search for the American Dream, local land use regulations, desire for open space and improved transportation (Mieszkowski and Mills 1993; Pendall 1999; Fulton, Pendall et al. 2001; Shumway and Otterstrom 2001; Carruthers 2003).

With the restructuring of space in the American countryside come both opportunities and obstacles. Peri-urbanization results in new potential users for agricultural land and thereby competition for a finite natural resource. As middle-class residents consume rural space in the countryside, they reinforce the commodification of that space and place (Marsden et al. 1996). With increased competition for land come higher land prices, more non-farm neighbor conflicts, and more regulation of agricultural land uses. While urbanization raises challenges for farmers, it can also provide new marketing opportunities associated with rising demand for 'local' food production centered in the very urban areas that cast the peri-urban shadow. New opportunities for farmers that result from urbanization can include customers for direct markets and increased traffic for related on-farm businesses.

Agricultural Geography Models

Since the early 1800s, agricultural geographers have developed models to predict the location and evolution of agricultural systems. While earlier models were somewhat spatially deterministic in nature (von Thünen 1966: originally published in 1826; Sinclair 1967), later models have recognized that local trajectories can depend on the dominant commodity types (Bryant et al 1973), the relative influence of local and non-local forces (Bryant, Russwurm et al. 1982), and the importance of farmer agency (Johnston and Bryant 1987). These authors recognized that farmers may react in different ways to similar influences and that they may also be proactive in creating new opportunities. Most agricultural geography models recognize that urbanization can have both positive and negative effects on farm operations and farm households, and that these can lead to positive, negative or adaptive changes to their operations. In 1992, Bryant and Johnston (1992) argued that diverse modes of agricultural production utilize land, capital and labor differently, utilize different management systems, and therefore can be expected to respond differently to the forces of change associated with peri-urban spaces. Smithers and Johnson's (2004) model even allows for multiple strategies to be taken at one time on the same farm.

Most agricultural geography models have emphasized the key role of local contextual factors such as biophysical and climate conditions (Johnsen 2004; Roberts 1996; Smithers and Johnson 2004) and the historically important commodity systems in specific agricultural landscapes (Bryant and Johnston 1992; MacFarlane 1996). Other commonly employed localized influences include the local political economy, including the public and community interests, local support, other spaces of regulation (through local land use and agricultural policy), local agricultural infrastructure and labor markets, and regional economic conditions. Since Sinclair, almost all agricultural geography models recognize the forces of urban proximity, population growth, and the horizontal restructuring of the exurban countryside (Furusetth and Pierce 1982). Beyond local factors, some geographers have drawn attention to the importance of macro (supra-community) conditions, including technological change, information, national policies, and international trade conditions (McMichael 1994).

While local and macro factors serve as important background forces of change, many models allow for the agency of landowners and agriculturalists. Such approaches recognize that farmers have highly diverse strategies to cope with change, and these strategies vary depending on their individual circumstances, values and attitudes (Shucksmith and Herrmann 2002). Importantly, due to the decentralized and family-labor nature of most agricultural production units, farmers' strategies typically reflect not only business goals but farm household constraints and goals as well. The duality of the farm business and farm household (Smithers and Johnson 2004) is such that neither acts independently within external structures (Shucksmith and Herrmann 2002). Therefore, both the business and household characteristics need to be examined to understand how farmers anticipate and respond to change. Important business indicators might be the organizational structure of the farm business, the scale of the operation, human capital assets of farm family members, the lifecycles of both the business and the household (Jackson-Smith 1999), access to resources, mode of production and position in production system, mobility of the operation, and relations with neighbors. Household attributes of interest can include human capital attributes of farm household members, personal goals, life histories, farming philosophy, attitudes, perceptions of risk, and the presence of a successor (Bryant and Johnston 1992).

In our work, we find the model used by Smithers and Johnson (2004) to be the most comprehensive foundation for an empirical analysis of the influences of farmer adaptation in peri-urban landscapes (see Figure 1). In their work, a distinction is made between local and macro-scale influences on farmer decision-making. Included in their macro-scale factors are changes in technology, information, climate, and broad market condition. Markets are mediated and filtered by the nation state, which can enable, support or hinder particular types of agrifood systems and commodity markets. Localized influences can include non-farm development, local traditions and culture, local land market, land use policy, local political support, labor markets, agricultural infrastructure, and relations with neighbors.

Regarding the manner in which these factors relate to one another, several researchers view the decision-maker as the interpreter (Johnston and Bryant 1987; Smithers and Johnson 2004). The Beauchesne and Bryant (1999) model allows for filtering to occur at many scales. Several authors examine networks and focus on the connections, the relationships, the linkages between actors, spaces and scales (Whatmore and Thorne 1997; Suryanata 2002). This includes the existence of feedbacks in the system (Smithers and Johnson 2004).

Conceptualizing Patterns of Farmer Adaptation

A critical challenge in the literature on agricultural change involves inconsistencies in the ways that different models conceptualize the essential aspects of farmer adaptive behaviors. Several authors have developed typologies for farmer adaptations. Most typologies describe adaptations on a continuum from enterprise growth at one end, to enterprise decline or exit at the other. Within this broad rubric, some authors have interpreted farm changes into a normative context, where positive/constructive adaptations are contrasted with negative/disengagement behaviors (Johnston and Bryan 1987). Building on the work of Shucksmith and Hermann (2002), Lobley and Potter (2004: 503) use a spectrum that describes ‘the degree to which they can be considered to be disengaging from mainstream agriculture,’ which includes categories for static farms, modest changers, and traditional restructuring on the one end, diversification and integration strategies in the middle, and capital consumers on the other end. In two studies of agricultural adaptation in urbanizing areas of the United States, distinctions have been made between traditional, alterative/adaptive, and recreational/hobby farming trajectories (Johnston and Bryan 1987; Heimlich and Anderson 2001). Smithers and Johnson (2004) recognize that different adaptations may not necessarily be mutually exclusive, and similar behaviors may at times be associated with divergent adaptive strategies.

Obviously, operationalizing indicators of agricultural adaptation can be complex. In the empirical research described below, we conceptualize five main overarching farm-level trajectories that reflect changes in concrete indicators of the use of land, labor and capital: growth, intensification, persistence, deintensification, and decline. Put simply, growth and decline reflect the aggregate increase (or decrease) in the scale of operation without a fundamental restructuring of the relationship between the main agricultural inputs or the intensity of the production process. Intensification is defined as an increase in the intensity of production, typically accomplished by increasing the application of labor and capital on an existing land resource, or by maintaining output through increased productivity or shifts toward higher value commodities in the face of a static or declining land base. Persistence reflects a pattern of relatively slow change associated with modest, incremental adjustments to changing market conditions. Deintensification is basically the reverse of intensification, but generally reflect an

intentional strategy to shift to less labor- or capital-intensive production systems (to release those assets for nonfarm employment or investment).

Aside from these core trajectory categories, we recognize that there are cross-cutting dimensions of farm adaptation that are common in the literature on peri-urban agriculture. Four key agricultural behaviors thought to be found at the urban fringe are: (a) off-farm diversification, generally involving increased reliance on non-farm employment to support the farm household (Ilbery 1985); (b) on-farm diversification utilizing productive and/or nonproductive aspects of the farm, designed to shift toward products more suited to the urban production environment (Bryant and Johnston 1992), (c) urban-oriented value-added processing or marketing activities (Heimlich and Anderson 2001), and (d) the rise of lifestyle, hobby, or recreational farming, where the fundamental logic of decision-making is based on considerations of quality of life factors as opposed to enterprise efficiency (Heimlich and Brooks 1989). A final set of agricultural adaptations that are anticipated in the peri-urban context reflect management approaches or changes in specific production practices explicitly designed to minimize potential nuisance complaints from neighbors (Sharp and Smith 2003).

Questions and Expectations

Our principal research question in this paper is ‘What are the most common types of farmer adaptation behaviors in peri-urban areas?’ To answer this question, we will focus on the results of an extensive landowner survey conducted in eight urbanizing yet agriculturally important counties in the United States. Based on the typologies outlined above, we anticipate finding evidence of a wide range of adaptive behaviors ranging from growth and intensification to decline and deintensification.

Given that land is a limiting factor and that land cost and availability is in part what distinguishes peri-urban areas from rural areas, we also expect that positive agricultural adaptations will emphasize capital investment, changes in commodity mix, and urban oriented marketing behaviors, rather than land expansion. Conversely, negative adjustments will be more likely to involve adjustments to accommodate new urban neighbors, and enterprise decline and the selling off of land (leading toward eventual exit from farming) rather than a shift toward a more consumptive or deintensified use of farm assets by existing farming operations. Few scholars expect farms in urban areas to be able to remain unchanged, so we anticipate patterns of stability or persistence to be uncommon.

Methods

The data summarized below are drawn from a set of 619 US counties that are both ‘agriculturally important’ nationally, yet also situated in relatively urbanized contexts. Agriculturally important (AI) counties were defined as those whose farm sector contributed significantly to the national agricultural economy. In practice, the AI designation means counties with at least 50 farms and that were ranked nationally in the top quartile of gross farm sales in either 1987 or 2002. In addition, we include a small number of counties which were in the second quartile of sales, but were in the top quartile for sales per acre (a measure of intensity) of farmland or cropland (see Jackson-Smith and Jensen, n.d. for more details).

To identify peri-urban counties that are experiencing relatively higher levels of urbanization, we relied on the USDA’s Economic Research Service Urban Influence Codes

(UIC) as described in Parker (2003). Any counties that fall in the first four categories of UIC -- including all metropolitan (henceforth 'metro') counties, as well as those nonmetropolitan (nonmetro) counties that are adjacent to large metro areas. To capture the subset of the next tier of counties that are experiencing relatively high rates of population growth, counties with UIC codes of '5'-'7' whose growth rate between 1990 and 2000 was greater the national median of 13.15 percent also were selected.

We intersected the indicators of AI and peri-urban counties to identify the subset of more urbanized counties that still retained a significant agricultural sector. In addition, to capture peri-urban agriculture in metro areas, we also include thirty counties with UIC codes of '1' (large metro areas of more than one million people), were included if over 50% of their land base was reported to be in agricultural use, even if their sales did not meet the thresholds described above. A map of the resultant study counties is shown in Figure 2.

The agricultural trajectories of resulting population of 619 counties were then examined to identify the diversity of change patterns. As mentioned above, indicators of farmland, farm number, and farm sales trends at the county level were combined to produce a matrix that classified aggregate trends into five groups: decline, deintensification, persistence, intensification, and growth. Analysis of the distinguishing characteristics of these different types of AI/peri-urban counties is presented elsewhere (Sharp et al., 2007).

To better understand the internal dynamics of AI/peri-urban counties experiencing different agricultural trends, we selected eight case study counties for detailed exploration. The particular study counties were selected ensure representation from different regions of the US and places where a particular type of change has been prominent.

Our case studies involved extended site visits by members of our study team, interviews with key informants, and collection of more detailed secondary data about local conditions and trends. As a component of the case study project, we developed an extensive mail survey instrument, which was then sent to a random sample survey of 300 landowners and farmers in each study site. The sampling frame consisted of a list of all landowners who own at least five acres of farmland in the unincorporated areas of each study, usually provided by county tax assessors or auditors. In each site, 200-300 names randomly were drawn from the landowner lists.

Because this tax parcel owner lists typically include both farmers and nonfarming agricultural landowners, we developed the instrument with blocks of questions that were appropriate for both types of respondent. Everyone was asked basic demographic questions and questions regarding the current uses of their land, and all were asked about their perceptions of community characteristics such as political support for agricultural production, land use policy effectiveness, and community cohesion. For those involved in farming, detailed questions were asked regarding the farm operation and farm household. A particularly detailed battery of questions inquired about past and future changes in the farming operation, with particular attention to indicators of the adaptation strategies described above and the subjective reasons behind these strategies.

The mail survey was implemented utilizing a modified Tailored Design Method (Dillman, 2006), and included multiple contacts of each potential respondent, including a prenotification letter explaining the purpose of the study, an initial survey mailing, a reminder postcard, and subsequent mailings of two replacement surveys and reminders to nonrespondents as appropriate. Our mail survey was implemented between May and September 2007. While the final results are still pending, our analysis below is based on the preliminary data that is available

at the present time. Our overall response rate is roughly 38 percent, though a final mailing and non-response analysis effort is currently underway. Overall, 43 percent of our useable responses were from working farmers; these are the responses used in the analysis presented below. A detailed table of response rates and farmer versus nonfarmer respondents is summarized in Table 2 below.

The high rate of nonfarming respondents from the landowner lists in these counties indicates that many owners of agricultural land in the peri-urban landscape are not active commercial farmers. About 2 in 5 landowners indicated that they farm some of their land. Interestingly, only half of these people described themselves as operators of a commercial farm, suggesting that many landowning ‘farmers’ consider themselves to be sub-commercial scale or hobby operations.

The most common reasons for owning agricultural property in our study counties are presented in Table 3. The results suggest that roughly half of all property owners use their agricultural property for their primary residence (it ranges from 25 percent in Cache County, Utah to 71 percent in Frederick County, MD). Another 6 percent have second homes on their agricultural land, and 18 percent use their land for recreation. Just under 30 percent of all farmland owners reported renting their land out to another person who farms it.

In the analysis below, we will focus on the farm enterprise adaptations engaged by farmer respondents. It should be remembered, however, that the overall trajectory of change in the peri-urban agricultural landscape will be shaped in important ways by the land use management approaches and land development decisions of non-farming landowners as well.

Results

Profile of farm respondents

The landowner farmer respondents to our mail survey are compared in Table 4 to published characteristics of the county farm population from the 2002 U.S. Census of Agriculture. Overall, farmer respondents identified in a random sample of landowners tended to be reasonably representative of census farms, though they over-represent larger farms and farms with livestock.

Frequency of Core Agricultural Trajectories

The survey asked farming respondents to indicate whether they had made any major changes in their land, labor or capital investments on their farm operations over the last five years. The results were combined to create proxy indicators of our five main trajectory paths – growth, intensification, persistence, deintensification, and decline. The frequencies of each type of trajectory in our pooled sample are presented in Table 5.

Results suggest that farms in our eight agriculturally-important urbanizing counties are more likely to be following in growth or intensification trajectories than decline or deintensification trajectories. The most common specific changes among landowner sample farms included increases in the value of gross sales, increased investments in farm equipment, and growth in livestock inventories. All told, over 40 percent of landowner farms in our combined case study counties appear to be experiencing a growth trajectory on one or more of our growth indicators. Over the same period, over 60 percent of landowner farms reported they were increasing the intensity of their farming operations on one or more of our intensification indicators.

The middle section of Table 5 reports the percent of farms that did not make changes in important aspects of their farms. These relatively stable (or ‘persistent’) operations reflect the ability of some farm operators to ride out changes taking place in the local area without significant restructuring. Looking only at individual indicators, the clear majority of farms in our case study counties reported no changes in the number of acres they own or rent for their operations, or in the numbers of livestock raised during the previous five years. Among landowner sampled farms, half reported no change in farm sales, and 57 percent reported no new changes in investments in farm buildings. While stability on a single indicator is common, there are relatively few farms that made no changes in any of the six indicators reported in the middle of Table 5.

Roughly 30 percent of landowner farms reported making changes associated with deintensification during the previous five years. The most common deintensification behavior involved idling or leaving fallow some farmland. By the same token, about 28 percent of farmer respondents reported a pattern of downsizing or decline. Here the most common change reflected a decline in gross sales, livestock numbers, or farmland rented.

The results suggest that roughly 13 percent of landowner farmers sold some land for nonfarm development during the preceding five years. While not insignificant, it is clear that other forms of adaptation and change are more common dynamics in this particular agricultural landscape.

Although we report the five major types of trajectories, they are defined in ways that allow individual farms to fit into more than one category (depending on their specific adaptive behaviors). Not surprisingly, half of the farms on a growth trajectory were also on an intensification trajectory. Similarly, roughly forty percent of those experiencing deintensification were also witnessing a decline trajectory. What was unexpected, however, is the fact that roughly ten to twenty percent of those with positive trajectories (growth or intensification) also reported one type of negative trajectory (decline or deintensification). This suggests a more complex individual farm-level pattern of enterprise change.

Other Forms of Agricultural Adaptation

There are several other potential forms of agricultural adaptation that are not captured by the five-part trajectory scheme presented above. These include on- and off-farm income diversification, and a range of positive or reactive behaviors made explicitly to respond to opportunities or challenges in the urbanizing environment. The frequency of the most common forms of agricultural adaptations our pooled data are presented in Table 6.

Initially, with respect to off-farm employment, over two thirds of farmers in our landowner sample reported some current household participation in nonfarm employment, and almost 80 percent relied on off-farm income for over 50 percent of total household income. Looking at off-farm work in a dynamic manner, the results suggest that landowner sample farms were more likely to reduce off-farm labor force participation or reliance on off-farm income over the last five years than to increase their participation.

It is apparent that on-farm diversification strategies are used by a relatively small minority of farmer respondents. Roughly one in eight landowner farmers reported increasing the number of farm commodities that they produced over the previous five years.

The middle of Table 6 reports the frequency of various types of “urban-oriented” agricultural behaviors among our farming respondents. Overall, over half of all landowner farms reported the use of at least one type of urban-oriented farming activity. The most common

behaviors among the respondents included selling products to hobby farmers, marketing products with particular attributes (e.g., local, natural, or organic), and direct sales to consumers from the farm. In each case, roughly 20 percent of farms reported using the practice. Marketing as local, natural, organic or family-raised is the most common characteristics of an urban oriented farm, with local branding being the most common response (not reported in these tables). Roughly 10 percent of farms reported selling at farmers markets, selling direct to local businesses, and selling animal boarding or training services.

Dynamic changes in the farm sector that are oriented toward specific urban markets were noted by roughly 20 percent of landowner farms. Most of these farms reported increasing sales of products directly to consumers. About 10-15 percent of all farms increased value-added processing, adjusted their marketing strategies explicitly to sell to new urban customers, or raised new crops or livestock to sell to new urban customers.

A final type of urban-oriented adaptation reflects the positive or negative changes a farmer can make in the day-to-day operation of their farm in an attempt to accommodate or mollify the behaviors or concerns of new urban neighbors. Overall, most farmers in our survey reported some type of accommodation behavior. Almost 60 percent of landowner farms reported making one or more changes along these lines. The most common accommodations made for neighbors included moving equipment during low traffic periods (roughly a third of farms), seeking out and meeting new neighbors (27 percent), and changing crop spraying activities to reduce drift (19 percent).

Diversity across the Individual Study Counties

While the broad patterns of agricultural adaptation in US peri-urban areas are revealed in the results of our landowner and farmer respondent samples, there are important differences in the relative frequency of adaptive behaviors among the eight counties included in our study. A summary of the disaggregated county-specific results are presented in Table 7. The results suggest that there are quite different agricultural trajectories and adaptation patterns across our eight case study counties. Growth and intensification were reported by a majority of farms in both Yamhill County, Oregon and Kent County, Michigan. In Shelby County, Kentucky there were also high relatively levels of both growth and intensification. Frederick County, Maryland witnessed relatively high levels of intensification, but did not have many farmers who reported growth trajectories. At the other end of the spectrum, two counties (Hall, Georgia and Cache, Utah) had unusually large proportions of farms who reported deintensifying or declining farming trajectories.

On-farm Diversification adaptations were most common in Yamhill and Kent Counties, as well as Spencer County, Kentucky, where at least 25 percent of farms reported making these types of changes. Off farm work increased most commonly in Kent and Yamhill, and least commonly in the two Georgia counties. Conversely, a trend toward decreasing reliance on off-farm work was most commonly cited in Frederick and Hall counties.

Urban-oriented farm marketing adaptations were relatively common across all of the study sites (ranging from 44 percent of farms in Spencer, Kentucky to 64 percent in Yamhill, Oregon. The most dynamic urban-oriented marketing adaptations were found in Kent, Yamhill and (to a lesser degree) Shelby counties. The least recent changes in terms of adjusting to markets were seen in both Georgia counties. Efforts to accommodate new urban neighbors were found in most counties, but were much more common in Kent County (almost double the level found in Cache County).

Discussion

The profile of landowner farmers in eight distinct peri-urban farming regions of the US documents a wide range of adaptive behaviors. Even though our analysis has been primarily descriptive in nature, there are many notable findings given the breadth of this empirical study. The following section reviews and discusses the importance of our findings.

Initially, it is interesting that a random sample of owners of farmland in the peri-urban fringe typically includes a very large fraction of nonfarmers. Moreover, among those who indicated that they or a family member is actively farming their property, about half did not self-identify as “commercial” farmers. Perhaps this is because they perceive the type and scale of agriculture they are conducting does not fall under the concept of a traditional commercial farm. This result poses challenges for the integration of mail survey findings with published agricultural census data. In future analyses we plan to profile the differences between the types of farms in this urbanizing area. For now we focus on the frequency of various forms of adaptation.

Despite those caveats, we do believe our farm sample is reasonably representative to the more commercially-oriented census farm population. Median farm sizes and proportions of operations with livestock (and in different sales classes) are not dramatically different among our survey respondents and the published 2002 Agricultural Census characteristics for each county. Differences may reflect who is responding to a survey about farming. As mentioned earlier, our sample has a slight bias towards larger operations, which is typical for those filling out a survey on farming. Moreover, the census has a very low threshold for who qualifies as a farm and includes many people who do not consider themselves to be farmers. Furthermore, these larger operations report higher rates of livestock on the farm. Finally, our respondents include higher proportions of large gross-sales farms than the census.³

A key part of our mail survey instrument focused on documenting the frequency of various “changes” made by farmers over the past five years. These changes serve as the basis for identifying individual farm-level trajectories and adaptations. The findings were somewhat surprising. For example, contrary to expectations in peri-urban areas experiencing higher than average population growth, agricultural growth and intensification are still the dominant trajectories. Growth is being driven by increased value of total gross sales and increased livestock sold, and not by increases in land owned or rented. Intensification trajectories are mostly being driven by increased capital investment in equipment and buildings, and less so by changing commodity mixes or taking land out of conservation programs.

It is important that growth and intensification tends to occur without increases in farmland owned or rented, each of which has remained fairly persistent or stable. This stagnation in the land base is not surprising given the peri-urban location of our respondents, but that there is so much growth and intensification on a stable land base is surprising. As mentioned earlier, our expectation was that farmers would exhibit low levels of persistence because of the dynamics at the rural-urban fringe and the need to adapt to these dynamics. The vast majority of farmers are stable in at least one factor listed in Table 5, while relatively few were able to survive without changing at least one important aspect of their operation.

³ To further understand the nature of any particular response bias, we are engaging in a non-respondent clean-up survey.

Recalling that our peri-urban counties were selected because they have higher than average development pressure, the relatively low incidence of deintensification and decline cases is contrary to what we would predict. The biggest driver of deintensification is the idling of land or leaving land fallow. Otherwise, within deintensification and decline, there are no dominant drivers. The rate at which current farmers are selling off land is lower than many observers expect.⁴ Overall, it appears that farmers are taking a range of adaptive strategies to remain in businesses, growing and intensifying or deintensifying and declining, while exhibiting forms of persistence in their land base.

Aside from core trajectories, the surveys documented a high level of specifically peri-urban adaptations, including urban-oriented marketing efforts and adjustments for new urban neighbors. While overall trajectories may reflect broader forces of change in the agricultural industry at large, these other changes respond to the unique challenges and opportunities provided by urban areas. These can include the relative availability of off-farm jobs in the area as well as new farm product processing and marketing opportunities.

Given the longstanding assumption in the agricultural geography literature regarding a rise in farmer pluriactivity, we were surprised to find that while the overall level of off-farm labor force participation is high, farmer respondents in these peri-urban counties were more likely to have decreased their participation in off-farm work and reliance on off-farm income in the last five years than to have increased off-farm work as a survival strategy.

Similarly, while many have speculated about the possibilities of catering to new urban food markets, the literature to date has usually noted that levels of participation in these new urban-oriented markets has remained low. By contrast, in our study sites a majority of landowning farmers reported using one or more of the various urban-oriented marketing strategies listed in the survey. Given the competitive land market and other obstacles associated with farming in peri-urban spaces, the ability for farmers to take advantage of urban opportunities to such a great extent shows promise for urban food system development. Similarly, our results demonstrate a high level of diversity in individual urban-oriented adaptations, with no one approach used by more than 20 percent of the total. The most common change in urban-oriented marketing reflected increases in volume or sales value of products sold directly to consumers.

Despite a pattern of growth and intensification, most farmers in these areas report some impacts linked to interactions with urban neighbors. Well over half report making some accommodation for urban neighbors within the past five years. The most common forms of accommodation involve avoiding roads during high traffic periods and efforts to develop social ties to new neighbors (at least in part to reduce the potential for nuisance complaints).

Overall, while individual urban oriented-adaptations are notable, it is still important to bear in mind that the most common farming adaptations reflect general patterns of broad agricultural restructuring (such as growth in sales, livestock inventories, and investments in farm and buildings). Overall, it appears that a wide range of trajectories and adaptations are taking place in the peri-urban environment, only some of which can be uniquely linked to urban influences, both positive and negative.

The results indicate that individual farm-level patterns of adaptation may be more diverse than the aggregate patterns discerned in periodic county-level agricultural census data. While there is some correspondence in the frequency of certain types of adaptation at the farm level, on

⁴ One reason might be that farmers who quit or sold all their assets during the last five years would no longer be in our 'farmer' subsamples (though they might still be in our nonfarming landowner pool – not summarized here).

the one hand, and the general trends in agricultural trajectories at the county level, there are obviously individual farm behaviors that fly in the face of any aggregate trend. Unpacking the diversity of individual adaptations illustrates how coarse trajectories can be deceiving when examining the future condition of an urban food system.

A final observation is that the patterns of change vary considerably across our eight study counties. While the length of this paper does not allow us to fully address these differences, as part of a larger study we are examining the importance of local contextual factors, such as urban growth pressure, commodity path dependence, local land use policies and local social capital. These factors could certainly explain the variance among the eight study sites.

Conclusion

In conclusion, farmer adaptive behaviors in peri-urban areas appear to be quite diverse. Recent adaptations and current conditions in fast-growing peri-urban areas demonstrate that macro-economic agricultural trends combine with uniquely urban opportunities for growth and change to produce a dynamic agricultural geography. Not all of the agricultural changes are consistent with the picture painted in the theoretical and empirical literatures on 21st century farming trends. We believe our results provide a benchmark and baseline for the further study of the forces underlying farm structural change, as well as the potential consequences for local land markets, environmental conditions, and urban foodsheds.

The results presented in this paper represent a preliminary analysis of our complex survey results. We plan to extend this work by examining the local and supra-local factors and their relative impact on individual and aggregate patterns of farm trajectories. Finally, the agency and underlying decision-logic of the farmers and landowners need to be integrated into the model.

Table 1. Region and Agricultural Trend Categories for Case Study Counties

	Midwest	Northeast	South	West
Decline	Shelby, KY Spencer, KY	-	Forsyth, Georgia Hall, Georgia	-
Deintensification	-	Frederick, MD	-	-
Persistence	Kent, Michigan	-	-	-
Intensification	-	-	-	Cache, Utah
Growth	-	-	-	Yamhill, Oregon

Table 2: Response Rates and Respondent Types by Study County

	Overall Response Rate	<u>Landowner Sample Respondents</u>		
		Farmers	Nonfarmers	Total
Cache, UT	53.6 %	71	72	143
Forsyth, GA	31.6 %	12	44	56
Frederick, MD	47.2 %	32	55	87
Hall, GA	27.5 %	22	48	70
Kent, MI	42.6 %	23	50	73
Shelby, KY	44.0 %	61	41	102
Spencer, KY	38.2 %	51	58	109
Yamhill, OR	40.4 %	46	53	99
TOTAL	37.9 %	318	421	739

Table 3: Landowner Respondent Uses of Farmland Parcels, by Study Site

County	I or other members of my household currently farm any of the land we own in the county	<u>Description of Current Uses of Farmland</u>					Other
		I currently operate a commercial farm	I rent my land to someone else who farms it	I live on farmland I own in the county	I use this land for recreation	I have a second home on this land	
<i>Percent of respondents *</i>							
Cache, UT	48.9	30.7	51.4	25.0	9.3	2.9	15.7
Frederick, MD	36.8	15.1	33.7	70.9	17.4	10.5	20.9
Forsyth, GA	21.8	7.3	7.3	58.2	14.5	5.5	25.5
Hall, GA	31.4	7.1	11.4	58.6	20.0	2.9	27.1
Kent, MI	31.5	21.9	45.2	32.9	30.1	4.1	26.0
Shelby, KY	60.4	28.4	15.7	60.8	21.6	6.9	14.7
Spencer, KY	46.3	16.7	19.4	58.3	28.7	5.6	25.9
Yamhill, OR	45.9	24.5	21.4	62.2	10.2	8.2	24.5
Total	42.8	20.8	27.9	51.8	18.4	5.7	21.7

* = landowner sample respondents only

Table 4: Comparison of Farm Characteristics, Survey Respondents and Census Populations

	<u>Farm Characteristics</u>				
	Percent with livestock sales	Median acres operated	Sole proprietorship	Percent with <\$10,000 gross sales	Percent with >\$100,000 gross sales
Cache, UT					
Landowner Sample Farms	73.9	200.0	58.8	31.9	29.0
Census Estimate (2002)*	67.3	72.0	83.8	61.6	15.1
Frederick, MD					
Landowner Sample Farms	65.6	55.0	64.5	58.6	24.1
Census Estimate (2002)	55.4	76.0	86.1	63.0	15.4
Forsyth, GA					
Landowner Sample Farms	75.0	50.0	60.0	50.0	25.0
Census Estimate (2002)	66.7	40.0	91.3	74.2	13.8
Hall, GA					
Landowner Sample Farms	81.8	36.5	65.0	54.5	4.5
Census Estimate (2002)	69.9	47.0	91.7	65.5	21.6
Kent, MI					
Landowner Sample Farms	34.8	240.0	45.5	9.1	50.0
Census Estimate (2002)	35.3	66.0	87.0	63.5	13.7
Shelby, KY					
Landowner Sample Farms	72.6	100.0	58.3	38.6	19.3
Census Estimate (2002)	51.6	70.0	87.0	61.7	6.6
Spencer, KY					
Landowner Sample Farms	80.0	84.5	68.8	48.9	4.3
Census Estimate (2002)	52.8	90.0	88.0	64.0	2.9
Yamhill, KY					
Landowner Sample Farms	51.1	40.0	66.7	40.0	24.4
Census Estimate (2002)	46.6	24.0	89.4	74.0	7.6

* 2002 Census of Agriculture

Table 5: Frequency of Basic Agricultural Adaptations in Farmer Samples

Incidence of changes over last 5 years	<u>Percent Indicating Yes</u> Landowner Sample Farms
Indicators of Growth	
Increased farmland owned	9.2
Increased farmland rented	16.2
Increased livestock sold	27.4
Increased value of total gross sales	37.2
<i>Used any of above strategies</i>	42.9
Indicators of Intensification	
Increased capital investment in farm buildings	37.1
Increased investment in farm equipment	54.8
Decreased land in conservation programs	2.9
Increased sales while land remained same	12.7
Shifted to crops or livestock that generate more sales per acre	23.6
<i>Used any of above strategies</i>	61.3
Indicators of Persistence ('remained the same')	
Farmland owned	84.6
Farmland rented	74.3
Livestock sold	57.2
Value of total gross farm sales	49.0
Investment in buildings	57.1
Investment in equipment	37.3
<i>Used <u>all</u> of above strategies</i>	4.4
Indicators of Deintensification	
Decreased capital investment in buildings	5.8
Decreased investment in equipment	7.9
Increased land in conservation programs	6.6
Decreased sales while land remained same	8.9
Idled or left fallow some farmland	16.7
<i>Used any of above strategies</i>	27.3
Indicators of Decline	
Decreased farmland owned	6.3
Decreased farmland rented	9.6
Decreased livestock sold	15.4
Decreased value of gross sales	13.8
Sold land for nonfarm development	12.6
<i>Used any of above strategies</i>	27.8

Table 6: Incidence of Urban-Oriented Adaptations in Farmer Samples

	Landowner Sample Farms
	<u>Percent indicating yes</u>
<u>Off-farm Work Profile</u>	
Anyone in household works at regular off-farm job	67.2
Off-farm income is 50% or more of household income	77.1
<u>Incidence of Off-farm Work Adaptive Strategies (last 5 years)</u>	
Increased participation in off-farm work	13.4
Increased reliance on off-farm income	12.0
Any Increase in Off-Farm Economy	22.1
Decreased participation in off-farm work	13.4
Decreased reliance on off-farm income	23.2
Any Decrease in Off-Farm Economy	27.9
<u>On-Farm Enterprise Diversification Strategies</u>	
Increase in the number of commodities produced	15.1
<u>Urban-Oriented Agriculture Profile</u>	
Markets as local, natural, or family-farm raised	23.2
Sells to hobby farmers	22.4
Sells direct to consumers from the farm	18.6
Animal boarding, breeding or training	11.0
Sells direct to consumers at farmers market or CSA	8.9
Sells directly to local institutions or businesses	8.7
Value added processing of farm products	5.0
Sells hunting, fishing or wildlife viewing services	3.9
Has Agritainment enterprise	2.5
<i>Any of the above</i>	53.0
<u>Incidence of Urban-Oriented Marketing Strategies (last 5 years)</u>	
Increased sales of products directly to consumers	20.7
Increased on-farm (value-added) processing of farm products	14.2
Adjusted marketing strategies to sell to new urban customers	12.3
Raised new crops or livestock to sell to new urban customers	9.0
<i>Any of the above</i>	21.1
<u>Accommodations made for urban neighbors (last 5 years)</u>	
Moved equipment during low traffic periods	34.2
Sought out and met nonfarm neighbors	26.6
Changed crop spraying activities to reduce drift/smells	19.4
Changed manure storage or management	14.5
Changed tillage, planting or harvesting practices	14.4
Held open house or tours for neighbors	8.1
<i>Any of the above</i>	57.9

Table 7: Frequency of Agricultural Adaptive Behaviors by Study County

Type of Trajectory or Adaptation	Study County*							
	Cache UT	Frederick MD	Forsyth GA	Hall GA	Kent MI	Shelby KY	Spencer KY	Yamhill OR
<u>Major Trajectory</u>								
Growth	44.9	18.8	41.7	18.2	52.2	48.4	46.0	53.3
Intensification	58.0	65.6	25.0	45.5	56.5	71.0	64.0	66.7
Persistence	7.2	3.1	8.3	0.0	8.7	1.6	6.0	2.2
Deintensification	33.3	25.0	25.0	40.9	21.7	27.4	26.0	17.8
Decline	37.1	31.3	33.3	40.9	17.4	19.4	28.0	20.0
<u>Other Adaptations</u>								
On-Farm Diversification	9.1	5.9	0.0	0.0	25.0	9.1	26.5	29.6
Off-Farm Work Increase	17.7	16.0	10.0	10.5	30.0	24.1	20.9	35.9
Off-farm Work Decrease	32.3	44.0	20.0	36.8	15.0	19.0	37.2	17.9
Urban oriented marketing (now)	48.6	46.9	45.5	50.0	60.9	59.7	44.0	64.4
Urban oriented marketing (growth)	14.1	17.9	9.1	11.1	36.8	22.8	18.2	35.9
Urban accommodations	45.5	55.2	72.7	61.1	81.0	62.1	58.1	56.4

* = landowner sample respondents only

Bold numbers reflect the counties where this form of adaptation is most common

Figure 1: Model of Factors Influencing Agricultural Change (from Smithers and Johnson, 2004)

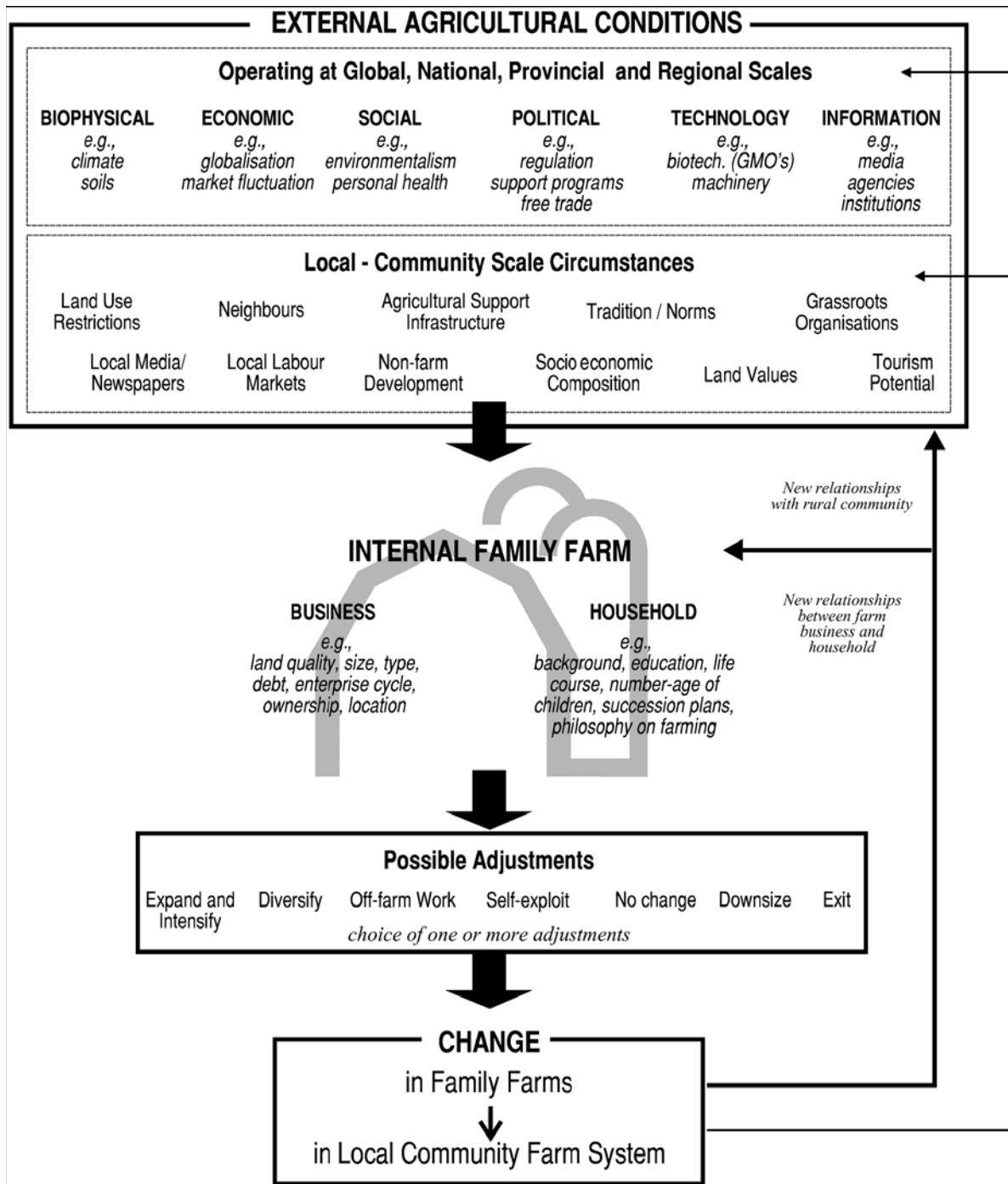
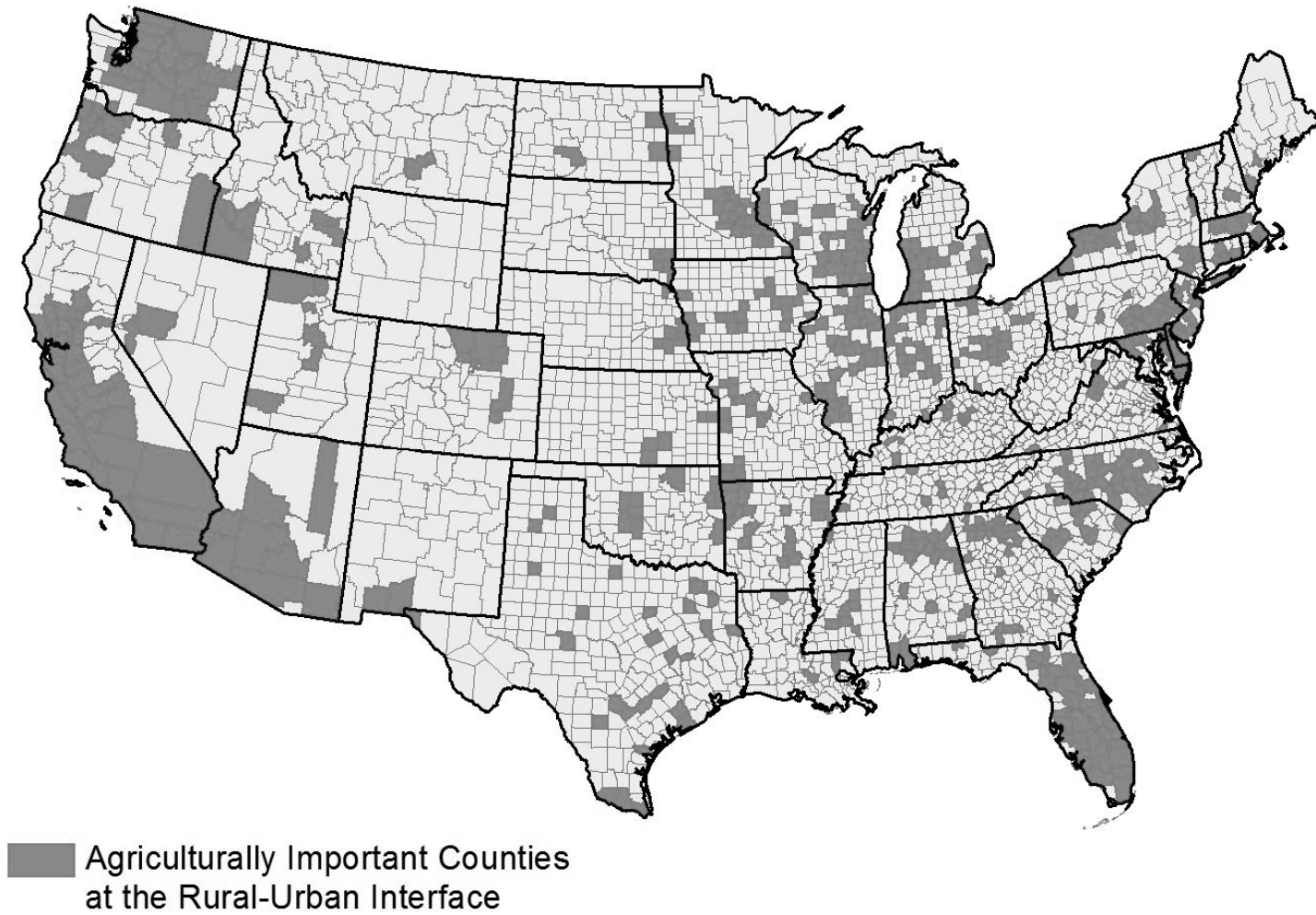


Figure 2: Map of Study Counties (AI + RUI)



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