

Feeding the Region:
**Assessing Local Agricultural Productive Capacity
to Meet Demand in Tompkins County, NY**

Produced for the Tompkins County
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Introduction

Tompkins County, in New York's Finger Lakes region, has a thriving local food culture. Many of the area's farmers grow food (fresh produce, beef, cheese, etc.) and sell directly to consumers through the Ithaca Farmer's Market and other local outlets. Local agriculture and food production make an important contribution to the area's quality of life, but have economic and environmental benefits as well: producing more of the food we eat keeps more money within the region, and keeps our communities relatively self-sufficient, able to support a portion of the population's total demand for food.

How well does Tompkins County feed itself? What investments might support the farmers in our local food system? This report offers a means of answering these questions, using local farms' production data and geographic information systems (GIS) analysis methods to estimate the region's current productive capacity, the population's total food demand, and whether individual farms are spatially arranged to make shared distribution infrastructure feasible (facilities for packaging, storing, and transporting products).

The report is divided into two parts:

Part I assesses the area's productive capacity, measuring local food activity serving the Ithaca market. The goal is to determine how much of the area's current productive capacity can support current demand—how self-sufficient the county is at present. Food products studied are limited to vegetables, fruits, and beef. The resulting ratio of capacity to demand indicates how much of the county's food needs may currently be met by local sources.

Part II analyzes the farms' locations in relation to the Ithaca Farmers' market and to each other. This includes determining how far local farmers travel to market in order to sell their products, and whether there are "clusters" of farmers producing the same foods who may be able to coordinate and share distribution infrastructure (transportation, storage, processing equipment, etc.). This analysis is hypothetical, but identifies possible locations for shared farm infrastructure.

PART I. ASSESSING PRODUCTIVE CAPACITY IN THE TOMPKINS COUNTY AREA

Research Question

No American city or region can currently supply all of its own food, particularly because of the wide variety of products consumers demand during all seasons. Growing concern about the economic and environmental instability of the current global food system has made local agriculture an attractive alternative. Purchasing food locally, either directly from the farmer or through retail outlets, keeps resources circulating within a region and, with direct and regular contact, can promote stronger relationships between producers and consumers (Hinrichs, 2000: 296). Considering the movement of food as an entire system, sourcing food locally also increases the region's level of self-sufficiency, increasing the security of its food supply if other supply chains are interrupted.

The character of a region's food system depends on its location, population size, and mix of nearby food-related activity. There is no fixed definition for "local," but it may be defined as food originating from within a 100-mile radius or the same state as where it is consumed (Martinez et al., 2010: 3). Peters et al. (2008) use the concept of a foodshed—the total area from which food travels to a particular community—to determine how much of New York's food needs are met within the state. Using a population's estimated total demand for food and comparing it to the productive capacity of the agricultural land in New York, the study suggests that the average foodshed in upstate New York is approximately a 30-mile radius around the community in question (Peters et al., 2008: 78).

The model is only an approximation of self-sufficiency, as upstate New York farms do not currently produce the range or volume of products demanded by the consumer population. It is a useful exercise, however, and can be adjusted to measure capacity for more specific food products. Tompkins County's local farmers tend to specialize in vegetables, fruit (especially apples), beef, dairy, and some value-added products like cheese and honey. Focusing on these strengths offers a more fine-grained picture of local agricultural assets, and provides a baseline for tracking further development of farms which grow those products.

Question for Analysis: How much of total demand for food in Tompkins County is met by local farmers?

Method

For this assessment, I chose to calculate capacity of local farms producing vegetables, fruit, and beef for direct sale in Tompkins County—this includes farms which sell at the Ithaca Farmers' Market and other local outlets, participate in Community Supported Agriculture (CSA) programs, manage or supply farmstands, and/or have U-pick operations. Most of the farms that participate in the Ithaca Farmers' Market sell fresh produce, from onions to kale to summer and winter squash. Upstate New York is also a significant region for cattle and dairy, and while many producers auction their livestock for processing elsewhere, local beef is readily available. Beef is also the most-consumed meat in the average American diet, followed by chicken and pork (Horowitz 2006: 12-13). While not all of Tompkins County residents regularly consume meat, it is a protein- and nutrient-dense food but also consumes more resources to produce

(Horowitz 3). Peters et al. (2006) found that by shifting some demand for meat to other foods, a region's productive capacity could be significantly increased; identifying a gap between demand and supply may indicate where agricultural production could be more resource-efficient (Peters et al., 2006: 147).

To set the boundaries of the study, I considered fruit and vegetable farms and beef producers which have direct-market operations in Tompkins County, and those from surrounding counties which regularly sell at the Ithaca Farmers' Market (IFM) and other local outlets. I then calculated a thirty-mile radius around the IFM (**Map 1**), as it is a central location in Tompkins County, and found that seven surrounding counties (Cayuga, Chemung, Cortland, Schuyler, Seneca, Tioga, and Yates) also had contributing farms. Two farms were located just outside the 30-mile boundary, but have been included in subsequent analysis because they are otherwise within the parameters for local farms. Using farm addresses received from the Cooperative Extension's database (**Tables 1-2**), I plotted all locations and found that there are 22 beef producers and 65 fruit and/or vegetable farms serving the Tompkins County market (**Maps 2-5**).¹ Most local farmers own and live on their productive land, so their given addresses generally correspond to actual farm location; others may provide a different mailing address, a distinction not reflected in this data set.

Farms in the Tompkins-area foodshed are mostly located within Tompkins County, with Seneca, Schuyler, and Cayuga Counties having most of the remaining farms. They also appear to be located along the same several corridors, suggesting that farms tend to locate along certain highways, or at least that farms place their mailing addresses along these roads. Vegetable and fruit farms are scattered throughout the area, but beef producers are mainly located north of Ithaca in Seneca and Cayuga Counties, perhaps indicating favorable conditions for growing cattle, processing or other infrastructure conveniently located near these farms, and/or effective incentives for cattle farms to locate there.

Calculating Agricultural Capacity

The outline below summarizes the method for calculating the ratio between local supply and demand of vegetables, fruit, and beef. The analysis is divided into total demand of Tompkins County population, resources needed to meet that demand, and total supply from local farmers, including data sources and assumptions for each piece.

Total Demand

- Population of Tompkins County
 - *Source:* U.S. Census 2000 and A.C.S. 3-Year Estimate (2006-08)
 - *Assumption:* Population has access to, and purchases, local food products
- Estimated Annual Consumption of Fruit, Vegetables, and Beef (**Table 3**)
 - *Source:* Fruit and Veg: FDA, annual per capita consumption (lbs.); Beef: Beef Industry Council, annual per capita consumption (lbs.)

¹ There is considerable overlap in farms producing fruit and vegetables, as well as one farm which sells both beef and produce (Rainbow Valley Ranch). They are depicted with individual symbols on the map to indicate total range of products; symbols which closely overlap indicate the same farm.

- *Assumptions:* Fruit and Veg serving is an accurate average, calculated by average weight per serving (4 oz.); Beef consumption (national average) reflects Tompkins County demand

Agricultural Productivity (Table 4)

- Average Yield (lbs. per acre)² for Small-Scale Farms
 - *Source:* Average estimate based on *Owner Built Homestead*; NEON Organic Farm Study; N. Dakota State University Extension Service; and Monika Roth, Cornell Cooperative Extension, Tompkins County
 - *Assumption:* Average Fruit and Veg yield (lbs. per acre) is a representative average for Tompkins-area farms, depending on intensity and product mix
- Average Yield (lbs. per head finished)³ for Beef Cattle
 - *Source:* Matthew LeRoux, Cornell Cooperative Extension, Tompkins County
 - *Assumptions:* Average Beef yield is representative for Tompkins-area farms; full yield from finished heads sold locally

Productive Capacity

- Fruit and Veg: Acres in Production for Tompkins-Area Farms (**Table 5**)
 - *Source:* Monika Roth, Cornell Cooperative Extension, Tompkins County
 - *Assumptions:* All productive acres farmed at capacity; produce sold locally
- Beef: Heads Finished Annually for Tompkins-Area Farms (**Table 6**)
 - *Source:* Matthew LeRoux, Cornell Cooperative Extension, Tompkins County
 - *Assumption:* All heads finished yield average amount of beef; beef sold locally

Calculation Sequence

- Total population in study area
- Per capita consumption per year for Fruit and Veg (lb.)
 - *Average serving size x total servings per year*
- Total consumption demand per year for Fruit and Veg, Beef (lb.)
 - *Per capita consumption x total population*
- Productive capacity of land for Fruit and Veg (lb. / acre)
 - *Average yield per acre of sample of fruit, vegetable crop yields*
- Productive capacity of cattle for Beef (lb. / head finished)
- Total land needed to meet demand for Fruit and Veg (acres)
 - *Total consumption demand / Average yield per acre*
- Total cattle needed to meet demand for Beef (heads)
 - *Total consumption demand / Average yield per head finished*

² *Agricultural Yield:* Total weight (lbs.) of food produced per acre. Varies according to weight of individual product, density of planting, and productivity of crop.

³ *Heads Finished:* Number of cattle slaughtered and prepared for sale. Average yield (lbs. per head) for cattle is 409 lb.; each head finished therefore produces 409 lb. of beef.

- Productive acres in study area
- Number of heads finished in study area
- Ratio of productive capacity to total demand for Fruit and Veg (%)
 - *Productive acres / land needed to meet demand*
- Ratio of productive capacity to total demand for Beef (%)
 - *Heads finished / heads needed to meet demand*

Conclusion

The result indicates that Tompkins-area farmers are currently meeting approximately **20%** of total demand for fruits and vegetables, and only **1.8%** of total demand for beef (**Table 7**). The gap between the two ratios may be attributed to the larger number of fruit and vegetable farms, the relative levels of growing activity, and the amount of resources needed to raise cattle versus grow greens and other produce. Total food demand which is met by local sources is likely lower than these numbers for specific products, but local farms do supply a significant portion of the area's produce. Gathering empirical data on individuals' consumption of local products would strengthen the application of the analysis to the current market, using actual rather than theoretical estimates to assess how much of the food supply is produced locally.

Using the framework this assessment provides, further study of Tompkins County's food system could adjust assumptions according to more accurate data, including:

- Empirical data for upstate New York farms' yield per acre
- Empirical data for per capita consumption of produce and beef
- Adjusted yield per acre into individual products, or separating fruit and vegetables

The assessment could also be expanded to include other products, such as meat (chicken, pork), dairy (milk, cheese), and miscellaneous foods (honey, wine and other beverages). While current farm production would not meet the region's demand for grains (wheat, oats, barley, etc.), analyses of product-specific local capacity would yield a fuller picture of what food needs the area can feasibly meet with local agriculture. Tracking local farms' annual production, using productive acres and heads finished, would allow the Cooperative Extension to follow trends over time, and to track whether the area is becoming more self-sufficient in meeting its food needs. This report's assessment offers only preliminary data, but may be used as a baseline for future research.

PART II. IDENTIFYING FARMS' POTENTIAL FOR SHARED INFRASTRUCTURE

Research Question

Small-scale, direct-market farming is time-consuming, requiring many hours of labor working the land, but also the functions of harvesting, transporting, marketing, and selling farm products. While it is important for local farmers to have a presence at the weekly farmers' market or a self-operated farm stand, putting time and effort into the marketing and sales functions of farming takes valuable time away from the land itself. Direct-market farming, in which the farmer performs all the needed functions to get food from the field to the consumer, has the benefit of greater social interaction between producer and consumer. However, consolidation of local farmers' resources through wholesale sales, shared processing and storage facilities, and coordinated transportation routes has efficiency benefits, depending on the scale of farm operations (Diffley 2008: 13-14).

The Tompkins-area market (30-mile radius surrounding the IFM) does not present a huge transportation barrier for local farmers. Farm trucks do not contend with the level of traffic in a large urban area, and county roads are generally well-maintained except during winter storms. Transporting products is time-consuming and costly, however, and the storage and cleaning facilities needed for most products represent a considerable investment for a small local farmer. Because many of the area's direct-market farms are located relatively near each other, it seems feasible that they coordinate logistics for the distribution, processing, and storage of their products—pooling transportation of products to the IFM, and/or establishing shared facilities.

Questions for Analysis: How far do local farmers in the Tompkins County area travel to sell their products? Are farms located near each other, so that some could invest in shared distribution, storage, or processing facilities?

Method

To answer this question, I conducted a two-part network analysis on the local farms identified above to determine how far they travel to the Ithaca Farmers' Market and how close they are located to neighboring farms which produce the same products. While produce farmers and meat farmers share some of the same needs, for this analysis I assumed that they would not share facilities, so the results are separated by farm product (Beef and Fruit/Veg). I also did not differentiate between fruit and vegetable farms, because many sell both products and generally have the same transportation, storage, and processing needs. All routes were measured by distance in miles, as travel times were not available with the existing road datasets; outside the City of Ithaca, most farmers would be traveling on county highways and encounter relatively little traffic, so travel times could be calculated with an average speed of 40-50 mph on rural roads and 20-30 mph in city limits.

Analysis 1: Proximity to Ithaca Farmers' Market

Using the previously-created maps of produce and beef farms, I created a street network based on the 8-county Roads file and conducted a "Nearest Facility" analysis, using individual farms as origins and the Ithaca Farmer's Market as the destination (**Maps 6-7**). Calculating the

total distance traveled for each farm, I found that produce farmers travel **12.66** miles (**Table 8**) and beef farmers travel an average distance of **15.67** miles (**Table 9**), with a weighted average of **13.42** miles (accounting for the larger number of produce farms). I then identified all farms which must travel more than 15 miles to the market (**Maps 8-9**), assuming that these farms may have an interest in lessening their travel costs by coordinating with farms closer to the market.

Based on the route map, it is apparent that many farms (both produce and beef) travel along the same routes to reach the market. This is due in part to the location of Seneca and Cayuga Lakes, which necessitate traveling along certain highways to get around them. Many of the farms northwest of Ithaca seem to travel the same route, and outlying farmers likely drive past other farms on their way to the market. Farms located east or directly south of Cayuga Lake would have a slight travel advantage because of the location of the Ithaca Farmers' Market, on the southeast shore of Cayuga Lake. Because of the traffic congestion that tends to build up in west Ithaca as people try to cross from one side to the other, farmers from Seneca and Schuyler Counties might benefit most from shared transportation. Outlying beef farmers might also benefit from shared transportation, as they tend to travel longer distances to the IFM.

Analysis 2: Proximity to Other Farms with Similar Products

To determine where farms appear to cluster in the study area, I employed “Origin-Destination Cost Matrices” for produce and beef farms. The software requires separate layers of origins and destinations, so I created duplicate layers for each type of farm; after calculating distances, I removed the invalid routes (those for which origin and destination were identical, or the reverse of a previously-calculated route).

The number of routes among farms increases as the threshold distance increases, so I calculated in 1-mile increments to determine a reasonable distance by which to define farm clusters. Almost no farms are located within one mile of each other, so I searched for a larger threshold. The map indicates that beef producers are generally located further apart than produce farms, so I assumed that a larger threshold would be needed to create clusters. Based on the number of routes and size of clusters, I determined that a 3-mile radius seems reasonable for produce farms (**Map 10**) and a 5-mile radius for beef producers (**Map 11**).

There are several produce farm clusters, particularly northwest of Ithaca, near Trumansburg. Not only are several farms close to each other, but the clusters themselves are relatively concentrated and might be grouped into a super-cluster. There are also a few produce clusters to the north, east, and south of Ithaca, located relatively close to the IFM. These clusters may serve as consolidation points for outlying produce farms, depending on what direction they would be traveling from.

Beef farms are relatively more scattered, but have stronger clustering behavior—there are two clusters northwest of Ithaca, one to the north, and one in southwest Tompkins County. The north cluster, located roughly in a corridor, may benefit from consolidating products at the closest farm, Crazy Diamond Beef; the northwest clusters may coordinate on transportation or, for the larger cluster closer to Ithaca, processing facilities.

Combining this analysis with the farms located more than 15 miles away from the IFM, I compared the location of clusters and outlying farms, and the routes those farms would travel to

reach the market (**Maps 12-14**). **Tables 10-11** list all farms which are strategically located to potentially benefit from shared infrastructure, grouped by membership in or proximity to a cluster identified in the analysis.

For produce farms, there is a clear relationship among outlying farms in the northwest (Seneca and Schuyler Counties), but no clusters in which they participate. There are multiple clusters closer to town, and this suggests that those farms may benefit from coordinating with each other to establish shared pick-up points, processing facilities, or transportation to the IFM. The routes indicate that farmers will tend to travel along the same highways as they get closer to the market, so consolidating at points where routes meet up might also be efficient. A few farms (e.g. Hendy Hollow and Unexpected Farm) are located farther than the others—while they would not be eligible to be part of a cluster, they could coordinate with other outlying farms or with closer clusters.

Beef farms are located along a northwest-southeast axis centered on the IFM, but the clusters are all located north of Ithaca. These producers may benefit from shared infrastructure, especially if outlying producers (Sabol’s Farm and the northwest cluster) coordinate with those located closer to Ithaca. The three to the southeast (Kingbird, Dead End, and Englebert Farms) have fewer resources to draw on from neighboring farms, but might still coordinate distribution among the three at a mutually-amenable meeting point.

Conclusion

Farmer presence is an important aspect of direct-market farming, and one of the functions of the Ithaca Farmers’ Market is to provide a space for interaction between producer and consumer. Because a farm’s marketing functions are time-consuming and can be costly for small farmers, however, it may be useful for some farms to consider sharing distribution and other infrastructure for CSAs, storing produce like squash and apples, or operating processing and cooling facilities for beef. By coordinating among farms located near each other and/or farms which must travel relatively far to the local market, small farmers may reap mutual benefits from shared investment in these facilities, or save some travel miles by combining trips to the market with the farm-product equivalent of a carpool. Based on the location of both produce and beef farms in the Tompkins-area foodshed, the area northwest of Ithaca (near Trumansburg) would most benefit from coordinating distribution and/or investing in shared infrastructure.

The clusters identified are hypothetical and based on distance, without incorporating further empirical information about which farmers already have relationships with each other or currently coordinate. The analysis also assumes that combining resources would be more efficient for all parties, which may not be true depending on the scale of farm operations or types of marketing they currently engage in. If a farmer sells solely at the IFM or through a U-pick operation, investing in other infrastructure might not make sense. Farms of different sizes may make unequal contributions to farm infrastructure, requiring further determination of what would be an equitable sharing of resources.

A more sophisticated version of this analysis could separate the farms according to size or level of current production to match peer operations more closely. Farms could also be

grouped according to type of product. For example, berry producers may wish to package their products together; foods with a longer shelf life may have different facility needs than those meant to be sold immediately, like lettuce or basil; and beef and produce farms may actually have similar needs which could be met by sharing facilities. Separating farms into their respective marketing channels would also produce a more sensitive analysis, as operations which sell through farmstands and U-pick would not need facilities for off-site selling.

Whether or not individual farmers opt to make shared infrastructure investments or coordinate transportation of their products, this analysis is useful because it provides a spatial understanding of local farms, and where there are opportunities for cooperation among farms located near each other. If the Cooperative Extension was interested in promoting the development of shared farm infrastructure, the clusters identified provide a starting point for conversations among local farmers about how to work together and improve their operations.

APPENDIX A. TABLES

Table 1. Fruit and Vegetable Farms in 8-County Study Area

	Farm	Address	City	ZIP	County	Veg?	Fruit?
1	Allison's Acres	5150 Cold Spring Rd.	Trumansburg	14886	Tompkins	No	Yes
2	Bakers' Acres of North Lansing	1104 Auburn Rd.	Groton	13073	Tompkins	No	Yes
3	BB Farms	37 Lower Creek Rd.	Ithaca	14850	Tompkins	No	Yes
4	Bittersweet Orchards	220 Hayts Rd.	Ithaca	14850	Tompkins	No	Yes
5	Black Diamond Farm	25 Washington St.	Trumansburg	14886	Tompkins	No	Yes
6	Blue Heron Farm	1641 Shaw Rd.	Lodi	14860	Seneca	Yes	Yes
7	Bob and Kareen Kenion	197 White Church Rd.	Brooktondale	14817	Tompkins	Yes	No
8	Brookside Berry Farm	82 Main St.	Freeville	13068	Tompkins	No	Yes
9	Brownies Sweet Corn & Produce Market	1710 Trumansburg Rd.	Ithaca	14850	Tompkins	Yes	No
10	Buried Treasures Organic Farm	808 Clark St. Ext.	Groton	13073	Tompkins	Yes	Yes
11	Butternut Creek Farm	200 Connecticut Hill Rd.	Newfield	14867	Tompkins	Yes	No
12	Cayuga Pure Organics	18 Banks Rd.	Brooktondale	14817	Tompkins	Yes	No
13	Ceres Greenhouse	14 East Stevens Hill Rd.	Willseyville	13864	Tioga	Yes	No
14	Cornell Orchards	709 Dryden Rd.	Ithaca	14850	Tompkins	No	Yes
15	Crispell Farms	134 Harford Rd.	Brooktondale	14817	Tompkins	Yes	Yes
16	CRS Growers	2622 N Triphammer Rd.	Ithaca	14850	Tompkins	Yes	No
17	Dan Clement	5027 Dubois Rd.	Ithaca	14850	Tompkins	No	Yes
18	Daring Drake	7726 Rock River Rd.	Interlaken	14847	Seneca	No	Yes
19	Dedrick Farms	716 Auburn Rd.	Groton	13073	Tompkins	Yes	No
20	Dedrick's Fruit Stand	159 Mott Rd.	Freeville	13053	Tompkins	No	Yes
21	Dilmun Hill	698 Dryden Rd.	Ithaca	14850	Tompkins	Yes	Yes
22	Early Bird Farm	806 Elmira Rd.	Ithaca	14850	Tompkins	Yes	No
23	Eddydale Farm Market	806 Elmira Rd.	Ithaca	14850	Tompkins	Yes	No
24	Ely Fruit Farm	4600 State Route 414	Burdett	14818	Schuyler	No	Yes
25	Ever Green Farm	5942 Old Lake Rd.	Rock Stream	14878	Yates	Yes	No
26	Fall Creek Farm Market	397 Fall Creek Rd.	Freeville	13068	Tompkins	Yes	No
27	Farmer's Choice Blueberries	281 Lake Rd.	Dryden	13053	Tompkins	No	Yes
28	Gardens of Earthly Mirth	30 Banks Rd.	Brooktondale	14817	Tompkins	Yes	No
29	Glenhaven Farm	6121 Serrine Rd.	Trumansburg	14886	Schuyler	No	Yes
30	Good Life Farm	4017 Hickok Rd.	Interlaken	14847	Seneca	Yes	No
31	Hendy Hollow Organic Farm	2 Monastery Rd.	Pine City	14871	Chemung	Yes	No
32	Hilker Haven Farm	277 Burns Rd.	Ithaca	14850	Tompkins	Yes	Yes
33	Hoffmire Farms	6515 State Route 227	Trumansburg	14886	Tompkins	No	Yes
34	Humble Hill	390 Tallow Hill Rd.	Spencer	14883	Tioga	Yes	No

	Farm	Address	City	ZIP	County	Veg?	Fruit?
35	Indian Creek Fruit Farm	1408 Trumansburg Rd.	Ithaca	14850	Tompkins	Yes	Yes
36	Ithaca Organics	85 Simms Hill Rd.	Dryden	13053	Tompkins	Yes	Yes
37	Kestrel Perch Berries	220 Rachel Carson Wy.	Ithaca	14850	Tompkins	No	Yes
38	Kingbird Farm	9398 West Creek Rd.	Berkshire	13736	Tioga	Yes	Yes
39	Littletree Orchards	345 Shaffer Rd.	Newfield	14867	Tompkins	Yes	Yes
40	Ludgate Farms	1552 Hanshaw Rd.	Ithaca	14850	Tompkins	Yes	No
41	MacDonald Farms	108 Hillview Pl.	Ithaca	14850	Tompkins	Yes	No
42	Mandeville Farm	894 Ithaca Rd.	Spencer	14883	Tioga	Yes	Yes
43	Mason Gilbert	2241 Coddington Rd.	Brooktondale	14817	Tompkins	Yes	No
44	Morrow Creek Farm	199 Algerine Rd.	Lansing	14882	Tompkins	Yes	Yes
45	Muddy Fingers Farm	3859 Dugue Rd.	Hector	14841	Schuyler	Yes	No
46	Oxbow Farm	7 Thayer Rd.	Erin	14838	Chemung	Yes	No
47	Pleasant Valley Gardens	109 Pleasant Valley Rd.	Groton	13073	Tompkins	Yes	Yes
48	Rabbit Creek Farm	593 W Groton Rd.	Groton	13073	Tompkins	Yes	No
49	Red Tail Farm	4061 Swamp College Rd.	Trumansburg	14886	Tompkins	Yes	Yes
50	Reisinger's Apple Country	2750 Apple Ln.	Watkins Glen	14891	Schuyler	No	Yes
51	Remembrance Farm	6294 Searsburg Rd.	Trumansburg	14886	Schuyler	Yes	Yes
52	RoseBarb Farm	108 Landon Rd.	Ithaca	14850	Tompkins	Yes	Yes
53	Sacred Seed	1000 Lake Como Rd.	Cortland	13045	Cayuga	Yes	Yes
54	Silver Queen Farm	5286 Stillwell Rd.	Trumansburg	14886	Schuyler	Yes	Yes
55	Six Circles Farm	1491 Caywood Rd.	Lodi	14860	Seneca	Yes	No
56	Stick and Stone Farm	1605 Trumansburg Rd.	Ithaca	14850	Tompkins	Yes	Yes
57	Sweetland Farm	9723 State Route 96	Trumansburg	14886	Seneca	Yes	Yes
58	Thomson Farm	823 Van Ostrand Rd.	Groton	13073	Tompkins	Yes	Yes
59	Tree Gate Farm	1401 Mecklenburg Rd.	Ithaca	14850	Tompkins	Yes	Yes
60	Unexpected Farm	3188 Unexpected Rd.	Watkins Glen	14891	Schuyler	Yes	Yes
61	Urban Youth Farm	23 Nelson Rd.	Danby	14850	Tompkins	Yes	Yes
62	West Haven Farm	114 Rachel Carson Wy.	Ithaca	14850	Tompkins	Yes	Yes
63	Wild Apple Organic Produce	101 Poole Rd.	Ithaca	14850	Tompkins	Yes	No
64	Woodwind Farm	4490 County Rd. 6	Trumansburg	14886	Schuyler	Yes	No
65	Yoder Farm	6081 Route 414	Romulus	14541	Seneca	Yes	Yes

Source: Cornell Cooperative Extension, Tompkins County

Table 2. Beef Producers in 8-County Study Area

	Farm	Address	City	ZIP	County
1	A.J. Teeter Farm	71 Gray Rd.	Ithaca	14850	Tompkins
2	Autumn's Harvest Farm	5374 McDuffie Town Rd.	Romulus	14541	Seneca
3	Beaver Brook Beef	918 White Church Rd.	Brooktondale	14817	Tompkins
4	Boberg Family Farm	800 Enfield Falls Rd.	Newfield	14850	Tompkins
5	Crazy Diamond Beef	186 Buck Rd.	Lansing	14882	Tompkins
6	Dead End Farm	113 Powers Rd.	Candor	13743	Tioga
7	Deer Run Farms	4797 Hilliard Rd.	Groton	13073	Cayuga
8	Englebert Farm	182 Sunnyside Rd.	Nichols	13812	Tioga
9	Glenwood Farm	1084 Glenwood Heights Rd.	Ithaca	14850	Tompkins
10	Grove Angus Farm	5807 Serrine Rd.	Trumansburg	14886	Schuyler
11	Hector Hill	6300 Burr Rd.	Trumansburg	14886	Tompkins
12	High Point Farms	9448 State Route 96	Trumansburg	14886	Seneca
13	Kingbird Farm	9398 West Creek Rd.	Berkshire	13736	Tioga
14	Kirby Farms	523 Auburn Rd.	Groton	13073	Tompkins
15	Lakeview Farm	665 Lake Rd.	King Ferry	13081	Cayuga
16	Laue Farm	72 Enfield Main Rd.	Ithaca	14850	Tompkins
17	McDonald Farm	5374 Route 414	Romulus	14541	Seneca
18	Orchardland Farm	9176 County Road 142	Interlaken	14847	Seneca
19	Rainbow Valley Ranch	931 Lansingville Rd.	Lansing	14882	Tompkins
20	Ron Durling	7088 Durling Rd.	Trumansburg	14886	Tompkins
21	Sabol's Farm	7999 Route 414	Ovid	14521	Seneca
22	Scheffler Farm	643 Cobb St.	Groton	13073	Tompkins

Source: Cornell Cooperative Extension, Tompkins County

Table 3. Annual Consumption Estimate

Tompkins County Population					
Census (2000)		96,501			
ACS (2006-08)		100,535			

Annual per Capita Consumption	
Vegetables	301.1 lb.
Fruit	136.9 lb.
Beef	65.8 lb.

Total Fruit and Vegetable Consumption (Calculation based on daily serving)					
Food Type	Daily servings	Annual Svgs	Svg Size	Lb./Svg	Lb./yr
Vegetable	3	1205	1 cup	0.25	301.1
Fruit	2	548	1 cup	0.25	136.9

Source: Food and Drug Administration; Beef Industry Council

Table 4: Average Yields and Agricultural Productivity Estimate

Average Beef Yield	
per Head Finished	409 lb.

Average Yield per Acre	
NEON Organic Estimates	
Assorted Veg	11,152 lb./acre
Assorted Fruit	13,363 lb./acre
AVERAGE	12,258 lb./acre
N. Dakota State Univ. Extension Svc.	
Assorted Veg	9,519 lb./acre
Assorted Fruit	14,000 lb./acre
AVERAGE	11,759 lb./acre
Owner-Built Homestead	
Assorted Veg	9,875 lb./acre
Assorted Fruit	10,300 lb./acre
AVERAGE	10,087 lb./acre

Overall Average Yields	
Fruit and Veg	11,368 lb./acre
Beef	409 lb./head

Source: Owner-Built Homestead; NEON Organic Estimate; N. Dakota State University Extension Service; Cornell Cooperative Extension, Tompkins County

Table 5. Productive Acreage of Fruit and Vegetable Farms in 8-County Study Area

	Farm	County	Veg?	Fruit?	Prod. Acres
1	Allison's Acres	Tompkins	No	Yes	4
2	Bakers' Acres of North Lansing	Tompkins	No	Yes	5
3	BB Farms	Tompkins	No	Yes	5
4	Bittersweet Orchards	Tompkins	No	Yes	10
5	Black Diamond Farm	Tompkins	No	Yes	6
6	Blue Heron Farm	Seneca	Yes	Yes	12
7	Bob and Kareen Kenion	Tompkins	Yes	No	2
8	Brookside Berry Farm	Tompkins	No	Yes	4
9	Brownies Sweet Corn & Produce Market	Tompkins	Yes	No	20
10	Buried Treasures Organic Farm	Tompkins	Yes	Yes	3.5
11	Butternut Creek Farm	Tompkins	Yes	No	20
12	Cayuga Pure Organics	Tompkins	Yes	No	90
13	Ceres Greenhouse	Tioga	Yes	No	1
14	Cornell Orchards	Tompkins	No	Yes	15
15	Crispell Farms	Tompkins	Yes	Yes	2
16	CRS Growers	Tompkins	Yes	No	2.5
17	Dan Clement	Tompkins	No	Yes	1
18	Daring Drake	Seneca	No	Yes	4
19	Dedrick Farms	Tompkins	Yes	No	20
20	Dedrick's Fruit Stand	Tompkins	No	Yes	10
21	Dilmun Hill	Tompkins	Yes	Yes	2
22	Early Bird Farm	Tompkins	Yes	No	30
23	Eddydale Farm Market	Tompkins	Yes	No	60
24	Ely Fruit Farm	Schuyler	No	Yes	15
25	Ever Green Farm	Yates	Yes	No	4
26	Fall Creek Farm Market	Tompkins	Yes	No	5
27	Farmer's Choice Blueberries	Tompkins	No	Yes	4
28	Gardens of Earthly Mirth	Tompkins	Yes	No	3
29	Glenhaven Farm	Schuyler	No	Yes	12
30	Good Life Farm	Seneca	Yes	No	2
31	Hendy Hollow Organic Farm	Chemung	Yes	No	4
32	Hilker Haven Farm	Tompkins	Yes	Yes	1
33	Hoffmire Farms	Tompkins	No	Yes	20
34	Humble Hill	Tioga	Yes	No	2
35	Indian Creek Fruit Farm	Tompkins	Yes	Yes	30
36	Ithaca Organics	Tompkins	Yes	Yes	47
37	Kestrel Perch Berries	Tompkins	No	Yes	5

	Farm	County	Veg?	Fruit?	Prod. Acres
38	Kingbird Farm	Tioga	Yes	Yes	2
39	Littletree Orchards	Tompkins	Yes	Yes	40
40	Ludgate Farms	Tompkins	Yes	No	1
41	MacDonald Farms	Tompkins	Yes	No	9
42	Mandeville Farm	Tioga	Yes	Yes	30
43	Mason Gilbert	Tompkins	Yes	No	1
44	Morrow Creek Farm	Tompkins	Yes	Yes	4
45	Muddy Fingers Farm	Schuyler	Yes	No	4
46	Oxbow Farm	Chemung	Yes	No	2
47	Pleasant Valley Gardens	Tompkins	Yes	Yes	1
48	Rabbit Creek Farm	Tompkins	Yes	No	1
49	Red Tail Farm	Tompkins	Yes	Yes	8
50	Reisinger's Apple Country	Schuyler	No	Yes	25
51	Remembrance Farm	Schuyler	Yes	Yes	30
52	RoseBarb Farm	Tompkins	Yes	Yes	2
53	Sacred Seed	Cayuga	Yes	Yes	10
54	Silver Queen Farm	Schuyler	Yes	Yes	18
55	Six Circles Farm	Seneca	Yes	No	3
56	Stick and Stone Farm	Tompkins	Yes	Yes	20
57	Sweetland Farm	Seneca	Yes	Yes	20
58	Thomson Farm	Tompkins	Yes	Yes	6
59	Tree Gate Farm	Tompkins	Yes	Yes	4
60	Unexpected Farm	Schuyler	Yes	Yes	3
61	Urban Youth Farm	Tompkins	Yes	Yes	2
62	West Haven Farm	Tompkins	Yes	Yes	12
63	Wild Apple Organic Produce	Tompkins	Yes	No	2
64	Woodwind Farm	Schuyler	Yes	No	20
65	Yoder Farm	Seneca	Yes	Yes	5

TOTAL 768

AVERAGE 11.82

Source: Cornell Cooperative Extension, Tompkins County

Table 6. Heads Finished Annually for Beef Producers in 8-County Study Area

	Farm	County	Fin. Head
1	A.J. Teeter Farm	Tompkins	6
2	Autumn's Harvest Farm	Seneca	15
3	Beaver Brook Beef	Tompkins	N/A
4	Boberg Family Farm	Tompkins	11
5	Crazy Diamond Beef	Tompkins	3
6	Dead End Farm	Tioga	N/A
7	Deer Run Farms	Cayuga	22
8	Englebert Farm	Tioga	27
9	Glenwood Farm	Tompkins	8
10	Grove Angus Farm	Schuyler	0
11	Hector Hill	Tompkins	20
12	High Point Farms	Seneca	35
13	Kingbird Farm	Tioga	6
14	Kirby Farms	Tompkins	15
15	Lakeview Farm	Cayuga	8
16	Laue Farm	Tompkins	35
17	McDonald Farm	Seneca	15
18	Orchardland Farm	Seneca	12
19	Rainbow Valley Ranch	Tompkins	10
20	Ron Durling	Tompkins	12
21	Sabol's Farm	Seneca	12
22	Scheffler Farm	Tompkins	15

TOTAL 287

AVERAGE 14.35

Source: Cornell Cooperative Extension, Tompkins County

Table 7. Ratio of Current Productive Capacity to Total Demand in Tompkins County

Tompkins County Population		
Census (2000)	96,501	
ACS (2006-08)	100,535	

Annual per Capita Consumption		
Vegetables	301.1 lb.	
Fruit	136.9 lb.	
Beef	65.8 lb.	

Total Resources Needed to Meet Demand			
	per Pop (2000)	per Pop (06-08)	
Acres (Fruit and Veg)	3,718	3,874	
Heads (Beef)	15,525	16,174	

Overall Average Yields		
Fruit and Vegetable	11,368 lb./acre	
Beef	409 lb./head	

Current Productive Capacity		
Fruit and Vegetable	768 acres	
Beef	287 heads	

Percent Demand Current Met by Local Capacity			
	per Pop (2000)	per Pop (06-08)	
Fruit and Vegetable	20.7%	19.8%	
Beef	1.85%	1.77%	

Table 8. Distance to Ithaca Farmers' Market for Fruit and Veg Farms
*Farms in **bold italics** are located more than 15 miles from the market*

Farm	Distance (mi)
MacDonald Farms	1.54
Dilmun Hill	2.47
Cornell Orchards	2.82
Wild Apple Organic Produce	3.34
West Haven Farm	3.39
Kestrel Perch Berries	3.63
Indian Creek Fruit Farm	3.78
Bittersweet Orchards	3.90
Tree Gate Farm	3.90
Early Bird Farm	3.98
Eddydale Farm Market	3.98
Hilker Haven Farm	4.47
Ludgate Farms	4.49
CRS Growers	4.60
Urban Youth Farm	4.63
Stick and Stone Farm	5.39
Cayuga Pure Organics	6.23
Gardens of Earthly Mirth	6.31
Brownies Sweet Corn & Produce Market	6.68
Dan Clement	6.96
RoseBarb Farm	7.54
BB Farms	7.93
Littletree Orchards	8.61
Mason Gilbert	8.74
Bob and Kareen Kenion	8.92
Red Tail Farm	9.27
Allison's Acres	9.63
Butternut Creek Farm	9.88
Dedrick Farms	10.04
Brookside Berry Farm	10.21
Crispell Farms	10.40
Bakers' Acres of North Lansing	11.74
Black Diamond Farm	11.81
Woodwind Farm	12.11
Thomson Farm	12.25
Dedrick's Fruit Stand	12.41
Hoffmire Farms	12.44

Farm	Distance (mi)
Sweetland Farm	12.80
Fall Creek Farm Market	12.82
Glenhaven Farm	13.25
Remembrance Farm	13.42
Pleasant Valley Gardens	13.65
Ceres Greenhouse	13.70
Morrow Creek Farm	13.94
Farmer's Choice Blueberries	13.98
Silver Queen Farm	14.30
Rabbit Creek Farm	14.53
Ithaca Organics	14.88
<i>Kingbird Farm</i>	16.44
<i>Mandeville Farm</i>	16.59
<i>Good Life Farm</i>	17.01
<i>Humble Hill</i>	18.92
<i>Buried Treasures Organic Farm</i>	19.22
<i>Muddy Fingers Farm</i>	21.98
<i>Daring Drake</i>	22.26
<i>Ely Fruit Farm</i>	22.82
<i>Sacred Seed</i>	23.25
<i>Blue Heron Farm</i>	23.37
<i>Six Circles Farm</i>	23.53
<i>Oxbow Farm</i>	26.14
<i>Reisinger's Apple Country</i>	26.56
<i>Yoder Farm</i>	28.86
<i>Ever Green Farm</i>	31.13
<i>Unexpected Farm</i>	33.55
<i>Hendy Hollow Organic Farm</i>	39.37
AVERAGE	12.66

Table 9. Distance to Ithaca Farmers' Market for Fruit and Veg Farms
Farms in bold italics are located more than 15 miles from the market

Farm	Distance (mi)
Glenwood Farm	5.03
A.J. Teeter Farm	5.84
Boberg Family Farm	7.68
Laue Farm	8.09
Crazy Diamond Beef	8.54
Kirby Farms	9.16
Ron Durling	10.69
Beaver Brook Beef	12.25
Scheffler Farm	12.83
High Point Farms	13.73
Grove Angus Farm	13.95
Rainbow Valley Ranch	14.12
<i>Hector Hill</i>	<i>15.98</i>
<i>Orchardland Farm</i>	<i>16.00</i>
<i>Deer Run Farms</i>	<i>16.41</i>
<i>Kingbird Farm</i>	<i>16.44</i>
<i>Lakeview Farm</i>	<i>18.00</i>
<i>Dead End Farm</i>	<i>20.23</i>
<i>Sabol's Farm</i>	<i>24.12</i>
<i>Autumn's Harvest Farm</i>	<i>29.75</i>
<i>McDonald Farm</i>	<i>30.90</i>
<i>Englebert Farm</i>	<i>34.95</i>
AVERAGE	15.67

Table 10. Potential Fruit and Vegetable Farms to Share Infrastructure
Grouped by cluster and with criteria for inclusion

Farm	Criteria for Inclusion
Bakers' Acres of North Lansing	Cluster
Dedrick Farms	Cluster
Rabbit Creek Farm	Cluster
Thomson Farm	Cluster
Mandeville Farm	15+ mi
Sacred Seed	15+ mi
BB Farms	Cluster
Brookside Berry Farm	Cluster
Dedrick's Fruit Stand	Cluster
Fall Creek Farm Market	Cluster
Buried Treasures Organic Farm	15+ mi
Bob and Kareen Kenion	Cluster
Cayuga Pure Organics	Cluster
Gardens of Earthly Mirth	Cluster
Hilker Haven Farm	Cluster
Mason Gilbert	Cluster
RoseBarb Farm	Cluster
Urban Youth Farm	Cluster
Humble Hill	15+ mi
Kingbird Farm	15+ mi
Cornell Orchards	Cluster
Dilmun Hill	Cluster
MacDonald Farms	Cluster
Early Bird Farm	Cluster
Eddydale Farm Market	Cluster
Kestrel Perch Berries	Cluster
Tree Gate Farm	Cluster
West Haven Farm	Cluster
Wild Apple Organic Produce	Cluster
Allison's Acres	Cluster
Bittersweet Orchards	Cluster
Brownies Sweet Corn & Produce Market	Cluster
Dan Clement	Cluster
Indian Creek Fruit Farm	Cluster
Red Tail Farm	Cluster
Stick and Stone Farm	Cluster

Farm	Criteria for Inclusion
Glenhaven Farm	Cluster
Hoffmire Farms	Cluster
Silver Queen Farm	Cluster
Muddy Fingers Farm	15+ mi
Ely Fruit Farm	15+ mi
Black Diamond Farm	Cluster
Remembrance Farm	Cluster
Sweetland Farm	Cluster
Blue Heron Farm	15+ mi
Daring Drake	15+ mi
Good Life Farm	15+ mi
Six Circles Farm	15+ mi
Yoder Farm	15+ mi

Farms Not Near a Cluster
Ever Green Farm
Hendy Hollow Organic Farm
Oxbow Farm
Reisinger's Apple Country
Unexpected Farm

Table 11. Potential Beef Producers to Share Infrastructure
Grouped by cluster and with criteria for inclusion

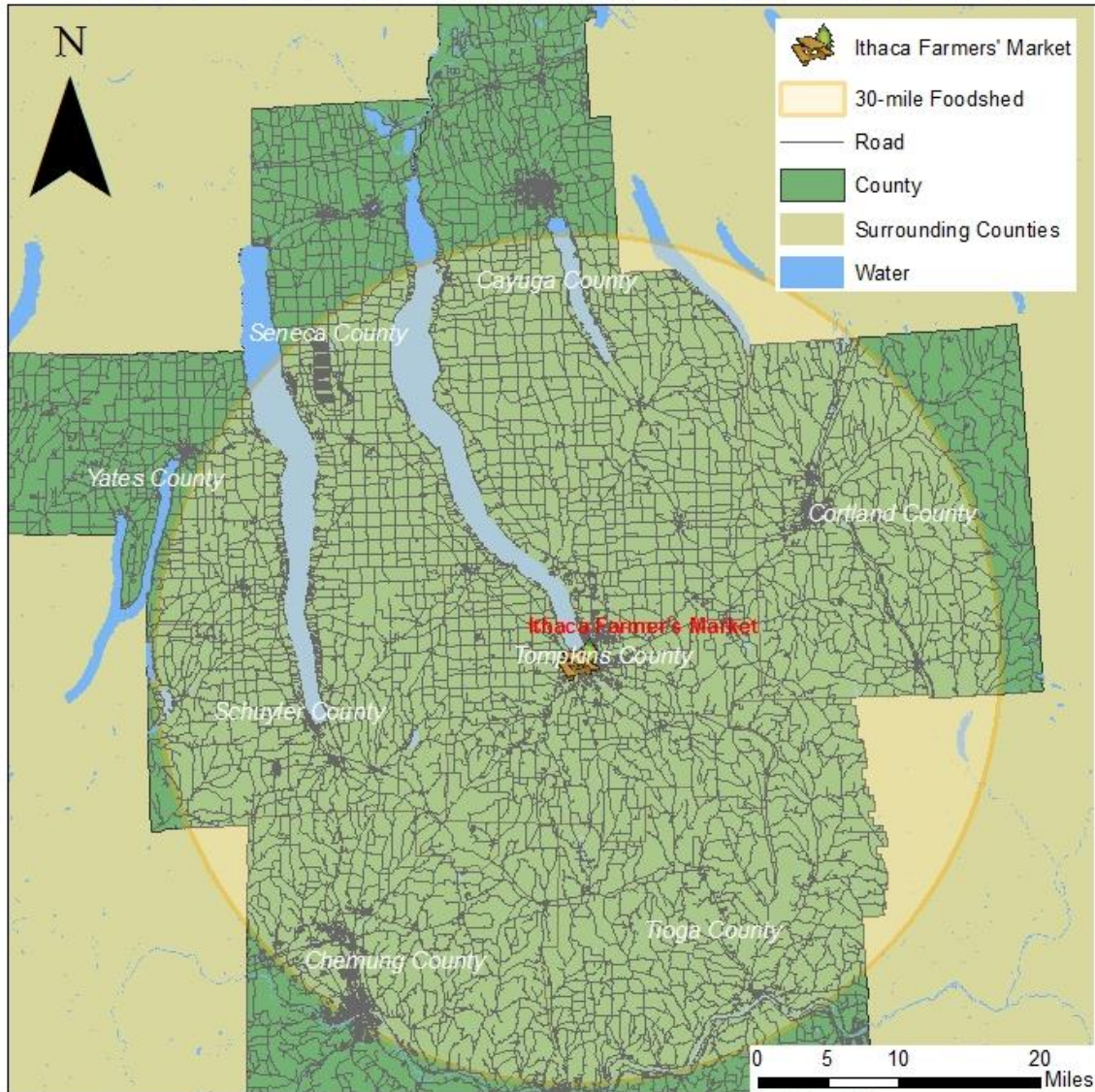
Farm	Criteria
Autumn's Harvest Farm	15+ mi; Cluster
McDonald Farm	15+ mi; Cluster
Grove Angus Farm	Cluster
Hector Hill	15+ mi; Cluster
High Point Farms	Cluster
Orchardland Farm	15+ mi; Cluster
Ron Durling	Cluster
Sabol's Farm	15+ mi
A.J. Teeter Farm	Cluster
Boberg Family Farm	Cluster
Laue Farm	Cluster
Crazy Diamond Beef	Cluster
Deer Run Farms	15+ mi; Cluster
Kirby Farms	Cluster
Scheffler Farm	Cluster
Lakeview Farm	15+ mi

Farms Not Near a Cluster
Dead End Farm
Englebert Farm
Kingbird Farm

APPENDIX B. MAPS

Map 1. 30-mile Foodshed for Tompkins County (Ithaca Farmers' Market)

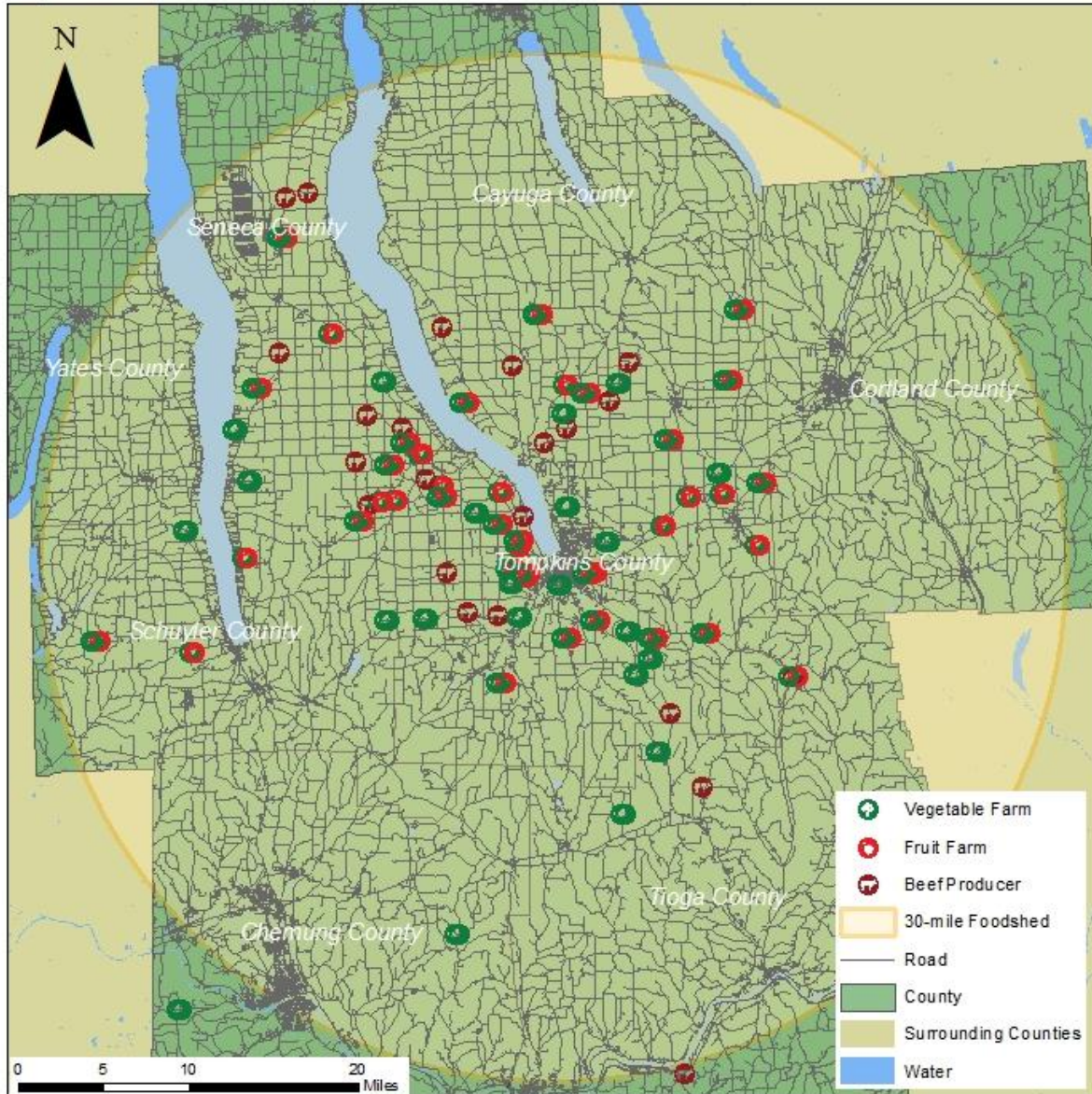
Tompkins County Foodshed: 30-mile Radius of Ithaca Farmer's Market, Central New York



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 2. All Farms in Study Area (IFM Foodshed)

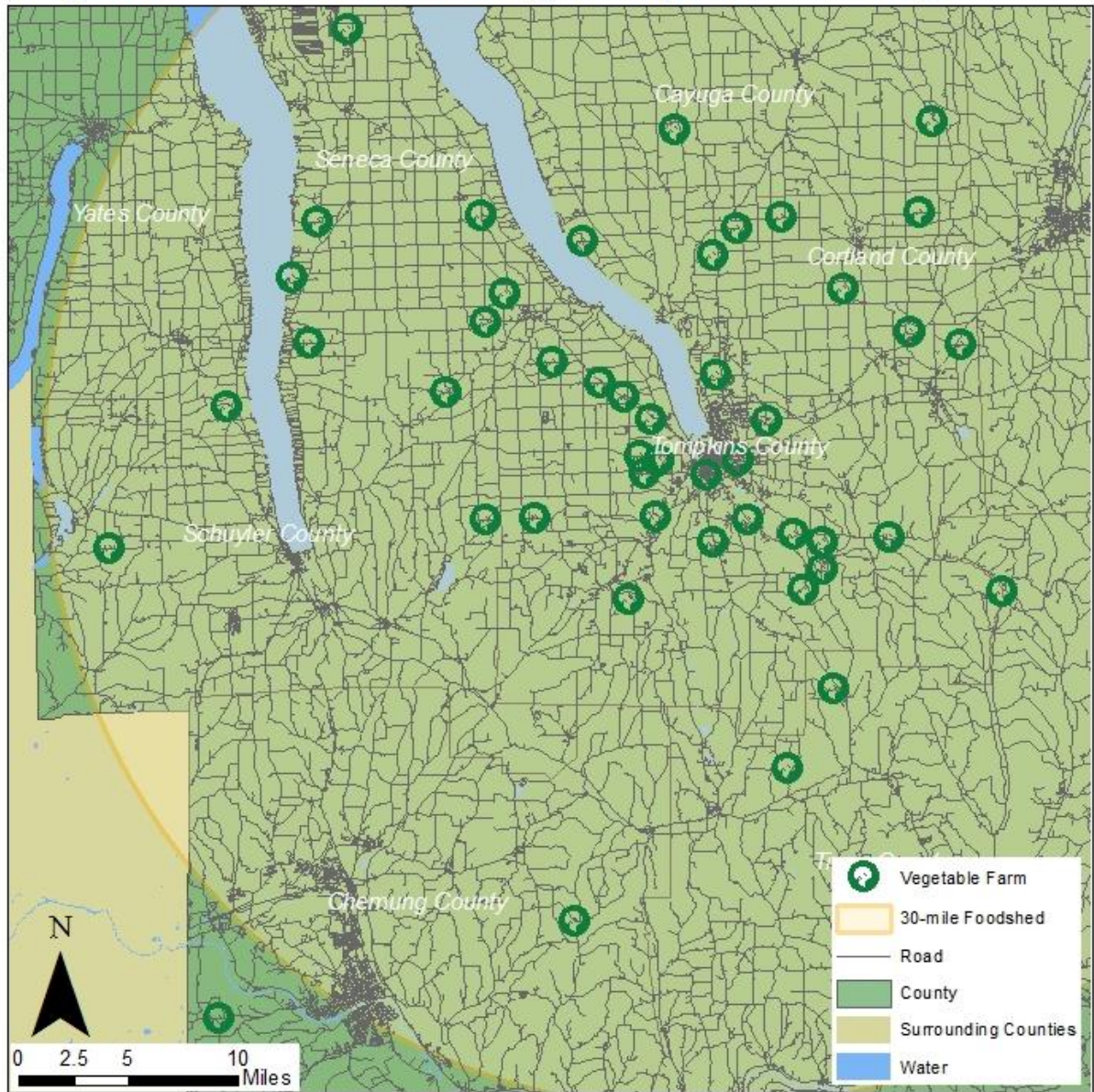
Direct-Market Farms Serving Tompkins County, by Food Product



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 3. Vegetable Farms in Study Area (IFM Foodshed)

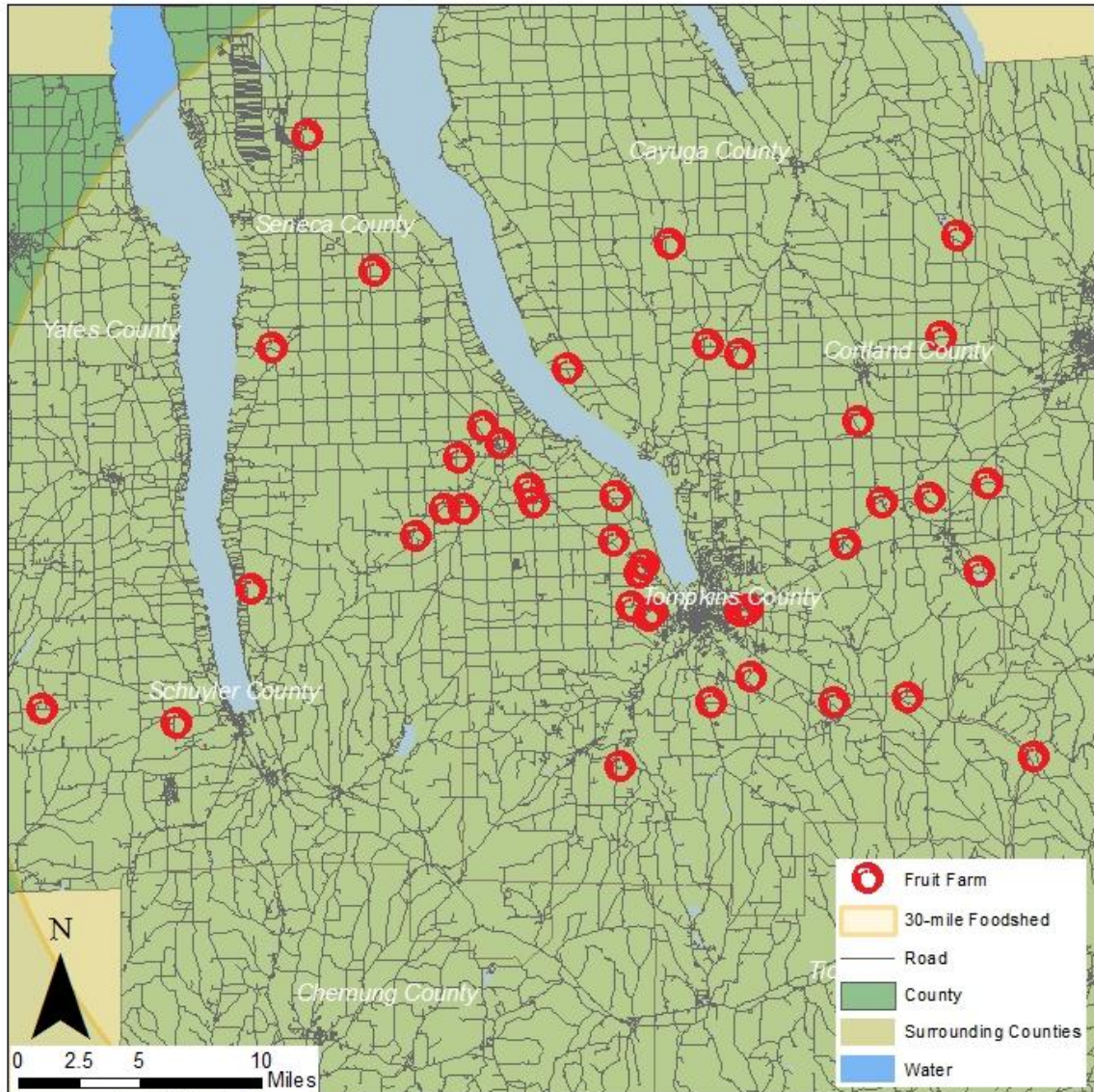
Vegetable Farms Serving Tompkins County



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 4. Fruit Farms in Study Area (IFM Foodshed)

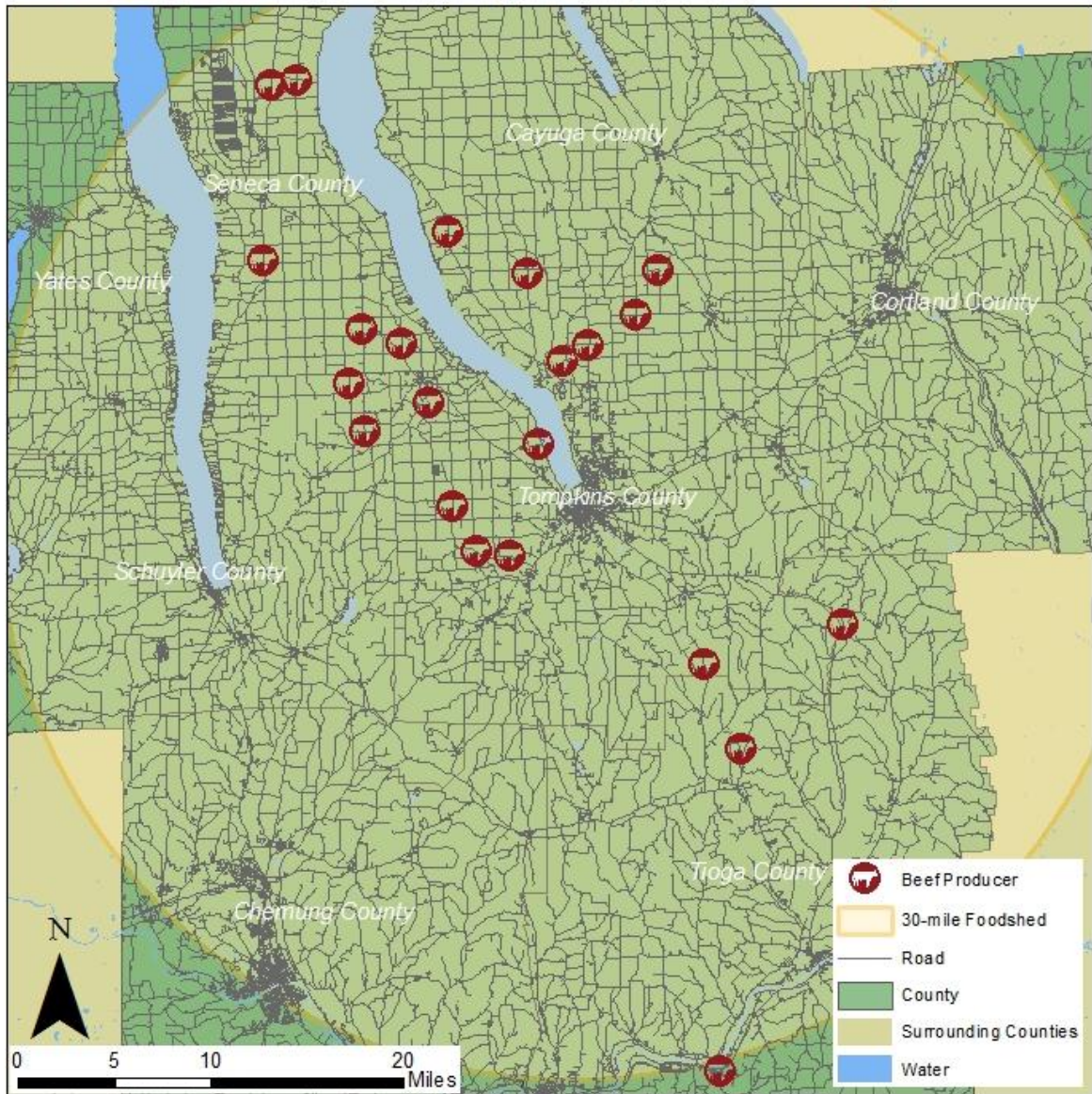
Fruit Farms Serving Tompkins County



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 5. Beef Producers in Study Area (IFM Foodshed)

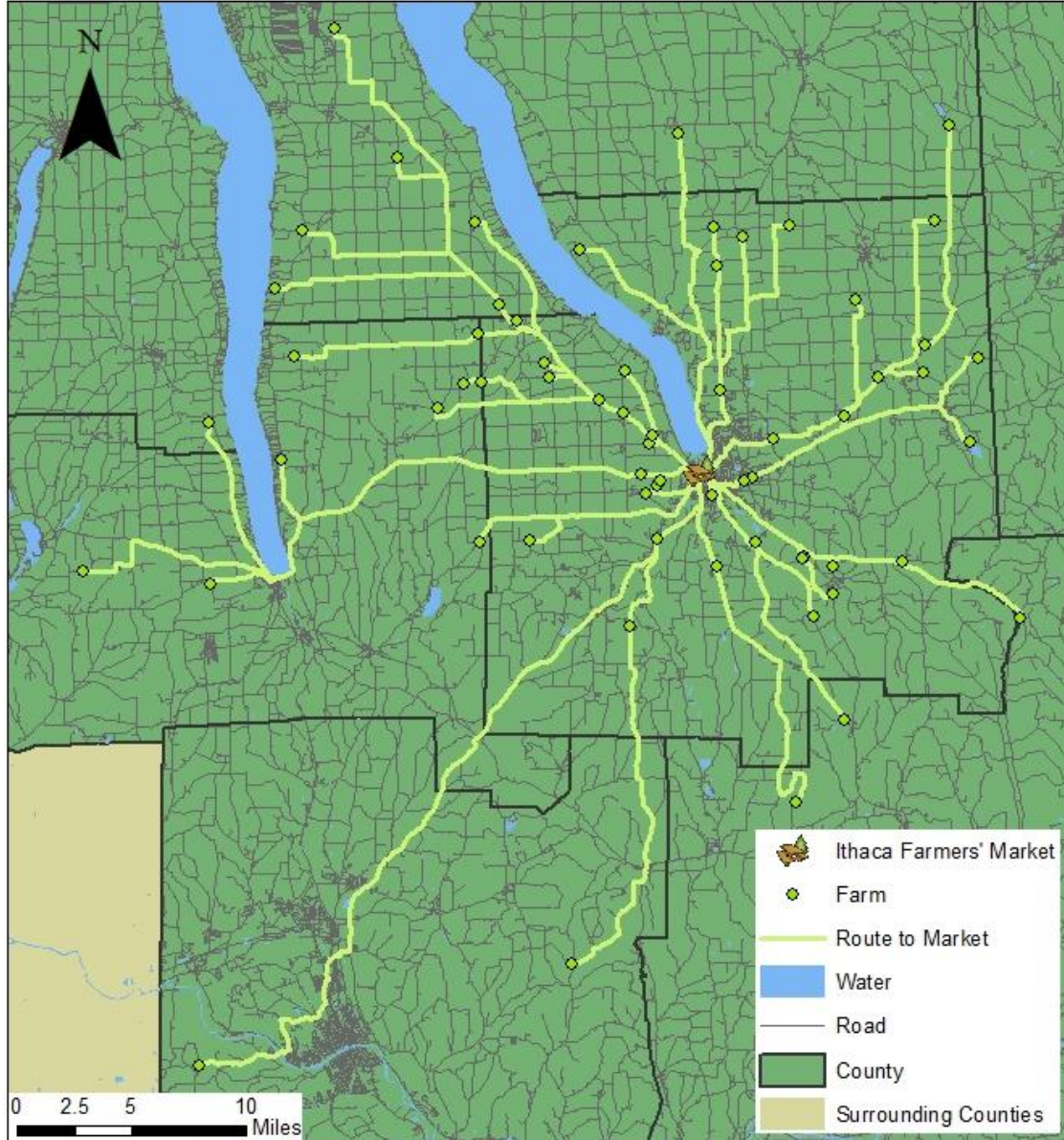
Beef Producers Serving Tompkins County



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 6. Routes to IFM for Fruit and Vegetable Farms in Study Area

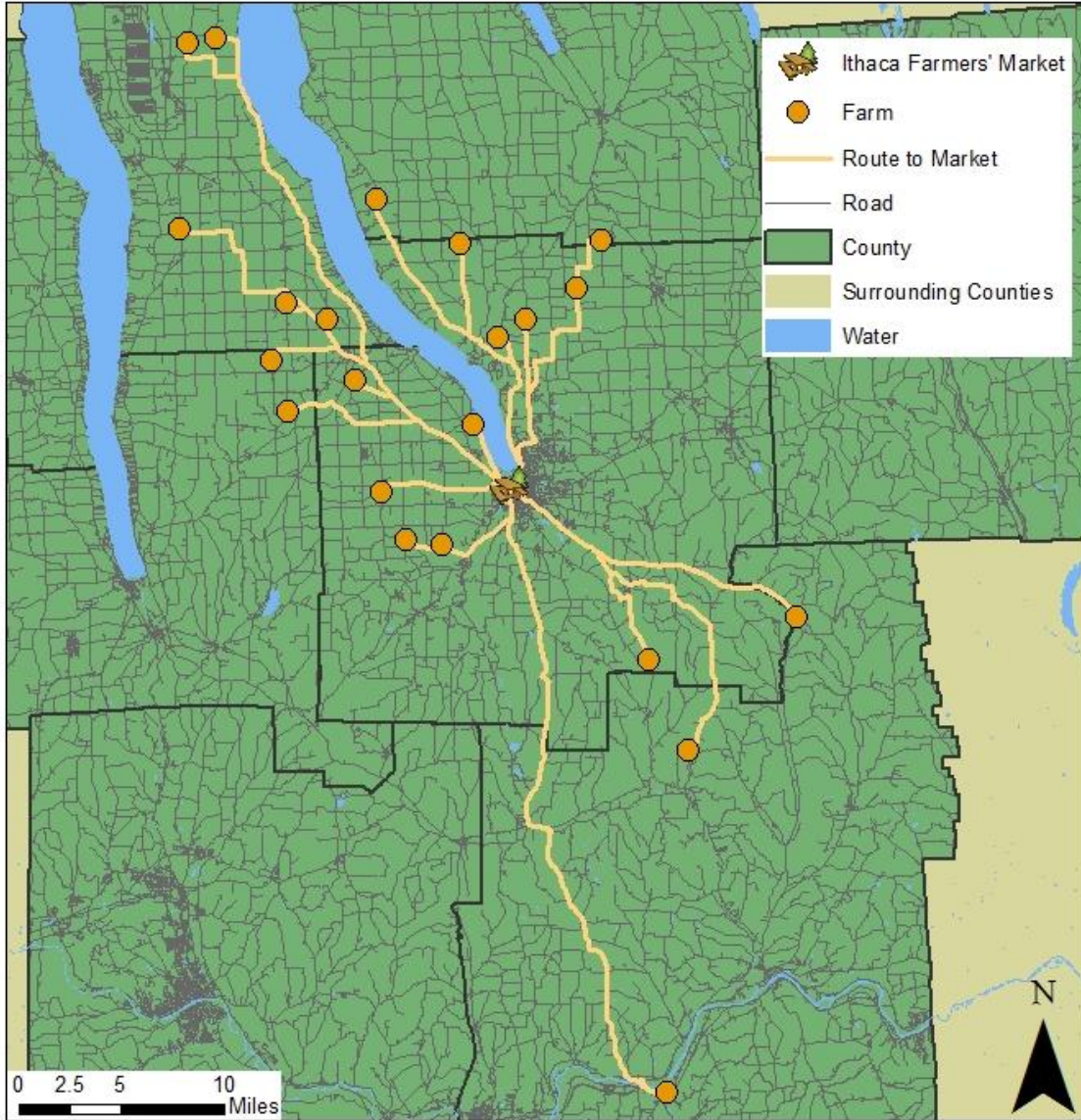
Fruit and Vegetable Farms: Routes to Ithaca Farmers' Market



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 7. Routes to IFM for Beef Producers in Study Area

Beef Producers: Routes to Ithaca Farmers' Market



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 8. Fruit and Vegetable Farms over 15 Miles from IFM

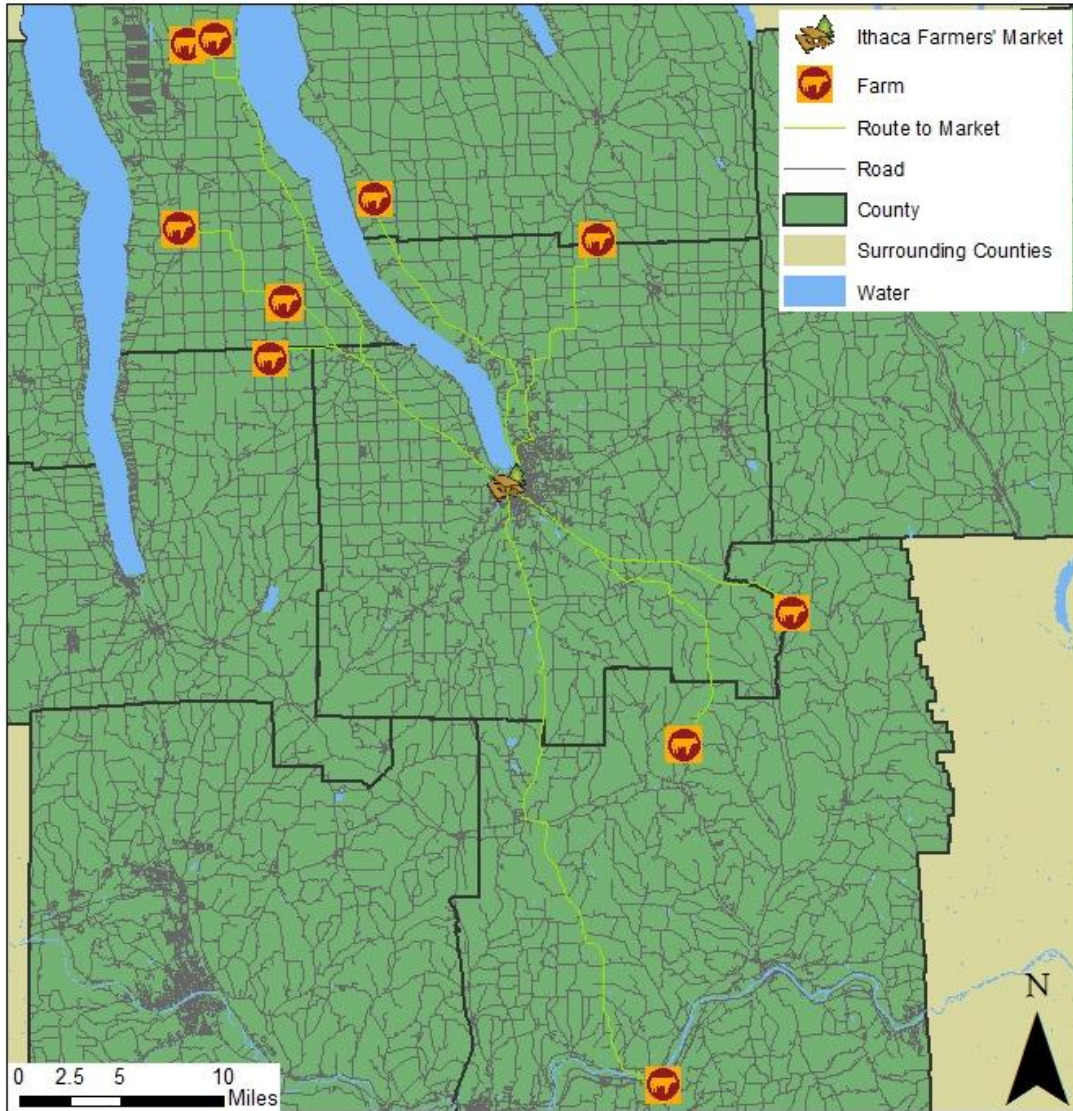
Fruit and Vegetable Farms: Farms Located More than 15 Miles from Market



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 9. Beef Producers over 15 Miles from IFM

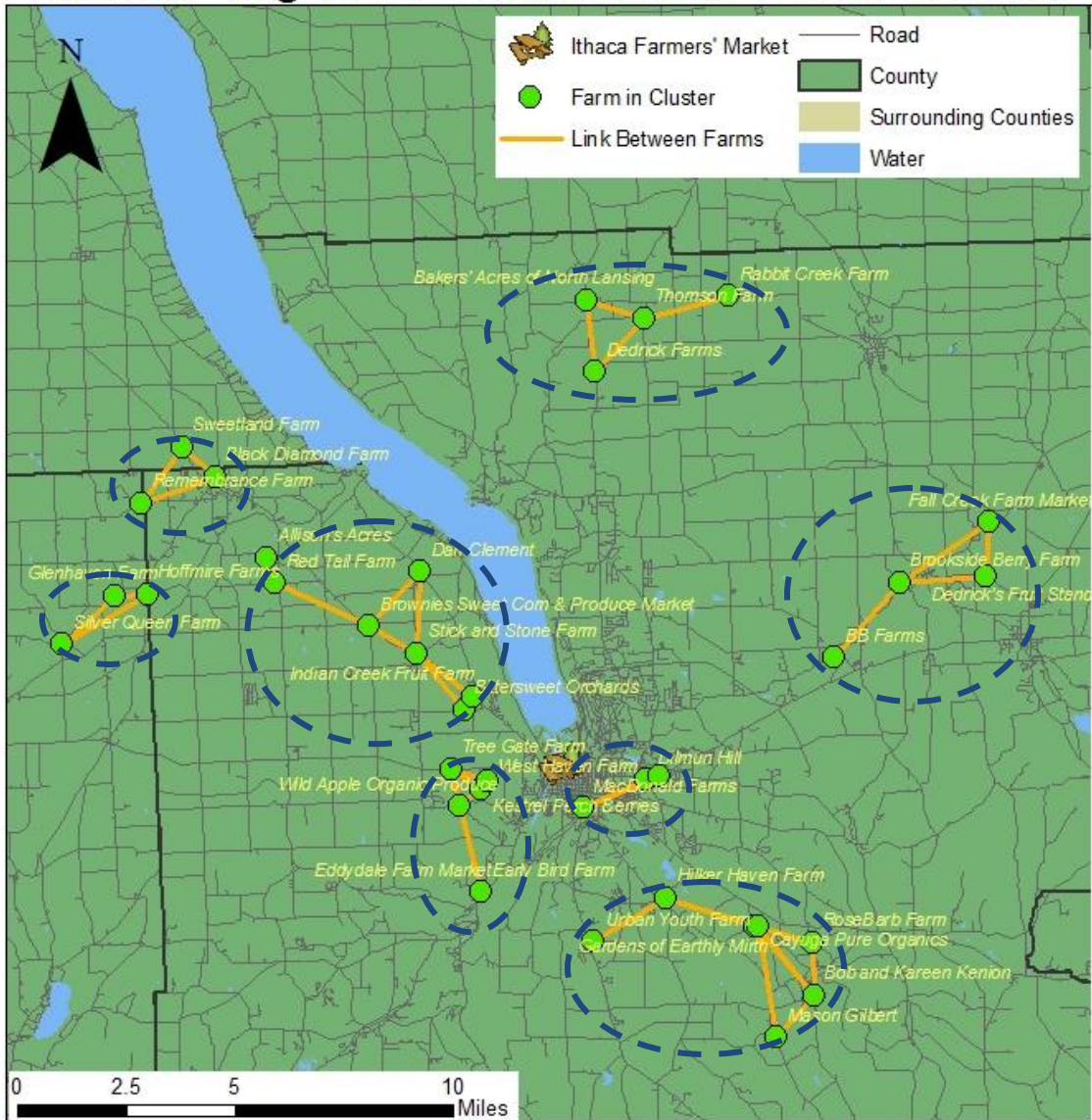
Beef Producers: Farms Located More than 15 Miles from Market



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 10. Clusters of Fruit and Vegetable Farms, Based on 3-Mile Proximity
Dashed ovals indicate cluster locations

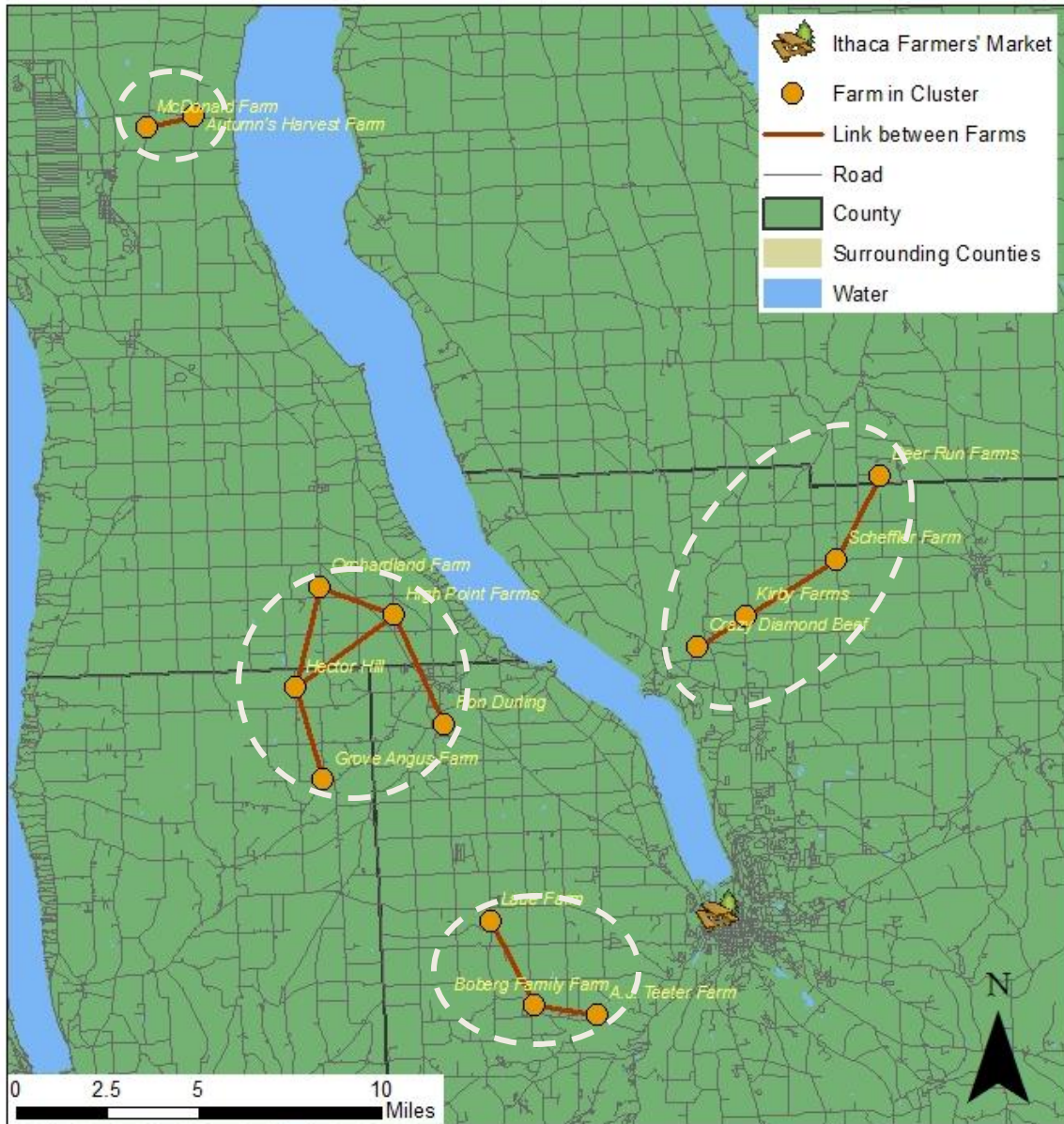
Proximity Analysis: Fruit and Vegetable Farms within 3-Mile Radius



Created by Anna B. Brawley | December 8, 2010
 Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 11. Clusters of Beef Producers, Based on 5-Mile Proximity
Dashed ovals indicate cluster locations

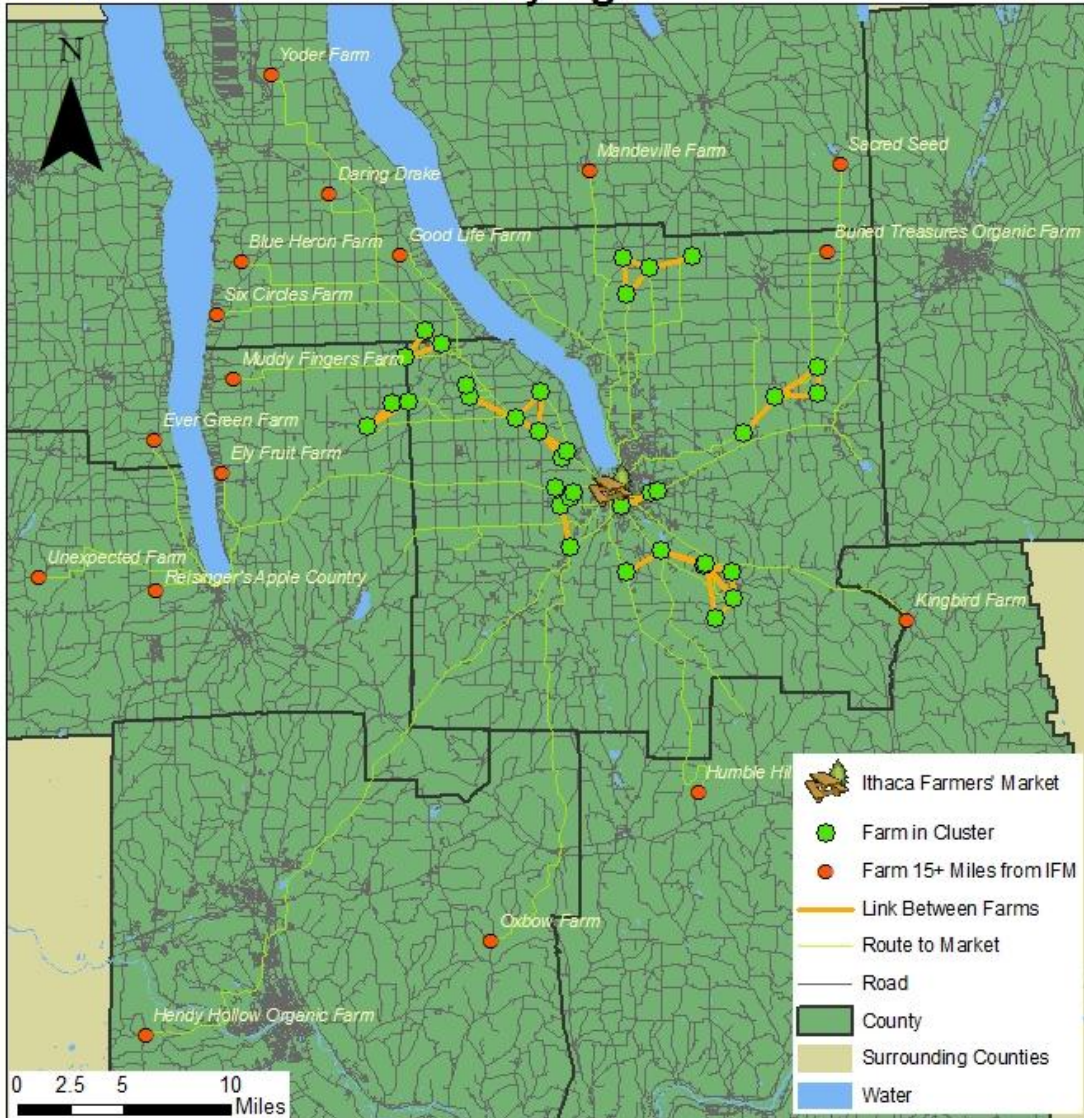
Proximity Analysis: Beef Producers within 5-Mile Radius



Created by Anna B. Brawley | December 8, 2010
 Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 12. Potential Fruit and Vegetable Farms to Share Infrastructure

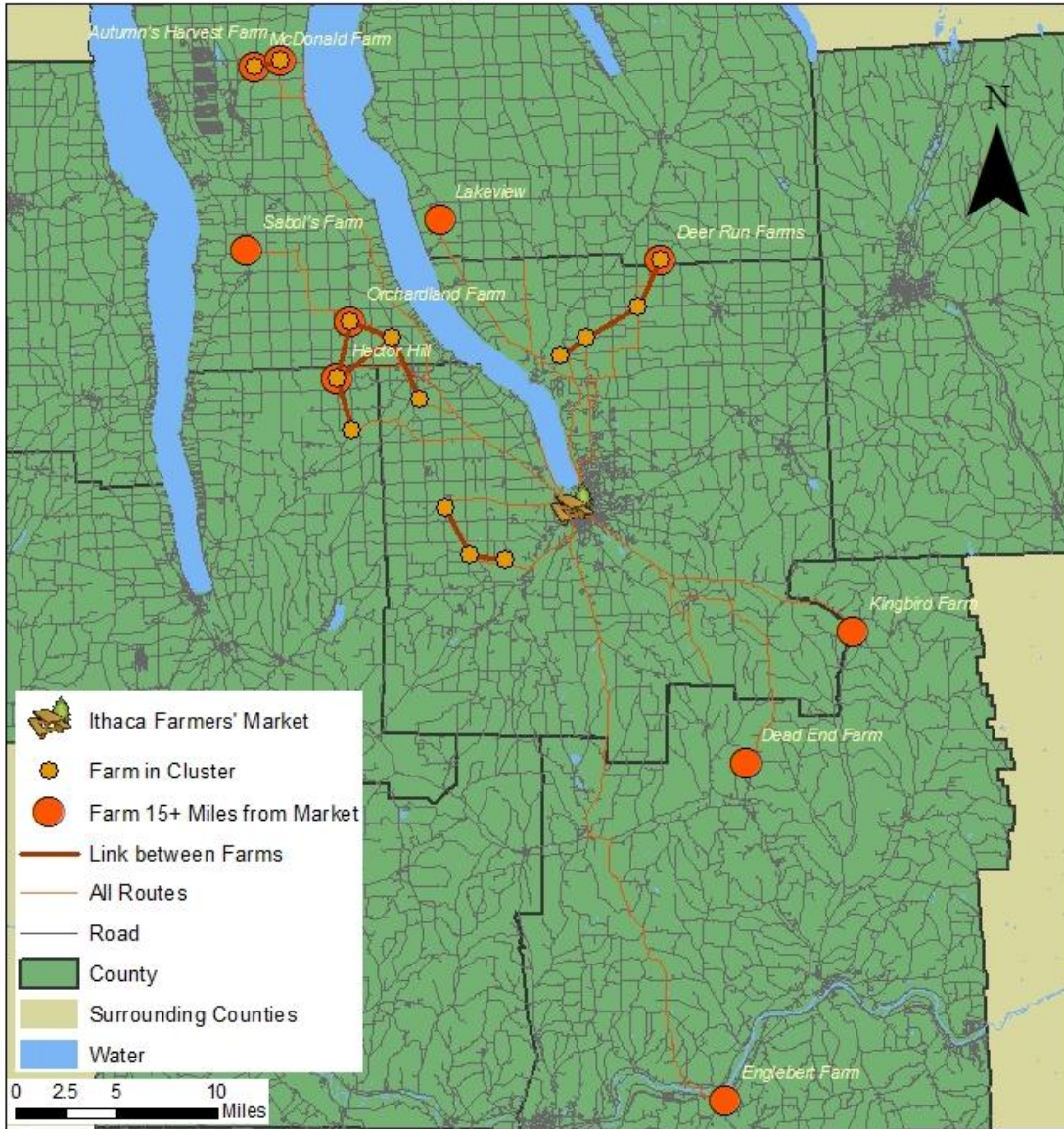
Proximity Analysis: Fruit and Vegetable Farm Clusters and Outlying Farms



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 13. Potential Beef Producers to Share Infrastructure

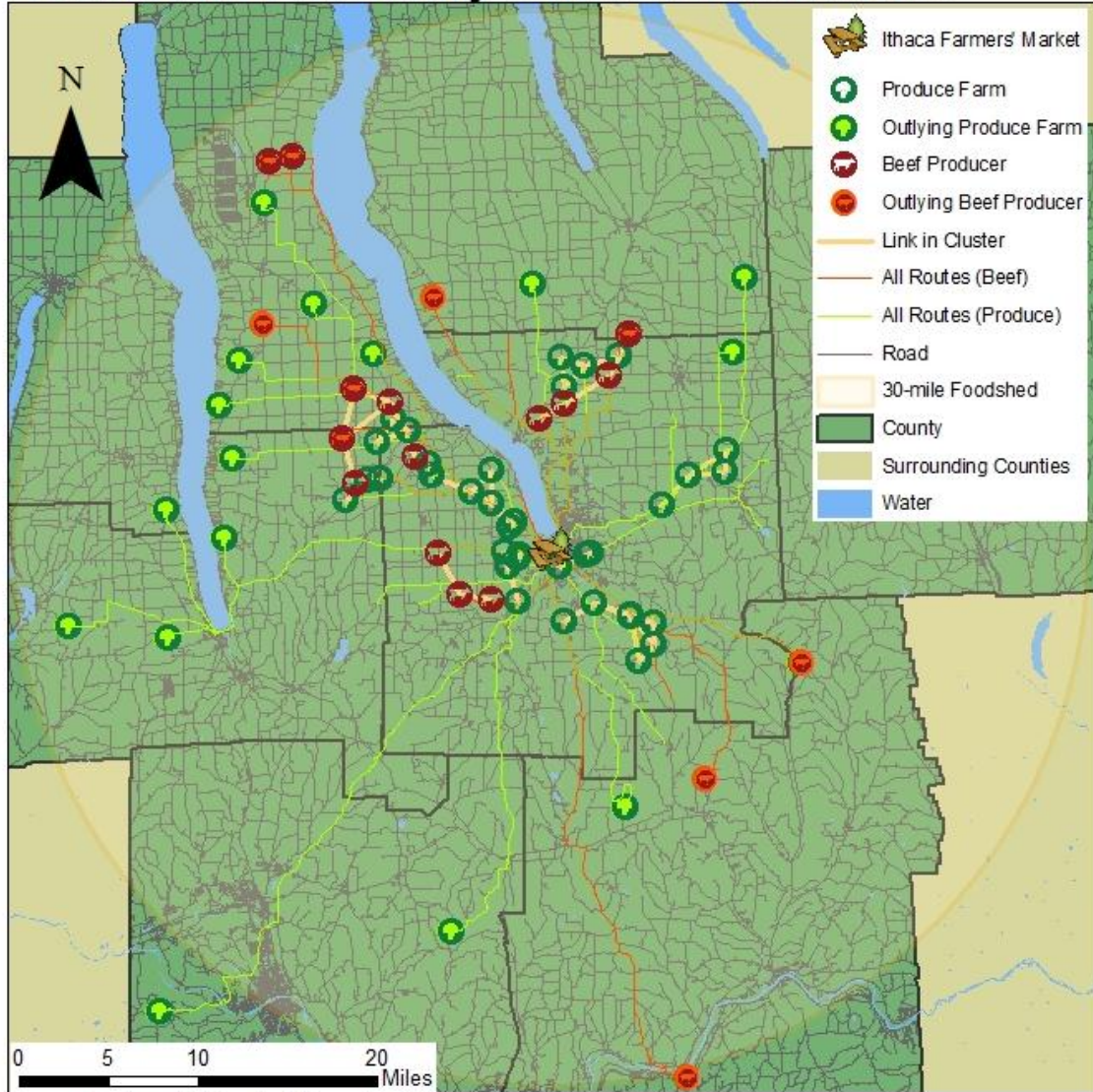
Proximity Analysis: Beef Producers Clusters and Outlying Farms



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

Map 14. All Local Farms (Clusters and Outlying) in IFM Foodshed

Final Analysis: Produce and Beef Farms Located to Potentially Share Infrastructure



Created by Anna B. Brawley | December 8, 2010
Projection: NAD 1983 State Plane, Central New York (FIPS 3102 Feet)

APPENDIX C. BIBLIOGRAPHY

Data Sources

American Fact Finder. Population: Tompkins County, New York. U.S. Census (2000) and A.C.S. 3-Year Estimate (2006-2008).

Beef Industry Council. Annual Per Capita Consumption of Beef, 2006.

Cornell Cooperative Extension, Tompkins County. Farm location and production data, 2010.
Beef Producers: Matt LeRoux.
Fruit and Vegetable Farms: Monika Roth.

Northeast Organic Network (NEON). "Organic Farm Yield and Profitability." Available at <http://www.neon.cornell.edu/training/ppts/OrganicFarmYieldandProfitability.pdf>.

Cornell University, Mann Library. Cornell University Geospatial Information Repository (CUGIR). Available at: <http://cugir.mannlib.cornell.edu/index.jsp>
U.S. Census 2000, TIGER road files for selected New York counties.
U.S. Census, TIGER County Boundaries for selected New York counties.

Food and Drug Administration. Recommended Daily Servings for Adults.

New York State Office of Cyber Security. New York State GIS Clearinghouse. Available at: <http://www.nysgis.state.ny.us/gisdata/>
National Atlas, NYS Hydrography.

North Dakota State University Extension Service. "Vegetable Maturity Dates, Yields and Storage." June 2010. Available at <http://www.ag.ndsu.edu/pubs/plantsci/hortcrop/h912.pdf>.

Kern, Barbara; Ken Kern. *The Owner Built Homestead*. New York: Scribner, 1974.

Works Cited

Allen, Patricia. *Together at the table: Sustainability and sustenance in the American agrifood system*. University Park: Pennsylvania State University Press, 2004.

Diffley, Atina. *Wholesale success : A farmer's guide to selling, postharvest handling and packing produce*. Oak Park, IL: Sustain Organization and FamilyFarmed.org, 2008.

Hinrichs, C. Clare. Embeddedness and local food systems: Notes on two types of direct agricultural market. *Journal of Rural Studies* 16 (2000) 295-303.

Horowitz, Roger. *Putting Meat on the American Table: Taste, Technology, and Transformation*. Baltimore: Johns Hopkins University Press, 2006.

Martinez, Steve; Michael Hand; Michelle Da Pra; Susan Pollack; Katherine Ralston; Travis Smith; Stephen Vogel; Shellye Clark; Luanne Lohr; Sarah Low; Constance Newman. *Local Food Systems: Concepts, Impacts, and Issues*. ERR 97. U.S. Department of Agriculture, Economic Research Service, May 2010.

Peters, Christian J.; Jennifer L. Wilkins; Gary W. Fick. Testing a Complete-Diet Model for Estimating the Land Resource Requirements of Food Consumption and Agricultural Carrying Capacity. *Renewable Agriculture and Food Systems* 22:2 (2006) 145-153.

Peters, Christian J.; Nelson L. Bills; Arthur J. Lembo; Jennifer L. Wilkins; Gary W. Fick. Mapping potential foodsheds in New York State: A spatial model for evaluating the capacity to local food production. *Renewable Agriculture and Food Systems* 24:1 (2008) 72-84.