

Prepared by Beth McKellips for The Intervale Center

Laying the Groundwork: A Snapshot of a Regional Food System in Chittenden and Surrounding Counties



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Beth McKellips University of Pennsylvania City and Regional Planning Master's Candidate, 2010 beth.mck@gmail.com

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Executive Summary

Goal of the Study:

To obtain the clearest image possible of local food consumption, production and land use, and to identify information gaps and to investigate the basic challenges and opportunities associated with the production and consumption of regionally produced food.

REGIONAL IS defined as Chittenden County, and the five surrounding counties: Addison, Franklin, Grand Isle, Lamoille, and Washington

The study aimed to answer 3 primary questions:

How much food is being consumed in the six county region?

2 How much food is being produced in the six county region?

How would a regional food system affect land use in the six county region?

To answer these questions, the following steps were taken:

1 Existing data sources and precedent studies were identified and analyzed

2 Following the review of the existing data sources, one set of administrative data was chosen for a statistical analysis of food consumption, production and land use in the six county region

3 Qualitative interviews were conducted to finesse administrative data

Recommendations were created based on study findings

Selected data sources: Consumption: USDA's Continuing Survey of Food Intakes by Individuals Market Study: US Census Bureau and Regional Grocery Store Sales Data Production: USDA's 2007 Agricultural Census Land Use: NRCS Important Farmland Classifications

CONSUMPTION

1. MEAN consumption per individuals in the Northeast for a basic basket of goods was obtained from the CSFII, from the Food and Nutrient Intakes by Individuals in the United States, by Region, 1994-96

2. MEAN consumption per individual in pounds was multiplied by 365 to estimate the annual consumption per individual

3. ANNUAL mean consumption of all food items was multiplied by the population total from the 2007 American Community Survey to estimate average annual consumption levels for the six county region

MARKET STUDY

4. ANNUAL sales data was obtained from a Northeast regional grocery store chain, making it possible to identify the top five selling products for the defined basic basket of goods 5. AVERAGE Prices for each top selling item in the defined standard basket were obtained through a field study of three grocery store chain in Burlington

6. AVERAGE annual consumption of commodities was then multiplied by the average price per pound to estimate the annual amount of money spent per year on the defined basic basket of goods

PRODUCTION

7. 2007 Census of Agriculture was used to obtain current amounts of agriculture production, including acres harvested and quantities of livestock for consumption
8. YIELD data and production data was gathered from local producers and established growing guides to convert acres and livestock headcounts to pounds of food produced

LAND USE

1.ACRES OF agriculture production were obtained from the 2007 Census of Agriculture

2. IMPORTANT Farmland acreage totals were obtained from the GIS data on Vermont Center of Geographic Information (VCGI)

3. COMPREHENSIVE plans and future land use information was obtained from regional planning offices

Vegetables

• Sweet corn accounts for approximately 49% of vegetable production in the six county area

• Sweet corn is the only vegetable in the six county region that is estimated to produce more than estimated demand

Fruit

• There are a total 1,505 acres bearing age fruit trees and plants

• Of these 1,505 acres, 91% are devoted to apples, totalling1,373 acres

Milk

• The total pounds of milk produced in the six county region is estimated to be 1,692,920,000 pounds of milk, 1,578,681,779 pounds of milk beyond estimated regional demand

• If demand doubled, regional production is estimated to still produce 1,464,443,558 pounds of milk beyond what local demand would consume

Eggs

• The number of eggs produced is roughly twice the estimated demand

Meat

• To meet the estimated beef demand in the six county area, an additional 11,920 steers would be needed, which would require an additional 23,840 acres of dry feed

• To meet the regional demand for pork, an additional 23,000 pigs and hogs would be needed. To support the pigs, an additional 4,600 acres would be needed for feed

• An additional 1.4 million broiler chickens would be needed to meet regional demand

Grain

• As of 2007, there were 5450 bushels of wheat harvested in the six county region (all in Addison County), which is estimated to produce roughly 397,850 one pound loaves of bread

• Based on the production in 2007, each acre produced 38.9 bushels of wheat, so an additional 5,102 acres of wheat would be needed to meet demand

Summary of Findings

• 1,415 acres of additional vegetable production are needed to meet demand

• There are 1,110 acres of apple orchard beyond what is needed to satisfy local demand

• There are 78,934 additional cows beyond what is needed to meet local demand

• To meet beef and pork demand, 28,440 additional acres for corn silage and hay would be needed, a 5% acreage increase to current total farm acres

• An additional 1.25-1.4 million broiler chickens would be needed to meet regional demand

• 5,102 acres of hard wheat would be needed to meet demand

RECOMMENDATIONS FOR NEW RESEARCH

Methodology

1. New studies of food consumption

2. Models of how to compare intake and/or

consumption data to production data

3. Most reliable existing consumption data

Farm Profitability

1. Farm profits variation via the various revenue streams

2. Yield estimates: Production styles and expected yields

Land Use and Planning

1. Define the local foodshed with possibility of including areas of New York State and Quebec

 Consolidation of zoning information and/or growth management measures from all towns
 Consolidate visions for growth and plans for added population

4. Update and add detail to soil surveys, delineate which land is suitable for which type of food production

Existing Data Sources on Food Demand and Supply:

espite the recent rise of food issues in the national media, actual data on food consumption and production is relatively non-existent. Governmental research agencies and universities have analyzed several elements of the food system extensively; however, a methodology for defining a comprehensive picture of what people are eating and the source of the food is yet to be established. Existing data on food consumption and production tends to be inaccessible and problematic, as discussed below in a review of the existing data sources and relevant precedent studies.

Food Consumption Data

The primary sources of consumption data are the Bureau of Labor Statistics (BLS); the Bureau of Economic Analysis (BEA) and Agricultural Research Service (ARS); and Economic Research Service (ERS) of the United State's Department of Agriculture (USDA).

One of the overarching findings of this study is that the data required to accurately understand food consumption is outdated or relatively inaccessible. The most recent data on food consumption, the National Health and Nutrition Examination Survey (NHANES) and the Food and Nutrient Database for Dietary Studies (FNDDS), is only available as raw data in SAS or MS Access formats. The data sets do not include summary tables; instead, the data tables include coded entries for each individual piece of data collected. Aggregating the raw data into usable information requires a sophisticated statistical understanding, and finding and comprehending the documentation can take considerable time. Ultimately, the food consumption data is not practical for professionals at food system related agencies or organizations.

Bureau of Labor Statistics

The BLS publishes both the Consumer Price Index (CPI) and the Consumer Expenditure Survey (CES). As the CPI calculates "the change in prices paid by urban consumers for a market basket of consumer goods and services; it is primarily used as an economic indicator and as a means of adjusting current-period data for inflation," the dataset is not relevant to this study. The CES, focused on actual dollars spent, is based on two individual surveys, " the quarterly Interview Survey and the Diary Survey, that provide information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit (families and single consumers) characteristics" and is updated annually. The CES provides annual average expenditures per consumer unit, defined as "either: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living guarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions." To be considered financial independent at least two of the three major expense categories (housing, food, and other living expenses) have to be provided entirely, or in part, by the survey subject. The CES data is broken down into four regions of residence in the U.S.: Northeast, West, South and Midwest. The level of detail of the food expenditures is moderate. For example, Fruit and Vegetables are broken down by Fresh Fruit, Fresh Vegetables, Processed Fruit and Processed Vegetables. While this data is more recent than other food consumption data, the lack of detail on consumption of individual food commodities made the CES impractical for this study. Another drawback of the CES data is that expenditures on food away from home are included in one lump sum. As of 2007, consumer units in the Northeast spent 42% of their total food consumption dollars away from home, so detailed information on the spending would be useful.

Bureau of Economic Analysis

In contrast, the BEA surveys businesses to analyze consumer spending. The survey data is presented in the National Income and Product Account (NIPA) tables. Personal expenditures by type of expenditures are included in the Table 2.5 series. The source of NIPA tables data is a variety of resources, as described in the documentation, "Data collected by federal government agencies provide the backbone of the estimates; these data are supplemented by data from trade associations, businesses, international organizations, and other sources." Because food expenditures are listed as one lump sum, the data was not suited for this study. As expected, the expenditures on food totals from the BLS and BEA differ greatly.

USDA's Agricultural Research Service

Next, the Agricultural Research Service of the USDA publishes several sets of data on food consumption of individual commodities. The most recent data falls under the umbrella of the What We Eat in America (WWEIA) study. In 2002, the USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and a survey administered by the Department of Health and Human Services (DHHS), the National Health and Nutrition Examination Survey (NHANES), were integrated under the WWEIA study. Under the integrated framework, DHHS is responsible for the sample design and data collection, while the USDA is responsible for the survey's dietary data collection methodology, development and maintenance of the food and nutrient databases used to code and process the data, and data review and processing. NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States. NHANES data is available in SAS format only and lists consumption in terms of nutrient consumption (fat, carbohydrates, iron, etc.). Data sets from both oneand two-day surveys are available. The SAS files list the intake of each item consumed by each survey subject. While the NHANES data is the most recent and most detailed on food consumption, the data was not used in this study due to the time required to aggregate the data and because of problems in calculating consumption from the survey units. Prior to 2002, WWEIA solely consisted of the CFSII. The CFSII is based on two non-consecutive days of dietary data for individuals of all ages that were collected 3 to 10 days apart through in-person interviews using 24-hour recalls (See Appendix for description of CFSII Methodology). The most recent CSFII data set is from 1994-96 and includes information on the food and nutrient intakes of 15,303 individuals. The 1998 CSFII data set includes 5,559 children up to 9 years of age. David J. Miller, Chief Chemistry & Exposure Branch, Health Effects Division, Office of Pesticide Programs, notes that the CFSII "is a very complex instrument that is difficult to understand or interpret without proper statistical grounding."

The ARS also publishes the Food Commodity Intake Database (FCID) for the Environmental Protection Agency (EPA). Extrapolated from the CFSII, the FCID provides data on the edible amount of agricultural food commodities contained in each food reported eaten in CSFII. Commodity intakes are expressed as grams consumed per kilogram of body weight per day.¹ The FCID was developed for the purpose of estimating human exposure to pesticide residues through the consumption of foods and beverages. As such, intakes are expressed in terms of EPA-defined agricultural food commodities, for example apple pie would be "translated quantitatively into the following commodities: wheat flour, peeled apple, sugar (from sugar cane or beet), cinnamon and the specific vegetable oils comprising shortening".² There are over 500 food commodities listed in the FCID.³ The consumption data is listed by region of residence and by age bracket. Because the data includes each commodity consumed per study subject in terms of his or her body weight, summary tables of the FCID data were acquired from the USDA. However, despite corresponding several times with the USDA and the EPA, instructions on how to apply the sample weights correctly were not possible to obtain. The data aggregation required to convert the individual consumption per kilogram body weight for thousands of entries for each commodity would be time consuming. The data is available on a CD-ROM for purchase from the USDA.

The ARS also utilizes the Food and Nutrient Database for Dietary Studies (FNDDS) to analyze data from the WWEIA survey. FNDDS is a database of foods, their nutrient values and weights for typical food portions that is used to analyze food intake data and to calculate nutrient intakes based on the foods and amounts reported.⁴ The FNDDS data is available in three formats: ASCII, SAS and MS Access. Similar to the NHANES, this set of data requires an SAS viewer, and the instructions about how to read the tables are complicated. To measure consumption, all of the portion weights would need to be calculated using the 5-digit codes that refer to the food portion description. This set of data was not used in this study, as the food portion descriptions include things like a slice, a piece or "can snack size."⁵ Similar to the NHANES data, the units utilized in the FNDDS

^{1. &}lt;u>http://www.ars.usda.gov/Services/docs.htm?docid=14514</u>. "Products and Services: Food Commodity Intake Database." Accessed on June 12, 2009.

^{2.} USDA, ERS. "Food and Agricultural Commodity Consumption in the United States/AER-820" www.ers.usda.gov/publications/aer820/aer820b.pdf. p.1

^{3.} USDA, ERS. "Food and Agricultural Commodity Consumption in the United States/AER-820" www.ers.usda.gov/publications/aer820/aer820b.pdf. p.1

^{4.} The USDA Food and Nutrient Database for Dietary Studies, 3.0, Documentation and User Guide. <u>http://www.ars.usda.gov/SP2UserFiles/Place/12355000/pdf/fndds/fndds3_doc.pdf#formats</u>. Accessed on June 23, 2009.

^{5.} The USDA Food and Nutrient Database for Dietary Studies, 3.0, Documentation and User Guide. <u>http://www.ars.usda.gov/SP2UserFiles/Place/12355000/pdf/fndds/fndds3_doc.pdf#formatshttp://www.ars.usda.gov/SP2UserFiles/Place/12355000/pdf/fndds/fndds3_doc.pdf#formats.p. 27. Accessed on June 23, 2009.</u>

made measuring consumption from this data problematic. The data sets were not used in this study due to the time required to aggregate the data and because of problems in calculating consumption using the respective survey units.

Economic Research Service

The ERS of the USDA also publishes several food expenditure tables, which offer data on a national level on expenditures on food and food away from home. The primary data source for the ERS series is the U.S. Census, U.S. Department of Commerce, specifically the Industry and Subject Series: Retail Trade, NAICS 44-45; Whole-sale Trade, NAICS 42; Accommodations and Food Services, NAICS 72; and Other Services, NAICS 81.¹ While the ERS tables do provide some analysis, the lack of detail on specific commodities is a drawback.

Lastly, the ERS also publishes Food Availability data, which is a common proxy for food consumption. There are three sets of data published: Food Availability, Nutrient Availability and Loss Adjusted Food Availability. Calculated by the ERS, each data set provides the amounts of several hundred foods available for human consumption in the United States on the national level. The loss-adjusted data considers the non-edible food parts and food lost through spoilage, plate waste and other losses in the home and marketing system in the final calculations, "calculated by adding total annual production, imports and beginning stocks of a particular commodity and then subtracting exports, ending stocks, and non-food uses. Per capita estimates are then calculated using population estimates for that particular year."² The ERS offers that food availability data is "useful for economic analysis because they serve as indirect measures of trends in food use...The per capita food availability system provides an indication of whether Americans, on average, are consuming more or less of various foods over time."³

Agricultural Marketing Services

In the past, the USDA's Agricultural Marketing Services (AMS) collaborated with Claritas, Inc. to publish Transportation and Marketing expenditure tables; however, the source of this data has proven difficult to verify.

Leopold Center for Sustainable Agriculture, U.S. Food Market Estimator

The U.S Market Estimator is an online tool based on the USDA's Food Availability Data System. The application calculates consumption by adding total annual production, imports and beginning stocks of a particular commodity, and then subtracting exports, ending stocks and non-food uses.⁴ Per capita estimates are then calculated using population estimates for a particular year. The tool provides information for 204 food products, including various dairy and meat products, fruit, vegetables and grains. Users select how they want results to be shown: by number of servings, pounds produced, truckloads transported, even cubic feet of warehouse space needed to store a particular product.

Summary of Consumption Data

Each of these data sets presents a different portrait of food consumption in the U.S. The varying units, levels of detail, organizations and methodologies make comparing them challenging. Scholarship is needed to determine which data sets present the most accurate estimate of food consumption and what innovations would improve assessments.

The CFSII data was chosen for this study for the level of detail and accessibility of the data.

^{1. &}lt;u>http://www.ers.usda.gov/Briefing/CPIFoodAndExpenditures/measuringtheersfoodexpendituresseries.htm</u>. "Food CPI and Expenditures: Measuring the ERS Food Expenditure Series." Accessed on June 12, 2009.

^{2. &}lt;u>http://www.ers.usda.gov/Data/FoodConsumption/</u>. "Food Availability (Per Capita) Data System." Accessed on June 12, 2009.

^{3. &}lt;u>http://www.ers.usda.gov/Data/FoodConsumption/FoodAvailFaqs.htm#actual</u>. "Food Availability: Questions and Answers". Accessed on June 17, 2009.

^{4.} Leopold Center for Sustainable Agriculture. "About the U.S. Food Market Estimator" <u>http://www.ctre.iastate.edu/market-size/about.html#how</u>. Accessed on July 14, 2009.

Food Production Data

In contrast to food consumption data, statistics on food production typically come from one source, the Agricultural Census. The UDSA publishes an Agricultural Census every 5 years; the most recent version features data from 2007. The Census strives to collect information from all farmers and ranchers on "all areas of farming and ranching operations, including production expenses, market value of products and operator characteristics."¹ Report forms for the 2007 Census of Agriculture were mailed to farm and ranch operators in December 2007, and producers could respond via mail and, for the first time, had the option of filling out the Census online.² The census definition of a farm is any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. The current definition of a farm was first used for the 1974 Census of Agriculture and has been used subsequently.³ The supply data is published in various units, depending on the commodity. Fruit production is measured in acres of crops that are "bearing age," while the production of other crops is listed in acres harvested. Despite the varying units, the level of detail in the Agricultural Census is quite good. Commodity production is detailed, and data is available on the county level. However, the relative small scale of farming in individual Vermont counties leads to some data being withheld to protect privacy an individual farms.

One known problematic area of the Agricultural Census is measuring profitability. The Agriculture Census lists acres harvested and total sales, but it does not break down sales per revenue channel. The prices farmers get from retail, wholesale and direct sales differ dramatically. In addition, given the cyclical nature of farming, food producer balance sheets are complex. Income from one year is likely used to buy supplies in advance for the next year. The Census attempts to differentiate the data by defining farm expenses as "the production expenses provided by the operators, partners, landlords (excluding property taxes) and production contractors for the farm business in 2007," and income as "gross income from farm-related sources received in 2007 before taxes and expenses from the sales of farm byproducts and other sales and services closely related to the principal functions of the farm business." ⁴The data excludes income from employment or business activities which were separate from the farm business." ⁵ Lastly, the growing numbers of new, relatively small farms are likely not to have the resources for sophisticated accounting systems.

Another area of significantly lacking data is yield data per production type. The 2007 Agricultural Census includes bushels harvested data for grain commodities only, and it does not include production method data on the county level. Production yields of all commodities vary dramatically per production method; for example, organic vs. conventional, pastured steers and cows vs. penned, differing types of feed, etc. Yields are also impacted by planting densities, climate, weather and soil suitability. While many universities publish various data on production techniques, there is no consolidation of regional yield data. For this study, yield information came from Johnny's Seed Catalog, interviews with local farmers and farming reference books , Elizabeth Henderson with Robyn Van En, *Sharing the Harvest: A Guide to Community Supported Agriculture*⁶ and Vernon P. Grubinger's book, *Sustainable Vegetable Production from Start-Up to Market.*⁷

Land Use Data

This study focused on the six county region in Northwest Vermont, including Addison, Chittenden, Franklin, Grand Isle, Lamoille and Washington counties. The study region is comprised of 2,025,184 acres, and as of 2007, 578,786 acres (29%) are used for farms.⁸ While zoning information is generally not available on the county-level (See Existing Conditions: Land Use Analysis for more details), analysis is possible using the "Important Farmland Classification Value" ratings for soils in Vermont, developed by the USDA's the Natural Resources

1. <u>http://www.agcensus.usda.gov/About_the_Census/index.asp</u>. "About The Census." Accessed on June 12, 2009.

2. <u>http://www.agcensus.usda.gov/Publications/2007/Getting_Started/index.asp</u>. "Getting Started." Accessed on June 16, 2009.

3. <u>http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Vermont/vtintro.pdf</u>. p VII. Accessed on June 16, 2009.

4. USDA, 2007 Census of Agriculture. Appendix B. p. B-21.

5. USDA, 2007 Census of Agriculture. Appendix B. p. B-23.

7. Vernon P. Grubinger, *Sustainable Vegetable Production from Start-Up to Market*. Natural Resource, Agriculture, and Engineering Service Cooperative Extension. Ithaca, NY: 1999.

8. USDA, National Agricultural Statistics Service. "2007 CENSUS OF AGRICULTURE - COUNTY DATA". Table 8, Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2007 and 2002.

^{6.} Elizabeth Henderson with Robyn Van En, *Sharing the Harvest: A Guide to Community Supported Agriculture.* Chelsea Green Publishing, White River Junction, VT: 1999.

Conservation Service (NRCS), as well as regional comprehensive plans. There is another outdated rating system, developed from a publication by the NRCS, titled "Agricultural Value Groups for Vermont Soils." While this Agricultural Value data system is more nuanced, it is outdated and considered less accurate than the Important Farmland designation.⁹

The Important Farmland ratings "identify soil map units that represent the best land for producing food, feed, fiber, forage and oilseed crops."¹⁰ The units used in the survey are: Prime Farmland, Unique Farmland, Additional Farmland of Statewide Importance and Additional Farmland of Local Importance. While the Important Farmland definitions (See definitions at right) may seem indicate that only Prime soils are truly suitable for agriculture, according to Thomas Villars at NRCS, "Statewide soils, along with Prime Farmland, are very suitable for growing crops and for pasture. Both the Statewide and Prime Farmland soils fall under what Vermont classifies as Primary Agricultural Soils. In a few counties, there are also soils identified as 'Locally important farmland soils' that fall under the state Primary Ag[sic] Soil designation. All of these soils are good for agriculture. Some have wetness issues or flooding concerns or whatever, but they are relatively the best we have."¹¹ As such, there are other soils that contribute to the overall agricultural soil acreage total, and consequently, the Important Farmlands acreage totals offer a conservative estimate of agricultural capacity (for instance, Franklin County currently has more acres in farms than are considered Important Farmland). Even though the classification may not capture all possible agriculture land, the rating does give a baseline of good land in the counties, and given the relatively small size of Vermont, it should not be ignored when planning for future development.

Agricultural Value Classification System

The Agricultural Value systmewas first published in October 1985 and then revised in March 1995, August 1999 and November 2002.¹² The publication reports data from a number of county Agricultural Value Group studies completed in the late 1980s, which rank the potential of soil map units within a specific county for crop production. The Agricultural Value Groups were derived by integrating three land classification systems: land capability classification, Important Farmland classification and soil potential ratings. Other factors were also considered, including slope, parent material and general knowledge of the use and management of specific soils. Soil map unit acreage was used to help derive the relative value of each group. Agricultural value groups are a land classification system that can be used to compare the "relative value" for crop production of one soil map unit to another.¹³ The relative value assigned to each Agricultural Value Group is a weighted average for the group and was derived using the soil potential indices (SPI's) (see Soil Potential Study) and the acreage of each soil map unit. Acres represent the estimated acreage of each soil map unit. As stated, the survey to attain the soil data is quite dated (see table below); however, Carolyn Alves from NRCS indicated that the mapping tends to be better for the agricultural areas in the old surveys.¹⁴

COUNTY	SOIL SURVEY DATE
ADDISON	1971
CHITTENDEN	1974, reissued 1984
FRANKLIN	1979
GRAND ISLE	1959
LAMOILLE	1981
WASHINGTON	2005

13. USDA, Natural Resources Conservation Service, p.7.

^{9.} Carolyn Alves, personal email to author. July 6, 2009

^{10.} USDA, Natural Resources Conservation Service, p.1.

^{11.} Thomas Villars, personal email to author, July 8, 2009.

^{12.} USDA, Natural Resources Conservation Service. "Farmland Classification Systems for Vermont Soils." June 2006. p.6.

^{14.} Carolyn Alves, personal email to author. June 22, 2009.

Important Farmland Ratings¹:

Soil map units are Prime Farmland if they have the best combination of physical and chemical characteristics for producing food, feed fiber, and oilseed crops and are also available for these uses. The present land use may be cropland, pasture, forestland, or other land uses, but not urban and built-up or water. Location, tract size, and accessibility to markets and support industries are not considered when making a Prime Farmland determination.

Prime Farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. These soils have an adequate and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity, and few or no surface stones or boulders. They are permeable to water and air, are not excessively erodible or saturated with water for a long period of time, and don't flood frequently or are protected from flooding.

To qualify as a Prime Farmland soil map unit, the dominant soils must meet all of the following conditions:

- Soil temperature and growing season are favorable.
- Soil moisture is adequate to sustain commonly grown crops throughout the growing season in 7 or more years out of 10
- Water moves readily through the soil and rootrestricting layers are absent within 20 inches of the surface.

• Less than 10 percent of the surface layer consists of rock fragments larger than 3 inches in diameter.

• The soils are neither too acid nor too alkaline, or the soils respond readily to additions of lime.

• The soils are not frequently flooded (less often than once in 2 years) and have no water table, or the water table can be maintained at a sufficient depth during the growing season to allow for the growth of commonly grown crops.

• Slope is favorable (generally less than 8 percent) and the soils are not subject to serious erosion.

• The soils are typically deep (greater than 40 inches to bedrock), but include moderately deep soils (20 to 40 inches) with adequate available water capacity

Additional Farmland of Statewide Importance (Statewide)

This is land in addition to Prime and Unique Farmland that is of Statewide importance for the production of food, feed, fiber, forage, and oilseed crops. In Vermont, criteria for defining and delineating Farmland of Statewide Importance was determined by the appropriate state agencies, working with the Natural Resources Conservation Service.

The dominant soils in these soil map units have limitations resulting from one or more of the following conditions:

- Excessive slope and erosion hazard,
- Excessive wetness or slow permeability,
- A flooding hazard,

• Shallow depth (less than 20 inches) to bedrock or to other layers that limit the rooting zone and available water capacity,

• Moderately low to very low available water capacity.

Additional Farmland of Local Importance (Local)

In some areas, there is a need to identify additional farmland for the production of food, feed, fiber, forage, and oilseed crops that has not been identified by the other categories in the Important Farmland system. These lands can be identified as Additional Farmland of Local Importance by the appropriate local agencies. In places, Additional Farmland of Local Importance may include tracts of land that have been designated for agriculture by local ordinance.

In Vermont, a few soil map units in some counties have been identified as Additional Farmland of Local Importance. Soil map units in Agricultural Value Group 8 could potentially be Additional Farmland of Local Importance. These soil map units have limitations for crop production that can be overcome. Many areas of these soil map units are currently being used for hay or pasture. The local Natural Resources Conservation Districts make these designations, with assistance from local NRCS personnel and concurrence by the NRCS State Conservationist.

The following soil map units are considered Additional Farmland of Local Importance:

Addison County:

Adams Loamy Fine Sand, 5 To 12 Percent Slopes Colton Gravelly Sandy Loam, 5 To 12 Percent Slopes-Raynham Silt Loam, 6 To 12 Percent Slopes

Franklin County:

Missisquoi Loamy Sand, 8 To 15 Percent Slopes

1. USDA, Natural Resources Conservation Service, p.1.

Precedent Studies

Think Globally, Eat Locally: San Francisco Foodshed Assessment

he most recent and most relevant study comes from the American Farmland Trust (AFT), completed in collaboration with the University of California at Berkeley and Sustainable Agriculture Education (SAGE). Similar to this study, the report was designed to "take a snapshot of local food production, distribution and consumption; to identify information gaps; and to investigate the basic challenges and opportunities associated with expanding both the production and consumption of locally-grown food in the region."¹ The study, titled "Think Globally, Eat Locally: San Francisco Foodshed Assessment," analyzes the 100-mile foodshed surrounding the Golden Gate bridge. Ultimately, the study found that 20 million tons of food is produced in this foodshed annually, compared with annual food consumption of 935,000 tons in San Francisco and 5.9 million tons in the Bay Area alone.² Similar to the Burlington area, eating locally has significant momentum in San Francisco, and as "the fossil fuel era wanes, fresh, local food may gain an advantage in the marketplace over food that is processed and shipped long distances."3

Summary of Precedent Studies

- There is not consensus among researchers on methodologies to study food consumption and production.
- Food availability data is often used as a proxy for consumption.
- Across the board, greater scholarship and more detailed data is needed on food consumption, production and the agricultural land base.
- Scholarship is also needed on what sets of existing data on supply, demand and land use are the most accurate.

The study comprised a statistical analysis of food production and consumption and a review of publications, websites, local food-related organizations and area consumers to understand how food moves from farm to table and to identify issues and opportunities for local food. As a tangent area of study, the amount of sustainable and organic growing practices was investigated, defined as "agricultural production practices that minimize the use of pesticides and other fossil fuel inputs."⁴

Food production data for the study was gathered from the annual reports compiled by the Agricultural Commissioners in each California county. While these reports are detailed and generally considered reliable,⁵ they do not include information on where the livestock and crops are marketed. As stated, the UDSA's Agriculture Census provides information on farm sales and acres harvested, but it does not track where the food is consumed. [Based on the Agricultural Commissioners' data, , the study found that the area surrounding San Francisco produces over 80 types of crops and varieties.⁶

The AFT study reinforces the problematic nature of food consumption data, stating, "Despite our best efforts, like other researchers before us, we could find no reliable data on food consumption specifically for the City of San Francisco or other communities in the Bay Area."⁷ Data on food availability and dietary patterns from the USDA and consumer spending data from the Bureau of Labor Statistics was used as a proxy for actual food consumption.⁸ The study analyzed the Loss-Adjusted Food Availability Data, estimated at the national level by compiling records of all food produced in the U.S., adding imports and subtracting exports, and then applying estimates of losses due to spoilage, waste and other losses.⁹ The analysis estimates there are 1,423 pounds of food available for every consumer, while the dietary survey data suggests that each consumer only eats 794

- 3. Thompson et al. p.1.
- 4. Thompson et al. p.5.
- 5. Thompson et al. p.6.
- 6. Thompson et al. p.7.
- 7. Thompson et al. p.6.
- 8. Thompson et al. p.6.
- 9. Thompson et al. p.6.

^{1.} Edward Thompson, Alethea Marie Harper, and Sibella Kraus. "Think Globally, Eat Locally: San Francisco Foodshed Assessment". American Farmland Trust: 2008. p.6.

^{2.} Thompson et al. p.1.

pounds of food.¹⁰ Explaining that the "food supply estimate uses rough estimates of how much food is lost between farm and plate, while the dietary survey is limited by reporting errors: consumers tend to report eating less than they really do, particularly of 'bad' foods,"¹¹ the study suggests that the actual amount of food consumption is likely to be in between these two figures.

The study also analyzed consumer spending to judge if higher incomes correlated to healthier eating, concluding that all consumers have come to expect to spend a relatively small proportion of their income on food.¹² Between 1987 and 2006, the percentage of income spent on food fell from 15% to 12%.¹³ As San Franciscans spend only 56% of their food budget at home, the source of food for local restaurants and fast food operations could have large impact on if people are eating locally.

For the land analysis, the AFT study did have the advantage of the Farmland Mapping & Monitoring Program (FMMP) of the Division of Land Resource Protection at the California Department of Conservation, identified as one of the best mapping projects in the country.¹⁴ The maps are updated every two years and include data on a per parcel basis. The report states that within the roughly 30,000 square miles (ten million acres) of land within the 25 counties that lie at least partially within 100 miles of the Golden Gate, "only half of this land is used for agriculture. The rest is forest, mountains, wetlands or developed for urban uses."¹⁵

In conclusion, the study cites the lack of traceability of food to be the overwhelming challenge to analyzing the food system and states "the first challenge to expanding local food systems in northern California or elsewhere is to re-establish the connection between farm and fork, between producer and consumer, between the food and its story."¹⁶ The market share of direct sales, Community Supported Agriculture (CSA) and farmers' markets is growing rapidly but remains a small proportion of total consumption. To bring local consumption to scale, large chain supermarkets would have to overcome the challenges posed by their reliance on economies of scale and standardization requirements, which is likely to increase costs if they were dealing with multiple producers and smaller amounts of each commodity. The study concludes with several recommendations, such as increasing the transparency of the food system, educating consumers on food choices, and expanding infrastructure capacity, but it does not offer any concrete steps on how to attain the stated goals. The report concludes that this study barely scratches the surface of the local food system in San Francisco and there is much more to do and learn.¹⁷

David Timmons: Measuring and Understanding Local Foods: The Case of Vermont

he literature review included in a thesis by David Timmons, "Measuring and Understanding Local Foods: The Case of Vermont," summarizes previous models for measuring food consumption. Timmons summarizes the merits and drawbacks of each method analyzing:

- 1. The U.S. Commodity Flow Survey (CFS), published by the Economic Census (U.S. Census Bureau)
- 2. The Minnesota IMPLAN Group (MIG) input-output model
- 3. Bahn and Christensen (1979)
- 4. The Cornucopia study of the Rodale Institute (1982)

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5. Gingrich and Madden (1979)

Food consumption models

The CFS is conducted every five years and records the value and weight of goods transported within the United States, aggregated under NAICS codes. Timmons contends that while this data does track the movement of food, it is limited in that "goods can represent anything from raw commodities (e.g. corn) to partially processed

- 10. Thompson et al. p.15.
- 11. Thompson et al. p.15.
- 12. Thompson et al. p.24.
- 13. Thompson et al. p.24.
- 14. Thompson et al. p.6.
- 15. Thompson et al. p.7.
- 16. Thompson et al. p.33.
- 17. Thompson et al. p.36.

foods (corn meal) to finished foods (corn flakes), and thus their values vary considerably."¹⁸ In addition, shipment origins and destinations do not exactly track consumption data. Timmons cites Vermont as an example, as many food shipments into the state originate in New York or Massachusetts. Lastly, this data is problematic for Vermont because transportation from farms directly to distribution points is not included.

The Minnesota IMPLAN Group (MIG) created software for input-output modeling, which includes a factor called the "Regional Purchasing Coefficient" (RPC), defined as the "proportion of local supply that satisfies local demand."¹⁹ The data sources behind this model are the USDA's Census of Agriculture, transport data from CFS and the Oak Ridge National Labs data on transportation modes, distances and costs.²⁰ Timmons argues that the IMPLAN RPCs are the most accurate estimates of local food consumption but are not sensitive to local consumer preferences.²¹ As Vermont has a strong consumer enthusiasm for buying local, the IMPLAN model may not be able to accurately capture the buying trends of Vermont's consumers. Additionally, the complexity of the model is a drawback, as most local users "cannot hope to understand what the model results mean for their particular areas."²²

Self-sufficiency studies

Next, Timmons reviews several self-sufficiency studies, primarily from the 1970s and 1980s, when several methods and manuals were published. Each of the methods examined assume that local production will first satisfy local consumption and commodities will be exported only when local consumption is satisfied. Timmons notes that each of the methods ignores cross-transportation and offers that apples are both imported and exported in Vermont. Despite their limitations, Timmons suggests these models are starting points for understanding local food systems.²³

The first study reviewed by Timmons is by H.M. Bahn and R.L. Christensen and was published in the *Journal of Northeastern Agricultural Economics* in 1979. This project compared 1975 national per-capita consumer expenditures with production data from the Census of Agriculture. Food was aggregated into seven different categories, and crop production value was converted to a retail price by multiplying a farm-retail price spread factor.²⁴ One limitation of this study is that the farm-retail price spreads do not include food eaten away from home, which as of 2007, constitutes almost half of consumer spending on food.²⁵ As Timmons explains, "Farm-restaurant spreads undoubtedly exceed farm-retail spreads, so use of the farm-retail figure has the effect of understating the final value of food consumed, and thus understating the possible self-sufficiency of a region."²⁶ The study, updated in 2000 by Holm et al. using the same methodology, found Vermont to have production levels at 123% of consumption in 1975 and at 111% in 1997. These figures represent the general production capacity of farmers in Vermont; however, the calculation method allows for surpluses in one category to increase the total self-sufficiency estimate. This means that dairy production was found to have a value of 830% rather than 100%. It might have made more sense to cap production capacity at 100%, since surplus production would lead to exports, not additional consumption. If the production categories had been capped at 100%, then Vermont would have been considered 31% self-sufficient in 1997.²⁷

In 1982, the Rodale Institute in Pennsylvania published a manual on calculating food self-sufficiency on the state-level, titled "The Cornucopia Project." Timmons reports that the Cornucopia's method was similar to Bahn and Christensen's methodology and that their results are fairly detailed. Included in the report is mention of how the lack of standardization in data collection among the states will prevent data from being comparable. In the manual, Pennsylvania was found to be 29% self-sufficient, and when Cornocopia's methodology was to Vermont in 1984, the state was found to have the potential to be 27% self sufficient.²⁸

The last methodology reviewed by Timmons, and the method used in his study, was created by Gingrich and Madden in 1979 in a Pennsylvania State University study entitled "Trends in Agricultural Self-Sufficiency in

18. David. S. Timmons. "Measuring and Understanding Local Foods: The Case of Vermont." Master's Thesis, University of Vermont. May 2006. p. 33.

- 19. Timmons. p. 34.
- 20. Timmons. p. 34.
- 21. Timmons. p. 35.
- 22. Timmons. p. 35.
- 23. Timmons. p. 36..
- 24. Timmons, p. 36.
- 25. Bureau of Labor Statistics. Consumer Expenditure Survey.
- 26. Timmons, p.36.
- 27. Timmons, p. 37.
- 28. Timmons, p.38.

_iterature Review

Timmons uses Gingrich and Madden's method to calculate an upper-bound for local production and consumption but makes several modifications. First, the national production levels, gathered from the USDA's Census of Agriculture, are adjusted for imports and exports. The food categories used are broadened to match the USDA's Agricultural Census commodity breakdowns. Additionally, self-sufficiency is capped at 100%. Timmons also calculates the capacity of food processing using a process similar to the process used to calculate local production , as an "additional constraint or second possible upper bound on local food consumption."² Finally, calculations for two possible lower bounds are also presented.

Before presenting Timmons' findings, there are a few things to keep in mind. Timmons does not include "nursery, greenhouse, floriculture and sod," so greenhouse vegetables are not included in his study. Fish and seafood are also excluded. Timmons uses the UDSA ERS's data on "supply and use" to calculate the importexport adjustment. He also rightly notes that there is some inaccuracy in his data because the ERS data is supplied by weights and volumes, and the Agriculture Census provides dollar values of goods.

Timmons' Methodology and Findings

Using population data from the 2002 Census and state-level per capita production data from the USDA, Timmons calculates two upper bounds, based on production and processing, and two lower bounds, derived from Vermont's portion of national production and direct sales.

Maximum 1: The sum of the minimum of state per capita production is divided by the U.S per capita production. Then, the U.S. per capita production is divided by itself, and the lesser of these two values is selected, which "caps the potential local food contribution from any one category at the national level."¹

Maximum 2: Food processing data is gathered from the NAICS codes from the Economic Census in 2002. The same method as Maximum 1 is followed to compare the state level processing per capita to the U.S. processing per capita. Similarly, the smaller of the two numbers becomes the upper limit on in-state food consumption.²

Minimum 1: If there were no transportation costs and all food supplies in the U.S. were thoroughly mixed, the minimum amount of local food consumed would be its own local contribution to national production. This is calculated by taking the sum of state production levels of each commodity group divided by the U.S. population, divided by the sum of U.S. production divided by U.S. population.

Minimum 2: This value is based on direct sales data from the USDA and food expenditure data from the Bureau of Labor Statistics. Assuming that direct sales costs mirror retails costs and that direct sales include sales of food that is sold where it is produced, Timmons calculates the second lower bound on food consumption. The total direct sales on the state-level is divided by the multiple of the state population and the regional at home food expenditures divided by the number of consumers per consumer unit by region.³

The upper and lower bounds for Vermont are respectively found to be 37.8%, 49.2%, .3% and 1.2%.⁴ Per capita production in Vermont exceeds U.S. production in three categories: other crops and hay, other animals

- 3. Timmons, p. 48.
- 4. Timmons, p. 50.

^{1.} Timmons, p. 43.

^{2.} Timmons, p. 45.

Timmons' study presents an advanced model for measuring food consumption. However, there are a few drawbacks to his method. He does not comment on the Food Commodity Intake Database, and instead he solely relies on food production data as a proxy for consumption. In addition, it does not make sense to use the direct sales data as a lower bound calculation of consumption because this represents such a small proportion of actual consumption. Lastly, Minimum 1 is also problematic, as consumption in states with small geographic areas who contribute a relatively smaller portion to the national food supply is greatly diminished.

Existing Chittenden County Food Expenditures, the Intervale Center

he Intervale Center recently published estimated food expenditures in Chittenden County. Based on the USDA's Transportation and Marketing Services data, the report states that the Chittenden County food expenditures total approximately \$439 million dollars on food each year, including food at home and food away from home.¹ The figure was calculated by multiplying the estimated number of households (obtained from the Center for Rural Studies at the University of Vermont) by the estimated Household Annual Expenditure data from the USDA's Transportation and Marketing State Profile tables. Of the \$439 million spent on food, \$255 million is projected to be spent on food at home.

Consumption Patterns and Demand for Local food in Chittenden County, Vermont, Center for Rural Studies at the University of Vermont (UVM) and the Intervale Center

n January 2009, the Center for Rural Studies published a study on food consumption in Chittenden County in collaboration with the Intervale Center. Data was collected through a phone survey of randomly selected households in Chittenden County. The questionnaire was tested by trained professional interviewers, as well as reviewed and approved by UVM's Committee on Human Research.² The survey was conducted between 4 and 9 PM between November 5th and 13th in 2007 and utilized the Sawtooth Software Ci3 computer-aided telephone interviewing (CATI) system. 1,030 households in Chittenden County were contacted, which yielded 412 usable questionnaires. Survey results were then analyzed using SPSS 15.0 (Statistical Package for the Social Sciences).

The study presents a coherent portrait of a common food shopper in Chittenden County. The criterion for participation in the study was that respondents must be the "primary food shopper in the household."³ The predominant demographic is a female shopper between the ages of 35 and 64 with a household income of over \$50,000 who shops at a large grocery store for a two person household. The key findings were that 97.1% of consumers did their shopping at a grocery store, and almost half (47.3%) responded that Hannaford was their primary store. The factors listed as what people liked most about their grocery store of choice were, in order of importance, location, food product selection, prices of products and simply liking the store.⁴

In terms of spending, consumers reported that they spent an average of \$111 in the previous 7-day period and tended to spend the most money at grocery stores (spending data does not include money spent on a CSA share).⁵ It was not recorded how often the consumers went to the store or how many people were being fed with the money spent on food.

Spending on local food was found to be significantly more likely for people who were younger (mean age of 54), had a larger household size (mean of 2.6) and had lived in Vermont for less years (mean of 33.5 years) than their counterparts.⁶ The study reports that the majority (65.3%) bought their local products at their primary grocery store, followed close by a general store (63.3%) and their secondary grocery store (59.3%).⁷ Buying local at one's primary grocery store was found to be significantly related to having a bachelor's degree and having a household income over \$65,000 annually.⁸ In terms of products, many consumers bought traditional Vermont products, including dairy, maple products, apples and apple products. 24% of respondancts indicated there are products that they would like to buy locally but have not been able to find, with meat being the most commonly mentioned product (21.2%). Other products mentioned as unavailable are vegetables **1**. The Intervale Center. "Explaining Chittenden County Food Expenditures." p.1.

2. Center for Rural Studies and The Intervale Center. "Consumption Patterns and Demand for Local food in Chittenden County, Vermont, Center for Rural Studies, University of Vermont." January 2009. p.4.

3. Center for Rural Studies, p.5.

- 4. Center for Rural Studies, p.7.
- 5. Center for Rural Studies, p.9.
- 6. Center for Rural Studies, p.9.
- 7. Center for Rural Studies, p.10.
- 8. Center for Rural Studies, p.10.

(20.2%), fruit (14.1%), produce (7.1%) and dairy products (4.0%). It is not explained how "produce" differed from fruit and vegetables. Over three-fourths of respondents would like to see more local food at the two locations where they spend the highest amount on average: their primary grocery store and Costco. The common barriers to buying local food consistently were seasonal availability and price.

There are a few weaknesses to the study. Overall, the study lacked clarity, primarily due to a lack of key definitions. First, the definition of local used in the study is not provided. In connection, as most people reported buying locally at a grocery store, it is pertinent to know how grocery stores define "local" and how consumers knew what they were buying was local. Secondly, it is unclear where the list of telephone numbers came from and consequently not possible to define the sample for the study. It is important to consider where the phone numbers came from, as this may have excluded individuals who only have a cell phone, who are typically not listed in the phone book. In addition, low-income families may not be able to afford a landline or may have service intermittently. Lastly, the study was conducted in November when farmers' markets and Vermont's growing season is significantly winding down, so fewer local foods may have been available for purchase.

Doug Hoffer and Ellen Kahler, The Vermont Job Gap Study, The Leaky Bucket: An Analysis of Vermont's Dependence on Imports

In July 2006, the Peace and Justice Center published the Leaky Bucket study as part of the Vermont Job Gap study. The purpose of the study was to "explore Vermont's reliance on outside sources of goods, services and capital and, to the extent possible, quantify the outflow of dollars, as well as opportunities for import replacement." Using data from the U.S. Customs Service, Office of Strategic Operational Analysis, the study found that in 1997, \$14.6 billion dollars worth of commodities were shipped into the state and that Vermont had an overall trade deficit in commodities of between \$8-10 billion. For food and kindred products specifically, Vermont was found to produce \$1,230,000 dollars with dairy accounting for \$783,000 of those sales. In contrast, the state imported \$1,808,000 in food domestically, creating a deficit of \$578,000. Thus, on average people were estimated to spend \$3,064 on food produced outside of the state in 1997. Using the input-output model, the study contends that if Vermonters substituted 10% of what they import with local production, \$376 million in new economic input would result, including \$69 million in personal earnings from 3,616 new jobs.

In addition to the U.S. Customs Service data mentioned, the study relied on data from the following sources, listed by type:

1. Instate Production: 1996 Annual Survey of Manufacturers for Vermont, U.S. Census Bureau

2. Domestic Imports: 1997 Commodity Flow Survey (CFS), U.S. Census Bureau and the Bureau of Transportation Statistics. Unpublished data.

The data on food was not broken down by county or commodity and for this reason would not be suitable for this study.

Delaware Valley Regional Planning Commission- Food System Study (unpublished)

The Delaware Valley Regional Planning Commission (DVRPC) is both a planning and transportation organization covering a nine-county area surrounding Philadelphia with parts in New Jersey and Pennsylvania. The agency focuses on transportation, land use, environmental protection and economic development issues. In 2008, DVRPC embarked on a three-year study of the 100-mile foodshed surrounding Philadelphia. The results of the study are not published yet, but the stated goals are "to evaluate the region's food needs, assessing the expanded food shed's agricultural resources, estimating the efficiency of transporting food from farm to plate, and planning for the increased production of food given rising fuel and food costs, and competing global markets." Preliminary indications point to the food consumption data being derived from USDA's food availability data. The study is ambitious and will likely offer a comprehensive model for measuring a local regional system.

Several other studies were reviewed for pertinent information and methodologies for measuring food consumption, including:

- 1. Ginger Nickerson, Understanding Vermont's Local Food Landscape: An Inventory and Assessment of Recent Local Food. Prepared for The Vermont Sustainable Agriculture Council, 2008.
- 2. Rachel Schattman, Sustainable Food Sourcing and Distribution in the Vermont-Regional Food System. Prepared for the Vermont Sustainable Agriculture Council, Rubenstein School of Environment and Natural Resources, University of Vermont. October 2008.
- 3. Caroline Alves, Farmland Preservation: Using GIS to Identify Valuable Soils, Viable Farms and Vulnerable Areas in the Lewis Creek Watershed. Master's Dissertation, University of Edinburgh, Scotland. No date available.
- 4. Shauna Cozad, Shawn King, Henry Krusekopf, Sarah Prout and Gail Feenstra. *Alameda County Food Shed Report.* UC Sustainable Agriculture Research and Education Program UC Davis. October 2002.
- 5. Portland State Institute of Metropolitan Studies. *Planting Prosperity and Harvesting Health: Trade-offs and Sustainability in the Oregon-Washington Regional Food System.* October 2008.
- 6. George C. Burill and James R. Nolfi, *Land, Bread and History: A Research Report on the Potential for Food Self-Sufficiency in Vermont.* Center for Rural Studies, 1975.

Knowledge Gaps: Recommended Areas of Further Research

Methodology

- 1. New studies of food consumption
- 2. Models of how to compare intake and/or consumption data to production data
- 3. Most reliable existing consumption data

Farm Profitability

- 1. Farm profits variation via the various revenue streams
- 2. Yield estimates: Production styles and expected yields

Land Use and Planning

- 1. Define the local foodshed with possibility of including areas of New York State and Quebec
- 2. Consolidation of zoning information and/or growth management measures from all towns
- 3. Consolidate visions for growth and plans for added population
- 4. Update and add detail to soil surveys, delineate which land is suitable for which type of food production

Selected Data Sources and Methodology

The charge of this study was to address very complex issues with limited resources and time, and the vision for the project was not to obtain an academic level of rigor. Rather, the project was designed to obtain the clearest image possible of local food consumption, production and land use, to identify information gaps and to investigate the basic challenges and opportunities associated with the production and consumption of regionally produced food.

The study methodology includes four basic parts: an analysis of existing data sources and precedent studies, a statistical look at food consumption, production and land use in the six county region, the completion of qualitative interviews to investigate how food moves throughout the study area and the creation of recommendations based on the study findings. For each area - consumption, production and land use - a primary set of data was selected. Qualitative information was sought to finesse the primary data.

The data sources used in this study are delineated below, including the benefits and drawbacks of each data set. All assumptions made are included with the relevant data and at the end of this section. All definitions are included in a Glossary at the end of the report.

CONSUMPTION

Despite several conversations with researchers at the USDA and university professors and analysis of precedent studies, no reliable data on food consumption could be found. The data chosen for the study as the most relevant was the Continuing Survey of Food Intakes by Individuals (CSFII). As previously stated, there is more recent consumption data available from two other sources, The National Health and Nutrition Examination Survey (NHANES) and the Food and Nutrient Database for Dietary Studies (FNDDS), but neither is usable for this study for the following reasons:

- NHANES: All data is listed by nutrient (Folic acid, Iron, etc.), rather than by food commodity.
- FNDDS: All of the portion weights would need to be calculated from the 5-digit code that refers to the food portion description. The food portion descriptions include things like a slice, a piece or "can snack size," which is problematic for this study.

Food consumption was estimated through the following steps:

- 1. The mean consumption per individual in the Northeast for a basic basket of goods was obtained from USDA's Continuing Survey of Food Intakes by Individuals (CSFII) from the Food and Nutrient Intakes by Individuals in the United States, by Region, 1994-96, Table 13.
 - a. Meat and Egg products
 - i. Beef
 - ii. Chicken
 - iii. Pork
 - iv. Eggs
 - b. Fruit
 - i. Apples
 - ii. Bananas
 - iii. Citrus
 - iv. Melons and berries
 - v. Juice and non-citrus juice
 - c. Vegetables
 - i. White potatoes
 - ii. Dark-green and dark-yellow vegetables
 - iii. Tomatoes
 - iv. Lettuce and lettuce-based salads
 - v. Corn, green beans and lima beans

- d. Dairy
 - i. Milk
 - ii. Yogurt
 - iii. Cheese
- e. Grains
 - i. Yeast bread and rolls
 - ii. Rice
 - iii. Pasta
 - iv. Ready to eat cereals
- 1. The mean consumption per individual of the items listed above was converted to mean pounds consumed.
- 2. The mean consumption per individual in pounds was multiplied by 365 to estimate the annual consumption per individual.
- 3. The annual mean consumption of all food items was multiplied by the population total from the 2007 American Community Survey to estimate average annual consumption levels for the six county region.

Benefits of Consumption Data Source

- Data is from a 3 year period, so dieting fads and trends may be balanced out in the data.
- Data is from the time period prior to when the Atkins and South Beach diets were popular.
- The data is utilized by the UDSA for their reports on diet patterns, which indicates this might be the best available data.
- Data is fairly detailed and includes consumption of individual commodities.
- Data is available for the Northeast region.
- According to a regional manager of a Vermont grocery store chain, buying patterns have not changed significantly in many years, which may indicate that dietary patterns have also not changed.

Drawbacks of Consumption Data Source

- Data is dated.
- Dietary surveys are problematic. People tend to underreport consumption, over-reporting "good" foods and underreporting "bad" foods.¹
- Strictly speaking, it is not statistically accurate to calculate "average" consumption from two days of survey data.

MARKET STUDY

The market study was conducted through the completion of the following steps:

- 1. Community demographics were gathered from the 2007 American Community Survey to create a consumer profile in the six county region.
- 2. Farm operator and operation demographics were obtained from the 2007 Agricultural Census.
- 3. A recent Center for Rural Studies and Intervale Center collaborative study on consumer shopping preferences was consulted to ascertain popular food sources for the population.

1. Edward Thompson, Alethea Marie Harper, and Sibella Kraus. "Think Globally, Eat Locally: San Francisco Foodshed Assessment". American Farmland Trust: 2008. p.22.

- 4. Annual sales data was obtained from a Northeast regional grocery store chain, making it possible to identify the top five selling products for the defined basic basket of goods. For example, the sales data indicated that the most popular kind of beef was 93% lean ground beef.
- 5. Prices for each top selling item in the defined standard basket were obtained through a field study of three grocery store chains in Burlington. The average price per pound of each item was calculated from the field data.
 - a. It was not always possible to ascertain the exact product from the sales data. For example, the sales data indicates the highest selling sausage is "fresh sausage" but does not specify a specific brand or type (e.g., "Hot Italian"). However, the regional manager indicated that the item with the highest sales will always be the product that takes up the most shelf space or space in the refrigerated case. In instances when it was not possible to identify the exact product from the sales data, a visual inventory was conducted at the store and the product in the highest quantity was selected for the pricing study.
 - b. To prevent the risk of overestimating spending, the products chosen for the pricing survey were conventionally produced and often the store brand. As expected, these products tend to have the lowest prices.
- 6. The average annual consumption of the commodities in pounds was then multiplied by the average price per pound to estimate the annual amount of money spent per year on the defined basic basket of goods.
- 7. The average price per pound of the top selling food products was used to break down the Consumer Expenditure Survey (CES) data to gather a secondary estimate of consumption.

Benefits of Market Study Data

- Demographic data is recent and y detailed.
- Sales data is an accurate measure of spending, as according to a regional manager for a Northeastern grocery store chain, neither buying patterns nor pricing change significantly from year to year.
- CES data is available for the Northeast region.

Drawbacks of Market Data

- Regional grocery store chain requests to remain anonymous.
- Grand Isle County was not included in the U.S. Census 2007 American Community Survey (ASC), so there are limited estimates for Grand Isle in 2007. For graphs and analysis based on the 2007 ACS, Grand Isle was not included.
- Financial data on farm operations can be problematic (See Existing Data).

PRODUCTION

Food production totals were calculated through the following process:

- 1. The 2007 Census of Agriculture was used to obtain current amounts of agriculture production, including acres harvested and quantities of livestock for consumption.
- To calculate how much food is being produced, yield data and production data was gathered from local producers and established growing guides to convert acres or headcounts of livestock to pounds of food produced. The yield sources used were:
 - a. Elizabeth Henderson with Robyn Van En, Sharing the Harvest: A Guide to Community Supported Agriculture.
 - b. Vernon P. Grubinger's book, Sustainable Vegetable Production from Start-Up to Market.

- 3. The amount of food produced annually was then compared to the pounds of food consumed annually.
- 4. Yield data was used again to estimate how many additional acres would be needed for each commodity to meet the regional demand.

Benefits of Production Data

- Data is recent and detailed.
- Data includes individual commodity production.

Drawbacks of Production Data

- Total acres harvested are reported, but bushels harvested are not recorded for all commodities. Consequently, yield estimations must be used to calculate total production levels.
- Types of production methods and yields are not detailed in the Agricultural Census.
- If there is only one farm producing a particular commodity in any county or state, production data is withheld to protect their privacy.
- Yield estimates are highly variable based on production method (planting density, organic vs. conventional, livestock breeds, type of feed given to livestock, etc.).

LAND USE

The amount of land suitable for agriculture was calculated through the following steps:

- 1. Acres in agriculture production were obtained from the 2007 Census of Agriculture.
- 2. Important Farmland acreage totals were obtained from the GIS data on Vermont Center of Geographic Information (VCGI).
- 3. Comprehensive plans and future land use information was obtained from regional planning offices.

Benefits of Land Use Data

- 2007 Census of Agriculture data is recent and detailed.
- Important Farmland data is considered the most reliable data on agricultural soils.

Drawbacks of Land Use Data

- The soil surveys which provide the basis for the Important Farmland classification system are dated.
- Land classification data does not specify for which type of agriculture each parcel is suited.
- Other land than what is identified as Important Farmland is used for agriculture.
- Data does not include zoning data or information on what levels of population densities are allowed in specific areas.

Summary of Assumptions

CONSUMPTION DATA

- Dietary patterns today parallel the patterns from 1994-1996 and 1998.
- Two-day consumption can be used as proxy to calculate average amount of food consumed per person per year.
- Mean consumption per individual in the Northeast region from the CFSII can be applied to total population of the six county region as estimated from the 2007 American Community Survey.

MARKET STUDY DATA

• Sales data from one regional grocery store chain is representative of dominant shopping patterns in the six county region.

PRODUCTION DATA

- For many commodities, there is not an "average" production method. The assumption is made that the yield data used in the study is representative of average production methods in the six county region.
- Important Farmland data is an accurate assessment of land suited for agriculture in the six county region.

EGGS:

- Consumption data in grams includes only food actually consumed and does not include bones, egg shells or other waste.
- Layer chickens are defined in the Census as, "...table-egg type layers, hatching layers for meat-types and hatching layers for table egg types."
- It is assumed there is not a significant number of hatching layer producers in the 6 county region.
- Hens lay all year round.

BEEF:

• Beef production totals do not include culled dairy.

Existing Conditions

he following is a brief review of population and social, economic and housing conditions in the six county area, followed by an analysis of growth patterns and land use the region.

Community Profile:

Data for the community profile is from the U.S. Census, specifically, the 1990 Decennial Census, Census 2000 and the 2007 American Community Survey. There is limited data on Grand Isle County available from 2007, as the county was not included in the 2007 American Community Survey (ACS). However, the Census Bureau published 2007 Community Estimates for communities not included in the ACS. Values marked with * do not include Grand Isle data. The typical study area is characterized by moderate incomes, a high percentage of population between ages of 45 and 54, married couple family households and a stable housing market.

POPULATION and AGE STRUCTURE:

The six county region was estimated in 2007 to have total population of 327,402, which is 53% of Vermont's total population. Chittenden County, with an estimated population of 151,826 in 2007, accounts for almost half of the population in the area of study. As evident in Image 1 and 2, most counties experienced significant population growth between 1990 and 2000. The average growth rate for the six county region from 1990 to 2007 was 14.53%, slightly above the national average for the U.S. of 13.2% from 1990 to 20001. While the growth rates from 1990 to growth rates from 2000 to 2007, the population gains appear to be leveling out.

DEMOGRAPHICS SUMMARY:

- Population in the six county area grew significantly between 1990 and 2000.
- The average population change in the six counties from 1990 to 2000 was 14.53%, compared to 8.19% growth in Vermont and the national average growth rate for the U.S. of 13.2%.²
- Population data from 2000 to 2007 may indicate that growth levels are leveling out.
- Vermont is projected to have a population of 711,867 by 2030, an increase of 91,278 from the 2007 population.³
 - If population trends stay the same, roughly 50,000 people will be added to the six county region, a population gain of 15%.
- The largest age group in all six counties and Vermont is 45 to 54.
- The largest proportion of educational attainment for people over 25 is a high school degree or equivalent.
- The housing market is stable, and home ownership rates are consistent.
- The median home value in 2007 for the region is \$189,700, slightly below the state median value of \$191,500.
- The median household income in 2007 is \$52,399*, slightly above the median household income in Ver-

 While the growth rates from 1990 to
 3. U.S. Census Bureau. "Interim Projections of the Total Population for the

 2000 are not directly comparable to the
 United States and States: April 1, 2000 to July 1, 2030." http://www.census.gov/population/projections/SummaryTabA1.pdf. Accessed on July 22, 2009.

Note: The population gains in Grand Isle County are significant but represent a relatively small net gain in population. While the county did grow by nearly 30% between 1990 and 2000, the net gain was an additional 1,583 people.

1. Marc J. Perry and Paul J. Mackun. "Census 2000 Brief: Population change and Distribution". U.S. Census; April 2001. p.1.

^{1.} Except where noted, all demographic data came from the DP 1 and DP 4 tables from the 1990 Decennial Census, DP 1 and DP 3 tables from Census 2000, and the Demographic, Social, Economic and Housing Summary tables from the 2007 American Community Census.

^{2.} Marc J. Perry and Paul J. Mackun. "Census 2000 Brief: Population change and Distribution". U.S. Census; April 2001. p.1.

2030 POPULATION PROJECTIONS

The Census does not publish county-level population projections for Vermont. The state is projected to have a population of 711,867 by 2030, which represents an addition of 91,278 persons to the 2007 population estimate. If the study region continues to account for 53% of the state's population, this will mean that roughly another 50,000 people will be added to the six county region by 2030, a population gain of 15%. Based on the 2007 ACS, the average household size for the study region is 2.5 people*. If this pattern is consistent, the study area can expect to add 20,000 households by 2030.

AGE STRUCTURE

The age composition of the six county region is illustrated in the age pyramid below in Image 3. Evident in the graph below, the age brackets indicate thatyoung adults may tend to leave the region following college years.

The high percentage of population between ages 45 and 54 warrants mention, as the age structure may have the potential to place economic strain on the region. As this group ages, changes in market demand are possible; this population may spend less as they are no longer purchasing for an entire a family and/or may have less income after retiring. Simultaneously, an increasingly elderly population will amplify the need for health care and other social services. Regional planning and economic development efforts should keep these possible market changes in mind when creating plans for the future.

Captured in Image 4, the median age does not vary widely but is slightly lower in Chittenden County, likely due to a high number of students and families with young children. In 2007, the median age for farmers in Vermont was 56.3, indicating that farmers in general are older than the general population (discussed below).

				Population	Population
	1990	2000	2007	Change	Change
	Population	Population	Population	1990 to 2000	2000 to 2007
Vermont	562,758	608,827	620,589	8.19%	1.93%
Addison	32,953	35,974	36,638	9.17%	1.85%
Chittenden	131,761	146,571	151,826	11.24%	3.59%
Franklin	39,980	45,417	47,754	13.60%	5.15%
Grand Isle	5,318	6,901	7,601	29.77%	10.14%
Lamoille	19,735	23,233	24,588	17.72%	5.83%
Washington	54,928	58,039	58,995	5.66%	1.65%

Image 1. Source: U.S. Census Bureau. 1990 Census, Census 2000 and 2007 ACS





Median Age, 200	7
Vermont	40.8
Addison	38.8
Chittenden	36.9
Franklin	38.1
Grand Isle	42.6
Lamoille	38.3
Washington	41
Image A Sources IIS Con	ALLA DURAGU

Image 4. Source: U.S. Census Bureau.

Image 2: Source: U.S. Census Bureau. DP-1.

Social Demographics:

Visible in Image 5, the majority of the population in the 6 county region live in family households. This may impact food purchasing patterns, as families must feed more people with the household income than individuals. Families may also economize by buying products in bulk and using more of what they buy, decreasing spoilage rates. Within family households, the Census data further indicates that close to the half of all family households are married couple families.

Education levels for the population over the age of 25 indicate that residents in the study area are moderately educated. Displayed below, the highest proportion of the population over 25 in all counties except Chittenden County has at least a high school degree or equivalent. Chittenden County has the smallest proportion of high school graduates of all the counties but also has the highest proportion of people with a bachelor's and graduate degree. The high attainment level in Chittenden County is likely due to both the presence of the University of Vermont (UVM) or other employers such as IBM, Fletcher Allen Health Care, and GE Healthcare.



Image 5. Source: U.S. Census Bureau. 2007 ACS

	Percent
	Married
	Couple
	Families,
	2007
Vermont	49.50%
Addison	54.30%
Chittenden	45.40%
Franklin	54.20%
Lamoille	46.80%
Washington	47.80%

Image 6. Source: U.S. Census Bureau. DP-1.



Image 7. Source: U.S. Census Bureau.

DP-1.

HOUSING:

The housing market appears stable and homogeneous. Home ownership can be one indicator of stability in a community, as people are less likely to move when they own homes. As seen in Image 8, most of the six counties have higher percentages of home owners than the state averages. Homeownership rates are logically lower in Chittenden County due to the high number of students at UVM and a higher proportion of lower income residents.

The 2007 median home value for the five county region is \$189,700*, just slightly below the median value for the state of \$191,500. The high home prices in Lamoille County may be due to the demand created by the Stowe ski resort. High home prices may present a barrier to maintaining or increasing agriculture production in Lamoille County; the value of the land will be much higher if the land is used for homes.

The vacancy rates further indicate that housing markets in the six county region are relatively competitive compared to the state. The table above includes the vacancy rates for the five counties for which there is vacancy data from 2007. Each county falls below the average vacancy rate for Vermont.

The Chittenden County vacancy rate, included in Image 10, indicates a relatively tight housing market, which anecdotally has only loosened slightly during the current economic and real estate downturn. However, the low vacancy rate in Chittenden County indicates existing homes can command premium prices. The portion of the estimated 20,000 houses to be added to the region by 2030 (See Population Projections) built in Chittenden County will be dependent on consumer demand. If the market does not want to pay the premium prices in the county, development may be pushed to adjacent towns. Any remaining open space at or near the fringe of Chittenden County will likely be considered prime real estate. Consequently, current agricultural production may be difficult to maintain, and land for new agriculture may be challenging to attain.



Homeownership in Northwest

Image 8. Source: U.S. Census Bureau. 2007 ACS



Median Home Value in Northwest Vermont (\$), 2007

Image 9. Source: U.S. Census Bureau. 2007 ACS

Vermont	18.93%
Addison	17.28%
Chittenden	5.21%
Franklin	12.02%
Lamoille	15.57%
Washington	15.91%

2007 ACS

Economic Demographics: Income Level

In the six county region, the median household income for the region is \$52,399*, and the average per capita income is \$26,123*. The income levels align with both state and national data. The 2007 average household income in the U.S. was \$50,007 and in Vermont was \$49,382. Nationally, the per capita income was \$26,178² and the per capita income for the state was \$26,223. As evident in Image 11, the median household incomes from 1990, 2000 and 2007 were highest in Chittenden County and Addison County. As largest employer in Chittenden County is Fletcher Allen Health Care and as the home of UVM, Chittenden County may fall under the "Eds and Meds" economic model. Other counties' income levels are close to the state averages. The per-capita income levels from 1990, 2000 and 2007 suggest that wealth structure has remained consistent during this time frame. In 1990, 2000 and 2007, Chittenden County had the highest per capita income, while Franklin County had the lowest per capita income. With the exception of Chittenden County, the per capita income in the counties is close the state levels.

The average percentage of families living under the poverty level in 2007 in the study region is 6.5%*, very close to the state poverty rate for families of 6.9%. The rate is below the national rate of poverty from 2007 of 9.8%.³ Across the six county region and in Vermont, the Census data indicates that poverty levels fell between 1990 and 2000⁴. Poverty levels then subsequently increased across the board between 2000 and 2007. However, the Census changed the methods of reporting on poverty between 1990 and 2000, which may cause problems when comparing data from 1990 and 2000.

2. U.S. Census. "2005-2007 American Community Survey 3-Year Estimates" <u>http://factfinder.census.gov/</u>. Accessed on June 29, 2009.

3. US Census Bureau, "Household Income Rises, Poverty Rate Declines, Number of Uninsured Up" <u>http://www.census.gov/Press-Release/www/releases/archives/income_wealth/010583.html</u>. Access on July 21, 2009.

4. US Census Bureau, 1990 and 2000 Census, DP-3. 2007 American Community Survey 3-year estimates.



Median Household Income in

Image 11. Source: U.S. Census Bureau.

DP-3.

Consumer Spending

Expenditures included in the CES consist of "the transaction costs, including excise and sales taxes, of goods and services acquired during the interview or record keeping period," including gifts and excluding business purchases.⁵ The entire cost of each purchase is recorded, regardless if full payment is pending. The major expenditure categories are: Food, Housing, Apparel and Services, Transportation, Health Care, Entertainment and Other Expenditures.⁶ A snapshot of consumer spending patterns is included in the graph above. Most remarkable is the change in the spending on "Meat, Poultry, Fish and Eggs" between 1990 and 2007.

It is not possible to compare the CES to the annual sales data obtained from the regional grocery store chain due to differences in product grouping. Proportional details on the sales data are listed below.

Other trends in local purchasing have been ascertained from an interview with a regional manager of a grocery store chain:

- Buying patterns do not change relatively, unless there are fad-type diets that become influential like the Atkins diet.
- Prices do not change significantly.
- Organic sales have not increased nor decreased significantly in the last 2 years.
- Organic buying differs greatly between stores.
- The stores do not feel any significant pressure from consumers to source locally.
- Produce buying is not contract based, except for bananas.
- 5. Bureau of Labor Statistics (BLS). "Glossary." http://www.bls.gov/cex/csxgloss.htm#expn. Accessed on July 3, 2009.
- 6. BLS. "Glossary." http://www.bls.gov/cex/csxgloss.htm#expn. Accessed on July 3, 2009.



Image 12. Source: BLS, CES



Existing Conditions | Land Use Analysis

GROWTH MANAGEMENT

A productive, working landscape and local food have long been valued in the greater Burlington area. A recent restaurant review in the local weekly, *Seven Days*, begins, "Maybe The Farmers' Diner could only happen in Vermont, where robust, modern 'localvore' principles coexist with old-fashioned American ag [sic] of the plaid-clad-farmer variety."⁷ Each regional comprehensive plan for the study area mentions the importance of agriculture and lists the loss of agriculture as a potential threat to the economic, social and environmental health of the respective areas. The Central Vermont Regional Plan states, "Farming helps to define the Region's cultural identity and provides Central Vermont residents with open space, recreational opportunities, aesthetic pleasure and a sense of place. More importantly, farms and farm soils, if protected now, can assure us of some degree of Regional self-sufficiency in the event that outside food supplies dwindle, are cut off or become prohibitively expensive."⁸ Similarly, the Addison Regional Plan declares their support for "residential use as permitted in town bylaws, but encourages the use of cluster/PUD developments particularly in developments on agricultural and forest lands, and/or to protect regionally significant resources."⁹ Clearly, preserving agricultural land is highly valued in the study area.

However, despite the importance of agriculture, there is little land use planning in effect to preserve farmland. The de facto growth management, instead, is governed through market forces. The combination of a high regard for local food and the lack of growth management hints to an unspoken belief that real estate development will not have the magnitude to overcome the working landscape. Yet competition between towns to increase their tax base by adding population may push towns to offer incentives to real estate developers and could potentially threaten the working landscape. The map in Image 14 illustrates the significant loss in land in farms.

The fragmented political structure in Vermont may hinder a regional approach to land use. In Vermont, the municipalities that hold political power are the towns. Each town has a select board of elected officials that govern the town. Their tasks include determining zoning and other land use controls. The regional planning commissions in Vermont have commissions that include the head select board member from each town in the jurisdiction and work toward establishing regional cooperation. The regional planning commissions review each town's municipal plans to see if they are in accordance with the regional comprehensive plan, but there is no 7. Suzanne Podhaizer. "Taste Test: The Farmers Diner." Seven Days. http://www.7dvt.com/2009taste-test-farmers-diner. Accessed on July 7th, 2009.

8. Central Vermont Regional Plan. "Land Use" p.2-3.

9. Addison County Regional Plan. "8.2 Future Land Use." <u>http://www.acrpc.org/pages/publications/Reg_Plan/LU_2.htm#3</u>. Accessed on July 20,2009.



Image 14. Source: Vermont Center for Geographic Informa-(VCGI)



Image 15. Source: VCGI

political mechanism that ensures horizontal cooperation. As Charlie Baker, Executive Director of the Chittenden County Regional Planning Commission, explained, the fragmented control makes growth patterns, such as build out dates, hard to predict. Zoning changes in any individual town can affect development swiftly and dramatically. Baker confirms that even though many towns want to prioritize agriculture preservation, there are several barriers to implementing growth management. For example, many towns plan for compact developments to maintain their rural character; however, utility services and infrastructure are utilized at capacity in many locations. Building population in many areas will require the construction of new roads, water and sewer systems. These systems are costly, and in efforts to attract as many home buyers as possible, towns may be tempted to forgo growth management. In addition, the administration required by Act 250 may further dissuade select boards from creating growth boundaries or employing other growth management tools that may scare off developers. Lastly, as towns face ever tightening budgets, competition between the towns to lure developers and home buyers may also push away from growth management.

Not surprisingly, there are few growth management measures in effect in the six county region. While consolidating zoning and allowable density information for the entire study area is beyond the scope of the project, future land use maps can offer some information on the vision for development in each county. On the whole, the future land use maps for the study area are not indicative of a significant level of protection for agriculture. The Chittenden County Regional Plan includes "Planned Areas" for Rural, Metropolitan, Village, Transition and Enterprise areas. Some of Chittenden County's planned areas for development are on Prime Soil (See overlapping red and green areas in Image 15).

Most of the rural land use allows low-level density housing. For example, Lamoille County contains a large proportion of Rural Residential Areas, which allows for 3 to 10 acre lots and states, "Locations far from roads, power and communications infrastructure increase costs to the project to bring in services or reduce the value of the project by not having access to them. Many of the local land use plans reflect this by identifying lands greater than 500 or 1,000 feet from roads for lower density growth."¹⁰ Only two of the towns in Lamoille County, Cambridge and Johnson, contain agriculturally preserved areas. Similarly, the Rural and Agricultural Planning Areas in the Addison Regional plan region includes "areas designated for residential uses on lots greater than two-acres in size."¹¹ Low density development can be doubly problematic for agriculture, as lots can break up contiguous parcels of land and homeowners may dislike living so close to working farms.

10. Lamoille Regional Plan. p.84.

11. Addison County Regional Plan "Future Land Use." <u>http://www.acrpc.org/pages/publications/Reg_Plan/LU_2.htm</u>.

Both South Burlington and Colchester have Transferable Development Right (TDR) programs, and Vermont Land Trust (VLT) administers a Purchase of Development Right (PDR) program. An updated list of conserved lands by VLT in the study area is included in Image 16.12 When analyzing the farming data in Vermont, it is important to remember that the relative scale of farming in the study area is small. Changes in any one county can change things dramatically. For example, there were 24,221 acres of cropland used only for pasture or grazing in 2007 in the six county area, compared to 37,059 in 2002, a decrease of 39.5%. This is mostly due to the drop in Addison County from 10,516 acres in 2002 to 6,731 in 2007. While the working landscape is clearly valued in Vermont, small changes in land use can affect overall production levels significantly and permanently.

ACT 183

Vermont's State Legislation passed "smart growth" legislation in 2006. Act 183 is designed to encourage compact growth in the state. In order to qualify for the program benefits, a proposed growth center must:

Summary of Suburban-Style Development:

The areas adjacent to Chittenden County may be particularly predisposed for suburban-style development. As the Central Vermont Regional Plan explains, "Parts of our Region have been and continue to be influenced by the growing Chittenden County 'metropolis.'" Compared to the rest of Central Vermont, municipalities in the study area displayed higher growth rates, incomes and housing costs and more dynamic commuting patterns. This effect dissipates as you move farther from Chittenden County. Land use policies and regulations don't appear to be as influential as market forces in determining the amount and location of growth. Growth pressures are highest closest to Chittenden County even where stringent regulations are in place.¹

Central Washington Plan. "Land Use" p.2-16.

- be integrated in or adjacent to a designated downtown, designated village or designated new town center,
- adhere to "smart growth" principles (e.g. mixed uses, higher densities, pedestrian scale, etc.),
- be reflected in a local plan which has received Regional approval, as well as in the local bylaws and capital budget and

• be "of an appropriate size sufficient to accommodate a majority of the projected population and development over a 20 year planning period."¹³

12. Vermont Land Trust. "Farms and Farmland Conservation". <u>http://www.vlt.org/agriculture.html</u>. Accessed on July 7, 2009.

13. Central Washington Plan. "Land Use" p.2-13.

	TOTAL	
AGRICULTURALTYPE	PARCELS	ACRES CONSERVED
Alpacas/Ilamas	4	165.46
Beef	40	3,584.06
Beefalo	4	207.77
Berries/Grapes/Vineyard	9	238.98
Cow Dairy	739	45,746.89
Cropland	463	28,254.75
Нау	176	9,580.54
Horse	74	2,493.31
Orchard	28	1,390.84
Other Farm Uses	1	3.52
Pasture	56	3,192.02
Poultry/eggs	20	868.23
Replacement Heifer	85	6,426.43
Sheep	24	860.44
Sheep/Goat Dairy	14	712.71
Sugaring	20	1,883.66
Vegetable	55	2,002.83
TOTAL ACRES CONSE	RVFD	107.612.43

Image 16. Source: VLT

Upon approval by the Downtown Development Board, State designated growth centers receive the following major benefits:

• Eligibility for Tax Increment Financing (TIF), which allows municipalities to borrow against future tax revenues of properties benefiting from public improvements, thereby facilitating infrastructure development.

• Relaxation of Act 250 standards including: higher jurisdictional thresholds for affordable housing projects, greater ease of master plan permitting and a lower ratio for the mitigation of primary agricultural soils impacted by development (1:1 within as opposed to 2:1 outside of growth centers).

• Priority eligibility for a variety of State funds and programs.¹⁴

As a great deal of documentation (including population projections, "build out analyses"/GIS mapping, calculations of infill potential and land area needs and other studies) is required in the application process to demonstrate adherence to these mandates, participation in the program may be unattainable for many towns. A cursory search did not identify any towns in Vermont taking advantage of Act 183.

GROWTH PATTERNS

As may be expected given the lack of growth management, the current dominant growth pattern appears to be suburban, low-density sprawl. As the Lamoille County Regional Plan explains, "Fringe environs have been the location of much of our recent growth. If growth in our existing urban areas is not possible due to limitations in infrastructure, a majority of growth will be pushed into our fringe areas."¹⁵ Similarly, the Central Vermont Regional Plan (the region including Washington County) offers, "With greater frequency, new businesses have located along the state highways, interstate exits and collector roads which bring commuters back and forth to work and tourists to and from their destinations, or in areas where other infrastructural improvements have been provided. While only a few locations have experienced full blown 'strip development,' or suburban sprawl, most of the Region's communities are witnessing the emergence of these patterns to some degree."16 Further, the Northwest Vermont Regional Plan explains why low-level density development is problematic, stating that "suburban settlement patterns can result in low density residential development and growth of commercial establishments on land that has the potential for high levels of agricultural production, negative impacts to scenic views and fragmentation of meadowlands due to poorly thought out siteing of development, and compromised wildlife habitat from clearing and draining of marginal lands."17 Chip Sawyer, Senior Outreach Professional and State Data Center Manager at the Center for Rural Studies, confirms that his impression is that most growth around Chittenden County is low density, suburban style growth.¹⁸ He also offered that Grand Isle and Franklin Counties have been Vermont's fastest growing counties, and that this growth is normally attributed to Chittenden County.¹⁹ In spite of acknowledging the problematic nature of current growth patterns and relaying the benefits of agriculture, there are very few active mechanisms in place to protect agricultural land. There appears to be a barrier or disconnect between desiring to protect the land and enacting measures to do so. Yet, if the current suburban growth patterns are not altered, the 20,000 housing units that are estimated to be added to the region by 2030 may significantly threaten agriculture. In the meantime, the land use system lies in a delicate balance.

- 18. Will "Chip" Sawyer, email to author. August 3^{rd, 2009.}
- 19. Will "Chip" Sawyer, email to author. August 3rd, 2009.

^{14.} Central Washington Plan. "Land Use" p.2-13.

^{15.} Lamoille Regional Plan. p.84.

^{16.} Central Washington Plan. "Land Use" p.2-12.

^{17.} The Northwest Regional Planning Commission. "Plan for the Northwest Region, 2007-2012." Effective October 3, 2007. p.126.

The average municipal taxes from 2004 in Image 17 confirm that land in Chittenden County and towns on the border of Chittenden County may be more desirable. With the exception of the Middlebury area, these areas tend to have higher tax levels, which may indicate that the land is more in demand and the population is willing to pay the higher taxes to be in or near Chittenden County.



Image 17. Source: VCGI

Summary of Farms In Vermont

- There are 2962 farms in 2007 in the study area, which accounts for 42% of the farms in Vermont
- 578,786 (29%) acres of the 2,025,184 acres in the study area
- Total farm acres in the six county region decreased by a -0 .93% from 2002 to 2007, identical to the state growth rate for total farm acres from the same time period
- There were 241,002 acres harvested in 2007 in the six county region, compared to 256,732 in 2002, a decrease of 5.02%
- The average size of farms in the six county area decreased slightly between 2002 and 2007
- Farms of 50-179 acres is the most common size of farms in each county.
- The quantity of farms increased by 7.32% in the six county area between 2002 and 2007, compared to 6.29% statewide.
- According to the North American Classification system, the largest proportion of farming (35%) in Vermont is "Sugarcane farming, hay farming, and all other crop farming," followed by "Dairy cattle and milk production" at 16.34%
- Within crops in the study area, the majority of crops are Forage for Feed (land used for haylage, grass Tsilage and greenchop)," accounting for 65.3%
- With the exception of Washington County, the estimated market value of buildings and land of farms in the six county area are slightly higher than the average value for Vermont
- Conserved farmland grew significantly from 574 acres in 2002 to 2473 acres in 2007, predominantly due to an increase from 330 to 1410 acres in Addison County. This could be due to one large acquisition, or the concentrated efforts of a land trust.

Existing Conditions

Community Land Use SWOT Analysis

Strengths:

- Strong cultural value of working landscape and agriculture.
- Strong interest in supporting local food producers and businesses.
- Farm- friendly tax policies: "Common Use" tax exemptions.
- Extensive network of farming and food system-related private and public agencies.
- There is not extreme growth pressure on the area relative to other New England urban areas.

Weaknesses:

- Lack of food infrastructure facilities and services (brokers, storage, processors, distributors).
- Lack of information infrastructure for new farmers.
- Lack of formalized horizontal relationships and collaboration on land use issues (also a threat).
 - Towns control zoning, densities and building permits.
 - Regional Planning commissions are advisory and have little actual political power.
 - Towns compete for tax base and are wary of adding growth restrictions because of Act 250.
- Lack of centralization of farming land information: expected yields, land available and quality of land.
- Soil surveys are outdated.
- Relatively small proportion of acres preserved.
 - The Vermont Land Trust has conserved roughly 15.5% of the Important Farmland. 42.5% of this land is dairy land.

Opportunities:

- Market opportunities for food processing, storage and distribution facilities.
- Capture the economic and political opportunity created by the raised popular consciousness of food issues.
 - Recent produce recalls (in the last year alone, there have been recalls issued for spinach, tomatoes, jalapenos and peanuts), the national rise in obesity and an elevation of food related issues in popular culture (Michael Pollen, Barbara Kingsolver, Food, Inc.) have elevated food-related issues. The raised consciousness should be considered an opportunity to gather public support, and thereby political will, and capture consumer spending to make substantial changes in the food system. Burlington can become a leader in urban agriculture, boost its economic health and protect resources.

Threats:

- The combination of rising populations, increased energy costs and climate change will threaten food security.
 - The underlying philosophy of any food system must be, as well stated in Portland University's Regional Food Systems Plan, to keep "food production sufficiently lucrative to keep fertile land in production, rather than lose it to development."²⁰ Even though growth patterns are leveling out, there will be a need for more food and more space. This rise in demand for development could threaten farmland and consequently food production, as the economic value of land for housing

^{20.} Portland State Institute of Metropolitan Studies. Planting Prosperity and Harvesting Health. Trade-offs and Sustainability in the Oregon-Washington Regional Food System. October 2008., p.52.

will be higher than the land's value as space for food production.

- The belief that because of the low population, growth management is not needed and that farmland preservation efforts will keep enough lead on market forces to keep land in agriculture while allowing for enough development to bring economic prosperity. This system is informal, and changes in any one town's zoning could quickly threaten farmland. This could be particularly damaging if the town was surrounded by several contiguous parcels of farm land. Small parcels can be viable farm land; however, if the parcels are not contiguous, farmers will face difficulties scaling up production and may face profitability challenges.
 - Addison and Franklin counties have the largest average size farms in the six county region and are the most profitable.

Existing Conditions | Agriculture Analysis

As stated, the area is likely to add at least 20,000 housing units by 2030. The added populations will require additional utilities, facilities, services, and related infrastructure systems. These systems are all costly, and towns in the study area may eventually be forced to choose between maintaining existing agriculture land or permitting the land be used for development in order to raise their tax bases.

As of 2007, the six county region comprised of 2,025,184 acres, with 578,786 acres (29%) are currently used for farms.²¹ See table below for county-level analysis using the "Important Farmland Classification Value" ratings for soils in Vermont, developed by the USDA's the Natural Resources Conservation Service (NRCS).

As seen in the table below, Franklin County is farming more acres than are deemed Prime or Statewide. In the other counties, there are approximately 139,999 additional acres of Prime and Statewide acres that are not already in agricultural production. Assuming the Important Farmland data is an accurate assessment of land suited for agriculture in the six county region, the region could be well served by efforts to maintain or reserve Prime land for soil dependant crops such as fruit and vegetables.

21. USDA, National Agricultural Statistics Service. "2007 CENSUS OF AGRICULTURE

- COUNTY DATA". Table 8, Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2007 and 2002.



	Importa nt Farmla nd	Land in Farms, 2007	Differen ce
ADDISO			
N	200,814	187,482	13,332
CHITTEN			
DEN	131,240	83,382	47,858
FRANKLI	Ĩ		
N	154,351	180,006	-25,655
GRAND			5 140 T
ISLE	36,657	17,138	19,519
LAMOILL			
E	90,407	49,749	40,658
WASHIN			
GTON	78,995	61,029	17,966
TOTALS	692,464	578,786	113,678

Total Land in Farms, 2002 and 2007

Image 18. Source: USDA, 2007 Agricultural Census.
There are a few overarching trends when considering land use trends in agriculture, visible in the table above. While the overall number of farms is increasing, in general, , the number of farms is increased slightly, while total farm acres and total cropland harvested declined slightly between 2002 and 2007.

The trends in farming could indicate:

- The increase of farmers could increase competition and drive prices down, making profitability in farming even more challenging
- As more farmers are farming less land, the land may be more fragmented, which could be problematic if farmers want to scale up
- As the proportion of land is both increasing and decreasing in the study area, farming could be moving towards being localized in certain counties.

	VERMONT			ADDISON		0	HITTEND	EN		FRANKLIN	4	0	RAND IS	LE		LAMOILL	E	W	ASHINGT	ON	
						%			%			%			%			%			%
	2002	2007	% Change	2002	2007	Change	2002	2007	Change	2002	2007	Change	2002	2007	Change	2002	2007	Change	2002	2007	Change
Farms	6,571	6,984	6.29%	676	773	14.35%	473	591	24.95%	770	740	-3.90%	99	114	15.15%	317	300	-5.36%	425	444	4.47%
Land In Farms	1,244,909	1,233,313	-0.93%	193,376	187,482	-3.05%	76,679	83,382	8.74%	190,115	180,006	-5.32%	16,289	17,138	5.21%	53,820	49,749	-7.56%	53,942	61,029	13.14%
Harvest																					
Cropland	454,699	433,074	-4.76%	107,173	102,626	-4.24%	27,648	23,906	-13.53%	80,958	75,636	-6.57%	9,155	9,268	1.23%	13,572	13,006	-4.17%	15,240	16,560	8.66%
Average Farm																					
Size	189	177	-6.35%	286	243	-15.03%	162	141	-12.96%	247	243	-1.62%	179	150	-16.20%	170	166	-2.35%	127	137	7.87%
Proportion																					
Land in Farms	21.00	20.90	-0.48%	39.20	38.20	-2.55%	22.20	24.30	9.46%	46.6	44.4	-4.72%	30.8	32.7	6.17%	18.2	16.9	-7.14%	12.2	13.9	13.93%
Image 19. Source: USDA, 2002, 2007 Agri-																					

cultural Census.

FARM PROFILE

As of 2007, there were 6,984 farms in Vermont²². Within the six county region, there were 2962 farms in 2007, which accounts for 42% of the farms in Vermont. Between 2002 and 2007, the number of farms grew by 7.32%, compared to a growth rate of 6.29% in Vermont.

Farm Classifications and Typology

A breakdown of farms per the North American Classifications is not available on the county-level, but the state level data indicates the most common type of farm in the state of Vermont is "Sugarcane farming, hay farming, and all other crop farming", comprising 35% of all farming in the state, followed by Dairy cattle and milk production at 16.34%. Other percentiles are visible in Image 20. The breakdown of North American Classifications is not available on the county-level.

Within the six county region, the Census data indicates grain crops are predominantly used to grow silage and greenchop. Visible in Image 20, "Forage for Feed (land used for haylage, grass silage and greenchop)" accounts for 65.3% of all crops, and corn for silage comprises for 30.3%.²³ Together, these crops account for a staggering 96% of all crop production. The "Vegetables harvested for sale" category accounts for less than 1% of all crops in the study area.

When analyzing farming conditions, it important to also consider land ownership and organizational structure. The overwhelming majority of farms function under a family or individual organization. All farms in Vermont were classified by type of organization in the census, and 84% of farms were classified at family or individual sole proprietorship farms. While there was not significant changes in farms per classifications from 2002 to

22. USDA. 2007 Agricultural Census. "Farms by North American Industry Classification System," Table 45.

23. USDA. 2007 Agricultural Census. Table 25. Selected Crops Harvested: 2007.



Type of Farms, North American Classification

Image 20. Source: USDA, 2007 Agricultural Census.

2007, family and individual farms did account for 3% less in 2007 than in 2002 and partnership farms accounted for 2% more in 2007 than in 2002. The classifications are defined as:

1. Family or individual (sole proprietorship), excluding partnership and corporation.

2. Partnership, including family partnership – in selected tables, partnership was further

sub-classified into:

a. Registered under State law.

- b. Not registered under State law.
- 3. Corporation, including family corporations in selected tables, partnership was further

subclassified into:

a. Family held or other than family held.

- b. More than 10 stockholders.
- 4. Other, cooperative, estate or trust, institutional

Farms were also categorized by the farm typology created by the Economic Research Service of the USDA. The 2007 Agricultural Census is the first Census to include this data. There are two major groupings of farms, small family farms with sales of less than \$250,000, and farms who have sales over \$250,000.

Based on this typology, the largest proportion of "small" farmers in Vermont are "lifestyle/residential" farmers who have a primary occupation other than farming, accounting for 38% of all "small" farmers. The small family farm group is divided into 5 subcategories:

1. Limited-resource farms have market value of agricultural products sold gross sales of less than \$100,000, and total principal operator household income of less than \$20,000.

2. Retirement farms have market value of agricultural products sold of less than \$250,000, and a principal operator who reports being retired.

3. Residential/lifestyle farms have market value of agricultural products sold of less than \$250,000,

and a principal operator who reports his/her primary occupation as other than farming.

4. Farming occupation/lower-sales farms have market value of agricultural products sold of less

than \$100,000, and a principal operator who reports farming as his/her primary occupation.

5. Farming occupation/higher-sales farms have market value of agricultural products sold of

between \$100,000 and \$249,999, and a principal operator who reports farming as his/her primary



Percentages of Acres of Grain Crop Production in study region, 2007

Image 20. Source: USDA, 2007 Agricultural Census.



Image 21. Source: USDA, 2007 Agricultural Census.

occupation. 24

Larger farms with annual sales of over \$250,000 are subdivided into three subcategories and are dispersed fairly evenly between the three types:

1. Large family farms have market value of agricultural products sold between \$250,000 and

\$499,999.

2. Very large family farms have market value of agricultural products sold of \$500,000 or more.

3. Nonfamily farms are farms organized as nonfamily corporations, as well as farms operated by hired managers.²⁵

Farm Operator Demographics

Farm operator demographics are available on the state-level only. According to the 2007 Ag Census, there were 11,392 total farm operators in Vermont, including 4,210 (37%) women operators. The demographic data reinforces the common belief that farmers in the state are getting older. The median age for farmers increased between 2002 and 2007 from 53.9 to 56.3. The shift in age brackets is visible in Image 22. Farmers between 25 and 35 increased by 1% between 2002 and 2007.

24. USDA. Agricultural Census. Appendix B. p. 8.

25. USDA. Agricultural Census. Appendix B. p. 8.

FARM OPERATORS:	Number of Farms	Percent Change
Farm operators reporting net gains 2007	3,044	-4.52%
Farm operators reporting net gains 2002	3,188	
Farm operators reporting net losses 2007	3,940	16.29%
Farm operators reporting net losses 2002	3,388	
FARM OPERATIONS	Number of Farms	Percent Change
Farm operations reporting net gains 2007	3,051	-3.36%
Farm operations reporting net gains 2002	3,157	0
Farm operations reporting net losses 2007	3,933	15.03%
Farm operations reporting net losses 2002	3,419	
Image 22. Source: USDA, 2007 Agricul-	·	•

tural Census.



Image 23. Source: USDA, 2007 Agricultural Census.

In 2007, slightly more than half of the farm producers were full producers owned the land, and there was not dramatic land ownership and tenure changes between 2002 and 2007.

Farm Profitability

As described in Data Sources, profitability in farming is complex and can be problematic to capture. The Agricultural Census solicits from farmers' net cash farm income, defined as the "the operators' total revenue (fees for producing under a production contract, total sales not under a production contract, government payments, and farm-related income) minus total expenses paid by the operators. Net cash farm income of the operator includes the payments received for producing under a production contract and does not include value of commodities produced under production contract by the contract growers. Depreciation is not used in the calculation of net cash farm income."²⁶

The net income of farm operations in the six county region vary greatly, but are significantly higher in the counties with the most farmland within the study area, Franklin and Addison counties, as well as largest average farm sizes.

In 2007, the average income for the six county region is \$31,540²⁷, significantly higher than the average income per far in 2002 of \$18,244 and higher than the state average of \$22,816. The considerable rise in net income can be explained by a dramatic rise in Lamoille County.

State-wide, profitability of farming displayed mixed growth rates from 2002 to 2007. The income of operators in Vermont increased from \$103,124,000 to \$159,352,000, an increase of 55% and the average income per farm in the state grew from \$15,462 in 2002 to \$22,816 in 2007 (neither farms ot adjusted for depreciation).

The Agricultural Census also publishes state-level data on two categories of farms: Farms with net gains (includes those operations that broke even) and farms with net losses. Both the number of operations and operators reporting net gains decreased while the number of operations and operators who reported net losses increased.

Insurance, equipment, storing and processing equipment all require significant capital, and the costs of farming are known to be prohibitive for new, start-up farmers. The high cost of farming is reflected in the relative higher cost of locally produced product and, in an interview with a local grocery store regional manager, the high price points was mentioned as one of the barriers to sourcing locally. If a local or regional food system is the goal for the greater Burlington area, investigations are needed on how to increase the profitably for local producers so they are able to offer products at a price that the large chain grocery stores will pay.

26. USDA. "Appendix B. General Explanation and Census of Agriculture Report Form." p. B-16.

27. USDA. 2007 Agricultural Census. Table 1- County Summary Highlights.

	Vermont	Addison	Chittenden	Franklin	Grand Isle	Lamoille	Washington
Average net cash farm							
income of operation, 2007							
(dollars)	22,816	52,944	15,543	58,764	29,709	20,066	12,214
Average net cash farm		5					
income of operation, 2002							
(dollars)	15,462	36,287	14,418	35,814	10,484	6,659	5,799

Image 23. Source: USDA, 2007 Agricultural Census.

Summary Of Farm Operators:

- Between 2002 and 2007, there was as a gain of 608 (6%) total operators.
- Over half of the farms (56%) are ran by 1-or 2- operators.
- Farming is the primary occupation for 30.5% of farming operators in Vermont.
- 54% of farm operators in Vermont live on the farm they operate.
- The median age of farm operators in Vermont is 56.3
- 64% of farm operators in Vermont own their property
- There was little change in land ownership rates between 2002 and 2007
- 84% of farms in Vermont are family or individual (sole proprietorship) farms
- The largest percentage (38%) of small farms with under annual sales under \$250,000 are "residential/lifestyle" farmers with a primary occupation other than farming
- The largest percentage(37%) of large farms with annual sales over \$250,000 are nonfamily farms. However, the proportion of the other two types of large farms, "large family" and "very large family," account for 34% and 29% respectively.

Study Findings

The following section presents the summary of the comparison of the estimated regional consumption and production, followed by an estimate of the land use shifts that would be needed to bring food demand and supply

levels into alignment.

Summary of Vegetable Demand:

Image 24 is a summary of the CFSII of vegetable intake. The highest proportion of consumption is captured by white potatoes (26%), followed by "other vegetables" (26%).¹ The white potatoes category includes "fried" potatoes and "other," which account for 9% and 17.35%, respectively. All definitions of what is included in each category is:

- Dark-green vegetables: Includes raw and cooked broccoli and dark-green leafy vegetables such as romaine, collards, mustard and turnip greens, kale and spinach; mixtures having dark-green vegetables as a main ingredient, such as broccoli with cheese sauce; and baby-food spinach.
- Deep-yellow vegetables: Includes raw and cooked deep-yellow or orange vegetables such as carrots, pumpkin, winter squash, and sweet potatoes; mixtures having deep-yellow vegetables as a main ingredient, such as peas and carrots and sweet potato casserole; and baby-food carrots, squash and sweet potatoes.²

In the sales data, fruit and vegetables are included in the "produce" category. The top vegetable sellers based on the sales data from a regional grocery store chain are, in order, white potatoes (7.94% of all produce sales), cooking greens (7.24%), salad greens and vegetables (6.62%), tomatoes (5.52%) and Dole Variety salads (4.74%).³

. USDA, Agricultural Research Service. December 1998. Data Tables: Food and Nutrient Intakes by Region, 1994-96. p. 56.

2. USDA. DATA TABLES: Food and Nutrient Intakes by Individuals in the United States, by Region, 1994-96 Table Set 13. p.112.

3. Anonymous sales data from a regional grocery store chain. Personal email to author. July 14^{th.}



Mean Percentages of Vegetable Consumption, Per Individual

Study Findings

Calculation Steps

As stated, to obtain the sales data, the size of the spread the each item has on a produce display was observed to obtain good measurement of the sales percent compared to other items on the case. The item with the largest spread was chosen to estimate consumer demand.

Consumer Spending

Based on the CFSII, the regional population spends approximately \$73 million on vegetables per year on average, including:

- \$25 million for tomatoes
- \$16 million on potatoes
- \$7 million on corn, green peas and lima beans
- \$2.4 million for green beans

According to the 2007 Consumer Expenditure Survey, the average consumer unit in the Northeast Region spent \$51,624 on average on expenditures, with an average of 12.4% of spending going toward food purchases. Food expenditures are broken down by food at home and food away from home, accounting for 56.22% and 43.78% of spending respectively. According to the data, the average consumer unit in the Northeast Region spent \$298 on average annually on vegetables, which accounts for 4.64% of food spending. The analysis from this study indicates people spend \$223 on average per year.

The USDA's Transportation and Marketing data estimates that Burlington households will spend \$412 on fruits and vegetables combined.⁴ The data is broken into "fresh," "canned," "frozen" and "other" and consequently cannot be compared any further.

4. USDA and Claritas, Inc.. Transportation and Marketing Services, Transportation and Marketing data.

	MEAN		TOTAL]
	POUNDS	POUNDS	POUNDS			то	TAL DOLLARS		
	CONSUMED,	CONSUMED	CONSUMED	AV	/ERAGE		SPENT PER	DOLLARS SPENT	
	NORTH EAST	PER PERSON	IN 6 COUNTY	PR	ICE PER	F	PERSON PER	IN 6 COUNTY	
	REGION	PER YEAR	REGION	P	OUND		YEAR (\$)	REGION (\$)	
WHITE POTATOES	0.11	41.04	13,434,625.50	\$	1.16	\$	47.61	\$15,584,165.58	
Dark-green vegetables	0.03	11.27	3,687,936.41	\$	1.39	\$	15.66	\$ 5,126,231.61	
Deep-yellow vegetables	0.02	8.05	2,634,240.29	\$	2.59	\$	20.84	\$ 6,822,682.36	
Tomatoes	0.07	26.55	8,692,992.97	\$	2.82	\$	74.88	\$ 24,514,240.18	
Lettuce, lettuce-based salads	0.04	12.87	4,214,784.47	\$	2.81	\$	36.18	\$ 11,843,544.36	
Green Beans	0.01	4.83	1,580,544.18	\$	1.52	\$	7.34	\$ 2,402,427.15	
Corn, green peas, lima beans	0.04	12.87	4,214,784.47	\$	1.59	\$	20.47	\$ 6,701,507.31	
Other vegetables	0.11	40.23	13,171,201.47		1		1		
TOTAL PER DAY	0.54			TOT SAL	TAL	\$	222.98	\$ 72,994,798.56	Image 25. Source: U CFSII, Table 13.
TOTAL CONSUMED	0.98	157.72	51,631,109.77		ſ]

Summary of Vegetable Sales Data

- The number one seller of all salad greens and vegetables is celery (accounting for 1.44% of the 6.62%), followed by iceberg lettuce (1.17%) and green leaf lettuce (1.11%).
- Celery is typically the number one seller in therefrigerated produce case with prepackaged vegetables, followed by broccoli, cabbage and carrots.¹
- Cooking greens represents all the different types of greens (spinach, kale, collards etc.).
- According to the regional manager of the grocery store chain, who previously managed the produce section, 90% of produce comes from California.
 Anonymous regional store manager

Summary of Vegetable Supply:

Calculation steps:

There quantity of commodities in the CSFII is quite limited compared to the production data from the Agricultural Census. To obtain a rough estimate of comparison, the following steps were taken: :

- For dark-green and dark-yellow vegetables, the most popular item was identified in the sales data, spe-٠ cifically broccoli for the dark-green category and carrots for the dark-yellow grouping.
- To compare the consumption of "corn, green beans, and lima beans" to the production levels, the con-• sumption of this category was divided by 3 to obtain an estimated consumption of each vegetable.
- Consumption of watermelons was estimated by taking half of the estimated "berries and melon" con-• sumption estimation from the Fruit table from the CFSII.
- Vegetable yields are highly variable based on planting density, the use of pesticides and weather.

ACRES HARVESTED FOR PROCESSING	Addison	Chittenden	Franklin	Grand	Lamolite	Washington	TOTAL PRODUCTION: 6 COUNTY REGION (ACRES)	PERCENT TOTAL PRODUCTION	YIELD PER ACRE (Ibs).	TOTAL POUNDS PRODUCED	TOTAL POUNDS CONSUMED	DISCREPANCY	ADDITIONAL ACRES NEEDED TO MEET DEMAND
Asparagus	2	0	0	0	z	0	2	0.15%					
Beans, Green Lima							0	0.00%	2,500	0	1404928.157	-1404928.16	562
Beans, Snap		0					0	0.00%	4,000	0			
Beets	1	2	1	0	0	7	11	0.80%	17,000	187,000			
Brocoli	5	2	0		0	3	10	0.73%	15,200	152,000	3,687,936.41	-3535936.41	233
Brussels Sprouts		0	1			1	2	0.15%	14,000	28,000			
Cabbage, Chinese			0			0	0	0.00%	35,000	0			
Cabbage, Head	2	9		0	0	0	11	0.80%	40,300	443,300			
Cabbage, Mustard	0						0	0.00%	0	0			
Cantaloupes	2	2		0	0	2	6	0.44%	15.000	90.000			
Carrots	0	2	0			2	4	0.29%	28,000	112 000	2 634 240 29	-2522240.29	90
Cauliflower	2				0	1	1	0.22%	15 900	47,700			
Celery							0	0.00%	50,000				
Collards		7	0		0		0	0.00%	16 275				
Cucumbers and					~			0.0074	10,275	0			
Pickles	1	,	2	1	1	5	19	1.38%	14,500	275,500			
Daikon							0	0.00%	39.000	0			
Eggplant	z	2			0	0	2	0.15%	47,670	95.340			
Escarole and					-		-	0.0070					
Endive							0	0.00%	16,100	0			
Garlic	1	2	1	0	1	z	5	0.36%		0			
Herbs, Fresh cut	0	1		0	8		9	0.65%		0			
Honeydew Melons							0	0.00%		0			
Horseradish							0	0.00%		0			
Kale		z	0	0		0	0	0.00%	18,138	0			
Lettuce, all	5	4	0	0	1	0	10	0.73%	22,500	225.000	4.214.784.47	-3989784.47	177
Lettuce, head	7	1	0	0	1	0	2	0.15%	21,000	42 000			
Lettuce, Leaf	4	1	0	0	2	0	7	0.515	23,500	164 500			
Lettuce, Romaine	1		0	-	2	0	1	0.07%	21,000	21,000			
Mustaul Greens								0.00%	29,000				
Okra				0	0		0	0.0094	62,000	0		-	
Onione Dev			0	0	~			0.00%	31,000	124 000			
Onions, bry			U	0				0.29%	31,000	124,000		-	
Onions, Green	1	1		0		0	2	0.15%	29,000	58,000			
Parsley Pass Chicasa				0	Q	1	1	0.07%		0			
(Sugar and Snow)		z	0	0		0	0	0.00%	4 000				
Peas, Green	2	7		0	2	2	13	0.94%	4,000	52 000	1404928 157	-1152928.16	118
Peppers, Bell	2	17	0	3	1	1	24	1.74%	4 000	96.000			
Peppers other than					· ·			8.1.4.4					
Bell (Including													
Chile)	1	2	0	2	0	z	5	0.36%		0			
Potatoes	10	0	6	6	8	1	31	2.25%	27,500	852,500.00			
Pumpkins	22	102	5	8	24	66	227	16.50%	35,000	7,945,000			
Radishes			0	Z	0	0	0	0.00%	7,500	0			
Rhubarb	0			0		0	0	0.00%		0			
Spinach	4	3	0	0	0	0	7	0.51%	15,800	110,600			
Squash, all	13	68	0	5	0	17	103	7.49%		0			
Squash, summer	2	0	2	2	2	10	18	1.31%	11,000	198,000			
Squash, winter	11	0	0	0	0	0	11	0.80%	20,600	226,600			
Sweet Corn	23	369	139	0	37	97	665	48.33%	8,500	5,652,500.00	1404928.157	4247571.84	-500
Sweet Potatoes			1				1	0.07%					
Tomatoes in the													
open	8	24	3	6	1	- 10	\$5	4.00%	22,100	1,215,500	8,692,992.97	-7477492.97	318
Turnips			0	0									
Turnip Greens													
Watermelons	1	0	0	0	2	0	3	0.22%	11,000	33,000	1975680.221	+1942680.22	177
Other Vegetable	21	60	5	4	0	12	102	7.41%					
						TOTAL HARVESTED ACRES, 2007	1,376		TOTAL POUNDS VEGETABLES PRODUCED	18,447,040		TOTAL ACRES NEEDED TO MEET DEMAND	1415

• For this study, an average of yield estimates was calculated from estimates from a local grower .

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Image 26. Source: USDA, 2007 Agricultural Census.

Summary of Vegetable Production:

- Sweet corn accounts for approximately 49% of vegetable production in the six county area.
- Sweet corn is the only vegetable in the six county region that is estimated to produce more than estimated demand.
- Pumpkins account for 17% of vegetable production, the second highest percentage of vegetable production.
 - and from the respected Northeast guide, Vernon P. Grubinger's book, Sustainable Vegetable Production from Start-Up to Market.
 - If yield data was not available from this book, the average yield was calculated from a local grower's estimates and Johnny's Seed Catalog.
 - It was not possible to locate yield data for all crops.

Conclusion

The total acreage to meet the estimated demand of the items included in the CFSII is 1,415 acres. With so few relative acres needed to meet the estimated demand of vegetables, the question is likely not one of land use but rather one of profitability and perhaps seasonality. The regional sales manager from the local grocery story chain listed volume as the number one barrier to sourcing locally, followed by pricing and the requirement of liability insurance. If a truly local food system is sought, production will have to scale up significantly, while maintaining a level of profitability for farmers.

One of the major hurdles to scaling up is likely to be a lack of food-related infrastructure facilities such as storage and processing. The Intervale Center's 2007 Producer survey found that the top 3 barriers to expansion as identified by farmers in Vermont are labor, storage and marketing capacity.⁵

5. The Intervale Center, Agricultural Development Services. "Expanding Local Food Production, Storage and Marketing Capacity in Vermont: Results from the 2007 Farm Producer Survey." p.3.

Assumptions

The following assumptions apply to all consumption and production comparisons:

CONSUMPTION DATA

- The dietary patterns today are equitable to the patterns from 1994-1996 and 1998.
- Two-day consumption can be used as proxy to calculate average amount of food consumed per person per year.
- Mean consumption per individual in the Northeast region from the CFSII can be applied to total population of the six county region as estimated from the 2007 American Community Survey.

MARKET STUDY DATA

Study

Sales data from one grocery store chain for Vermont is representative of dominant shopping patterns in the six county region.

PRODUCTION DATA

• For many commodities, there is not an "average" production method, so the assumption is made that the yield data used in the study is representative of production methods in the six county region.

Summary of Fruit Demand:

Below is a summary of the CFSII of fruit intake The highest proportion of consumption is captured by juice (40%), followed by non citrus juice (19%) and "other fruits" (10%).⁶ Apples and bananas each account for 9% of fruit consumption. See the glossary for definitions for more details.

The regional sales data includes all fruits and vegetables in the produce category and shows that the top 5 fruit sellers are, in order of popularity: apples (6.35% of all produce sales), bananas (5.66% of all produce sales), berries (5.46% of all produce sales), grapes (5.01% of all produce sales) and citrus (4.66% of all produce sales).

Consumer Spending

Based on the CFSII, the regional population spends approximately \$58 million on fruit per year on average, including:

- \$16 million on juice
- \$ 11 million on berries and melons
- \$6 million on apples

Calculation steps:

Estimating the average spending on fruit using the sales data is a nuanced process. The CFSII data includes juices and non-citrus juices; however, the identifying top seller is difficult because the sales data includes juices in the dairy sales data as well as the produce data. As described in the "Data Sources and Methodology" section, to obtain the sales data, the size spread that each item has on a produce display was observed to obtain good measurement of the sales percent compared to other items on the case. The item with the largest spread was chosen to estimate consumer demand.

• The fruits included in the CFSII are listed below with the top selling items indicated in the sales data:

6. USDA, Agricultural Research Service. December 1998. Data Tables: Food and Nutrient Intakes by Region, 1994-96. p. 56.



Image 27. Source: USDA, CFSII, Table 13.

Regional Fruit Sales Notes:

- Organic fruit comprises 0.69% of all produce sales.
- According to a regional grocery store manager, organic sales have leveled off in the last 2 years.
- Within produce sales, juices and cider account for 1.66%. The most popular juice is apple cider (0.69%), followed by orange and grapefruit juices at (0.37%).
- The regional manager of the grocery store chain estimates that
 90% of produces comes from
 California.

Study Findings

- Juice: Refrigerated Juices
- o Apples: Western Loose Apples
- o Bananas: Conventional Bananas
- Melons/Berries: Strawberries
- Grapes: Red Grapes
- Citrus: Bagged Citrus
- o Dried Fruit: Raisins
- Non-citrus Juice: Apple Cider
- Items that are not sold by the pound, such as apple cider and orange juice, were weighed using a digital scale at the Intervale Center.
- The apple cider that took up the most shelf space was chosen as the non-citrus juice.
- "Refrigerated Juices" account for 1.44% of sales for the "Grocery" category, which includes dairy and other basic grocery items, such as soda, beans, rice, etc. The orange juice that took up the most shelf space was chosen for comparison.

According to the 2007 Consumer Expenditure Survey, the average consumer unit in the Northeast Region spent \$6,419 on average on food expenditures and \$349 annually on average on fruit, which accounts for 5.44% of all consumer spending.⁷ The spending estimate does not include juice or any beverages. The analysis from this study indicates people spend \$175 on average per year on fruit including juice; the actual consumption is likely remarkably higher. The USDA's Transportation and Marketing data estimates that Burlington households will spend \$412 on fruits and vegetables combined.⁸

7. Bureau of Labor Statistics. Consumer Expenditure Survey. Food average annual expenditure table, northeast region.

8. USDA and Claritas, Inc.. Transportation and Marketing Services, Transportation and Marketing data.

	MEAN		5			
	POUNDS					
	CONSUM		TOTAL		TOTAL	
	ED,	POUNDS	POUNDS		DOLLARS	DOLLARS
	NORTH	CONSUMED	CONSUMED		SPENT PER	SPENT IN 6
	EAST	PER PERSON	IN 6 COUNTY	AVERAGE PRICE	PERSON PER	COUNTY
	REGION	PER YEAR	REGION	PER POUND	YEAR (\$)	REGION (\$)
Citrus	0.03	9.66	3,161,088.35	1.12	10.81	3,540,418.96
Juice	0.18	64.37	21,073,922.36	0.75	48.28	15,805,441.77
Dried Fruit	0.00	0.80	263,424.03	3.39	2.73	893,007.46
Apples	0.04	14.48	4,741,632.53	1.20	17.38	5,689,959.04
Bananas	0.04	13.68	4,478,208.50	0.67	9.17	3,000,399.70
Melon/berries	0.03	12.07	3,951,360.44	2.83	34.16	11,182,350.05
Other	0.04	15.29	5,005,056.56	2.32	35.47	11,611,731.22
Noncitrus Juice	0.08	29.77	9,746,689.09	0.57	16.97	5,555,612.78
TOTAL CONSUMED	0.44	160.13	52,421,381.86	TOTAL SALES	174.97	57,278,920.96

Image 28. Source: USDA, CFSII, Table 13.

Summary of Fruit Supply:

Summary:

In the study area, there are a total 1,505 acres of bearing age fruit trees and plants. Of these 1,505 acres,

91% are devoted to apples, totaling 1,373 acres. As seen in the table below, there is minimal other fruit production. There are approximately 1,110 more acres for apple production than would be needed to meet demand.

Calculation Steps:

- Yield information was derived from local growers and growing guides, as discussed in "Data Sources and Methodology."
- Consumption of watermelons was estimated by taking half of the estimated "berries and melon" consumption estimation from the Fruit table from the CFSII.

Conclusion

With the exception of apples, fruit production is very minimal in the study area. While some of the lack of fruit is likely due to climate, there are significant market opportunities for other types of fruit.

Similar to vegetable production, the lack of food-related infrastructure facilities such as storage and processing is likely to hinder scaling up fruit production.





BEARING AGE ACRES	Addison	Chittenden	Franklin	Grand Isle	Lamoille	Washington	TOTAL
Apples	1,041	194	D	131	7	D	1,373
Apricots		0					0
Cherries, sweet	D			0			0
Cherries, tart		0		0	· · · · · · · · · · · · · · · · · · ·		0
Grapes	D	15		0		D	15
Nectarines		0			· · · · · · · · · · · · · · · · · · ·		0
Peaches*		3		0			3
Pears*		1		0	· · · · · · · · · · · · · · · · · · ·	0	1
Plums and Prunes		0					0
Other Noncitrus	1	0			· · · · · · · · · · · · · · · · · · ·		0
Berries- Irrigated acres	25	51	15	6	1	15	113
TOTAL FRUIT AGE BEARING ACRES	1,066	264	15	137	8	15	1,505

Image 29. Source: USDA, 2007 Agricultural Census.

Summary of Dairy and Egg Demand:

The dairy industry has long been the keystone of Vermont's agriculture. The market for dairy products is particularly complicated, as the supply is constant, demand tends to vary seasonally, government subsidizes production, and the product has a relatively short shelf life (unless made into cheese or other by products). In general, people drink less milk in the summer, partially due to children being out of school. Milk consumption tends to spike around September 1st when school begins. Recent news indicates that the market is currently challenged, as prices are down to around \$11 per hundred pounds of milk produced, approximately \$6 to \$8 less than it costs to produce.

Below is a summary of the CFSII of dairy intake. The highest proportion of milk consumption is a whole milk (28%), followed by low fat milk (26%).⁹ See definitions below for more details on what is included in each category. Eggs are included in the "Eggs; legumes; nuts and seeds; fats and oils; sugars and sweets" table in the CFSII. See table below for consumption estimates.

The sales data from a regional grocery store chain includes dairy sales in the grocery category, and dairy accounts for 16% of all grocery sales. The top five sellers of dairy are, in order, cheese (4.11% of all dairy sales), milk (2.9%), yogurt (2.06%), refrigerated juices (1.44%) and eggs $(1.2\%)^{10}$.

- The sales data does not differentiate between different types of milk.
- Ice cream, not included in the dairy sales data, accounts for 1.84% of frozen food sales, second highest after frozen meals (1.89% of frozen food sales).

9. USDA, Agricultural Research Service. December 1998. Data Tables: Food and Nutrient Intakes by Region, 1994-96. p. 56.

10. Anonymous sales data from a regional grocery store chain.

Summary of Dairy Production

- As of 2007, there 84,646 milk cows in the six county region and 139,719 cows in Vermont. The study region accounts for 60% of the total milk cows in the state.
- The number of milk cows in the study area fell by 6,827 cows between 2002 and 2007, a decrease of 7.4%¹.
- The number of milk cows in Vermont fell by 7.2%.
- Each cow produces and estimated 20,000 pounds of milk per year²
- 12 pounds of milk to make 1 gallon of ice cream³
- It takes 10 pounds of milk to make 1 pound of cheese⁴
- Each cow requires 2.5 acres of hay and corn silage each year⁵
- The American Dairy Farmers suggest that milk cows eat 100 # feed/day (a combination of hay, grain and silage)⁶

- 4. Midwest Dairy Association. <u>http://www.midwestdairy.com/pages/faq.cfm?TREE_ID=511</u>.
- 5. Mark Cannella, The Intervale Center.
- Dairy Farming Today. "Frequently Asked Questions." <u>http://www.dairyfarmingtoday.org/DairyFarmingToday/Learn-More/</u> FAQ/. Accessed on July 26, 2009.

^{. 2007} Agricultural Census. Table 11. Cattle and Calves - Inventory and Sales: 2007 and 2002.

^{2.} Mark Cannella, The Intervale Center.

^{3.} University of Vermont, <u>http://www.extension.org/faq/28136. Accessed on July 28</u>, 2009.

Consumer Spending

After applying the sales data to the products for which there is comparable consumption data to estimate how much money is spent on dairy and egg products, an estimated \$53 million is spent on milk, eggs, cheese and yogurt. The most money is spent on cheese, accounting for approximately \$26 million followed by whole milk, accounting for \$7 million. Again, given conservative estimate of consumption from the CFSII, the actual regional spending is likely to be more.

The Consumer Expenditure Survey data only includes expenditures on "eggs," "fresh cream and milk" and "other dairy products," and thus is not easily comparable the CSFII data. A comparison of milk and dairy spending is included below. As stated, the CFSII is likely a low estimate of annual consumption.

Within expenditures on food at home, dairy products and eggs account for approximately 6.23% and .7% respectively.

The CES data is slightly below the spending from the USDA's Transportation and Marketing data estimate of spending on dairy products (fresh milk and cream, cheese, ice cream and butter/margarine) and eggs of \$572 per household in 2008 in Burlington. Again, the CES data is per consumer unit, so the data sets are not directly comparable.

	MEAN		TOTAL			
	POUNDS	POUNDS	POUNDS		TOTAL DOLLARS	
	CONSUMED,	CONSUMED	CONSUMED	AVERAGE	SPENT PER	
	NORTH EAST	PER PERSON	IN 6 COUNTY	PRICE PER	PERSON PER YEAR	DOLLARS SPENT IN 6
	REGION	PER YEAR	REGION	POUND	(\$)	COUNTY REGION (\$)
Whole	0.16	59.55	19,493,378.18	0.36	21.44	7,017,616.14
Low fat	0.15	56.33	18,439,682.06	0.36	20.28	6,638,285.54
Skim	0.07	27.36	8,956,417.00	0.36	9.85	3,224,310.12
Yogurt	0.02	8.85	2,897,664.32	1.95	17.26	5,650,445.43
Milk Desserts	0.06	22.53	7,375,872.82			
Cheese	0.04	13.68	4,478,208.50	5.78	79.07	25,884,045.13
Other Milk, Milk drinks and						5.50 at 60
yogurt	0.07	26.55	8,692,992.97			
Eggs	0.03	11.27	3,687,936.41	1.16	13.07	4,278,006.24
TOTAL CONSUMED	0.62	226.12	74,022,152.27	TOTAL SALES	160.96	52,692,708.61

Image 30. Source: USDA, CFSII, Table 13.



Image 31. Source: USDA, CFSII, Table 13.

Study Findings

Summary of Dairy and Egg Supply:

EGGS:

- There were 223, 605 laying chickens in Vermont in 2007, a 5.5% increase from 2002.
- As of 2007, the census records 13, 859 laying chickens in the six county region.
 - However, data from Addison and Franklin counties were withheld.
 - A large producer in Addison County offers that they have 65,000 laying chickens on their website.¹¹
 - \circ All other counties besides Addison and Franklin have numbers reported for laying hens.
 - If all counties are subtracted from the state total, and 65,000 layers is substituted for Addison, there are an estimated 125,844 layers in Franklin County.
 - With Addison and Franklin estimated totals, there is an estimated 203,703 laying hens in the study area
 - Assuming these hens lay year round, the estimated production would equal 52,557,656 eggs total.
- Layer chickens are defined in the Census as, "This category includes table-egg type layers, hatching layers for meat-types, and hatching layers for table egg types.
 - It is assumed there is not significant number of hatching layers producers in the 6 county region.
- According to a local producer, if chickens are in their prime production years (6 months to 2 years old), an 80% lay rate is expected (meaning 80% of chickens will lay eggs that day). Of those eggs, a 4% loss rate can be expected (cracks, too small, large, etc.)¹²

Calculation Steps:

DAIRY

According to the CFSII:

- Total milk and yogurt consumption for the study region is 49,787,142 pounds of milk consumed each year. These products are assumed to have a 1:1 ratio of milk produced to end product.
- Cheese consumption is estimated to be 4,478,209 pounds per year. The ratio of pounds of milk to finished product for cheese is 10: 1.¹³ Cheese consumption equals 44,782,085 pounds of milk.
- Milk Desserts consumption is estimated to be 7,375,873 pounds per year. The production ratio for ice cream is 12 pounds of milk to make 1 gallon of ice cream¹⁴ and federal regulations dictate that ice cream must weigh 4.5 pounds per gallon.¹⁵ If all of the consumption is assumed to be ice cream, the milk dessert consumption would equate to 1,639,083 gallons of ice cream, or 19,668,994 pounds of milk.
- 11. Maple Meadow farms. maplemeadowfarmeggs.com. Accessed on August 4th, 2009.
- 12. Christa Alexander, email to author, July 1, 2009.
- 13. Midwest Dairy Association. <u>http://www.midwestdairy.com/pages/faq.cfm?TREE_ID=511</u>.
- 14. University of Vermont, <u>http://www.extension.org/faq/28136. Accessed on July 28</u>, 2009.
- 15. National Ice Cream Retailers Association. http://www.nicra.org/startbus.html#ol10

EGGS:

- Consumers in the six county region are estimated to consume 3,687,936 pounds of eggs annually, which is estimated to equate to 2,089,482 dozen eggs or 25,073,789 eggs total.
 - Consumption total in pounds was calculated from CFSII
 - A conventional dozen of large grade A eggs was weighed. The brand chosen was the brand the most prevalent in the case, and assumed to be the most common type of eggs consumed.
 - This weight was used to estimate how many eggs total were being consumed in the six county region

Conclusion

Based on these calculations, the total milk demand in the study region is 114,238,221 pounds. The total pounds of milk produced in the six county region is estimated to be 1,692,920,000 pounds of milk, an excess of 1,578,681,779 pounds of milk. Based on the yield estimate of 20,000 pounds of milk per cow each year, the production levels indicate there is an "excess" of 78,934 cows in the region

As mentioned, measuring how much land is needed to support cows is complicated. Some metrics are based on "Dry Matter Intake" (DM or DMI), to remove the water content. On average, each cow requires 2.5 acres of hay and corn silage each year. \Box Cows do also need grain products, however, the composition of the grain feed vary so dramatically it is not possible to estimate how much land is needed to produce grain feed. If the cows needed to meet demand for milk were fed regional hay and silage, they would need 14,280 acres. If the current supply of cows were fed with locally produced hay and feed, 211,615 acres would be needed, a difference of 197,335 acres. To put the land use into perspective, there were 241,002 total acres harvested in the six county region in 2007 \Box .

	2.5 F
YIELD PER	
ANIMAL (lbs).	489.00
TOTAL	
POUNDS	
PRODUCED	761,813.10
TOTAL	
POUNDS BEEF	
CONSUMED	6,585,600.74
ADDITIONAL	
POUNDS	
NEEDED	5,823,787.64
NUMBER OF	
ADDITIONAL	
COWS	
NEEDED TO	
MEET	
DEMAND	11,909.59
TOTAL	
ADDITIONAL	
CATTLE	
NEEDED TO	
MEET STEER	
DEMAND	23,819.17
Image 32. Source	ce: USDA, 2007
·	

YIELD PER	
ANIMAL (lbs).	4.40
TOTAL POUNDS	
PRODUCED	13,754.40
TOTAL POUNDS	
CHICKEN	
CONSUMED	6,058,752.68
ADDITIONAL	
POUNDS	
NEEDED	6,044,998.28
NUMBER OF	
ADDITIONAL	
CHICKENS	1.373.863.24
Image 33. Source	: USDA, 2007
Agricultural Censu	JS.

	Addison	Chittend en	Franklin	Grand Isle	Lamoille	Washingt on	TOTAL
Broilers and other meat- type chickens							
2007	D	D	620	260	1426	820	3,126

Image 34. Source: USDA, 2007 Agricultural Census.

Study Findings

Scenario: Doubling the Demand

Given the assumption that the CFSII underestimates actual consumption, a scenario in which dairy consumption is doubled is analyzed. When consumption is doubled:

 Regional production is estimated to still produce an excess of 1,464,443,558.46 pounds of milk.

CURRENT MILK DEMAND		CURRENT	MILK SUPPLY	SCENARIO: DO	DUBLE DEMAND
NUMBER OF TOTAL				NUMBER OF TOTAL	
COWS NEEDED TO		CURRENT TOTAL		COWS NEEDED TO	
MEET DEMAND	5,711.91	MILK COWS	84,646	MEET DEMAND	11,423.82
TOTAL POUNDS		TOTAL POUNDS		TOTAL POUNDS	
PRODUCED	114,238,220.77	PRODUCED	1,692,920,000	PRODUCED	228,476,441.54
ACRES NEEDED TO		ACRES NEEDED TO		ACRES NEEDED TO	
FEED COWS HAY		FEED COWS HAY		FEED COWS HAY	
AND SILAGE		AND SILAGE		AND SILAGE	
(2.5/cow)	14,279.78	(2.5/cow)	211,615.00	(2.5/cow)	28,559.56

The brief analysis in this report exposes several new questions, such as, as the land cannot support the current levels of production, does importing feed hurt dairy farmer's profitability. However, increasing locally produced feed to lower the cost of producing milk would demand a magnitude of land use devoted to growing feed. In connection, if Vermont wants to eat locally produced food, some of the acres currently used to feed cows may be needed for growing produce. A vision for the market is needed.

EGGS

The number eggs produced is roughly twice the estimated demand. However, comparing the eggs demand to supply required several assumptions. While there are not any large scale producers of layers of meat hatchers, it is likely that the production is slightly overestimated as all the laying eggs were assumed to be laying table eggs rather than hatching eggs.

The egg supply calculations include the following assumptions:

- 1. Consumption data in grams includes only food actually consumed, and does not include bones, egg shells, or other waste
- 2. Hens lay all year round
- 3. Layer chickens are defined in the Census as, "This category includes table-egg type layers, hatching layers for meat-types, and hatching layers for table egg types
 - a. It is assumed there is not significant number of hatching layers producers in the 6 county region

Summary of Meat Demand:

The CFSII data of consumer intake of meat is captured below in Image 35. The highest proportion of meat consumption is a miscellaneous category of "Mixtures mainly meat, poultry, and fish," however, the consumption of more pure forms of meat align with the sales data from a regional grocery store chain. Explicitly, the top three sellers of meat, beef, chicken and sausage, match the top two pure meat forms consumed. See definitions below for more details on what is included in each category.

The top five products of meat sales are, in order, ground beef (14.99%), chicken (14.68%), frozen meat (8.44%) sausage (7.79%), franks (4.87%) and smoked meat (4.46%).

Consumer Spending

After applying the sales data to the products for which there is comparable consumption data to estimate how much money is spent on meat products, an estimated \$78.4 million is spent on ground beef, chicken, pork and sausage products alone. The most money is spend on chicken, with approximately \$25.2 million is spend on chicken and \$23.6 million is spent on beef. Given conservative estimate of consumption from the CFSII, the actual spending is likely higher.

- The most popular ground beef product is 93% Lean Ground Beef
- The most popular chicken is boneless chicken breasts, accounting for 6.13% of all meat sales.
- The most popular smoked meat is boneless ham steaks (.84% of all meat purchases)
 - Smoked meat category includes items such as smoked ham with and without bones, smoked chops with and without bones, and other pork products (shanks, whole hams, spiral hams)
- Breaded boneless chicken is the popular type of frozen meat (4.84%)
- The most popular kind of franks are natural casing franks (2.02%).
- Note: sausage includes all type of sausages.



Image 34. Source: USDA, CFSII, Table 13.

	MEAN				TOTAL	
	POUNDS	POUNDS			DOLLARS	DOLLARS
	CONSUMED,	CONSUMED	TOTAL POUNDS	AVERAGE	SPENT PER	SPENT IN 6
	NORTH EAST	PER PERSON	CONSUMED IN 6	PRICE PER	PERSON PER	COUNTY
	REGION	PER YEAR	COUNTY REGION	POUND	YEAR (\$)	REGION (\$)
Chicken	0.05	18.51	6,058,752.68	4.16	76.93	25,184,215.30
Other	0.01	3.22	1,053,696.12			
Beef	0.06	20.12	6,585,600.74	3.59	72.22	23,642,306.64
Pork	0.02	8.85	2,897,664.32	3.36	29.71	9,726,493.25
Lamb, veal, game	0.00	0.80	263,424.03	n/a		
Organ meats	0.00	0.80	263,424.03	n/a		
Frankfurters, sausages, luncheon meats	0.05	17.70	5,795,328.65	3.42	60.60	19,839,341.74
Fish and shellfish	0.03	9.66	3,161,088.35	n/a		
Mixtures mainly meat, poultry, fish	0.21	77.25	25,288,706.83	n/a		
TOTAL CONSUMED PER YEAR	0.43	156.91	51,367,685.74	TOTAL SALES	239.47	78,392,356.92

Image 35. Source: USDA, CFSII, Table 13.

As stated, the CFSII is likely a low-ball estimate of annual consumption. The Consumer Expenditure Survey is not directly comparable for all products, but indicates actual consumption of beef, chicken and pork is higher than the CFSII predicts. The land use analysis will be based on the CFSII consumption estimates, and therefore, likely underestimates the additional land and resources used to produce enough product to meet demand.

The CES data is slightly below the spending from the USDA's Transportation and Marketing data estimate of spending on meat and eggs of \$1090 per household in 2008 in Burlington. However, the CES data is per consumer unit, so the data sets are not directly comparable.

	2007 Average Annual Expenditure	Average price	Estimate of		
	Per	per pound	annual	Annual	
	Consumer	(BASED ON	consumptio	Consumption	
	Unit	TOP SELLERS)	n (LBS)	from CFSII	Difference
MEAT					
Beef	207	3.36	61.67	20.12	41.55
Pork	149	3.36	44.39	8.85	35.54
Other meats	121				
Poultry	151	4.16	36.33	18.51	17.82
Fish and seafood	159				
Eggs	45				
TOTAL	832				

Image 36. Source: BLS, CES.

	MEAN	5	5			
	POUNDS					
	CONSUM	POUNDS				
	ED,	CONSUM	TOTAL POUNDS	AVERAGE	TOTAL DOLLARS	
	NORTH	ED PER	CONSUMED IN	PRICE	SPENT PER	DOLLARS SPENT
	EAST	PERSON	6 COUNTY	PER	PERSON PER	IN 6 COUNTY
	REGION	PER YEAR	REGION	POUND	YEAR (\$)	REGION (\$)
Yeast breads and rolls	0.12	44.26	14,488,321.62	2.33	103.12	33,757,789.37
Other Cereals and Pasta	0.03	12.07	3,951,360.44	Ì	l.	
Ready to Eat Cereals	0.04	13.68	4,478,208.50	4.18	57.18	18,718,911.53
Rice	0.07	24.14	7,902,720.88	1.13	27.28	8,930,074.60
Pasta	0.06	23.34	7,639,296.85	1.39	32.44	10,618,622.63
Quick Breads, pancakes, french t	0.03	12.07	3,951,360.44			
Cakes, cookies, pastries, pies	0.08	28.16	9,219,841.03			
Crackers, popcorn, pretzels, corn	0.43			4.17		
Mixtures mainly grain	12.96					
TOTAL CONSUMED	13.83	157.72	51,631,109.77	13.20	220.02	72,025,398.13

Image 37. Source: USDA, CFSII, Table 13.

Beef Production:

To meet the estimated beef demand in the six county area, an additional 11,920 steers would be needed. To estimate the land needed to supported the additional livestock, the rule of thumb is one acre per animal, as the one acre will be needed to support the mother of the steer, and one acre will be needed for the steer itself. Consequently, the additional steers would require an additional 23,840 acres of dry feed^D. See calculations at right. Note, the beef production totals do not include culled dairy cows.

Beef Supply Summary

- The number of beef cattle fell by 856 cows between 2002 and 2007, a decrease of 19.8%[□].
- According to Ed Jackson of Vermont's Beef Association:
- The majority of beef producers are small scale with producers with 10-20 head of cattle. There are only a handful of operations in the state with herds of 100-200.
- The number of beef cows in the Census is breeding cows:
- From 3,462 steers, 1558 (45%) can be expected to be finished
- 50% are assumed to be heifers, and 50% are assumed male, and 5% are assumed to be lost
- Only the males are finished for beef
- The average finishing weight is 1200 pounds
- The average hanging weight is 60% of the finshing weight, or 720 pounds
- 3% is lost when the carcass is chilled, so the average steer would weigh 698 pounds
- 30% of the 698 pounds (209 pounds) is cut out (bones, tendons, etc.)
- The average final weight of each steer is estimated to be 489 pounds
- The total meat produced in the six count region is 761,813 pounds
- Meat yield will vary per production method. According to a local grower, Jericho Settlers, who raises relatively small cattle (500 to 550 lbs):
- There is not a dominant production method in the region (grain fed, grass fed, etc.)
- Cows yield 55% of their finishing weight.
- For quality beef, cows need to eat 3% of their body weight per day.

Poultry Production:

- According to a local grower:
 - Meat birds are almost all Cornish cross, the only large meat bird for which chicks are available 0 in large numbers, though a few producers are also growing Red Bros., a smaller breed prized for its' flavor□
- Data from Addison and Chittenden Counties was withheld in the 2007 Agriculture Census.
 - There is a large chicken producer is in Addison County. Production estimates were not possible 0 to obtain for this study.
- The quantity of broiler chickens grew by 731 between 2002 and 2007, an increase of 30%[□]. •
- Because chickens require a relatively very small amount of land and production varies so dramatically a land use assessment is not relevant.

To meet the estimated chicken demand in the six county area, an additional 1.4 million chickens would be needed. Chickens are relatively less taxing on land than cows, and can be produced on a relatively small amount of land. Yield data is based on information from a local grower.

Scenario: Estimating Addison County

If the large producer in Addison County was assumed to produce 125,000 chickens, the total number of broiler chickens in the six county region would be 128,126 broilers. At this production level, the region would still need 1.25 million chickens to meet demand.

4.40

563,754.40

6,058,752.68

5,494,998.28

1,248,863.24

	YIELD PER	
	ANIMAL (lbs).	
119.00	TOTAL POUNDS	
	PRODUCED	563.7
		/-
155,176.00		
263,424.03		
108,248.03	TOTAL POUNDS	
	CHICKEN	
	CONSUMED	6,058,7
	ADDITIONAL	
	POUNDS	
909.65	NEEDED	5 494 9
	NULLARER OF	5,454,5
	NUMBER OF	
909 647 21	ADDITIONAL	
505,047.51	CHICKENS	
	NEEDED TO	
	MEET DEMAND	1,248,8
454.82	Image 38. Source	e: USDA, 2007
	Agricultural Cens	us.
	119.00 155,176.00 263,424.03 108,248.03 909,65 909,647.31 454.82	119.00 YIELD PER ANIMAL (lbs). TOTAL POUNDS PRODUCED PRODUCED 155,176.00 Image 38. Source 263,424.03 Image 38. Source 108,248.03 TOTAL POUNDS 108,248.03 TOTAL POUNDS CHICKEN CONSUMED ADDITIONAL POUNDS 909.65 NUMBER OF ADDITIONAL CHICKENS 909,647.31 CHICKENS 454.82 Image 38. Source

181.93 dry matter in tons) Image 37. Source: USDA, 2007 Agricultural Census.

PRODUCTION (1 Acre produces 2.5

Pork Production:

- Yield notes from local producer[□]:
 - o 170 LBS. hanging weight is the goal for the average finishing weight.
 - o Diet:
 - Varies seasonally, as pigs forage more on pasture in the summertime, eat more hay in the wintertime, and always as grain available to supplement.
 - Different age pigs eat different amounts.
 - In general, it takes 1000 pounds of feed to bring a weanling pig to slaughter weight when they are on good pasture. Farmers who use only grain may need more feed.
 - Producers who feed their pigs whey or other dairy products may not feed their pigs any grain at all.
- There is not a dominant production style and/or breeds in the surrounding counties.
 - However, a lot of dairies and cheese producers raise a few pigs. They feed them whey and other dairy waste products as pigs utilize this waste very well.

To meet the regional demand for pork, an additional 23,000 pigs and hogs would be needed. To support the pigs, an additional 4,600 acres would be needed for feed.

Conclusion

As the actual consumption of beef, chicken, pork and other meat products is like higher than the CFSII, and meeting the demand would require significant additional acres for livestock and feed.

As of 2007, there were 578,786 acres in farms in the six county region. To meet the conservative estimate of demand for meat products, an additional 28,440 acres would be needed to feed the cows and pigs corn silage and hay alone, which would be an 5% increase in total farm acres.

As a bulk of the beef and pork production tends to be concentrated in Addison and Franklin counties, land use changes in these counties could swiftly affect production levels in the region.



Image 39. Source: USDA, 2007 Agricultural Census.

Summary of Grain Demand:

Summary of Grain Demand:

Below is a summary of the CFSII of grain intake. The highest proportion of consumption is "mixtures mainly grain" (35%), followed by yeast bread and rolls (17%) and cakes, cookies, pastries and pies at (11%).^{\Box} See the glossary for definitions for more details.

Calculation steps:

As with other commodities, the product in the greatest quantity was chosen for the price comparison. Organic products and specialty products were generally avoided.

- Grain products are included in the general grocery section.
- The top 5 general grocery sellers are, in order, carbonated soft drinks (5.11%), bread and rolls (4.28%), wine (3.51%), beer (3.41%) and salty snacks (2.97%), the data roughly matches the consumption data.
- If you remove beer and wine, cold cereals (2.51%) and crackers (1.88%) slide into 4th and 5th place, respectively.

Consumer Spending

Based on the CFSII, the regional population spends approximately \$72 million on grain products per year on average on yeast bread, rice, pasta and ready to eat cereal, including:

- \$34 million on yeast bread and rolls
- \$19 million on ready to eat cereals
- \$11 million on pasta
- \$9 million on rice

Stud

According to the 2007 Consumer Expenditure Survey, the average consumer unit in the Northeast Region spent \$6,419 on average on food expenditures, and spent \$495 on average annually on "Cereal and Bakery" products which accounts for 7.71% of consumer spending on food[□]. The spending estimate includes \$157 spent on cereal and cereal products, and \$339 on "bakery products." The analysis from this study indicates people spend \$220 on average per year on grain products.

The USDA's Transportation and Marketing data estimates that Burlington households will spend \$492 on "bread & products," \$88 dollars on "cookies" and \$42 on "crackers". \Box



Image 39. Source: USDA, CFSII, Table 13.

Summary of Grain Supply:

As of 2007, there are a total of 241,005 acres harvested for grain within the six county region. The Census data indicates that of the 241,005 acres harvested, 231,914 (96%) are devoted to growing growing silage and greenchop. "Forage for Feed (land used for haylage, grass silage and greenchop)" accounts for 65.3% of all crops, and corn for silage comprises for 30.3%.[□] Together, these crops account for a staggering 96% of all crop production. The amount of acres of corn, oats, and wheat harvested for grain equals less than 2% of all harvested acres.

Assessing how much grain product goes into a loaf of commercially produced bread, pasta or cereal is highly variable and proprietary, consequently, impossible to reliably assess. While no reliable source could be found, one "back of the napkin" estimate is that one bushel of grain can produce 73 one pound loaves of bread, based on the following conversions[□]:

- 1 bushel of wheat = 60 pounds
- 60 pounds of wheat = 42 pounds of flour
- 42 pounds of flour = 73 loaves of bread

As of 2007, there were 5450 bushels of wheat harvested in the six county study region (all in Addison County), which can be estimated to produce roughly 397,850 one pound loaves of bread. The estimated consumption of bread in the study area is 14,488,321.62 pounds of yeast bread and rolls per year, a different of 14,090,471.6 pounds. If the conversion rates above are applied to the estimated consumption of wheat, the estimated bushels of wheat needed to meet demand is 198,470 bushels. Based on the production in Addison County in 2007, each acre produced 38.9 bushels of wheat, so roughly 5,102 acres of wheat would be needed to meet demand.

Conclusion

While there are clear market opportunities for grain products, the building of processing, transportation and storage facilities will require considerable capital. Yet, in order for locally-produced grain products to capture the market share, the producers will have to meet the price points offered at grocery store chains. To match this pricing, the grain production operations will likely have to be large in scale, which would again require significant capital. Given the decrease in total agricultural land, the prevalence of livestock in the region, and the funding required to scale up grain production for food, regionally produced grain products may not be likely to be produced.

Land Use Summary:



Image 40. Source: USDA, 2007 Agricultural Census.

Study Findings The overall image of land use in the six county region is dominated by livestock feed and apple production. To align the land use with the conservative estimate of regional demand, the following shifts would have to be made at minimum:

- 1,415 acres for additional vegetable production
 - Reduce apple crops by 1,110 acres for apple production
- Reduce milk cows by 78,934 head

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- 28,440 acres to feed steers and pigs corn silage and hay alone
- Roughly 5,102 acres additional of wheat

If a regional or local food system is truly sought, production will need greater diversification and all products with the exception of apples, sweet corn and dairy products will require significant scaling up.

Summary of Consumption, Production and Land Use Comparisons:

Consumer Spending Summary:

Based on the consumption of food commodities included in the CFSII, the regional population spends approximately :

\$73 million on vegetables per year on average, including:

- \$25 million for tomatoes
- \$ 16 million on potatoes
- \$7 million on corn, green peas and lima beans
- 2.4 million for green beans

\$58 million on fruit per year on average, including:

- \$16 million on juice
- \$ 11 million on berries and melons
- \$6 million on apples

\$53 million is spent on milk, eggs, cheese and yogurt, including:

- \$26 million on cheese
- \$7 million for whole milk
- \$6 million on yogurt
- \$4.3 million on eggs

\$78.4 million is spent on ground beef, chicken, pork and sausage products alone, including:

- \$25.2 million on chicken
- \$23.6 million is on beef

\$72 million on grain products per year on average on yeast bread, rice, pasta and ready to eat cereal, including:

- \$34 million on yeast bread and rolls
- \$19 million on ready to eat cereals
- \$11 million on pasta
- \$9 million on rice

The total spending estimate for the limited number of goods for which it was possible to obtain pricing data indicates there are market opportunities to capture at least \$334,400,000 for food products in the six-county region.

Study Findings

Recommendations

While there is a high level of food activism across the country currently, Vermont has experienced a long-standing strong commitment to agriculture and supporting local farms. Yet, farms are struggling to stay profitable, the farm land is unprotected from development and food production is not diversified. The following is a set of recommendations aimed at increasing the amount of food that is both produced and consumed regionally.

Define the Vision

Adopt a Food Charter

A food charter is a declaration of the goals of the food system within a defined area, for example, improving access to healthy food in schools or improving economic viability of farmers. The adoption of a food charter can define the boundaries and vision for the preferred foodshed (which, for Burlington, may include parts of New York and Quebec) and act as a guide for policy decisions.

The food charter can also be used as a tool to nurture horizontal relationships between towns. Towns control the growth management but may lack information and resources to make informed decisions for agriculture.

Build Food System Infrastructure

If the vision of the people is for a regional food system, infrastructure will be needed for processing, storing, distributing and transporting food. As the construction of these systems requires significant capital, creative solutions and gap financing options need to be explored. The co-ops in Burlington and Montpelier as well as other towns have significant buying power when combined and could pool resources to create a facility. Alternatively, city governments could investigate ways to offer low-interest municipal bonds for construction.

Close Knowledge Gaps

Collaborative Food Consumption Study

Burlington contains the unique position of a deep cultural commitment to agriculture and the advantage of having a land-grant university, UVM. Improved data on food consumption and agricultural land use is greatly needed. If various UVM's departments and regional agricultural organizations such as The Intervale Center pooled their resources, one comprehensive study of food consumption in the area would offer important information on the regional food system and identify market opportunities for farmers.

Create a foodshed map

Several of the soil surveys are from the 1960's and 1970's and are in need of an update. If an update of soil surveys is not possible, the creation of GIS (Geographic Information Systems) maps of where food is being produced within the foodshed would be useful for guiding decisions on where to develop land. Again, as a land-grant institution, the resources and graduate students at UVM could be employed to create the maps. Maps that display tracking information, such as where food is produced and where it is consumed, could also be powerful.

Investigate and Increase Farmer Profitability

The current food system presents challenges for non-commodity food producers in multiple ways. Investigations into ways to into ways to improve farmer's economic situations, such as income insurance or increasing tourism opportunities could help keep farmers in business.

Improve Knowledge of Consumer Behavior

While not all shoppers are likely to be open to changing their shopping habits, improved data is needed on how to convert consumers to support regional producers. Consumer studies could explore if pricing is the driving force behind consumer behavior and if prices at farmer's market are truly higher. Another research topic could be to examine how to retain Community Supported Agriculture share holders.

Education and Outreach

Continue to Educate Consumers

Until policy changes demand changes the commodity food system, efforts to fuel the alternative food system can increase regional demand for regionally produced food. Education on the environmental, social and economic costs of the commodity food system may convert additional consumers to buying from local farms. As consumers learn the benefits of supporting local farms, more consumers who are open and able to changing their shopping patterns may choose to seek out alternative options. Other areas of research include if farm to school programs improve children's health and performance.

Farming Information Infrastructure

Several innovative technical methods and business practices for farming are being created and utilized across the state of Vermont. In addition, information on working with equipment, insurance, inspections, tax policies and accounting practices is complex. Farmers would benefit from a forum to share information, stories and ideas, as a mechanism to support each other.

Glossary

Contuining Food Survey on Intake by Individuals Definitions¹⁶

GRAIN PRODUCTS

Total grain products: Includes yeast breads, rolls, cereals, pastas, quick breads, pancakes, French toast, cakes, cookies, pastries, pies, crackers, popcorn, pretzels, corn chips, and mixtures having a grain product as a main ingredient. Excludes grain products that were ingredients in food mixtures coded as a single item and tabulated under another food group, such as noodles in tuna-noodle casserole which are tabulated under Meat, Poultry, and Fish (the food group for tuna, the main ingredient).

Yeast breads and rolls: Includes white, whole-wheat, "wheat," cracked-wheat, rye, pumpernickel, oatmeal, multigrain, and other yeast breads and rolls (excluding sweet rolls), bread stuffing, English muffins, bagels, and croutons.

Total cereals, rice, pasta: Includes macaroni, noodles, spaghetti, grits, oatmeal, rice, other cooked cereal grains, unsweetened and sweetened ready-to-eat cereals, baby food cereals, and mixtures of baby cereal and fruit.

Ready-to-eat cereals: Includes unsweetened and sweetened ready-to-eat cereals.

Rice: Includes white, brown, and wild rice.

Pasta: Includes macaroni, noodles, and spaghetti.

Quick breads, pancakes, French toast: Includes biscuits, cornbread, tortillas, muffins, other quick breads, pancakes, waffles, and French toast. Excludes quick-bread-type coffee cakes.

Cakes, cookies, pastries, pies: Includes yeast-type sweet rolls, yeast- and crumb- or quick-breadtype coffee cakes, croissants, cakes, cookies, pies, cobblers, turnovers, danish pastries, doughnuts, breakfast bars and tarts, granola bars, and sweet crackers.

Crackers, popcorn, pretzels, corn chips: Includes nonsweet crackers; grain-based salted and unsalted snacks such as corn chips and tortilla chips, popcorn, and pretzels. Excludes potato chips, which are tabulated under Vegetables in the subgroup "white potatoes."

Mixtures mainly grain: Includes mixtures having a grain product as a main ingredient, such as burritos, tacos, pizza, egg rolls, quiche, spaghetti with sauce, rice and pasta mixtures; frozen meals in which the main course is a grain mixture; noodle and rice soups; and baby-food macaroni and spaghetti mixtures.

VEGETABLES

Total vegetables: Includes white potatoes, dark-green and deep-yellow vegetables, tomatoes, lettuce, green beans, corn, green peas, lima beans, other vegetables; mixtures having vegetables as a main ingredient; and vegetable juices. Excludes vegetables that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, potatoes or tomatoes in beef stew are tabulated under Meat, Poultry, and Fish.

White potatoes: Includes baked, boiled, mashed, scalloped, and fried potatoes; potato chips; and mixtures having potatoes as a main ingredient, such as potato salad, stuffed baked potatoes, and potato soup.

Fried potatoes: Includes french-fried, deep-fried, hash brown, and home-fried potatoes; potato skins; and potato chips.

Dark-green vegetables: Includes raw and cooked broccoli and dark-green leafy vegetables such as romaine, collards, mustard and turnip greens, kale, and

spinach; mixtures having dark-green vegetables as a main ingredient, such as broccoli with cheese sauce; and baby-food spinach.

^{16.} USDA, Agricultural Research Service. December 1998. Data Tables: Food and Nutrient children should note that breast-fed children have been excluded from Intakes by Region, 1994-96.

Deep-yellow vegetables: Includes raw and cooked deep-yellow or orange vegetables such as carrots, pumpkin, winter squash, and sweet potatoes; mixtures having deep-yellow vegetables as a main ingredient, such as peas and carrots and sweet potato casserole; and baby-food carrots, squash, and sweet potatoes.

Tomatoes: Includes raw and cooked tomatoes; tomato juice; catsup, chili sauce, salsa, and other tomato sauces; and mixtures having tomatoes as a main ingredient, such as tomato-based soups and tomato and corn coded as a single item.

Lettuce, lettuce-based salads: Includes lettuce and mixed salad greens; lettuce salad with assorted vegetables, cheese, or egg; and other lettuce-based salads.

Green beans: Includes raw or cooked green and yellow beans; mixtures having beans as a main ingredient such as beans with tomatoes or onions, bean salad, and beans with cream or mushroom sauce; and baby-food green beans.

Corn, green peas, lima beans: Includes raw or cooked green peas; cooked corn and lima beans; mixtures having corn, green peas, or lima beans as a main ingredient such as creamed corn, corn pudding, peas and onions, or pea soup; and baby-food corn and green peas. Excludes dry lima beans, which are tabulated under Legumes.

Other vegetables: Includes raw and cooked vegetables other than the following: white potatoes, darkgreen and deep-yellow vegetables, tomatoes, lettuce, green beans, corn, peas, and lima beans and their mixtures. Includes vegetable soups; pickles, olives, and relishes; mixtures having "other" vegetables as a main ingredient; baby-food vegetables and baby-food vegetable mixtures with meat.

FRUITS

Total fruits: Includes citrus fruits and juices, dried fruits, and other fruits; mixtures having fruit as a main ingredient; and fruit juices. Excludes fruits that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, apples in apple pie are tabulated under Grain Products.

Total citrus fruits and juices: Includes oranges and other citrus fruits, mixtures of orange juice and other citrus juices, and baby-food citrus juices. Excludes citrus fruit drinks and ades such as lemonade, which are tabulated under Beverages.

Citrus juices: Includes fresh, frozen, canned, or bottled grapefruit, lemon, lime, orange, and other citrus juices, either sweetened or unsweetened; mixtures of citrus juices such as grapefruit and orange juice; and baby-food citrus juices. Excludes mixtures of citrus juices with noncitrus juices, which are tabulated under "noncitrus juices and nectars."

Dried fruits: Includes dried apples, apricots, dates, prunes, raisins, and other dried fruits. Excludes juices such as prune juice, which are tabulated under "other fruits, mixtures, and juices."

Total other fruits, mixtures, juices: Includes raw, frozen, cooked, and canned apples, bananas, melons, berries, and other fruits except citrus and dried fruit; mixtures that are mainly noncitrus fruit; noncitrus juices (including prune juice) and nectars; mixtures of citrus and noncitrus juices; and baby-food noncitrus fruits and juices, fruits with tapioca, and fruit desserts. Excludes fruit drinks and ades, which are tabulated under beverages. Excludes frozen fruit juice bars and sorbets, which are tabulated under Total Sugars and Sweets.

Apples: Includes raw and cooked apples, applesauce, and baby-food applesauce.

Bananas: Includes raw and cooked bananas and baby-food bananas. Excludes the starchy vegetables called plantains or "green bananas," which are tabulated under Vegetables in the subgroup "other."

Melons and berries: Includes cantaloupe, honeydew melon, watermelon, blueberries, blackberries, raspberries, strawberries, and cranberries.

Other fruits and mixtures mainly fruit: Includes fruits other than citrus fruits, dried fruit, apples, bananas, melons, and berries; mixtures of noncitrus fruits and mixtures that are mainly noncitrus fruits coded as a single

item such as fruit salad with salad dressing, marshmallow, or pudding; and baby-food noncitrus fruits and mixtures having fruit as a main ingredient.

Noncitrus juices and nectars: Includes fruit juices, nectars, and baby-food juices other than citrus; and mixtures of citrus juices with noncitrus juices. Excludes fruit drinks and ades, which are tabulated under Beverages.

MILK AND MILK PRODUCTS

Total milk and milk products: Includes milk and milk drinks, yogurt, milk desserts, and cheese. Fluid and whipped cream, half-and-half, sour cream, and milk sauces and gravies are included in this total but not in any of the following subgroups. Excludes butter and nondairy sweet cream and sour cream substitutes, which are tabulated under Fats and Oils. Excludes milk and milk products that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, cheese on pizza is tabulated under Grain Products.

Total milk, milk drinks, yogurt: Includes fluid milk and yogurt. Flavored milk and milk drinks, meal replacements with milk, milk-based infant formulas, and unreconstituted dry milk and powdered mixtures are included in this total but not in any of the following subgroups.

Total fluid milk: Includes fluid whole, lowfat, skim, and acidophilus milk; buttermilk; reconstituted dry milk; evaporated milk; and sweetened condensed milk.

Whole milk: Includes whole fluid milk, low-sodium whole milk, and reconstituted whole dry milk.

Lowfat milk: Includes lowfat (1 and 2 percent) milk, buttermilk (lowfat and nonfat), acidophilus milk, lowfat lactose-reduced fluid milk, and reconstituted lowfat dry milk.

Skim milk: Includes skim or nonfat fluid milk, lactose-reduced fluid nonfat milk, and reconstituted nonfat dry milk.

Yogurt: Includes plain, flavored, and fruit-variety yogurt. Excludes frozen yogurt, which is tabulated under "milk desserts."

Milk desserts: Includes ice cream, imitation ice cream, ice milk, sherbet, frozen yogurt, and other desserts made with milk, such as pudding, custard, and babyfood pudding.

Cheese: Includes natural hard and soft cheeses, cottage cheese, cream cheese, processed cheese and spreads, imitation cheeses, and mixtures having cheese as a main ingredient, such as cheese dips and cheese sandwiches coded as a single item.

MEAT, POULTRY, AND FISH

Total meat, poultry, and fish: Includes beef, pork, lamb, veal, game, organ meats, frankfurters, sausages, luncheon meats, poultry, fish, shellfish, and mixtures having meat, poultry, or fish as a main ingredient. Excludes meat, poultry, and fish that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, pepperoni on pizza is tabulated under Grain Products. Meat gravies and unflavored gelatin are included in this total but not in any of the following subgroups.

Beef: Includes all cuts (including ground), corned beef, beef bacon, pastrami, and baby-food beef. Excludes organ meats, frankfurters, sausages, and luncheon meats.

Pork: Includes all cuts (including ground); pickled, smoked, and cured pork; ham; pork roll; bacon; salt pork; pig's feet; and pork rinds. Excludes organ meats and frankfurters, sausages, and luncheon meats.

Lamb, veal, game: Includes lamb, veal, goat, venison, and other game. Excludes organ meats, frankfurters, sausages, and luncheon meats.

Organ meats: Includes liver, tripe, gizzards, and other organ meats.

Frankfurters, sausages, luncheon meats: Includes frankfurters, sausages, and luncheon meats made from beef, pork, ham, veal, game (deer bologna), chicken, and turkey; and baby-food meat sticks.

Total poultry: Includes chicken, turkey, duck, cornish game hen, and baby-food chicken and turkey. Excludes

organ meats (giblets), frankfurters, sausages, and luncheon meats.

Chicken: Includes only chicken. Excludes organ meats (giblets).

Fish and shellfish: Includes finfish; shellfish, such as clams, crabs, lobster, oysters, scallops, and shrimp; and other seafood.

Mixtures mainly meat, poultry, fish: Includes mixtures having meat, poultry, or fish as a main ingredient, such as chicken cacciatore; beef loaf; chili con carne; venison stew; hash; tuna salad; corn dog; chicken soup; frozen meals in which the main course is a meat, poultry, or fish item; meat, poultry, or fish sandwiches coded as a single item (for example, cheeseburger on a bun); and baby-food meat and poultry mixtures.

EGGS; LEGUMES; NUTS AND SEEDS; FATS AND OILS; SUGARS AND SWEETS

Eggs: Includes whole eggs; egg whites; egg yolks; egg substitutes; and mixtures having egg as a main ingredient, such as omelets, egg salad, or egg sandwiches

coded as a single item. Excludes eggs that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, eggs in baked goods are tabulated under Grain Products.

Legumes: Includes cooked dry beans, peas, and lentils; mixtures having legumes as a main ingredient, such as baked beans or lentil soup; soybean-derived

products, such as soy-based baby formulas, tofu, soy sauce, and soy-based meal replacements; and meat substitutes that are mainly vegetable protein. Excludes peanuts, which are tabulated under Nuts and Seeds. Excludes legumes that were ingredients in food mixtures coded as a single item and tabulated under another

food group. For example, beans in tacos are tabulated under Grain Products.

Nuts and seeds: Includes unroasted, roasted, and honey-roasted nuts and peanuts; coconut; peanut butter; peanut butter sandwiches coded as a single item; nut mixtures; and unroasted and roasted seeds. Excludes chocolate-covered nuts, which are tabulated under Sugars and Sweets in the subgroup "candy." Excludes

nuts and seeds that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, nuts in baked goods are tabulated under Grain Products.

Total fats and oils: Includes table fats; cooking fats; vegetable oils; salad dressings; nondairy cream substitutes; and tartar sauce and other sauces that are mainly fat or oil. Excludes fats and oils that were ingredients in food mixtures coded as a single item and tabulated under another food group. For example, fats or oils used to fry chicken are tabulated under Meat, Poultry, or Fish. Also, mayonnaise in cole slaw is tabulated under Vegetables.

Table fats: Includes butter, margarine, imitation margarine, margarine-like spreads, blends of butter with margarine or vegetable oil, and butter replacements.

Salad dressings: Includes regular and reduced- and low-calorie salad dressings and mayonnaise.

Total sugars and sweets: Includes sugar, sugar substitutes, syrups, honey, sweet toppings, frostings, sweet sauces, jellies, jams, preserves, fruit butters, marmalades, gelatin desserts, ices, fruit bars, popsicles, candy (including dietetic sweets), and chewing gum. Excludes sugars that were ingredients in food

mixtures coded as a single item and tabulated under another food group. For example, sugar in baked goods is tabulated under Grain Products. Also, sugar in carbonated soft drinks is tabulated under Beverages.

Sugars: Includes white sugar, brown sugar, saccharin, aspartame, and other sugar substitutes.

Candy: Includes all types of candy (including dietetic sweets), chocolate-covered nuts, chocolate chips, fruit leather, and chewing gum.

Important Farmland Ratings¹⁷:

Soil map units are Prime Farmland if they have the best combination of physical and chemical characteristics for producing food, feed fiber, and oilseed crops and are also available for these uses. The present land use may be cropland, pasture, forestland, or other land uses, but not urban and built-up or water. Location, tract size, and accessibility to markets and support industries are not considered when making a Prime Farmland determination.

Prime Farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. These soils have an adequate and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity, and few or no surface stones or boulders. They are permeable to water and air, are not excessively erodible or saturated with water for a long period of time, and don't flood frequently or are protected from flooding.

To qualify as a Prime Farmland soil map unit, the dominant soils must meet all of the following conditions:

• Soil temperature and growing season are favorable.

• Soil moisture is adequate to sustain commonly grown crops throughout the growing season in 7 or more years out of 10

- Water moves readily through the soil and root-restricting layers are absent within 20 inches of the surface.
- Less than 10 percent of the surface layer consists of rock fragments larger than 3 inches in diameter.
- The soils are neither too acid nor too alkaline, or the soils respond readily to additions of lime.

• The soils are not frequently flooded (less often than once in 2 years) and have no water table, or the water table can be maintained at a sufficient depth during the growing season to allow for the growth of commonly grown crops.

- Slope is favorable (generally less than 8 percent) and the soils are not subject to serious erosion.
- The soils are typically deep (greater than 40 inches to bedrock), but include moderately deep soils (20 to 40 inches) with adequate available water capacity

Additional Farmland of Statewide Importance (Statewide)

This is land in addition to Prime and Unique Farmland that is of Statewide importance for the production of food, feed, fiber, forage, and oilseed crops. In Vermont, criteria for defining and delineating Farmland of Statewide Importance was determined by the appropriate state agencies, working with the Natural Resources Conservation Service.

The dominant soils in these soil map units have limitations resulting from one or more of the following conditions:

- Excessive slope and erosion hazard,
- Excessive wetness or slow permeability,
- A flooding hazard,

• Shallow depth (less than 20 inches) to bedrock or to other layers that limit the rooting zone and available water capacity,

• Moderately low to very low available water capacity.

Additional Farmland of Local Importance (Local)

In some areas, there is a need to identify additional farmland for the production of food, feed, fiber, forage, 17. USDA, Natural Resources Conservation Service, p.1.

and oilseed crops that has not been identified by the other categories in the Important Farmland system. These lands can be identified as Additional Farmland of Local Importance by the appropriate local agencies. In places, Additional Farmland of Local Importance may include tracts of land that have been designated for agriculture by local ordinance.

In Vermont, a few soil map units in some counties have been identified as Additional Farmland of Local Importance. Soil map units in Agricultural Value Group 8 could potentially be Additional Farmland of Local Importance. These soil map units have limitations for crop production that can be overcome. Many areas of these soil map units are currently being used for hay or pasture. The local Natural Resources Conservation Districts make these designations, with assistance from local NRCS personnel and concurrence by the NRCS State Conservationist.

The following soil map units are considered Additional Farmland of Local Importance:

Addison County: Adams Loamy Fine Sand, 5 To 12 Percent Slopes

Colton Gravelly Sandy Loam, 5 To 12 Percent SlopesRaynham Silt Loam, 6 To 12 Percent Slopes

Franklin County:

Missisquoi Loamy Sand, 8 To 15 Percent Slopes



The Intevale Center 180 Intervale Road Burlington, VT 05401 www.intervale.org

BETH MCKELLIPS BETH.MCK@GMAIL.COM