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A Framework for Monitoring Local and Regional Food Systems

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SIT Graduate Institute

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A Framework for Monitoring
Local and Regional Food Systems

Heather Victoria Davis • PIM 69

May 2011

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A Framework for Monitoring Local and Regional Food Systems

Heather Victoria Davis
PIM 69

A Capstone Paper submitted in partial fulfillment of the requirements for a
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List of Abbreviations

BLS: Bureau of Labor Statistics
CAE: The Center for an Agricultural Economy
CCV: Community College of Vermont
CSA: Community Supported Agriculture
EBT: Electronic Benefit Transfer
GDP: Gross Domestic Product
LED: Light Emitting Diode
M&E: Monitoring and Evaluation
NEK: Northeast Kingdom
NEKSWMD: Northeast Kingdom Solid Waste Management District
NOFA-VT: Northeast Organic Farming Association – Vermont
SNAP: Supplemental Nutritional Assistance Program (formerly Food Stamps)
US: United States
USDA: United States Department of Agriculture
UVM: University of Vermont
VFVC: Vermont Food Venture Center
WIC: Women, Infants, and Children
WTO: World Trade Organization

“Since we get what we measure, we should measure what we want”
– Charting Growth, The Wallace Center

“What you measure affects what you do.
If you don’t measure the right thing, you don’t do the right thing.”
Nobel Prize winner, Joseph Stiglitz

Abstract

The US food system has been experiencing gradual, yet significant, changes in recent years, with many people recognizing that conventional approaches to food systems and agriculture are not only unsustainable, but also destructive. As an alternative paradigm, the development of local food systems has been flourishing because of the benefits they bring to us: more local control over our food; supporting the local economy and entrepreneurs, healthier food options, fewer “food miles” and the associated benefits of lowered use of petroleum, stronger community connections, job creation for our rural communities, more gentle on the environment, and a more secure food system overall. Monitoring the level of health of various aspects of our food systems and the relevant trends that are occurring can bring us many benefits: allowing us to get a clear picture of our food system at present, being able to assess trends that are occurring, and, in turn, being able to identify weaknesses in the system that need to be addressed. Part I of this Capstone provides a framework for monitoring the trends in our local and regional food systems. It is my hope that this framework - developed for the Hardwick, Vermont area and Vermont’s Northeast Kingdom - will also be useful to other communities, permitting them to make better informed policy and programmatic choices concerning the development of their local food systems. Part II applies the trend-monitoring framework, although in an abbreviated form, to the food system in Vermont’s Northeast Kingdom, to illustrate the insights and benefits that such trend monitoring can provide.

Context

Hardwick, Vermont is a community that has garnered wide media attention over the past several years because of the recent innovative agricultural developments that have been taking place there.¹ It is a town that has experienced both boom and bust – once thriving during the early twentieth century and then struggling after the granite quarries that supported this golden-era of the town closed down. During the nineteen-seventies many people moved to the area from out-of-state, bringing with them a desire to move back to the land and rejecting much of what modern society was offering in the mainstream United States. Building upon the tradition of agriculture that already existed both here and throughout the state, these people integrated themselves into the community and many started organic farms to support and feed themselves and their neighbors. Twenty or so years later, a new generation has taken the torch and is making new contributions to the evolution of the region by starting farms and food-based businesses and taking thoughtful, deliberate steps to develop a local economy that is based upon local food.

There are many exciting things happening in food systems around the state, the country and the world, but Hardwick has been receiving particular attention. There is considerable work underway in Hardwick to harness the area's comparative advantage in agricultural resources and know-how in order to strengthen the economy of the region and the well-being of its citizens.

These efforts have proven so successful and have been so geographically concentrated, that many people are interested in what is happening in this small town and want to learn from what

¹ See Hewitt, Ben, *The Town that Food Saved: How one town found vitality in local food*; Dan Rather Reports, episode 72, November 17, 2009; Burros, Marian, *Uniting Around Food to Save an Ailing Town*; and Van Susteren, Dirk, *Fresh start: Farms and food and innovative human energy sustain a town's revival*.

is happening there. Many interested parties from around the country and the world have come to visit this community, inquiring how they can take this model and bring it back to their own communities.

It's clear that these multiple efforts have had a synergistic effect; one that has resulted in seven major downtown buildings seeing major renovations in recent years and 32 new businesses coming into town since 2005. While there is still much work to be done in Hardwick, an historically deprived area, one can look at the town as a case study in positive deviance: studying the unique successes taking place in Hardwick and learning from what is working, then taking this information to other communities so that they can benefit as well. In order for us to take full advantage of the lessons learned, additional research should be done to permit a clear understanding about exactly how and why this community is excelling in this context.

In the face of this exciting growth and development of the Hardwick area, there is still a relatively high level of poverty that should not be overlooked. In 2007, 14% of all residents and 17.6% of children were living below the poverty level (rates were 9.4% and 11.7% respectively for Vermont as a whole). Hardwick had a 9.3% unemployment rate in April 2010 while in Vermont it was at 6.7%, and 67.9% of the adult population has only a High School diploma or less.² We hope to see more encouraging trends in the future, as we would like to see the positive developments happening in the town being equitably distributed among all populations. Explicit, intentional steps must be taken along the way to assure that this is the case.

² Vermont Indicators Online

The food systems monitoring framework presented here - originally developed by myself for the Hardwick area - can also be adapted by other interested communities to evaluate their food systems, and can enable them to take steps, based on empirical evidence, to improve these systems. Regularly updated monitoring data will then contribute to ongoing development and provide clear pathways for continued evolution of the region.

In Part I of this Capstone, the purposes and process of developing local food systems and trend monitoring for such systems are discussed, with a complete set of indicators presented in Appendix 2. Part II, as an illustrative example, applies portions of the monitoring framework to the food system in the three counties of the Northeast Kingdom of Vermont (Caledonia, Essex, and Orleans counties) of which Hardwick is a part.

The Center for an Agricultural Economy

For my Practicum I have been working at the Center for an Agricultural Economy (CAE), located in downtown Hardwick, Vermont. It is an organization that is working to:

Build upon local tradition and bring together the community resources and programs needed to develop a locally-based 21st century healthy food system. The CAE supports the desire of rural communities to rebuild their economic and ecological health through strong, secure, and revitalized agricultural systems to meet both their own food needs locally as well as to determine and build the best opportunities for value-added agricultural exports (CAE Website)³.

³ <http://www.hardwickagriculture.org>

The CAE, founded in 2004, adopted a unique, entrepreneurial-driven approach to supporting sustainable agriculture, which is reinforced by the innovative opportunities that community leaders in the region have been creating. The mission of the CAE is to “engage agricultural leaders in the emerging 21st century food system to build capacity and inspire the public in supporting and implementing this system.” The goals of the organization are to develop a broad food and agricultural vision embraceable by all area residents, and to assure that this vision is owned by the citizens of the greater Hardwick (Vermont) region.

My primary project at the CAE has been to develop a framework for monitoring the trends of the local food system on an ongoing basis, as well as to assess its health. This is being done to gain a clearer understanding of the trends relating to each component, or element, of the food system in the region, to build upon the successes of the strategic developments that are taking place, and to identify problem areas in timely fashion. The CAE recognizes the importance of assessing these trends and measuring the impact of their activities through a systematic monitoring and evaluation process, and that, being a relatively new and rapidly developing organization, now is the time to initiate and implement such a system.

Specifically, the CAE wants to measure the health and vitality of each element of our local food system and ultimately the impact that the system as a whole is making upon the local community. The data that are being collected in this framework, and in other CAE monitoring and evaluation initiatives, can be used to guide further project development, to recognize what is working and consider upscaling successful initiatives, to identify weaknesses that need attention,

and to provide guidance for other communities interested in following paths similar to those being pursued in the Hardwick area.

Much of the CAE's work has been focused on Hardwick and the adjoining towns, but the CAE has recently branched out to serve the entire Northeast Kingdom of Vermont by developing a participatory Regional Food Systems Strategic Plan. Portions of the trend monitoring framework developed for this Capstone are being applied to this plan.

Part I: Food Systems Trend Monitoring

What do we want in our rural communities? Do we want to be in control of our own destinies or do we want to live our lives at the mercy of far-away policy-makers and corporations? What do we want for our children? What do we want our legacy to future generations to be? In order to take control of our future, we need a clear vision of where we wish to be going, as well as an understanding about where we are right now. It is these very questions that have driven the Food Systems Monitoring Framework being developed. With an understanding of the current status of each element of our food system and the recurrent updating of these indicators, we will be able to determine whether we are moving toward our chosen vision of the future, as well as be able to identify both our strengths and our shortcomings.

In recent years, the importance of monitoring and evaluation (M&E) has been recognized and emphasized both nationally and internationally. Many financial donors want to have evidence of the impact that their support and involvement are creating within a community or population. Community stakeholders want to know that the organization is doing worthwhile work if they

are to give it their support. Organizations not only should be held accountable for their work, but should also want to assure *themselves* that their work is making a real difference for the communities they serve. This broad recognition of the benefits of monitoring and evaluation has led organizations around the world to make M&E an integral component of their projects.

The impact that an organization has can be measured through a specific and generally accepted process. Indicators are part of that process and are specific measures of implementation progress and impact. Data on the indicators selected can be collected after or during specific activities, collected annually, or less often depending on the purpose. The data are then compiled and analyzed to determine whether implementation is proceeding according to plan, whether progress is being made, and whether this progress is the result of the activities of the organization.

This monitoring framework and the baseline data that is gathered herein serve as an illustrative implementation of the framework and represents the first steps in a larger process of gaining an intimate perspective of the local food system. This data provides a clearer understanding of the present status of each element of the food system, as well as the basis against which later collected data will be compared. For each indicator in the system, data will now be collected or compiled at regular, pre-determined intervals to permit determination of trends, and, in turn, the sustainability of each element of the system, as well as for the system as a whole. As stated by Heller and Keoleian (2002), "...a sustainable system is one that can be maintained at a certain state or quality on a long-term time horizon. This 'quality' of the system can often be evaluated by following trends in certain indicators" (p. 1008).

Monitoring the well-being of a country, state, or region has traditionally focused exclusively upon economic indicators, especially the most commonly used measure of Gross Domestic Product (GDP), which is, “the total market value of all final goods and services produced within a nation’s borders in a given time period” (Schiller, 2008, p. 27). This approach has proven to be limiting and provides a far too narrow picture of the existing situation at a national or sub-national level. Particularly problematic is that measuring our well-being in this way counts revenue spent, whether beneficial or detrimental to a society, and counts it as a benefit. For example, crime has a negative impact on society, but if we take the GDP approach; the lawyer fees, the cost of repairing damages if relevant to the situation, police wages, the cost of prisons and incarceration, are all counted toward increasing the GDP, which is considered a benefit to society. The same has been the case with the monitoring of agricultural processes, i.e. looking almost exclusively at production and revenue, and not accounting for environmental damage caused by our agricultural system or other externalities and negative impacts, among them poor working conditions and unhealthy food consumption patterns. Additionally, other important elements of the food system beyond production and economics are not generally considered in traditional analysis, and they are not customarily viewed holistically. By looking at the entire food system and at a much broader array of the elements of this system, we can gain a deeper understanding about who is benefitting, who and what is suffering, and, in turn, acquire a much clearer picture of what impact our food system is having upon society as a whole.

One indication of trends toward more holistic approaches of measurement began with the request made in 1972 by the King of Bhutan who called for the measurement of Gross National Happiness. Today this concept is now being considered by numerous countries, including

England, which has recently implemented a similar plan, calling on the “Office for National Statistics [to] ask people to rate their own well-being, with the first official happiness index due in 2012” (Plan to measure happiness ‘not woolly’ - Cameron, 2010). It is now being more broadly acknowledged that the well-being of societies goes far beyond economic growth, and includes many other facets of our lives. This food system monitoring framework seeks to take a similar approach to this movement toward more holistic measures.

Project Goals and Objectives

The goal of this framework is to develop a system for gathering important and relevant data that will track the elements of a local food system, and in turn, provide measures of the overall health of the local or regional food system and its intended impacts. The framework takes disparate sets of data from relevant agencies and organizations, compiles them, and then identifies additional surveys designed to collect important data that is not currently gathered. In combination, it becomes possible to present a broad picture of our food system.

At the heart of the development of a local food system are four desired impacts: healthy communities, a robust and equitable economy, food security, and environmental quality. With these impacts in place, the life of a community and its citizens are well supported; they support life through cultivating community connections and solidarity; by providing a respectable living for those who grow and process the food; by nourishing the people who eat the food, regardless of income; and by supporting the environment so that the environment can continue to support us.

The creation and subsequent implementation of a monitoring framework in food systems development is a fundamental way to have a clear understanding of the environment we are working within. But before investing significant amounts of time and energy into the implementation of a food system monitoring program, we need to fully understand and appreciate the importance of this component of planning and food system development by asking ourselves, “What is it that we’re working toward? Why should we put our efforts into collecting data about our food system? What benefits will it provide us? Who does this benefit? Why have we developed this framework to begin with?”

The benefits of measuring our local food systems would seem to include the following:

- When indicators are connected to locally-developed goals, the collection of data on these goals provides the community with an ongoing picture of the progress being made toward them.
- Data will be useful to farmers, food processors, restaurants, and retail outlets for making business decisions, which when based upon real trends can prove to be a powerful tool.
- Data will be useful to policy-makers, so they can better understand where needs exist and how best to fill them. By seeing what is working locally, policy-makers can also encourage these trends through policy action.
- Data will be useful to organizations supporting elements of the food system in the same manner as above, as well as for soliciting funding.
- Data will be useful to academia in supporting and advancing research.
- Data will be useful in identifying the effects of specific projects and programs, and, in turn, facilitating useful and relevant program and project decisions.

- Data will be useful for regional and town planning.
- Data will generally be useful for soliciting donor funds and knowing where best to allocate available resources.

The purposes of trend monitoring in any context should be established at the onset to inform the specific data that will be needed, who the beneficiaries of these data are, and the amount of time and resources that will need to be invested into the process. The proper selection of indicators is critical in assuring that we are actually measuring what we really want to know, and these should be very carefully considered. Surveys far too often collect data based on indicators which are not of value to users, creating a significant waste of time and resources.

Assumptions of the Food Systems Monitoring Framework

There are several “assumptions” underlying this entire Capstone. I put quotes around assumptions because they are based upon evidence, but are still debated, and they are oppositional to the traditional models that have not yet been abandoned. I am intentionally not going in depth into these topics because although the arguments for each of these are rich, interesting, and complex, it is beyond the scope of this Capstone to have a thorough discussion about each of them.

First, the concept of “local food.” There is an increasing recognition by many that supporting local food is beneficial on many levels: it keeps money in the local economy and supports small business; it promotes diversification of farms and small family farmers; it has the potential of increasing the consumption of healthy foods, and therefore contributing to the alleviation of the

obesity epidemic that exists in this country. According to the organization Vital Communities, for every dollar spent at a local business 45¢ is reinvested locally. Whereas for every dollar spent at a corporate chain store, only 15¢ is reinvested locally.⁴

There are also strong arguments against our conventional farming and distribution methods with the dominant food system being based upon the consumption of oil, in both its agricultural practices and high “food miles,” or large shipping distances. This is not a sustainable solution for the future, with rising oil prices and a shrinking oil supply, as well as the concerns about global warming that is associated with the burning of fossil fuels. There is also a major debate raging about the safety of genetically engineered seeds and concerns about the concentration of power of multi-national seed companies. Large-scale monocropping is a concern because it leaves farmers and consumers vulnerable to crop failures, as well as making crop failures more likely because of creating conditions that have a higher susceptibility to pests and disease. Others believe that the status quo is acceptable and necessary to feed the world. Within this Capstone, I take the stance that local food is the better choice for farmers, individuals, communities and the environment and is the more sustainable approach.

There is another long-running debate about whether or not organic food is “better.” Some believe that conventional farming (using pesticides and synthetic fertilizers, etc) is not harmful and is necessary to make farms profitable and to feed a growing population. Many others believe that organic farming methods are important to support because it is not as destructive of the environment, is healthier for farm workers as well as consumers, and is a long-term, sustainable solution to the challenges of farming. For this Capstone, I support the belief that

⁴ Vital Communities: Local First Alliance, <http://www.vitalcommunities.org/>

organic farming is the ideal, sustainable choice that we should be moving toward and supporting; both in our own purchasing choices and those we make choices as a society.

Diversification of individual farms and farms in a local area or region is expressed in this framework as an ideal that we should be moving toward in farming, as well. This is based upon the old adage, “Don’t put all your eggs in one basket,” or the systems thinking conviction that, “a diverse system with multiple pathways and redundancies is more stable and less vulnerable to external shock than a uniform system with little diversity” (Meadows, 2008, p. 3). Within this framework, we are looking to measure and see the increasing diversification of farms both between farms and within individual farms.

Finally, in light of the multiple problems that exist because of our dependence upon oil – wars, global warming, rising oil prices - I am taking the position in this framework and Capstone that renewable energy and decreased energy use are ideals that we should be moving toward, both on an individual level and at the societal level.

Theory: Systems Thinking

According to Donella Meadows in her book, *Thinking in Systems: A Primer* (2008), a system is, “an interconnected set of elements that is coherently organized in a way that achieves something.... [and] must consist of three kinds of things: elements, interconnections, and a function or purpose” (p. 11). Clearly, a food system fits this definition and a model of a food system that demonstrates this can be found in Figure 1, below. Within the model there are the

elements of the food system in each of the boxes, the interconnections are shown through the arrows, and there is a clear purpose to the food system: to feed us!

Systems thinking also emphasizes following the changes of a system over time, something that is integral to trend monitoring. Within systems, things are not static – they are continually changing and evolving, depending upon what is happening within each of the elements, between them, as well as the result of external influences.

Considering that stocks, or the level of strength of the elements within systems, change gradually over time, this provides us the opportunity “to maneuver, to experiment, and to revise policies that aren’t working... You can use the opportunities presented by a system’s momentum to guide it toward a good outcome” (Meadows, 2008, p. 11). These gradual changes can only be identified through relevant trend monitoring and when these are discerned we are able to make applicable interventions.

Monitoring can also encourage appropriate balancing of feedback loops, an important mechanism of systems identified as, “a closed chain of causal connections from a stock, through a set of decisions or rules or physical laws or actions that are dependant on the level of the stock, and back again through a flow to change the stock” (Meadows, 2008, p. 27). The “Management by Exception” process can be implemented here, where the weakening of a particular element, or stock, is recognized through the monitoring process and triggers a pre-determined response that is appropriate and will strengthen it. But, “the presence of a feedback mechanism doesn’t necessarily mean that the mechanism works well” (Meadows, 2008, p. 30). What this says, in

the context of a food system, is that we can have all the information that we could possibly want, but if we don't look at it and use it in a thoughtful way, it won't be effective in creating the desired changes.

Daniel Aronson, in his article *Overview of Systems Thinking* (1998) states:

Traditional analysis focuses on separating the individual pieces of what is being studied.... Systems thinking, in contrast, focuses on how the thing being studied interacts with the other constituents of the system – a set of elements that interact to produce behavior – of which it is a part. This means that instead of isolating smaller and smaller parts of the system being studied, systems thinking works by expanding its view to take into account larger and larger numbers of interactions as an issue being studied. (p. 1)

In this framework, we are dissecting each individual element by creating specific indicators for them, and therefore narrowing the scope. However, when looking at the results of the indicators, we should step back and look at them within the context of the whole food system and the interactions between the elements (see Figures 1 and 46, below). To do this, we need to understand how food systems function and what influences exist.

Capstone Contribution

Whole food systems monitoring is a relatively new phenomenon, and a review of existing literature on the topic of food systems monitoring reveals a serious lack of food systems monitoring frameworks designed to track food systems at the local level. Most of what exists has been conceived either for the national, regional, or state level and relies solely upon existing

secondary data. In this Capstone, I analyze considerable secondary data, but have also developed indicators and data collection instruments capable of gathering the data which is missing – but which is necessary to provide a more complete look at food systems and their associations with a broad array of demographic and socioeconomic factors.

If we are serious about changing the paradigm of farming and our food system, we need to have a broad, in-depth understanding about the conditions in which we are working. This Capstone makes the case that national, regional and state food systems cannot eliminate the need for the monitoring of more local systems, given the considerable variations among geographic areas and their agricultural potential.

Literature Review

As indicated, most existing literature on the monitoring of food systems relates to the national, regional or state levels. The literature that is explored here takes a more holistic approach than is traditionally the case, but is relatively recent. Earlier considerations of agricultural progress, as mentioned above, has looked almost exclusively at the production end, with little thought given to the broader scope of food systems. Information on these newer, more holistic approaches is summarized in Table 1.

There is a clear message contained in many of these sources about the importance of taking a holistic approach to monitoring food systems. The authors indicate that the traditional ways of measuring success are becoming outdated and only address particular facets, most significantly, production and farmer incomes (without, at the same time, considering the economic well-being

of all concerned in agricultural processes or associated externalities). These authors underline the large number of variables affecting the success and sustainability of the entire food system, as well as affecting personal well-being. The result is an increasing number of agricultural monitoring efforts seeking to take this more holistic approach.

Illustrative of the new literature on food systems monitoring is the work of Anderson, Fisk, Rozyne, Feenstra, and Daniels. In their report, *Charting Growth to Good Food: Developing Indicators and Measures of Good Food* (2009), they take a holistic approach to monitoring food systems and look at secondary data on a national scale, with the purpose of, “select[ing] credible, legitimate indicators to estimate the amount of ‘good food’ available at any given time, with the end goal of drawing meaningful inferences that might guide action” (p. 9). This group used a participatory approach, soliciting input from experts and the public, and used an approach that selected measures [what is referred to as indicators in this work] based on specific criteria: that they are “valid, reliable, timely, consistently collected over the entire US, publically available, transparent and understandable” (p. 8). Using an outcome-based approach, they first defined “good food” and concluded that it meant food must be, “healthy, green, fair, and affordable” (p. 6). These key attributes were then further explained, with measures and indicators being associated with them, using publically available data, while also describing the limitations and the urgency of each one. The underlying theory of change behind this paper was that “once ‘healthy, fresh and local’ food reached approximately 10% of the food supply, the food system might reach a ‘tipping point’ at which this loop would continue to be self-reinforcing without the need for steady infusion of donor funds. This theory focuses on demand, not supply” (p. 2).

Feenstra, Jaramillo, McGrath, and Grunnell, in their report, *Proposed Indicators for a Sustainable Food System* (1997) also uses an outcome-based approach: looking at the ultimate goals of the food system that encompass the whole value-chain and creating indicators to measure whether or not their selected goals that bring us to positive economic, social and health outcomes, are being met. A participatory approach to developing indicators was also used here, with clear and defined criteria in place for indicators, as well as a requirement for using existing data sources. Indicators were associated with the particular goals laid out for a food system and identified the strengths and limitations of the associated data.

Martin C. Heller and Gregory A. Keoleian, in their paper, *Assessing the Sustainability of the US Food System: A Life Cycle Perspective* (2002) take an approach similar to the systems approach laid out here, which, “aids in reestablishing the connection between consumption behaviors and production practices.... [and] assists in prioritizing improvement strategies, often revealing overlooked portions of the system” (p. 1034). Within this framework, various stages of the life cycle of agricultural products are laid out and monitored using existing secondary data through specific indicators in the economic, social and environmental realm for each stage in the life cycle. These stages of the life cycle are laid out as:

- Origin of resource
- Growing and production
- Processing and distribution
- Preparation and consumption
- End of life

Kenneth Meter in, *Evaluating Farm and Food Systems in the US* (2006), takes a very different approach and selects one specific indicator that he has found in his many years of research to be a keystone indicator – the percent of farm debt locally held – which signifies the strength of a local food system. This claim is based upon the observation that, “systemic economic relationships... extract considerable wealth from rural communities” (p. 141), exemplified by large, national corporate loaning institutions financing farming operations, and drawing financial resources away from rural communities. Meter explains:

I asked a group of Minnesota farm neighbors how they could tell when the farm economy was healthy. Without using the term, and long before I worked as an evaluator, I had asked the farmers to suggest an indicator. The men replied without hesitation, thinking back to the days, twenty-five years earlier [meaning in the 1950’s], when they had started farms in this community. They had told me that when their farm economy was strong, their rural community had its own supply of credit, sufficient to cover the costs of farm production.... Now, after extensive follow-up research over 25 years, it is clear to me that the indicator they chose – the strength of responsive local credit sources – is indeed a profound measure of the health of farm communities.” (p. 143-44)

Meter finds appropriate data sources from the USDA’s Economic Research Service, which reports the amount of farm debt held by “individuals and other” lenders. To further support his argument, he uses this historical data in conjunction with identifying “golden eras” of agriculture, and demonstrates that lower levels of external debt correspond with these more prolific times in agriculture, and vice versa. Placing this single indicator within the whole system of agriculture, he illustrates how this single influence interacts with various aspects of the

system, and outlines three different modeling tools: Causal-Loop Diagrams, Soft Systems Methodology, and Complex Adaptive Systems.

The details regarding the current literature discussed here are summarized in Table 1, below.

Table 1: Summary of Food System Monitoring Literature

Lead Author	Title	Purpose	Procedure	Indicator criteria	Data source	Scale	Approach
Anderson, Molly, et al.	<i>Charting Growth to Good Food: Developing Indicators and Measures of Good Food</i>	“Select credible, legitimate indicators to estimate the amount of ‘good food’ available at any given time” (p.9)	<ul style="list-style-type: none"> •Theory of Change •Participatory •Define “good food” – Healthy, green, fair and affordable •Use of publically accessible data •Select indicators from “important drivers, pressures, states, impact and responses (DPSIR) within the system of interest” (p. 8) •”Consider the impacts of interrelated activities in the food system” (p. 10) •Developed “National” and “Promising innovations” indicators 	<ul style="list-style-type: none"> •Valid •Reliable •Timely •Consistently collected over the entire US •Publically available •Transparent •Understandable 	Secondary	National (US)	Outcome-based
Feenstra, Gail, et al.	<i>Proposed Indicators for Sustainable Food Systems</i>	Filling the, “need for a way to indicate change in the food system, as a mechanism to measure progress toward sustainability.” (p. 16.1)	<ul style="list-style-type: none"> •”Indicators must be measurable and based on data that is currently collected or can be collected. (p. 16.1). •Indicators that “represent a limited set of benchmarks to help gauge progress toward a sustainable food system and are intended to be used in combination with expert opinion and qualitative analytical methods.” (16.1). •Indicators are, “measurable data that covers key trends whose change is a proxy for change in the broader system” (p. 16.1). •”Developing a system for measuring progress toward ecological, economic, social, and health outcomes” (p. 16.1). •Pressure-state-response model 	<ul style="list-style-type: none"> •Based on project goals •Opportunities-based •Statewide •Measurable •Available •Cost-effective •Stable, reliable, & credible •Understandable & usable •Sensitive to change 	Secondary	Regional (California)	Outcome-based

			<ul style="list-style-type: none"> •"Identify and clarify a list of goals of a sustainable food system." (p. 16.1). •Participatory approach •Goal-based approach •"Wish List" Indicators, "Cross-cutting" Indicators 	•Measure effectiveness of VP scenarios			
Heller, M. C. & Keoleian, G.A.	<i>Assessing the sustainability of the US food System: A Life Cycle Perspective</i>	Development of indicators and analysis of sustainability of US food system	<ul style="list-style-type: none"> •Life cycle assessment: "an analytical method used to evaluate the resource consumption and environmental burdens associated with a product, process or activity" (p. 1009). •Monitoring design: Life cycle stage → stakeholders → indicators •"Improving the sustainability of this complex system requires a thorough understanding of the relationships between food consumption behaviors, processing and distribution activities, and agricultural production links." (p. 1007). 			National (US)	Life cycle (origin of resource; growing and production; processing and distribution; preparation and consumption ; end of life), and economic, social and environmental impact of each of these
Meter, Kenneth A.	<i>Evaluating Farm and Food Systems in the US</i>	Discusses a keystone indicator for farm health and provides tools for evaluating food systems	Provides three tools: <ul style="list-style-type: none"> •Systems Dynamics •Soft Systems Methodology •Complex Adaptive Systems 	Input from "wise practitioners"	Qualitative, primary	General	Keystone indicator

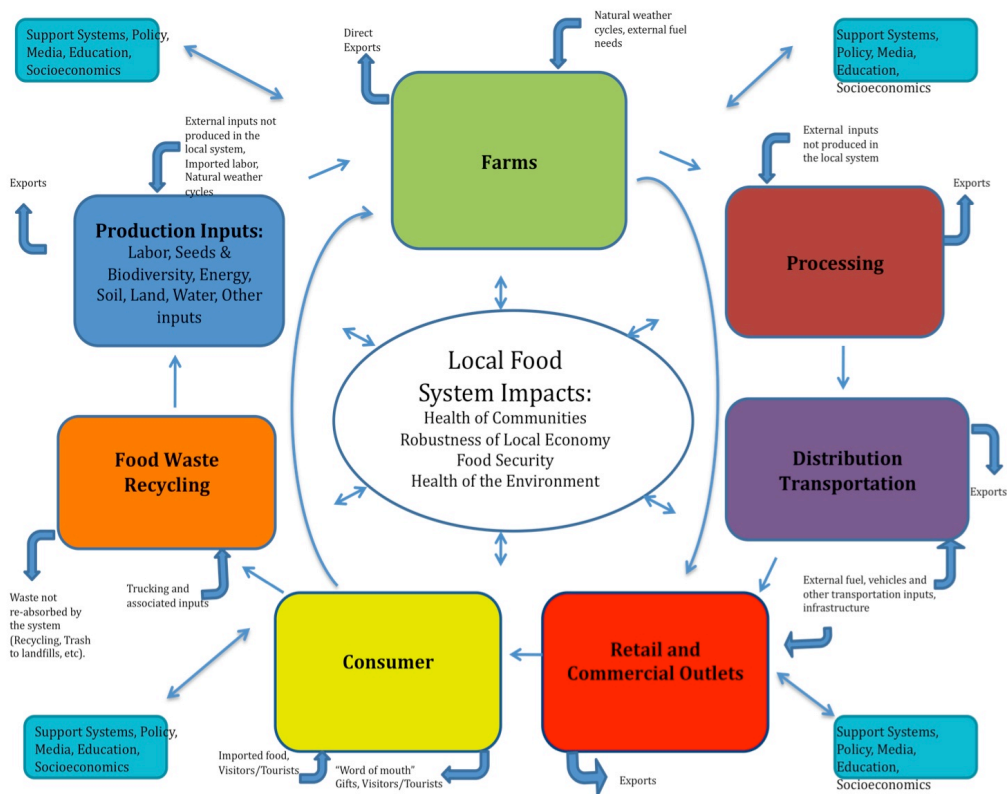
Food System Model

The model below in Figure 1 was developed together with CAE colleague Erica Campbell.

Although, "all models, whether mental models or mathematical models, are simplifications of

the real world,” (Meadows, 2008, p. 22). the model is intended to be comprehensive and show us how the various elements of the food system are connected and interact. It allows us to see both the big picture *and* the details at the same time, in a simple, graphic way and seeks to demonstrate both the complexity and the dynamic nature of food systems. Although the model appears to be relatively simple, such systems are rarely simple; changes in one area are likely to create changes throughout the system, and these effects cannot necessarily be predicted. This model, and the associated monitoring framework, hopefully, will permit us to make informed decisions when attempting to influence the food system, as well as being a tool that can be used to anticipate what the possible impacts of interventions may be.

Figure 1: Food Systems Model



Source: Heather Davis and Erica Campbell, The Center for an Agricultural Economy

Food System Monitoring Framework

The framework developed here is based upon interviews held with various relevant stakeholders and experts. Portions of this framework are being used in the Northeast Kingdom Regional Food Systems Strategic Plan, referred to earlier. In the NEK plan, the approach is outcome-oriented [as opposed to the approach laid out here which is system-oriented] and selected indicators are associated with the goals that have been developed by the concerned stakeholders. This outcome-oriented approach also has been utilized in several of the food systems monitoring efforts discussed in the literature review and appears appropriate for regional planning using regional goals that emerge during the planning process. By contrast, the system-oriented approach used in this framework can be used as a more holistic and generalized approach, making it more transferrable because while goals may be more distinct to a specific region, the basic elements of the food system are more similar across geographic regions.

The framework presented here, although specifically developed with the Hardwick region and Vermont's Northeast Kingdom in mind, can be adapted to other areas and regions. When implementing the framework elsewhere, individuals and groups can decide what goals are most important to them, and what is most feasible to be collected, considering local needs as well as time and economic constraints. Given that some of the indicators are designed specifically for the NEK region, including data regarding local projects, equivalent and locally appropriate indicators will need to be developed when the framework is adapted to other regions.

This monitoring framework has a dominantly quantitative focus, in the tradition of the post-positivist philosophical worldview, one that "hold[s] a deterministic philosophy in which causes

probably determine effects or outcomes.... It is also reductionistic in that the intent is to reduce the ideas into a small, discrete set of ideas to test” (Creswell, 2009, p. 7). The approach is based upon the scientific method, which “provides us with the tools to make decisions that are based on empirical (observed) evidence and not on our own bias or beliefs” (Salkind, 2010, p. 9). The use of qualitative methods, such as interviews and focus groups, may be useful as a complimentary system to provide increased contextual understanding and has been used in other information collection activities of the CAE. It is, however, not generally utilized in data collection for this framework, beyond asking for comments, questions and concerns in the survey instruments.

The quantitative strategy used within the framework comprises survey research that “provides a quantitative or numerical description of trends, attitudes, or opinions of a population by studying a sample of that population” (Creswell, 2009, p. 12). The quantitative survey method allows for larger numbers of individuals to be reached, is more likely to be representative, and can be a more economical use of resources. If an implementing organization is so inclined, it could take this framework to the next level - experimental research - in which there is an experimental and a control group. In this case, a community or region that is similar demographically and socio-economically and has not been the beneficiary of the organization’s activities should be chosen as a control – thereby permitting an assessment of the extent to which change taking place in the project area is attributable to specific projects. However, one must keep in mind that if similar activities are occurring in the control region, these are likely to influence the results.

Stakeholder Analysis

When developing a project it is important to consider all of those who may have an interest in the project or may be influenced by it. This allows us to assure that means are available in the M&E system to consider the project’s effects on the concerned groups, and makes clear which entities should be involved in project decision-making and become recipients of project reports. Table 2 below lays out the normal stakeholders of a food system.

Table 2: Stakeholder Table

Stakeholder	Interest in project	Dissemination of results
Local Farmers	Information on trends will identify strengths and weaknesses in existing operations, and identify new opportunities	Articles, website, newsletter, targeted announcements
Food processors	Information on trends will identify strengths and weaknesses in existing operations, and identify new opportunities	Articles, website, newsletter, targeted announcements
Retail, Wholesale, Restaurants, Institutions, Service providers	Information on trends will identify strengths and weaknesses in existing operations, and identify new opportunities	Articles, website, newsletter, targeted announcements
Labor	More and better paying jobs available	Articles, website, newsletter
Community	Benefits of strengthened economy, healthier environment, improved food security, and a stronger, healthier community	Articles, website, newsletter
Academia	Available data for research and contribution to understanding of how food systems function	Results Reports
Food System and Community Organizations	Available data for project development and contribution to understanding how food systems function	Results Reports

Government	Evidence of impact for potential supporting policy and investment	Results Reports
Funders	Evidence of impact for potential investment	Grant proposals and Results Reports

Indicator Development

As alluded to above, when considering the planning of food systems, there is a high premium on clear and specific goals. These goals are best identified with stakeholder input: a participatory approach. Experience with the traditional top-down approach has shown that this “may alienate local community members and fail to capture locally important factors” (Fraser, 2005, p. 115).

A participatory approach, although a much more intensive and time-consuming process, has now become the “gold standard” for the development of projects generally, and for goal and indicator selection specifically. Using this process will assure that what we are working toward is relevant and useful in the local context. This approach, accordingly, has been used in the development of both the food system elements and the indicators for this project.

In accordance with this participatory approach, there was, in the identification of the elements and the selection of indicators, a concerted effort to get as much input as possible from concerned stakeholders, among them local experts, farmers, CAE board members and staff. As a result, not only are the indicators more relevant and accurate to food systems and local conditions than would otherwise be the case, but, additionally, the process as a whole acquired broader ownership. Informal and semi-formal interviews were conducted with the stakeholders laid out below to get their understanding about the primary elements of the local food system and the best possible ways of measuring their health. Table 3 specifies the stakeholders consulted.

Table 3: Stakeholder Interviews

	Organization / Business	Interviewee	Stakeholder Group	Food System Element
1.	Buffalo Mountain Co-op	Barry Baldwin & Robin Cappucino	Retail	Retail Outlet
2.	Butterworks Farm	Jack Lazor	Farmer	Farms
3.	Farm Bureau	Bruce Shields	Food System Organization	Support Systems
4.	Food Works	Joseph Kiefer	Food System Organization	Food Security
5.	Hardwick-Area Food Pantry	Angie Grace	Food System Organization	Food Security
6.	Hardwick Elementary School Food Service	Val Simmons	Service Provider	Commercial Outlet
7.	Harvest Hill Farm	Bill Half	Farmer	Farms
8.	Highfields Center for Composting	Tom Gilbert & Josh Kelly	Food System Organization	Food Waste Recycling
9.	High Mowing Seeds	Tom Stearns	Farm/Processor	Seeds & Biodiversity
10.	New England Agricultural Statistics		Government	Support Systems
11.	NOFA-VT, Soil Conservation Service	Chuck Mitchell	Food System Organization	Soil
12.	UVM Center for Sustainable Agriculture, Land Link	Ben Waterman	Food System Organization	Land
13.	Vermont Food Venture Center	Brian Norder	Processing	Processing
14.	Vermont Sustainable Jobs Fund	Kit Perkins	Food System Organization	Support Systems

Coded details resulting from this qualitative inquiry can be found in Appendix 1.

In addition to the importance of soliciting stakeholder input into the development of indicators, they should be created with certain criteria in mind: they should be, “relevant; reflect community values; attractive to local media; statistically measurable; logically or scientifically defensible; reliable; leading; and policy-relevant,” according to Sustainable Seattle, a well-known sustainability monitoring effort in the United States. Levinson, Rogers, Hicks, Schaezel, Troy,

and Young (1999) identify good indicators as being simple, valid, clearly defined, reliable, measurable, and quantifiable (p. 82).

Based upon these recommendations, it has been our intent that the indicators presented in this framework be relevant, useful, reliable and realistic. Some of the data needed for the indicators are available from secondary sources and are easily obtained. Others will need to be collected from other organizations and/or via the implementation of surveys. Some indicators will be available from public sources, but only on the county or state scale, and will need to be included in survey data collection when data is desired on the local, sub-county level.

Some factors that influence a food system are not measured in this framework. These include: fuel prices (which influence the costs of conventional foods more significantly than locally produced food since the industrial food system is so dependent on fossil fuels); media influences; federal, state and local policies; and attitudes and beliefs prevalent in communities. It would be interesting in future frameworks, or during the evolution of this one, to attempt the measurement of some of these external influences and seek to estimate their effects.

Indicators

Prior to selecting specific indicators, and with the participation of the stakeholders listed above, the food system was broken down into twenty-one basic components, or elements, which includes four impacts. These elements are presented in Table 4 below (together with “sub-themes” for each), with the role and vision for each element described, the basic indicators listed,

and a discussion of the central issues relating to each element. A more complete list of indicators for each element is presented in Appendix 2.

Table 4: Food System Elements Descriptions

Food System Element / Subtheme	Element vision	Basic Indicators	Comments
Demographics / Socioeconomic		<ul style="list-style-type: none"> •Median household income •High school graduates, percent of persons age 25+ •Bachelor's degree or higher, percent of persons age 25+ 	<p>It is important to track demographics and socioeconomic indicators for several reason.</p> <ul style="list-style-type: none"> • To evaluate whether or not the development of the food system could be contributing to the changes in these indicators • When gathering this data in surveys, we can disaggregate results and associate particular characteristics and conditions with them • To determine what regions may be most disadvantaged and therefore in most need of interventions
Soils •Soil quality •Topsoil protection	Ag soils are protected and nutrients are replenished. They contain high levels of organic matter and microbiological activity.		Although healthy soils were identified by farmers to be one of the most important things for farming success, there is very little available data regarding soil health. Static soil maps exist and are based upon soil type, but not health. Recruiting schools to be involved with this process and developing a curriculum would provide an opportunity to gather important data as well as providing students with skills and experience. Farmers could also do their own data collection based upon the same curriculum and enter it into an online database. Vermont's Farm to Plate report identified the development of a statewide soil monitoring system as one of their recommended action items.
Land •Total ag land protected •Total agricultural land use •Agricultural land prices	Agricultural land resources are protected, sufficient to feed the local population, and are economically accessible (affordable).	<ul style="list-style-type: none"> •Acres of conserved farmland / total acres in farms •Total acres in cropland / total land acres •Estimated market value of land and buildings (average per acre), measured in \$ / acre 	It is very important that agricultural land prices are within the means of individuals wanting to farm. Preservation of the "Working Landscape" was determined to be a top priority for Vermonters in a values study done by the Vermont Council on Rural Development. Monitoring preservation efforts, land in agricultural usage and ag land prices will allow us to identify any undesirable trends and take appropriate action when necessary.
Water •Groundwater •Stream stability •Pollution levels	Water resources are used conservatively, are plentiful and clean. Pollution is minimal, ideally nonexistent.	<ul style="list-style-type: none"> •Acres of irrigated land / total # of acres of cropland •Nitrogen and Phosphorus levels in lakes and ponds 	Vermont does not currently have a water availability issue. There is plenty of rainfall and very little agricultural land in irrigation. Despite these conditions, water usage in agriculture should be monitored to reveal any evolving trends that we should be concerned about. Water quality is, however, a challenge we face in Vermont, largely because of agricultural influences. Lake water quality is currently monitored through the state and this data is incorporated into this framework.
Seeds and biodiversity	Seeds are increasingly locally produced and sourced, locally	•Top five crops grown and percentages of	There is very little data available regarding GMO usage and seed saving rates. Proxies can be used for organic seed by

<ul style="list-style-type: none"> •GMO usage •Biological diversity •Seed saving rates •Usage of local and organic seeds 	<p>appropriate and widely available. Biological diversity is increasing.</p>	<p>total acres</p> <ul style="list-style-type: none"> •Sales from High Mowing seeds to NEK 	<p>tracking High Mowing Seeds sales. Biological diversity should have more attention paid to it, as it is critical for insurance against crop failure and is important to our long-term success in agriculture. Concentration of control over our genetic resources is a concern.</p>
<p>Energy</p> <ul style="list-style-type: none"> •Locally produced energy production •Decreasing energy usage within the food system 	<p>Increasing quantities of energy needs are being produced locally and sustainably. Energy efficiency of farms is increasing.</p>	<ul style="list-style-type: none"> •# of farms generating energy or electricity on the farm / total # of farms 	<p>Renewable energy is an investment in the future and should be encouraged through policy and incentives. The Agricultural Census is beginning to track some aspects of energy production on farms. Data regarding energy production among community members does not appear to be available.</p>
<p>Farm and food processing labor</p> <ul style="list-style-type: none"> •Food system workers wages •Cost of labor in production •Migrant labor •Food system workers skills •Working conditions 	<p>Food system labor is well trained, has safe working conditions and is treated fairly.</p>	<ul style="list-style-type: none"> •Agricultural payroll / total farm production expenses •Agricultural payroll / # of hired farm labor •# of hired farm labor / total labor force 	<p>According to the report, Green Jobs in a Sustainable Food System, “The people who produce our food face some of the worst working conditions and labor in some of the lowest paying occupations in the country.” These are not acceptable conditions. The Agricultural Census does gather significant amounts of data regarding the labor force in agriculture, but labor in food processing is more difficult to come by. Additional information may be found from the Bureau of Labor Statistics in both farm and food manufacturing. I was unable to find injury rates for farm and food manufacturing.</p>
<p>Other farm inputs</p> <ul style="list-style-type: none"> •Farm supplies availability •Appropriate veterinary care availability 	<p>These needs are being met locally, as much as possible.</p>		<p>This data would need to be gathered locally by either identifying the location of purveyors of these services and estimating whether or not it was sufficient or by surveying farmers as to whether or not these resources were sufficient. The latter approach is taken in this framework.</p>
<p>Support systems</p> <ul style="list-style-type: none"> •Perception 	<p>Farmer/processor support systems (organizations, state and federal agencies, etc) are relevant, quality, and</p>		<p>Similarly to above, this is about perception of the sufficiency of available resources and would best be identified by farmer and processor survey.</p>

<p><i>of support</i></p> <ul style="list-style-type: none"> • <i>Demonstration of use of available resources</i> 	sufficient.		
<p>Education</p> <ul style="list-style-type: none"> • <i>Participation rates in ag-ed</i> • <i>School gardens</i> • <i>Continuing / higher ed programs</i> 	There is sufficient, quality support and training for future farmers and food processors. Schools emphasize the importance of healthy, local foods.		We want to see whether or not young people are being engaged in agricultural issues to assure the continued strengthening and evolution of our food system, as well as developing young citizens awareness of healthy foods and the food system. This is done mainly via surveying existing programs and schools.
<p>Farms</p> <ul style="list-style-type: none"> • <i>General production</i> • <i>Farm economics</i> • <i>Farmer demographics</i> 	Farm numbers and production are sufficient to meet demand. They are diversified and are economically viable.	<ul style="list-style-type: none"> • Total # of farms • # of farms / 1,000 population • # of acres in vegetable production / # of acres of total cropland • # of dairy farms / # of farms • Net cash farm income of the operations (average per farm) • # of farms with female principal operators / total # farms • # of farms with minority operators / total # of farms • Average age of principal operator 	There is much data available for this element. Data may be somewhat skewed, considering that over 1/3 (36.96%) of the farms have sales of less than \$1000, as well as other limitations such as non-respondents. Although the data is not perfect, it is the best we have and is much more detailed than many of the other elements. If this same data is gathered via survey, it can be disaggregated with data from other elements to identify connections and patterns more clearly.
<p>Processing</p> <ul style="list-style-type: none"> • <i>Business</i> • <i>Community</i> 	Infrastructure demand is being met, processing and facilities add to food security, the local economy and farm revenue.	<ul style="list-style-type: none"> • Farms producing & selling value-added commodities / total # of farms 	To have a strong food system in a rural region, we would like to see processing both on the individual/family level, as well as in businesses. Additionally, food processing businesses that use local food in their products are contributing to the growth of local farms. Although some of this data is now available through the Agricultural Census, much needs to be collected via survey or, in this case, from project monitoring at the Vermont Food Venture Center.
<p>Transportation</p> <ul style="list-style-type: none"> • <i>General</i> • <i>Reduction</i> • <i>Energy source for transport</i> 	Needs are being met, food and commute miles are decreasing, and the trend is toward the use of non-petroleum sources of fuel.	<ul style="list-style-type: none"> • Mean travel time to work (minutes), workers age 16+ 	With concerns about global warming, increasing fuel costs, the limited availability of petroleum resources, and the social and environmental costs of extraction, decreasing our dependency on petroleum, in this case when used in transportation, is becoming more and more important. Keeping our food system as local as possible can make a big impact on this problem, but using alternative fuels is another way. Surveying farmers about their means of transporting their product can give us clear ideas as to where we are at present and how we can improve our approach.
<p>Distribution</p>	Local agricultural products are getting to community	<ul style="list-style-type: none"> • Value of agricultural products sold directly 	Available direct sales data has improved with the growing interest in local food, but some data, such as local wholesale

<ul style="list-style-type: none"> •General •Direct sales info. 	members, schools, and service providers.	<p>to individuals for human consumption / market value of [total] agricultural products sold</p> <ul style="list-style-type: none"> •# of farms with direct sales / total # of farms •Direct farm sales per capita •Farms that marketed products through CSA / total number of farms •# of farmers markets per 1,000 pop 	distribution networks, must be gathered either independently via survey or from organizations and businesses.
<p>Consumer</p> <ul style="list-style-type: none"> •General •Consumption patterns •Direct sales participation 	Consumers are aware of food system issues, participate in the local food system, are eating healthier, and are supportive.	<ul style="list-style-type: none"> •% of adults who eat 3+ daily servings of vegetables 	Local sales do not directly translate into consumption: they do not account for food waste and can only be averaged across the total population. Increasing the robustness of this data would be very valuable. Some data is available from the Vermont Health Status Report and the Food Environment Atlas.
<p>Retail and commercial outlets</p> <ul style="list-style-type: none"> •Restaurant and institutional use of local foods. 	Restaurants and local institutions purchase increasing amounts of local foods		There is no single source for this information and it must be gathered from individual restaurants and institutions, which may have varying ways of quantifying the data, if they track this data at all. However, with increasing interest in local foods, these institutions may have more of an incentive to track these purchases so they can share this information with their customers.
<p>Food waste management</p> <ul style="list-style-type: none"> •Compost use •Compost production •Food waste recycling 	Food wastes are being recycled via composting, animal feed, and biodigesters. Waste not being re-absorbed by the food system is decreasing.		A significant amount of food waste is thrown into landfills in this country, contributing to greenhouse gases and wasting important nutrients. Resourcing food waste is an important part of improving our food system and bringing it full circle. Food waste can be put to use in several different ways such as composting, biodigesters (turning waste into energy), and as animal feed. This is all collected into the general term of food waste recycling. Much of this data needs to be gathered via surveys and from organizations, farms and municipalities involved with composting and food waste recycling.
<p>Health of communities</p> <ul style="list-style-type: none"> •Physical health •Barter economy •Local org participation rates •Life satisfaction 	Community ties are strong and vibrant. Community members are engaged, healthy, and can depend upon one another.	<ul style="list-style-type: none"> •Adult obesity rate •Homeownership rate 	When a community is involved with local foods, there are more ties among community members which creates more accountability more incentive to work together, and - since we are social beings - greater life satisfaction. There is much data available on physical health through various secondary sources. A considerable amount of other data related to this element is not widely available and needs to be collected via survey implementation.
<p>Robustness</p>	The local economy is growing.	<ul style="list-style-type: none"> •Unemployment rate 	We want to understand the importance that agriculture and food

of local economy • <i>Ag economy</i> • <i>General economy</i>	ag-related businesses are increasing in number, jobs are being created and household incomes are rising.	•Gini Coefficient	processing have on the region’s economy. Economic indicators are included to indicate the overall health of the local economy which contributes to the well-being of society.
Food Security • <i>General</i> • <i>Economic access to local, fresh food</i>	Economically vulnerable community members can access sufficient amounts of quality, nutrient-dense and healthy local foods.	•Persons below poverty level, percent	Food security is a critical measure for the food system. We need to prioritize access to local, healthy foods for disadvantaged populations and assure that it is not reserved for the privileged few. In order for the food system to be sustainable and just, it must be available to all.
Health of the environment • <i>Farming techniques</i> • <i>Use of agricultural inputs</i>	Environmental quality is improving, with fewer pollutants being released from farms. Farming techniques are becoming increasingly sustainable.	•Total acres used for organic production / total acres of cropland •Total organic sales / Total market value of agricultural products sold •Chemicals purchased (\$)/ total farm production expenses	We use farming techniques to measure environmental health given the central effect of these techniques on the environment.

There is much secondary data available on the county scale from both the Census of Agriculture, which is implemented every five years, and the US Census, which is implemented every ten years. Agricultural Census data are available only down to the county level. US Census data are available down to the town level and mostly comprise demographic and socioeconomic data. The indicators in this food system trend monitoring framework have been based in part upon those used from these secondary sources, and will also be used in local data collection to assure comparability across data sources. As indicated, locally designed surveys will collect important information that is not currently available – or not available at the desired local level from secondary sources. Where indicators or sets of indicators need to be collected locally, this need is clarified in the far right-hand column of Appendix 2, which contains the comprehensive set of desired indicators.

As mentioned, a significant challenge regarding the collection of data for these indicators is the limitations in data availability. There is much farm production, economic data, socioeconomic and demographic data available – all critical for measuring the health of our food system. There is new data specifically measuring organic production and direct sales and marketing, which reflects the new attention and acceptance of the organic and local food movements. Data regarding other elements, such as soil health, however, is essentially nonexistent. Farmers with whom I spoke expressed the belief that their soils are the most important part of their farms and that the health of soils is critical in assuring our ability to feed ourselves. In response to this glaring information gap, the very recent report of Vermont’s Farm to Plate Strategic Plan (2011) has called for the institution of a statewide soil monitoring system.

While baseline data on these indicators is essential, it is the regular collection and compilation of the data over time that makes the trend-monitoring framework most useful. Then, as new data is entered into the framework, the monitoring system can also indicate the percentage change, plus or minus, compared with the previous data collection. The desired direction of change is also necessary to know, and are indicated in Table 16 with up or down arrows. Indicators that do not have an arrow are considered neutral, while still being considered important to track. For example, while there is not a clearly desirable direction for the indicator, “Dairy as % of total farms,” tracking this indicator is necessary to give us a clear idea about dairy’s important, but changing, contribution to the agricultural economy.

Considering the large number of indicators that have been selected for this trend monitoring (over 200), particular indicators have been selected that would simplify the system, if that is

desirable and/or necessary to those that are implementing the system (See third column in Table 4, above). These priority indicators and the associated simplified framework were chosen based upon several factors:

- They needed to have existing, reliable and regularly collected data sources.
- They needed to cover as many of the elements of a food system as possible.
- They should cover as many of the sub-themes as possible within each element.

There are particular indicators that should be interpreted with some caution. For example, within the “Land” element, changes in “acres of conserved farmland / total acres in farms” could be the result of decreased funding for this program, or its elimination altogether, resulting in fewer acres being enrolled in federal land conservation programs. Similarly, in assessing the numbers of individuals receiving food stamps - now known as 3SquaresVT, SNAP or EBT benefits - numerical increases could indicate an increase in the numbers of people in poverty or could reflect a change in eligibility requirements or in program funding levels. These points demonstrate the importance of having an informed approach to making any conclusions or generalizations about the results of the monitoring framework.

Survey Instruments

The surveys contained in this framework serve to gather data from a representative sample of the population in order to create a complete picture of the local food system. Separate surveys will be carried out for farms, consumers, ag-processors, retail outlets, restaurants, and institutions. As will become clear in the second half of this Capstone - Food System Trend Monitoring in Vermont’s Northeast Kingdom: An Illustrative Example - there are still many missing pieces of

information relating to the food system that could be useful to food system stakeholders. Survey questions are designed to fill this gap and are based upon those indicators for which existing secondary data at the desired level do not exist. By implementing the Consumer and the Farm Survey on a random sample of the entire population, we can “generalize from (that) sample to a population so that inferences can be made about ... (the) characteristic(s), attitude(s), or behavior(s) of this population” (Creswell, 2009, p. 146). Other surveys, with their lower number of target respondents, will aim to collect information from the entire set.

Survey questions have two major requirements: that they should be valid and reliable. Validity, “describes how well the instrument measures what it was intended to measure,” and reliability, “describes how consistent the instrument is with repeated measurements over time or items” (National Research Center, 2006, p. 90).

Validity, in turn, has three forms:

- Content validity: Do the survey questions measure what they intend to measure?
- Predicative, or concurrent validity: Do certain results correlate to other results of the survey?
- Construct validity: Do the items measure concepts and do they “serve a useful purpose and have positive consequences when they are used in practice?” (Creswell, 2009, p. 149).

Reliability can be broken down into:

- Measures of internal consistency: “Are the items’ responses consistent across constructs?”
- Test-retest correlations: Are scores consistent when applied to the same population more than once? (Creswell, 2009, p. 149). This type of reliability is especially important when examining changes over time, as is the intention of this framework.

In this framework, survey questions that were gleaned from secondary sources have already been tested for these characteristics. Survey questions developed specifically for this monitoring framework will be tested for these properties via pre-testing of the survey instruments. In order to assure that data would be comparable if implemented on varying scales, and to assure that the survey questions are reliable and will gather the information that we intend, many of the survey questions have been gleaned from existing surveys; particularly the Census of Agriculture, the US Census, and the Gallup-Healthways Well-Being Index.

For determining the number of individuals and farms within the Hardwick region (Hardwick and all of the bordering towns: Craftsbury, Wolcott, Elmore, Woodbury, Cabot, Walden, Stannard, and Greensboro) and the Northeast Kingdom that would need to be surveyed, I consulted the website <http://www.surveysystem.com/sscalc.htm>. At this website one can easily calculate the numbers that should be surveyed, based upon the population and the desired confidence interval and level, in order to have a statistically valid sample. The results are presented in Tables 5 and 6.

Table 5: Household Sample Sizes

Region	Number of Households	Survey Sample Size	Confidence Interval	Confidence Level
Hardwick region	3969	350	5	95%
NEK	24711	378	5	95%

Since the calculated sample size for the farms that should be surveyed in the Hardwick region is comparable to the total number of farms and would not require excessive additional amounts of resources, it was decided to gather data from all farms in the region when implementing this survey. However, when implementation takes place within the NEK as a whole, a sample should be used. See Table 6 below.

Table 6: Farm Sample Sizes

Region	Number of farms	Survey Sample Size	Confidence Interval	Confidence level
Hardwick region	150	108	5	95%
NEK	1260	295	5	95%

For the remaining four surveys (Retail, Institutional, Restaurant, and Food Processor) surveys will be sent to the entire sample.

The sampling design is single-stage, in which, “the researcher has access to names in the population and can sample the people directly” (Creswell, 2009, p. 148). To get a representative survey that will permit generalizations to be made about the entire population, respondents will be randomly selected, via a random numbers table. Comparing demographic data of the survey

sample with existing region-specific demographic data from the US Census will determine whether representative samples have, in fact, been selected.

Survey Implementation

Large-scale data collection of this type, when carried out in highly literate societies, is normally implemented as mailed and/or online surveys. When implementing a mailed survey, it is generally recommended that the survey be sent to a population 10% higher than the required response rate, to account for non-response. To assure a higher response rate, a four-phase administration should take place, according to Salant and Dillman (as cited in Creswell, 2009, p. 150). There should be an advance letter announcing the survey, followed by mailing of the actual survey a week later. A follow-up postcard to all should occur in another week, and a fourth contact should be made to all of those who have not responded to the survey with a letter, the survey, and a pre-stamped and addressed envelope three weeks after that.

Decisions regarding the frequency of re-surveying for this trend-monitoring program will depend upon the implementing organization, the purposes for implementing, and the capacity of the organization. Within the context of the CAE, I would recommend implementation of the entire set of surveys a *minimum* of every five years, following the schedule of the Census of Agriculture, although the CAE may identify a set of particularly policy or programmatically-sensitive indicators that require more frequent data collection.

Surveys should be implemented at approximately the same time of year to avoid, ‘seasonal bias,’ which would result in “differences [that] are due to time or seasonal effects rather than the

project activities” (Levinson et al, 1999, p. 101). This is especially important to consider in food system monitoring because food systems are so highly dependant upon the seasons. Since the farm survey is extensive, and potentially time consuming, there may be value in implementing the surveys during the winter months since this is generally a slower season for most farmers.

Both a paper and an online survey are recommended, providing a link to the online survey on the paper survey. Many find filling out surveys online to be a less burdensome process and online surveys also makes data collection and entry a much simpler procedure. Consideration of incentives for filling out the survey is also recommended - given the nature of the survey, it may be appropriate to have drawings for gift certificates to local foods restaurants or, perhaps, CSA memberships.

An experienced individual or team of individuals should be designated to implement the trend monitoring system. This individual or team should have experience with survey implementation and statistical software for analysis.

Data Analysis

For further determination of the validity of the surveys, it should be discerned whether or not there is response bias in the survey results. This can be done by contacting a few of the non-responders by phone, conducting the survey by phone, and assessing whether their responses differ greatly from the returned surveys (respondent-non-respondent check for survey bias) (Creswell, 2009, 152). The response rate itself also should be reported using a format similar to Table 7 below.

Table 7: Respondent Rate Dummy Table

Survey	# Contacted	# Responded	% Response
Consumer			
Farmer			
Food Processor			
Institutional			
Retailer			
Restaurant			

Descriptive analysis (means, standard deviations, range) should be carried out for each indicator. In addition, disaggregation of the data, using statistical analysis software such as SPSS or PSPP, can provide particularly valuable information. Disaggregating by demographic and socioeconomic indicators, specifically, will permit assessment of production and consumption patterns among more vulnerable communities, and would allow the CAE or other implementing organizations to tailor programs to meet their specific needs.

Additionally, where local data is collected on specific farms and individuals, it becomes possible to carry out multiple regression analysis, asking such interesting and important questions as: what are the primary determinants of production levels, or farmer incomes or of the environmental health of a farm. Similarly, questions can be asked about the primary determinants of consumer purchases and food consumption.

Statistical tests for examining the major inferential research questions or hypotheses: t-test, analysis of variance, analysis of covariance, Mann-Whitney U test, Chi-square, Pearson product moment correlation, multiple regression, and Spearman rank-order correlation - can be performed in many statistical software programs. The distribution of responses can also be assessed.

Dissemination

Once data is collected and analyzed, CAE staff and board members should review the baseline information to assess the present state of the food system and consider its implications. The data should be made as widely available as possible, with presentation and accompanying descriptions targeted to particular audiences. The CAE may wish to hold discussions with each set of stakeholders, presenting relevant data and examining with the stakeholders the meaning of changes in the indicators. Specific suggestions regarding the most appropriate method for disseminating results to particular groups of stakeholders can be found in Table 2.

Challenges in Utilizing the Trend Monitoring Framework

An inherent limitation of such frameworks is the lack of available data for certain elements of the food system or sub-themes within the elements. For example, there is very little available information regarding the actual consumption levels of local food, meaning that production-based proxies need to be used. Additionally, although considerable food production-related data is available through the Census of Agriculture on the county, state, and national levels, this

information is not available on the local level, requiring, as indicated above, local survey data on these indicators.

Given the breadth of the framework and the large number of indicators necessary to fully monitor food systems, financial constraints have to be taken into account. In some cases, accordingly, some implementers may decide to settle for a subset of the indicators and thereby limit the necessary survey work. Such an option should be carefully weighed, taking into account the larger purposes of the trend monitoring system and the decision-making that may be contingent upon the information provided. A simplified monitoring framework has, in fact, been laid out in Part II of this Capstone: “Food System Trend Monitoring in Vermont’s Northeast Kingdom: An Illustrative Example.”

Although the food systems trend monitoring framework as it is implemented will prove very useful to the CAE (as well as to many others), the framework does not permit attribution of positive changes in the food system to CAE programs, except perhaps in the case of food processing carried out at the Vermont Food Venture Center (VFVC). Ultimately, the trend monitoring framework should be able to address the effects of each CAE project.

Finally, there are other elements of the food system that are not yet measured in this framework. For example, one that could be relatively easily incorporated would be hunting and fishing, for which there is some data available on the state-level that could be used. Overlaying dominant weather patterns that have occurred during the year the framework is implemented may be very useful for providing some context for the monitoring results because of this most basic and

important influence on farming outcomes. In addition to the externalities referred to earlier in this paper, future food systems trend monitoring might wish to consider changes relating to media, policy, attitudes and beliefs, and global factors such as WTO regulations and trade patterns.

Part II: Food System Trend Monitoring in Vermont's Northeast Kingdom: An Illustrative Example

Having laid out the purposes, processes, and challenges of food system trend monitoring more generally in Part I, Part II of this Capstone seeks to apply the framework to Vermont's Northeast Kingdom. As indicated earlier, this NEK trend monitoring implementation uses only a subset of the indicators discussed above and listed in Appendix 3. The indicators used in the NEK system were chosen based upon the current availability of data from secondary sources and their distribution across the various food system elements. A portion of this data is presented below, element by element, to give a sense of the value of this data and its likely implications for food system development and decision-making.

The NEK averages were calculated by using a weighted mean, when appropriate. No additional surveys have been carried out so far to supplement this secondary data. While some of the data presented and discussed here relates to a single point in time, other data, compiled from these secondary sources, can be compared over time.

Demographics and Socioeconomics of the NEK

There was an estimated 64,159 people living in the three counties of the NEK in 2009, making up 10.33% of the population of Vermont. The median age of 38.9 is older than in Vermont (37.7) and the US (35.3). The percentage of the population that are children in the NEK (21.19%) is similar to Vermont (21.11%) and the US (23.00%). While the percentage of the population in the workforce (52.08%) is a bit lower than in Vermont (56.32%), it is higher than in the US (49.97%). Additional demographic data is presented in Table 8, below.

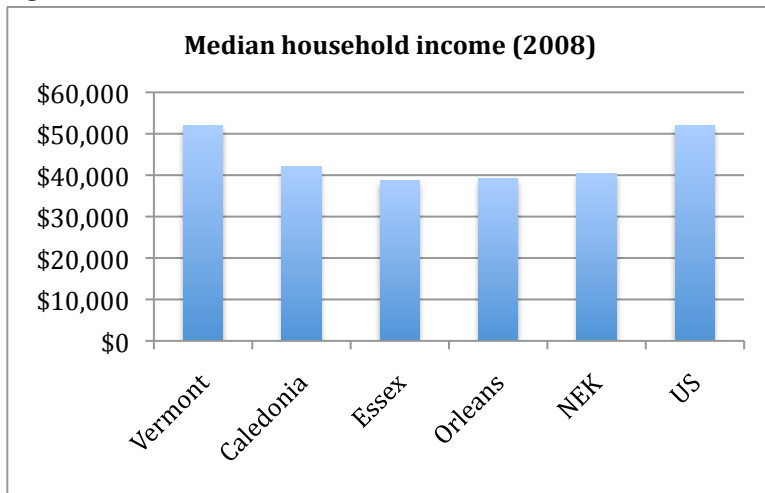
Table 8: NEK Demographics

	Caledonia	Essex	Orleans	NEK
Population (estimated, 2009)	30,470	6,500	27,189	64,159
Percentage of total population	4.90%	1.05%	4.38%	10.33%
Total households, (2000)	11,663	2,602	10,446	24,711
Total population, 18 yrs and older, (2000)	22,163	4,813	19,689	46,665
% of population 18 yrs and older	72.74%	74.05%	72.42%	72.73%
# in labor force (population 16 years and older)	16,168	3,349	13,895	33,412
% of population in labor force	53.06%	51.52%	51.11%	52.08%
Median age of population	38.50	39.00	39.30	38.89
Average household size	2.46	2.47	2.45	2.46
Child population (2008)	6,544	1,302	5,752	13,598
% of population children	21.48%	20.03%	21.16%	21.19%

Sources: US Census and Vermont Indicators Online

The NEK of Vermont has been traditionally considered an economically depressed area, and the median household income in the region, being 20% lower than the US and VT median household income, supports this perception.

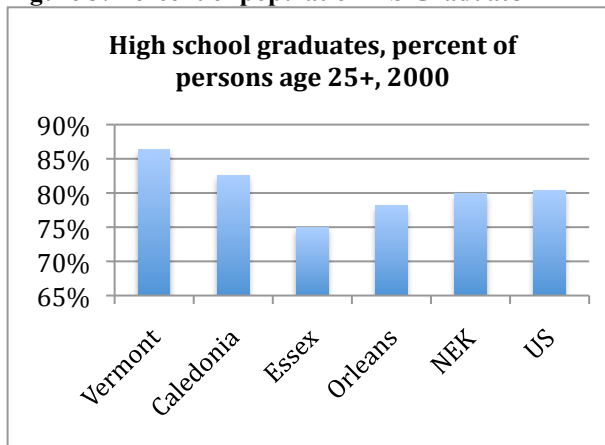
Figure 2: Median Household Income



Source: US Census, 2008.

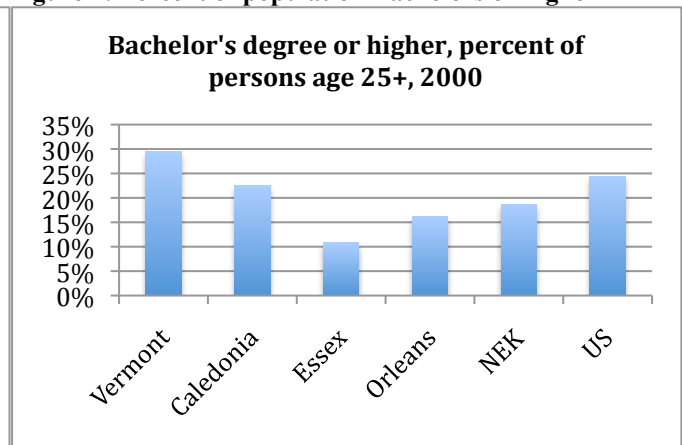
Census data also shows us lower than average educational levels existing in the NEK. The percent of the population that are high school graduates, 79.96%, is very close to the US average of 80.4%, but lower than the Vermont average of 86.4%. The percentage of the population with a bachelor’s degree or higher in the NEK (18.59%) is significantly lower than in Vermont and in the US as a whole (29.4 and 24.4 respectively). Essex County is the lowest of the NEK counties with a startlingly low 10.8% of its population having a bachelors degree or higher. Current 2010 census data will be available within the next year.

Figure 3: Percent of population HS Graduate



Source: US Census, 2000.

Figure 4: Percent of population Bachelors or higher



Source: US Census, 2000.

Soil

Soil is the foundation of the success in farming. As indicated earlier, there are currently no data available on soil health from secondary sources, a problem the Vermont legislated Farm to Plate Strategic Plan by the Vermont Sustainable Jobs Fund (2011) has recommended rectifying through the creation of a statewide soil monitoring system. Meanwhile, what are available are static soil maps that indicate where particular types of soils are located. These can be useful for future land use planning and to purposefully protect and utilize the best agricultural soils for agricultural purposes.

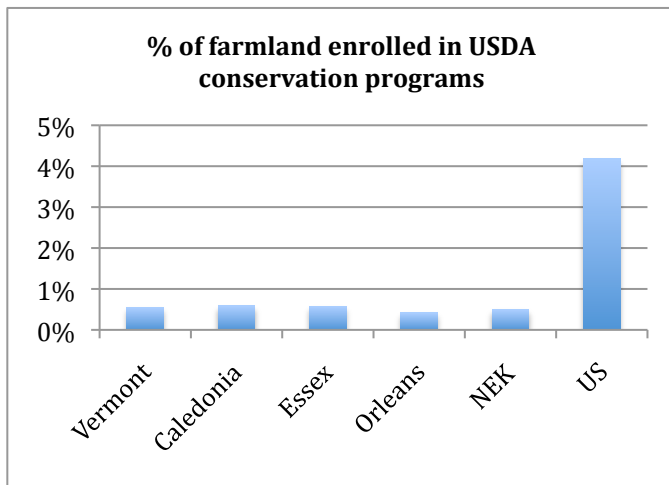
One possible way to address this issue of the lack of soil health data would be to work with local schools and incorporate into their curriculum simple, but useful and educational, processes that can give us a sense about soil health. “The Monitoring Toolbox,” produced by The Land Stewardship Project, could potentially be a useful tool in assisting these efforts. Within this resource are simple instruments that can be used to monitor the health of soils, as well as streams (for use in the evaluation of stream health within the water element of this framework).

Land

Land is a finite resource, and the preservation of the working landscape was identified as a primary value for Vermonters in a research study performed by the Vermont Council on Rural Development called *Imagining Vermont: Values and Vision for the Future*. Vermont is known widely for its farming and forested landscape, attractive both to its citizens and to tourists, and the land is a precious resource that should be actively protected.

As presented in Figure 5, however, relatively small amounts of farm acreage are enrolled in federal conservation programs such as the Conservation Reserve, the Farmable Wetlands, the Conservation Reserve Enhancement, and the Wetlands Reserve Program. (The table does not include land enrolled in state programs, such as Current Use⁵, or in land trusts, and further data should be gathered.) Nonetheless, the table raises serious questions about the low level of participation in these conservation programs, and what benefits may be associated with participation.

Figure 5: Percent of farmland in federal conservation programs

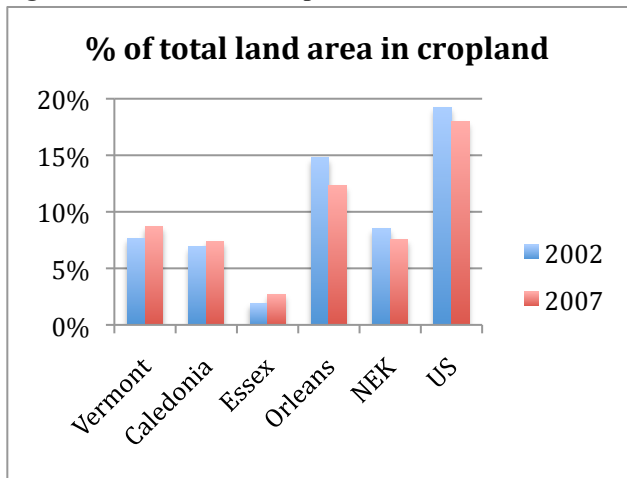


Source: US Census of Agriculture, 2007.

Figure 6 indicates that although cropland is increasing in the entire state and in particular counties, there is a decreasing trend in the NEK as a whole, as well for the country. This also a source for potential concern and deserves further investigation as to the causes of this trend.

⁵ “The Current Use Program offers landowners use value property taxation based on the productive value of land rather than based on the traditional “highest and best” use of the land.” Vermont Agency of Agriculture, Food & Markets. (2005).

Figure 6: Total land in cropland



Source: US Census of Agriculture, 2007.

Analysis of additional Agricultural Census data indicates a nearly 50% reduction in land used for pasture and grazing between 2002 and 2007. Harvested cropland acreage is also decreasing.

During this same time, there has been an increase of 74 farms in the NEK (from 1186 to 1260) and in farm acreage (+2590), but a decrease of 77 dairy farms (from 339 to 262).

Table 9: Agricultural land use in NEK

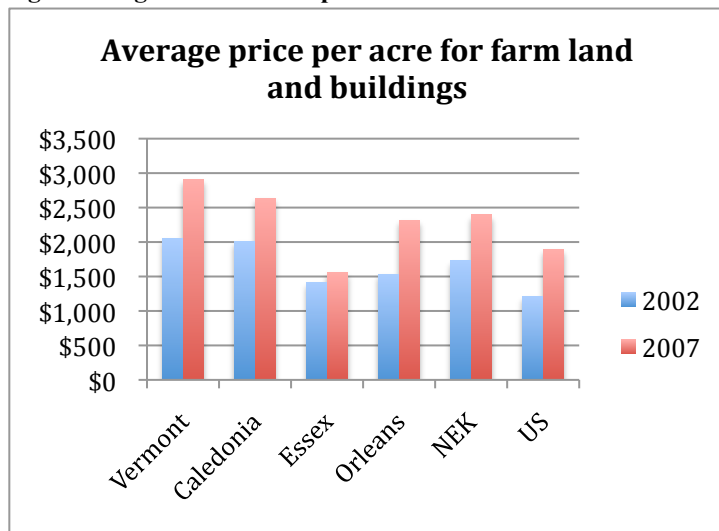
Northeast Kingdom (acres)	2002	2007	Change
Land in farms	236,396	238,986	+2,590
Total cropland	109,625	97,544	-12,081
Harvested cropland	89,318	83,014	-6,304
Pasture/grazing	15,796	8,406	-7,390
Idle	2,909	5,140	+2,231

Source: US Census of Agriculture, 2007.

If this loss in pastureland and cropland indicates that a shift away from dairy and meat production is taking place, the implications for the agricultural economy and for assumptions concerning its growth in the region and in the state as a whole need to be considered carefully.

To preserve the NEK’s landscape and encourage the growth of farms, farmland needs to be affordable to those considering agricultural livelihoods or investments. In Figure 7 below, however, we see a remarkable jump in agricultural land prices, creating a significant cause for concern. Land prices did not only increase an average of nearly 38% in the NEK between 2002 and 2007, but they are also significantly higher than average land prices in the US as a whole. This is at odds with the lower median household income in the NEK, discussed above, and may have the effect of discouraging new agricultural livelihoods in the region. A clear understanding as to what causes of these higher prices are and what can be done to influence this trend is essential. Policies and programs do exist to mitigate this situation, such as the Current Use program that gives tax relief to working farms, but other potential solutions to this predicament will need to be investigated.

Figure 7: Agricultural land prices



Source: US Census of Agriculture, 2007.

Water

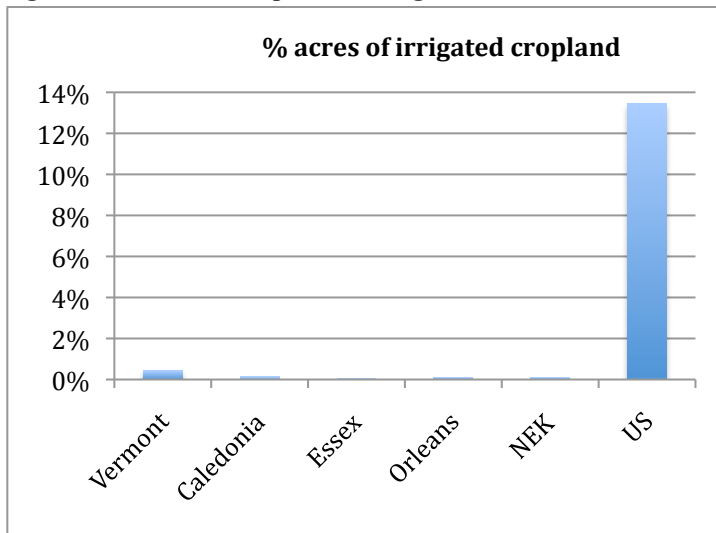
Water is one of the foundations of agriculture, as it is of life. Although water availability is not generally a concern in Vermont or the NEK, water should still be monitored over time to assess

trends and to be able to detect problems in a timely manner. There are three main components of water that should be monitored within the context of a food system: water availability, water usage and water pollution.

Although two-thirds of Vermonters rely upon groundwater for drinking, there was no protection of this critically important resource until 2008, when the Vermont legislature passed a law to “protect our drinking water from overconsumption, depletion and privatization,” states the Vermont Natural Resources Council. The new law concerning groundwater, “is designed to help map it, measure it and apportion it. It puts home and farm uses of water at the front of the line in case of shortages and makes large-scale withdrawals... subject to new permits and monitoring” (Barringer, 2008).

Regarding agricultural water usage, changes in the percent of cropland in irrigation (Figure 8) could be evidence of several different phenomena. It could indicate changes in rainfall – possibly relating to changes in climate that are being experienced worldwide. If this is the case, and water availability becomes a concern in the state and the region, measures will have to be taken to assure more conservative water utilization. But changes in cropland irrigation could also reflect shifting investment in farm infrastructure or a shift toward or away from water-intensive crops and cropping patterns. Accordingly, changes in this indicator require careful examination, with information likely to be needed from indicators associated with other components of the food system.

Figure 8: Percent of cropland in irrigation



Source: US Census of Agriculture, 2007.

Finally, water quality is important to monitor, as farms tend to be a considerable source of pollution in the state: “Runoff from our farms is a major source of phosphorus and nitrogen entering rivers, lakes and coastal areas.... [and] nutrient fouling seriously degrades our marine and freshwater resources and impairs their use for industry, agriculture, recreation, drinking water and other purposes” (Carpenter, 1998, p. 3).

Phosphorus is a proxy indicator for soil loss as it is not water-soluble and attaches itself to soil particles. Soil loss, and thus phosphorus levels, can be the result of poor farming practices, but may also be the result of logging and land development. The maximum acceptable level of phosphorus, according to the organization Winnepesaukee Gateway (2010), is 8.0 µg/L. If levels exceed this point “the lake would be considered impaired.” Although some lakes that make up the averages in Table 10 are at or below this level, many are significantly above, raising a serious need for intensified efforts to mitigate soil erosion.

Nitrogen levels “in streams are directly related to land use and associated fertilizer applications and human and animal wastes in upstream watersheds” (Dubrovsky, 2010, p. 6), with agricultural drainage tiles contributing significantly to this pollution. “Lakes with total nitrogen in excess of 0.48 [mg/l] may exhibit diminished aesthetic value due to enhanced algal growth” (Larouche, 2009, p. 11), so within this context, lakes and ponds in the NEK show acceptable levels of nitrogen.

Table 10: Lake and Pond Phosphorus and Nitrogen Levels

Lake and Pond monitoring	Phosphorus (µg/l)	Nitrogen (mg/l)
Maximum acceptable level	8.0	0.48
Caledonia average	10.2	0.224
Essex average	11.4	0.247
Orleans average	11.5	0.271
NEK average	11.0	0.247

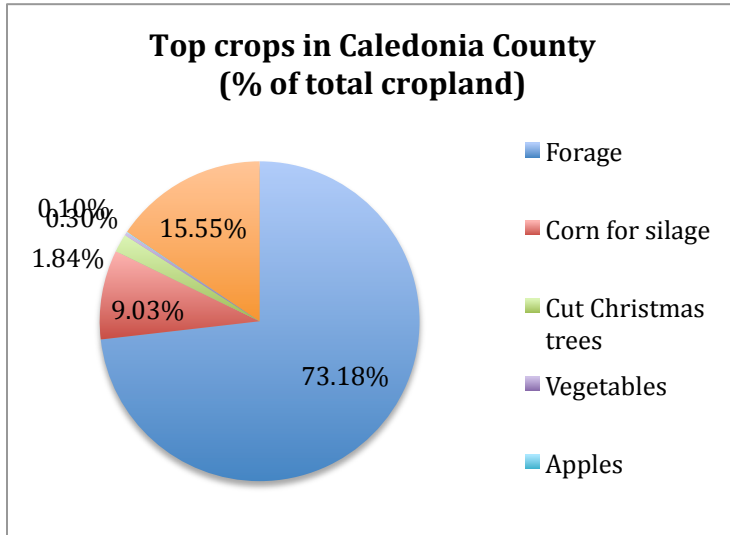
Source: Vermont Agency of Natural Resources

Seeds and Biodiversity

Diversification of production and biodiversity lead to increased stability of agricultural production, as well as farm financial stability. If one crop fails, farmers and consumers have other crops to fall back upon. Levels of biodiversity have been partially identified in Figures 9-11 below, which present for each county the percent of total cropland in particular crops. The higher the amount of acreage in “other” and in vegetables, the more diversified the farming. Forage makes up most of the cropland, but this does include several different types of crops that are grown for cattle and dairy. What we can clearly see from these charts is that most of the cropland is devoted to animal production – 72-89% of total cropland acreage in the NEK - when forage and corn for silage are combined. For the purposes of this monitoring framework, we will be looking for increases in “vegetables” and “other” categories, and perhaps a decrease in cropland devoted to animal production. It would be valuable to look at individual farms via farm

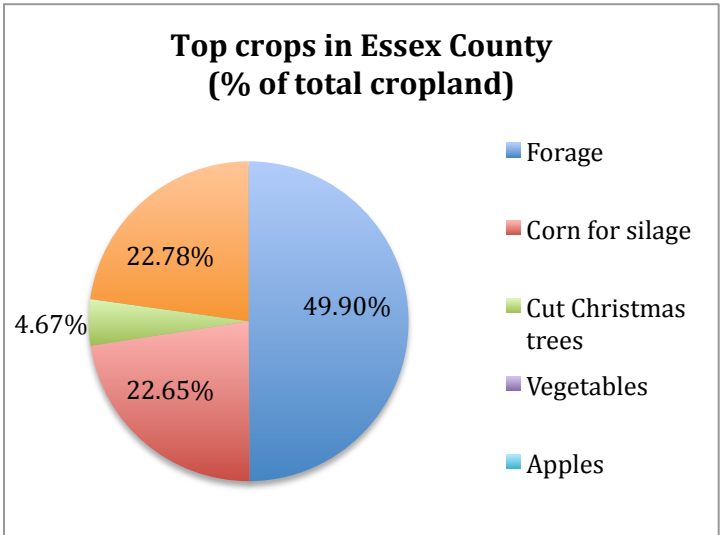
surveys and see if there are connections between the diversification of farms and the long-term financial stability of the farms.

Figure 9: Top crops in Caledonia County



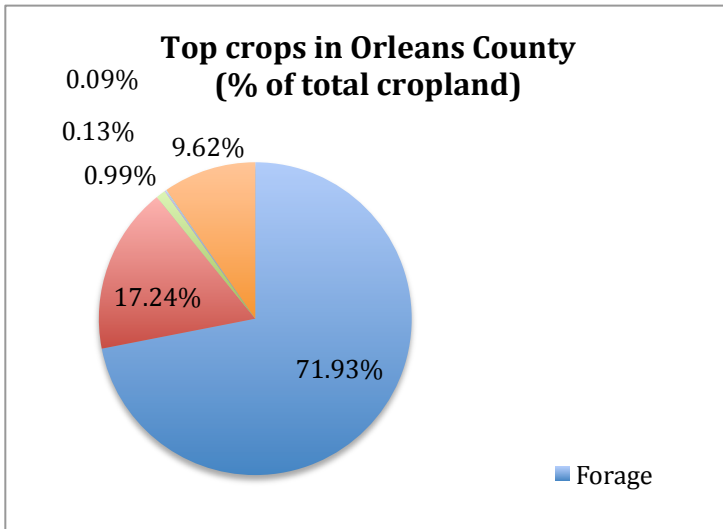
Source: US Census of Agriculture, 2007

Figure 10: Top crops in Essex County



Source: US Census of Agriculture, 2007.

Figure 11: Top crops in Orleans County



Source: US Census of Agriculture, 2007.

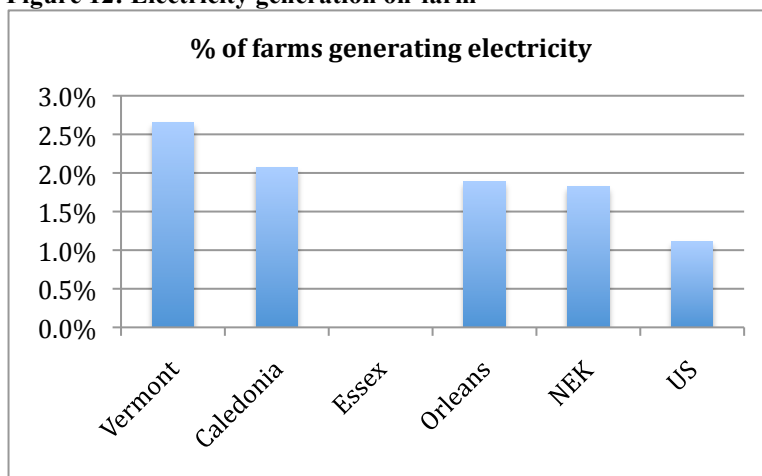
Preservation of seed genetic diversity is another important factor to consider in the long-term stability of the food system. In this framework, with the proximity of High Mowing Seeds to the Hardwick area and the NEK, we use local sales from High Mowing as a proxy for the growth or loss of genetic diversity. The company produces organic seeds that are not genetically

engineered, along with many heirloom seeds that have withstood the test of time. This variety provides a stronger, more diversified, genetic pool. Sales data from High Mowing Seeds have been collected, and as this framework is implemented over time, the percent change in sales will be the indicator. Of course, there are several factors that could influence the successes or failures of this business, so any judgement regarding the results of the data should be taken within the context of the business itself.

Energy

With continually increasing costs of energy, as well as significant social and environmental concerns associated with the use of non-renewable sources of energy, the production of energy on-farm is the direction that this framework embraces as an ideal we should be working toward both within and outside of the food system. As can be seen in Figure 12 below, there are many more Vermont farms and farms in the NEK producing their own electricity (2.65% and 1.83% respectively) than in the US as a whole (1.11%). While the comparison is encouraging, and one more reason for Vermonters to be proud of our farms and food system, the percentages themselves, however, still constitute a very small number of farms producing their own energy.

Figure 12: Electricity generation on-farm



Source: US Census of Agriculture, 2007.

In addition to encouraging on-farm energy production, we also should be looking at energy use reduction. Efficiency Vermont, a program operated by the Vermont Energy Investment Corporation, has initiated efforts to decrease farm energy consumption by providing financial incentives to change conventional farm lighting to more energy efficient LED lighting. Data from the Vermont Energy Investments Corporation’s Efficiency Vermont’s 2009 Annual Report is only available on the statewide scale, but indicates that in 2008 the program served 50 farms (0.83% of total farms) in the state and in 2009 increased coverage to 68 additional farms (an additional 0.97%). The incentives that were provided to these 118 farms by Efficiency Vermont resulted in a savings of 1,138 MWh of electricity annually, and 14,765 MWh over the lifetime of the equipment. Equivalencies for these numbers can be seen in Table 11.

Table 11: Energy savings equivalencies

	CO2 emissions from electricity use of homes for one year	CO2 emissions from gallons of gasoline consumed	Carbon sequestered annually by tree seedlings grown for 10 years	Greenhouse gas emissions from passenger vehicles per year
Annual (1138 MWh)	106	92,126	21,000 lbs	157 lbs
Lifetime (14,765 MWh)	1,380	1,195,276	272,462 lbs	2,032 lbs

Source: Greenhouse Gas Equivalency Calculator, www.airbestpractices.com

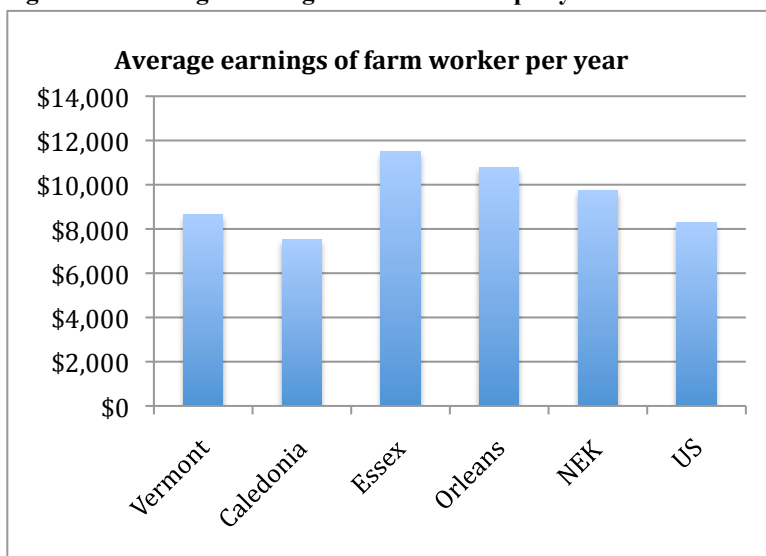
Farm and Food Processing Labor

According to US Bureau of Labor Statistics (BLS), “food manufacturing has one of the highest incidences of injury and illness among all industries” and “production workers in food manufacturing averaged \$14.00 per hour, compared with \$18.08 per hour for all other workers in private industry” (BLS, 2010-11, Food Manufacturing). Farm labor is described as work in which working conditions vary widely depending upon the job, and “does not lend itself to a

regular 40-hour work-week.... many agricultural worker jobs are seasonal in nature” (BLS, 2010-11, Agricultural Workers, Other). Regarding earnings, median hourly wages for farmworkers in May 2008 ranged between \$8.64 and \$12.00. “Farmworkers in crop production often are paid piece rates, with earnings based on how much they do instead of how many hours they work. Farmworkers tend to receive fewer benefits than those in many other occupations. Some employers supply seasonal workers with room and board” (BLS, 2010-11, Agricultural Workers, Other). By contrast, farmers and farm managers earned a median weekly income of \$775 in 2008. Interestingly, the BLS also indicates that “small-scale local farming, particularly horticulture and organic farming, offer the best opportunities for entering the occupation [of farming]” (BLS, 2010-11, Farmers, Ranchers, and Agricultural Mangers).

Average payroll per farm worker is higher overall in the NEK than in Vermont and in the US as a whole, as indicated in Figure 13 below, and may make participation in farming more attractive to labor. However, these figures could also indicate that there are more part-time workers in the US and Vermont, thus diluting the total wages paid.

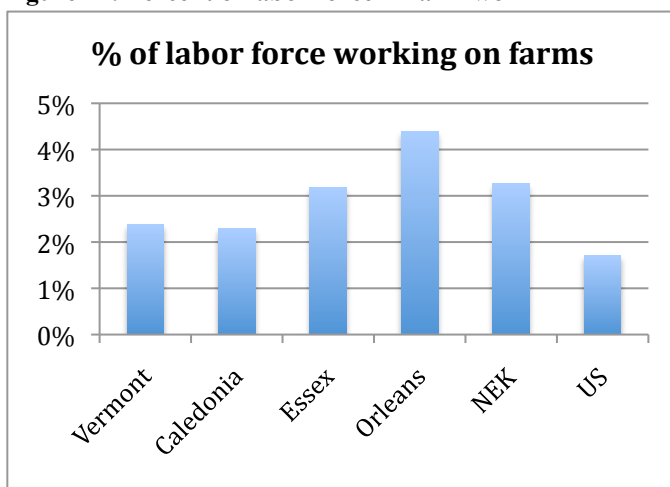
Figure 13: Average earnings of farm worker per year



Source: US Census of Agriculture, 2007.

One sign of a healthy and vibrant local food system and its relative importance to the local economy is increasing percentages of the labor force employed in agriculture. While we will only be able to see if this is the case over time, Vermont and the NEK do have higher percentages of the labor force working on farms than in the US overall as indicated in Figure 14 below.

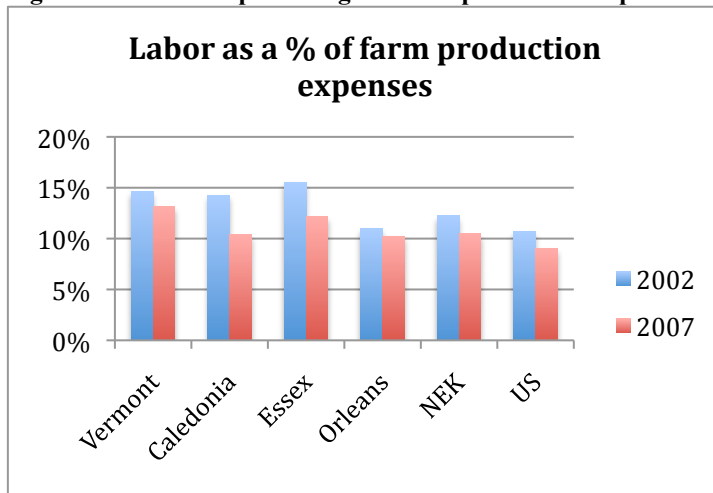
Figure 14: Percent of labor force in farm work



Source: US Census of Agriculture, 2007.

Labor as a percent of total farm production expenses have decreased overall between 2002 and 2007 as indicated in Figure 15. This may reflect increases in other costs (e.g. fuel), increased mechanization resulting in a decreased need for manual labor, or lower wages paid to farm workers. The causes of the trend clearly cannot be established by these data alone, demonstrating yet another reason why additional surveys are necessary in explaining trends.

Figure 15: Labor as percentage of farm production expenses



Source: US Census of Agriculture, 2007.

Two more points that the Bureau of Labor Statistics makes regarding food manufacturing labor that are important to consider are:

1. Unlike many other industries, food manufacturing is not as sensitive to economic conditions as other industries. Even during periods of recession, the demand for food is likely to remain relatively stable and the demand for processed food may even increase.
2. Most production jobs in food manufacturing require little formal education (BLS, 2010-11, Food Manufacturing).

Education

Considering that the NEK has lower levels of educational achievement overall, food production and manufacturing can provide relevant jobs to those individuals who have chosen not to pursue higher educational levels. At the same time, increasing educational attainment levels could potentially increase household incomes in the NEK, as well as contribute to the innovative development of the food system as a whole. Those individuals wishing to start businesses or

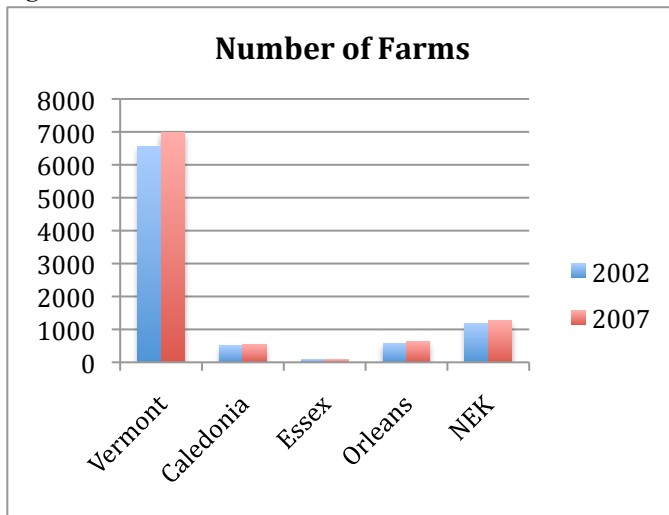
manage complex farming operations should have relevant educational resources available to them, ideally without having to travel long distances. Fortunately, here in Vermont and in the NEK there are many opportunities for continuing education to improve farming and food business outcomes. There are high school technical programs in organic horticulture, green space development in landscape design, organic pesticide application, aquaponics, hydroponics, and passive solar design alternative energy. The University of Vermont (UVM) and Sterling College provide various relevant training to those interested in farming. The New England Culinary Institute provides training to chefs and incorporates the local food movement into its curriculum. Lyndon State College has a sustainability degree with some focus upon farming. The Community College of Vermont (CCV) and Johnson State College provide business and computer classes. There are also many organizations which offer additional training including the Center for an Agricultural Economy, UVM Extension, and the Vermont Small Business Development Center. It would be worthwhile to monitor the quality of these programs as well as enrollment rates, in order to assess their continuing relevance and capacity.

Education about the food system should begin at a young age, so school gardens and the incorporation of education on healthy food production and consumption should be incorporated into school curricula and monitored. The lack of a centralized source of information available regarding these concerns underlines the need in food systems trend monitoring for explicit school surveys to monitor how many schools have a relevant curriculum, whether or not they have a school garden, if they are using local foods in their school meals, and if they are participating in food waste recycling.

Farms

The number of farms has grown in the US as a whole, in Vermont, and the NEK between 2002 and 2007, with growth rates at 3.56%, 6.28%, and 6.24% respectively, as seen in Figure 16 below. The higher growth rates in Vermont and the NEK demonstrate the increasing importance of farming to the economy and the culture of the state.

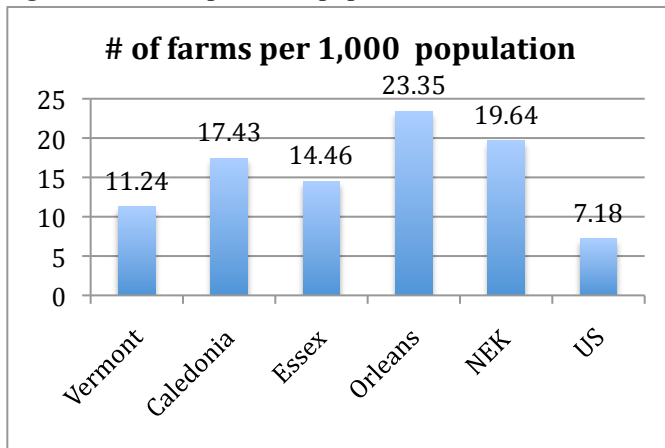
Figure 16: Number of farms



Source: US Census of Agriculture, 2007.

Examination of the number of farms per 1,000 population (see Figure 17 below) levels the playing field between regions of varying populations. What this reveals is that Vermont has a higher proportion of farms to citizens than the US overall, and that each of the NEK counties are higher than Vermont also indicating the relative importance and vitality of agriculture in the region.

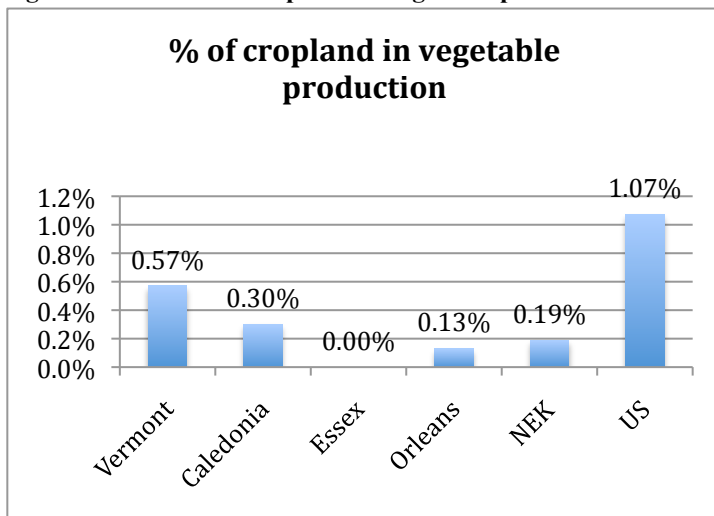
Figure 17: Farms per 1,000 population



Source: US Census of Agriculture, 2007.

If part of the goal of a local food system is to feed itself and to provide households with a locally produced and diversified diet, increasing vegetable production should be promoted. In this area, as indicated in Figure 18, the NEK is clearly lagging. By contrast, as seen in Figure 19, there is a very high number of dairy farms in the region which are producing more than the local region can consume. While agricultural exports are important and serve to bring in revenue from outside the region, such export-oriented production at the expense of production for local consumption can be problematic, resulting in vulnerabilities in the food system. This problem, being faced in the NEK is also a particularly common one in many low income countries.

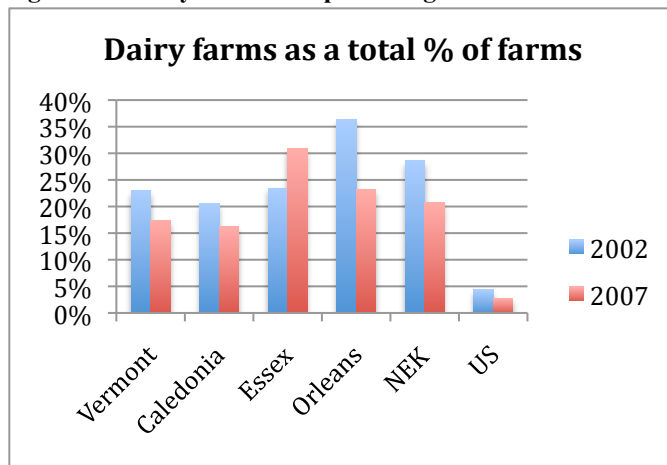
Figure 18: Percent of cropland in vegetable production



Source: US Census of Agriculture, 2007.

Figure 19, however, also indicates that the actual number of dairy farms has fallen between 2002 and 2007 at a rate of 22.71% in the NEK, with decreases in two of its counties. (Essex County experienced a 26.09% increase.) The decrease is significant and is itself a cause for concern in a region where dairy represents 84.98% of the total market value of agricultural products sold. To determine whether these decreases have been the result of decreased demand outside of the region, an insufficient price for milk being paid to farmers (historically true), or an intentional effort to provide a better balance in regional agricultural production, would again require additional region-specific data collection.

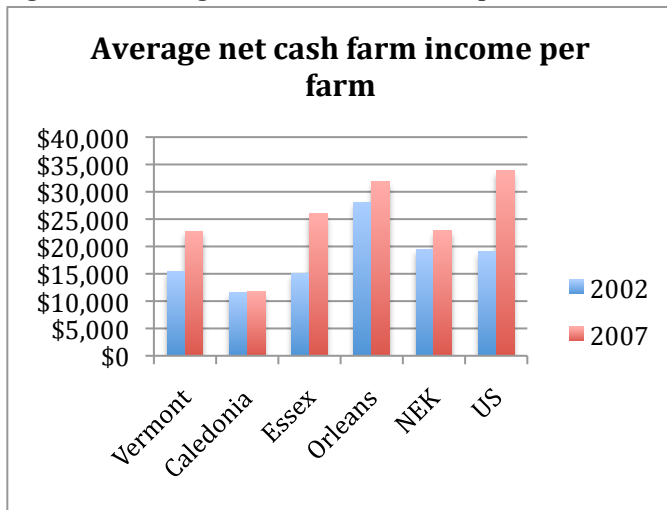
Figure 19: Dairy farms as a percentage of total farms



Source: US Census of Agriculture, 2007.

One encouraging trend is an increase in the average net cash farm income (after expenses) between 2002 and 2007, as seen in Figure 20 below. Although the increase is not as substantial in Vermont and the NEK as it is in the US, it would be valuable to know whether these increases were equally distributed across farms or simply represented increases in a smaller number of larger farms. Once again, local surveys permitting disaggregation would be particularly useful.

Figure 20: Average net cash farm income per farm

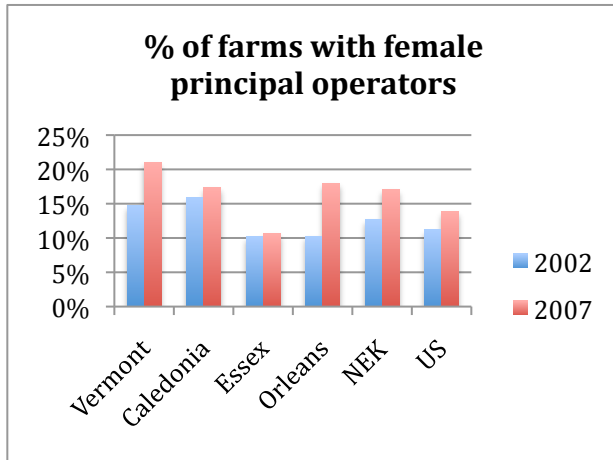


Source: US Census of Agriculture, 2007.

It is both interesting and revealing to examine who is running our farms and to speculate on the effects of such ownership. While women make up approximately 50% of the population, they only account for 20.99% of Vermont's principal farm operators, 17.14% in the NEK, and 13.89% in the US as a whole - although these figures have increased between 2002 and 2007 (see Figure 21.) When we look at acreage controlled by women (Figure 22), we see that in Vermont such farms comprise 11.75% of the acreage, 8.83% in the NEK, and 6.97% in the US. The percentage of the total market value of agricultural products sold on farms operated by women is even lower: 5.21% in Vermont, 3.6% in the NEK, and 5.99% in the US. It is hard to say why these conditions of decreasing control exist, and this warrants further investigation. It may be possible that (1) women who are farming may be choosing to run smaller operations and/or may not be interested in scaling up, (2) that women who are farming may not be doing so as their primary occupation, or (3) that barriers exist for women seeking to scale up their operations and make them more profitable.

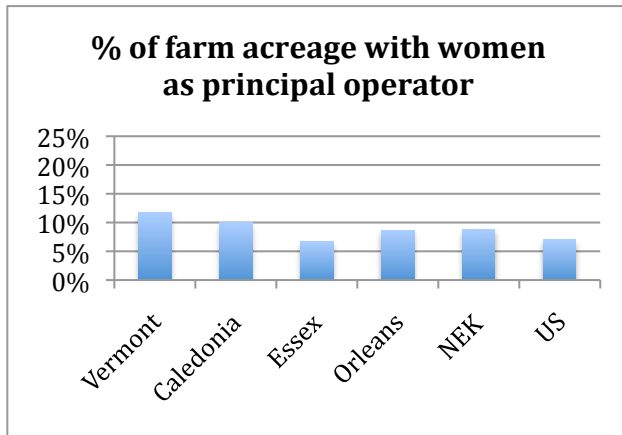
A 2005 NY Times article may address this issue when it states, “The rise of small-scale ‘market farming’ has brought many women back to farming” (Moskin, 2005). This would resolve the seeming contradiction between the increase in women farmers and the decreasing acreage and revenue on farms operated by women, if these farms are generally by choice small-scale market farms, rather than large-scale commodity farms.

Figure 21: % of farms with female principal operators



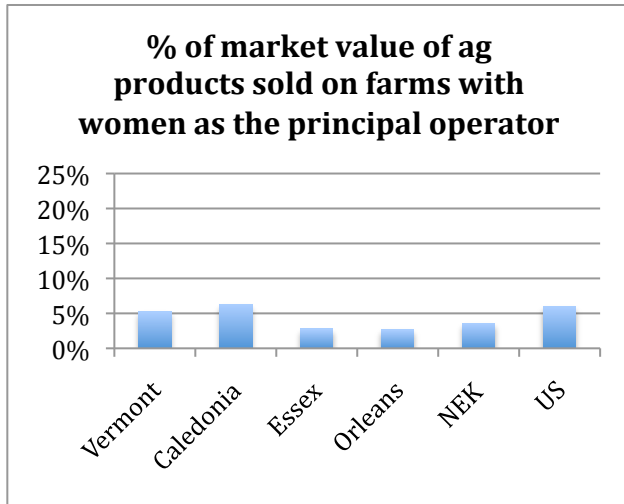
Source: US Census of Agriculture, 2007.

Figure 22: % of farm acreage with female principal operators



Source: US Census of Agriculture, 2007.

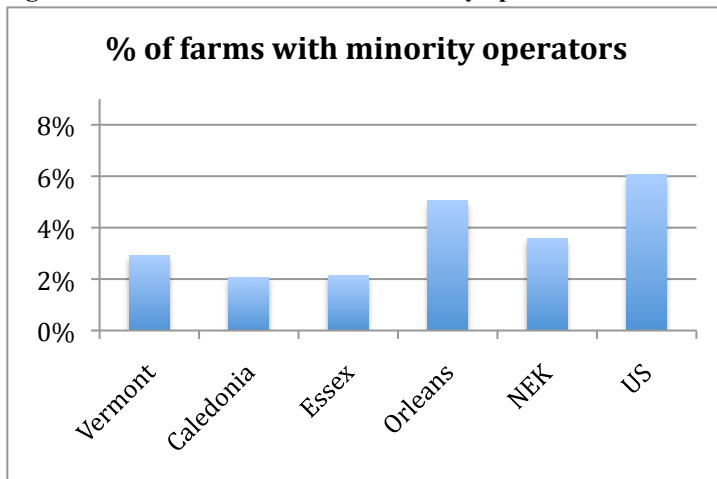
Figure 23: Market value of product sold with female principle operators



Source: US Census of Agriculture, 2007.

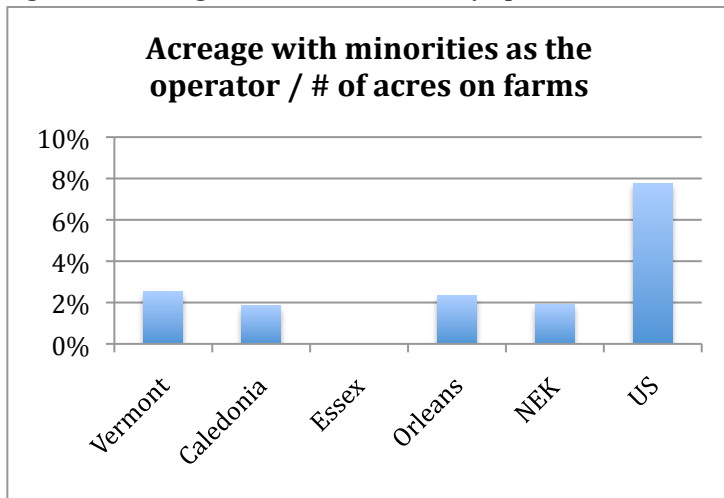
When we look at these same statistics for minority operators (Figures 24 and 25 below), we see that, at least in Vermont, the percentage of minority operators is roughly in proportion to their population (3.8% of the population in Vermont, 2.8% in the NEK). Minorities in Vermont and the NEK control a somewhat smaller percentage of acreage than operation of farms, but the disparity is not as large as is the case with women. No data was available on the percentage of the market share of agricultural products sold by farms operated by minority individuals.

Figure 24: Percent of farms with minority operators



Source: US Census of Agriculture, 2007.

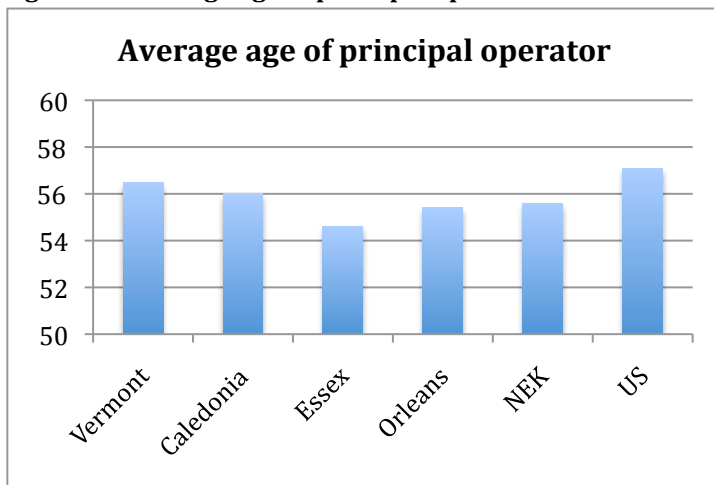
Figure 25: Acreage of farms with minority operators



Source: US Census of Agriculture, 2007.

As the average age of an occupation increases there is cause for concern because this signifies that there are not enough younger individuals entering the field that will ultimately continue the future of the occupation. The 2007 Agricultural Census indicates the average age of farmers in Vermont, the NEK, and the US in the mid to late 50's, signifying a shortage of younger people involved in farming. There is, however, some likelihood that we will find this trend reversing in the next Agricultural Census, as the media report a significant renewal of interest in agriculture among young people getting involved.⁶

Figure 26: Average age of principal operator



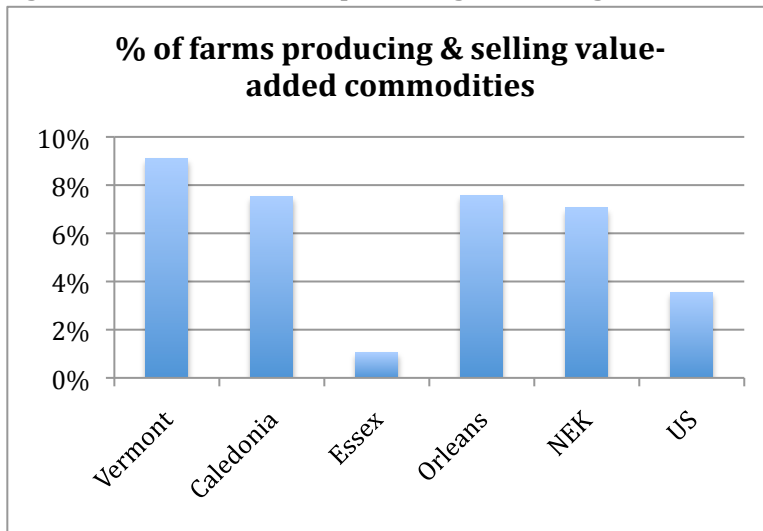
Source: US Census of Agriculture, 2007.

⁶See, for example, Raftery, 2011.

Processing

Processing and then selling processed products made from crops and commodities grown or raised on-farm brings in a higher price for the farm products. This extension of the on-farm value chain also adds to the diversification of farm income, providing more economic stability for farms. As we can see in Figure 27, more Vermont farms, as well as two of the three counties of the NEK, are producing value-added commodities than in the US as a whole. This is new data that the Agricultural Census is collecting. Continued upward trends in this indicator will signify increased the strength and stability of our farms and our food system, as well as representing a higher price paid to farmers for their products.

Figure 27: Percent of farms producing and selling value-added commodities



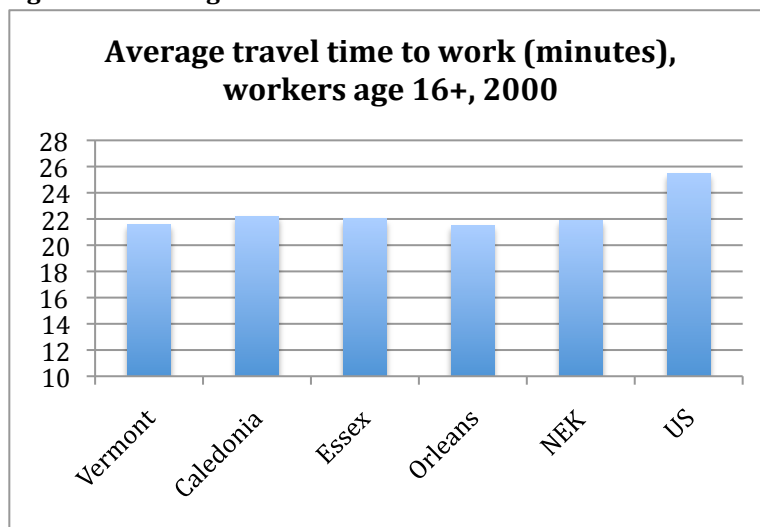
Source: US Census of Agriculture, 2007.

There is much other useful data we would like to see regarding farm product processing, such as the extent to which local food processing companies use local raw materials. Some of this data is likely to be collected by the Vermont Food Venture Center, expected to open its doors in Hardwick in early June 2011.

Transportation

Data on food transport costs and on use of alternative fuels in such transport is not available but should be encouraged and can be gathered through surveys. Commuting time to work, however, is a useful proxy for the extent to which jobs are locally available. Figure 28 indicates that commuter times in Vermont and in the NEK are shorter than in the U.S. as a whole, an encouraging sign for this region.

Figure 28: Average travel time to work



Source: US Census, 2000

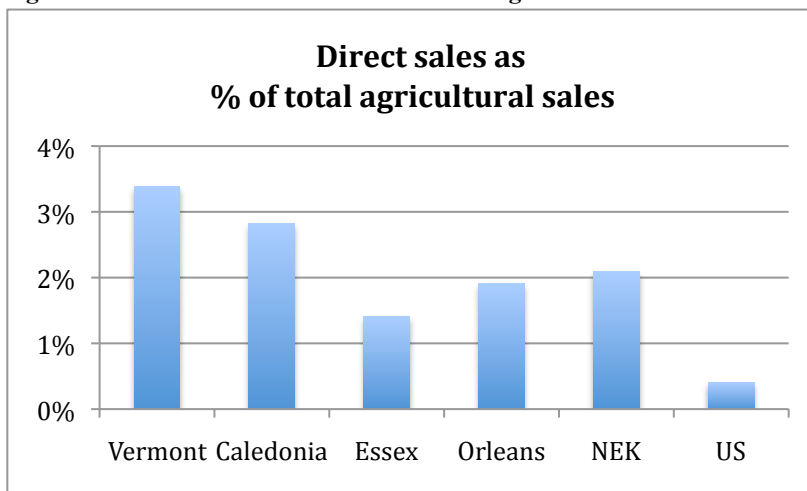
Distribution

The Agricultural Census is beginning to track data regarding direct sales to consumers.

Agricultural Census data for 2007 shows that Vermont and the NEK are well ahead of the rest of the US in this regard. Desired upward trends in this indicator over time will indicate higher prices paid to farmers, more connections made between farmers and consumers, and more money staying within the local economy.

In Figure 29, we can see that although direct sales do not make up a significant portion of overall sales, these sales represent a significantly higher percentage in Vermont and the NEK than they do in the US as a whole. It is possible that if we disaggregated this data to look at farms excluding dairy farms, the percentages may be higher because of the large proportion of agricultural sales being represented by the dairy industry, which generally only participates in bulk sales.

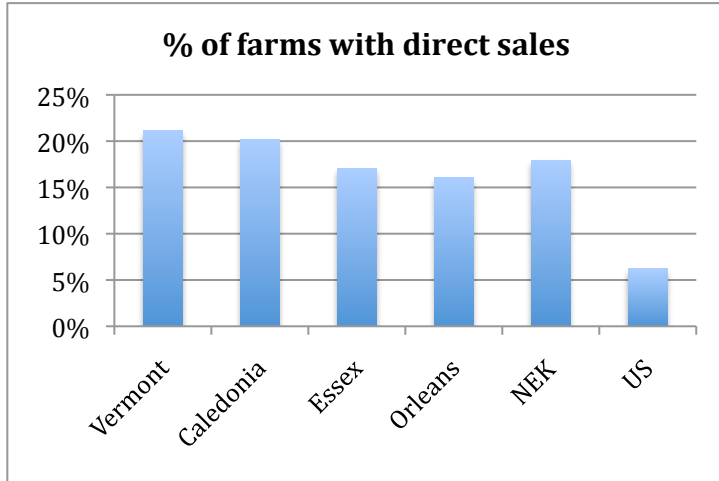
Figure 29: Direct Sales as Percent of Total Agricultural Sales



Source: US Census of Agriculture, 2007.

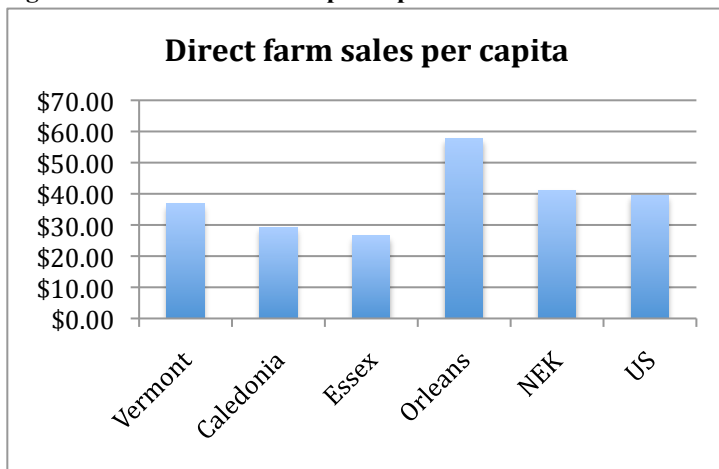
As seen in Figure 30, the percentage of farms with direct sales is significantly higher in Vermont (21.10%) and the NEK (17.90%) than the US (6.20%), but the NEK figure is below the state average. Interestingly, when we move on to Figure 31, the direct farm sales per capita is more closely aligned with the US average, both in Vermont and the NEK as a whole, while Orleans County is doing much better in this regard. The reasons for this are unclear and would be interesting to discern.

Figure 30: Percent of farms with direct sales



Source: US Census of Agriculture, 2007.

Figure 31: Direct farm sales per capita

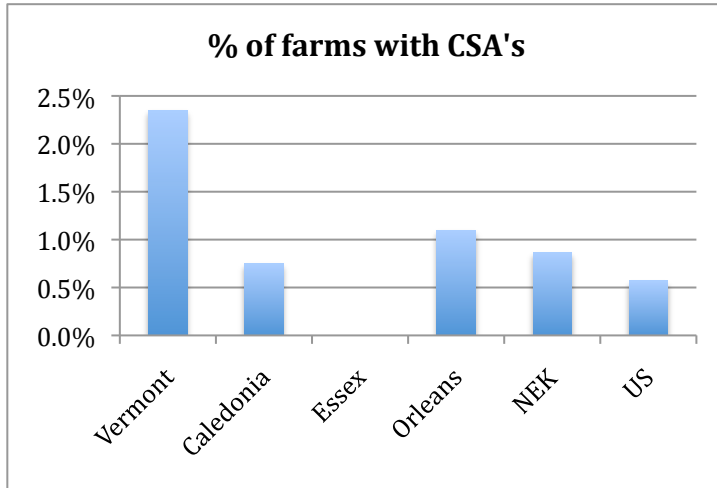


Source: US Census of Agriculture, 2007.

Community Supported Agriculture (CSA) is a farm marketing strategy in which farmers sell weekly shares of their farm products to consumers at a set price at the beginning of the season. This approach assures an income for farmers at planting time, when they need it most (have high costs for inputs but no sales) and spreads the risks of farming among a larger group: the CSA share purchaser understands that if the farm experiences a crop failure, the share purchaser may not receive what was originally expected. Conversely, if the farmer experiences a highly productive season, the CSA members experience these benefits. As can be seen in Figure 32, the

percentages of farms using this strategy are still relatively low, but Vermont has a comparatively higher percentage of farms with CSA's (2.35%) than the NEK (0.87%) or the US (0.57%).

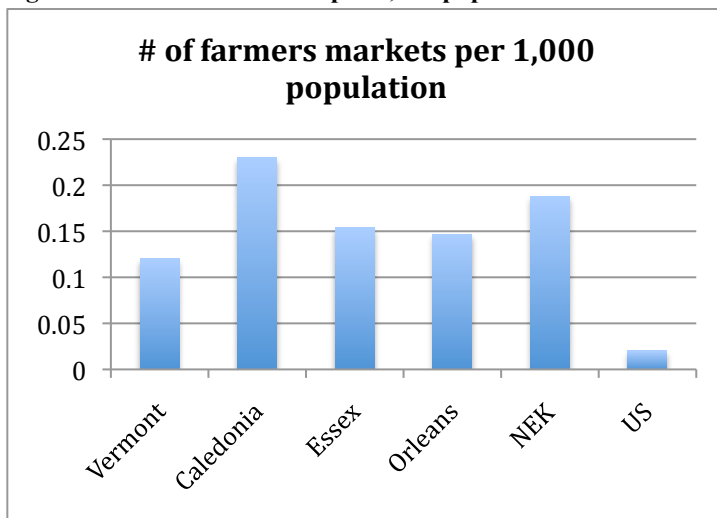
Figure 32: Percent of farms with CSA's



Source: US Census of Agriculture, 2007.

By contrast, the NEK has a larger concentration of farmers markets than Vermont, which in turn has roughly six times more per 1000 population than the US (see Figure 33). Once again, an increasing trend will indicate both higher prices for farmers and a stronger connection between farmers and consumers – a more vibrant local food system.

Figure 33: Farmers markets per 1,000 population



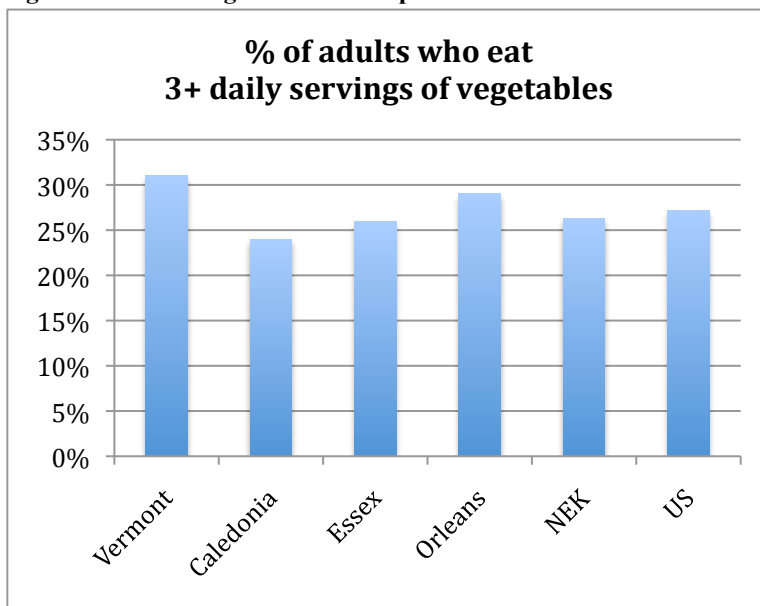
Source: Food Environment Atlas

Consumers

There is surprisingly little food consumption data available from national or state sources. Although sales are sometimes used as a proxy and can translate relatively well into actual consumption if we account for food waste. The Food Environment Atlas and the Vermont Health Status Report have some consumption data, but local data collection is necessary both to derive more accurate patterns and also to permit disaggregation by demographic and socioeconomic indicators.

The USDA recommended consumption of fruit and vegetables is 5-9 servings per day. As can be seen in Figure 34, fewer than a third of adults in Vermont and the NEK consume three servings of vegetables a day, and there is little likelihood that they make up for this shortfall with fruit consumption. Although Vermont percentages are higher than the US average, the NEK falls just a bit behind.

Figure 34: Adult vegetable consumption



Source: Vermont Health Status Report and Center for Disease Control

Retail and Commercial Outlets

There is, similarly, little available information regarding retail sales of fresh, local foods, important information that will need to be collected through local surveys.

Food Waste Recycling

Food waste recycling is a crucial step to complete the cycle of a food system: nutrients are recycled back into the system by being composted, fed to animals, or producing energy in biodigesters, rather than being lost to landfills. The Hardwick-based Highfields Center for Composting has made great efforts in the NEK and throughout Vermont to increase composting and creating awareness about its importance, but state and regional data is scarce and needs to be collected.

The potential magnitude of large-scale composting is indicated in Table 12, with data collected by Stone Environmental in Montpelier, VT, which totals the estimated weekly production of food waste from all of the commercial businesses and organizations that produce it in the NEK.

Table 12: Estimated commercial food scrap production per week

Location	Tons of estimated commercial food scrap production / week
Caledonia	30.91
Essex	4.59
Orleans	32.16
NEK Total	67.66

Source: Stone Environmental, Montpelier, VT

This weekly figure equates to 3,518 tons per year, which can then be compared with the amount of composting of commercial food scraps carried out by the NEK Solid Waste Management District (NEKSWMD) as shown in Table 13 (229 tons), and the Highfields Center for Composting, which reported collecting 118.5 tons of food scraps last year. Together, this

represents only 9.88% of the total annual estimated waste. However, this 9.88% figure may represent an underestimate of actual food waste recycling since some diversion takes place at other composting facilities and through individual efforts.

Table 13: Tons of food waste composted in NEK by NEKSWMD

Materials Diverted for Composting			
Town	Food Waste	Leaf/yard Waste	Total Composted
Danville	26.5 tons	n/a	26.5 tons
Greensboro	12 tons	n/a	12 tons
Lyndon	130 tons	52.8 tons	182.8 tons
Peacham	1.5 tons	n/a	1.5 tons
Newark	2.2 tons	n/a	2.2 tons
Sheffield/Wheelock	4 tons	n/a	4 tons
2010 Total			229 tons

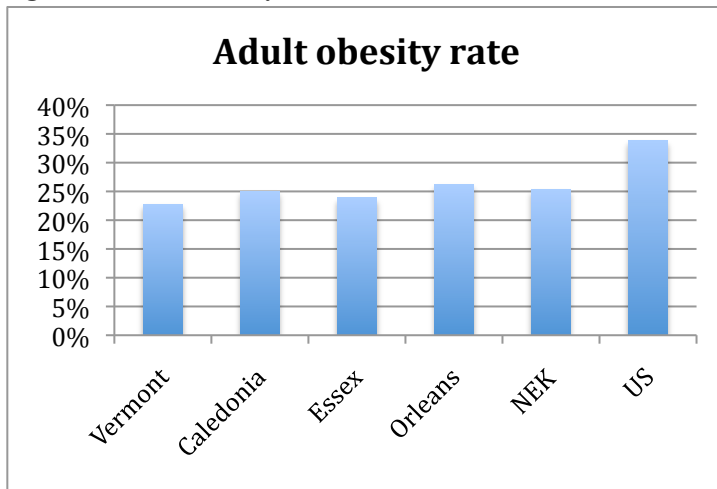
Source: Northeast Kingdom Waste Management District Annual Report, 2010

Strength of Communities

The strength of a community might be measured by various indicators, among them; physical health, community participation, levels of investment in the community, and measures that indicate the quality and quantity of interactions among citizens. In fact, relatively little of this data is available from secondary sources.

Among the few indicators we do have are rates of obesity, a major source of health problems and health care costs, and clearly related to food consumption. We can see in Figure 35 that the adult obesity rates in Vermont and the NEK are significantly lower than the overall US rate.

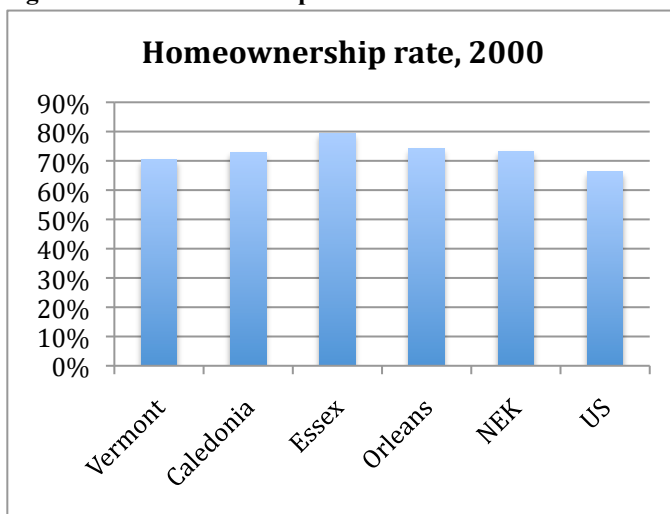
Figure 35: Adult obesity rate



Source: Food Environment Atlas

Homeownership also reflects a community’s stability and citizens’ investment in their communities. While homeownership is often associated with income levels, it also can serve as a measure of pride in one’s community and a stable connection with it. As seen in Figure 36, the homeownership rate in Vermont as a whole is 70.60% and 73.36% in the NEK, both higher than the US (66.20%).

Figure 36: Homeownership rate



Source: US Census

The complete food system trend monitoring framework presented in Appendix 2 includes indicators for quality of life and life satisfaction. Often, these are presented as indices which

combine several indicators, as is the case with the Gallup-Healthways Well-Being Index. This index compares the well-being of states and congressional districts, but, unfortunately for purposes of this more local trend monitoring, does not present data at the county level. Results are presented below in Figure 37, and indicate cause for some concern given Vermont’s drop in its national ranking between 2009 and 2010, a result of a sharp drop in in the “Work Environment” category, and a reduction, relative to other states, in the “Emotional Health” category.

Figure 37: Vermont's Well-Being

State of Vermont Well-Being

Ranking from data collected January 2, 2010 – December 30, 2010

	Result		Rank	
	2009	2010	2009	2010
Well-Being Overall	67.9	67.1	6	17
Life Evaluation	45.1	47.2	41	32
Emotional Health	79.7	78.2	12	35
Physical Health	76.8	76.5	25	28
Healthy Behavior	68.4	69.5	1	1
Work Environment	53.1	47.0	2	31
Basic Access	84.2	84.2	12	10

*#1 is the top Rank and 50 the bottom

*#0 is the bottom Result and 100 the top (see methodology for descriptions)

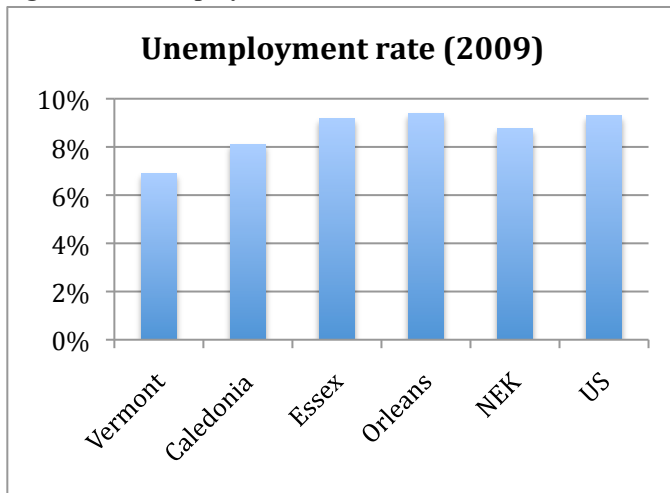
*Source: Gallup-Healthways Well-Being Index Survey 2010, n = 352,840 and 2009, n = 353,849

Implementation of an equivalent inquiry through the local and regional consumer and farm surveys is recommended to permit local examination of these important indicators, and are included in the survey instruments.

Robustness of the Local Economy

Unemployment has risen significantly in the past two years. As seen in Figure 38 below, Vermont’s unemployment rate is considerably lower than that of the country as a whole, while the NEK rates are much closer to the US average.

Figure 38: Unemployment rate



Source: US Census

The Gini Coefficient is the most commonly used measure of income inequality, and “the US coefficient has risen steadily since the late 1960’s” (McKibben, 2007, p. 12), a serious cause for concern. The coefficient varies between 0, which reflects complete equality and 1, which indicates complete inequality (one person has all the income or consumption, all others have none)” (McKibben, 2007, p. 12), so the higher the number, the greater the disparities between rich and poor. To provide an international context to the numbers in Table 14, “the American index has soared to .40 in recent decades, but the Chinese, for all their economic success, are doing even worse at .45. (In Japan, by contrast, the number was .25)” (McKibben, 2007, p. 12). Although Table 14 is incomplete, it is clear that income distribution in the NEK is significantly more equitable than in the US and Vermont as a whole. Since wealth inequalities adversely affects social cohesion and reflects unequal opportunities and access to resources, this lower Gini Coefficient is a positive indicator for the NEK. At the same time, the coefficients in the NEK counties have been rising since 1990 at rates equal to the growing inequality in the country as a whole.

Table 14: Gini Coefficient in 1990 and 2009.

	Vermont	Caledonia	Essex	Orleans	NEK	US
1990		.3558	.3223	.3895	.3665	.4280
2009	.4280	.4420		.4120		.4680

Sources: <http://www.unc.edu/~nielsen/data/ineq90.txt>; U.S. Census Bureau, 2009 American Community Survey; and US Census.

Food Security

There is a general perception that local foods are more expensive than conventional foods – true in some cases, while not true in others (see Pirong and McCann, 2009). In a local food system that seeks to be equitable, fair, and sustainable, food security should include not only access to food in general, but also to food that is healthy and locally produced.

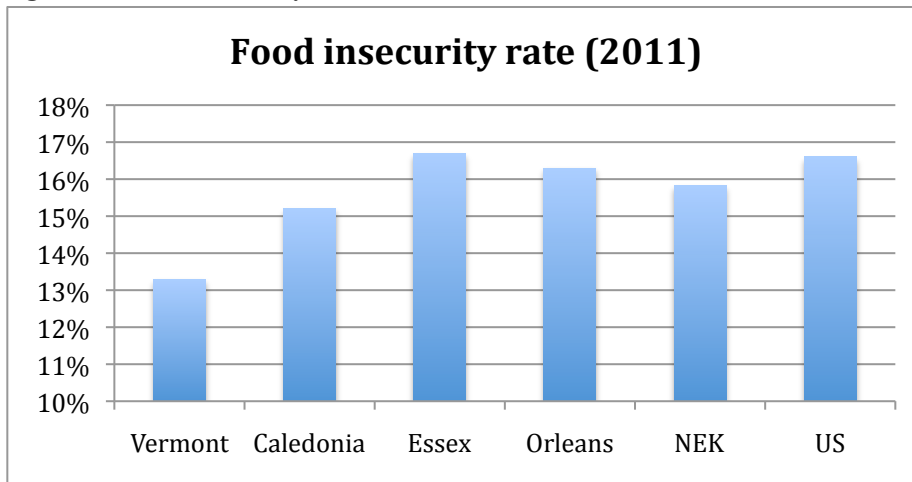
Food security is defined by the USDA as, “access by all members [of a household] at all times to enough food for an active, healthy life. Food security includes at a minimum:

- The ready availability of nutritionally adequate and safe foods.
- Assured ability to acquire acceptable foods in socially acceptable ways (that is, without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)”

(Nord and Coleman-Jensen, 2009).

This is an important measure in its own right, but particularly within the context of a food system. Increasingly, the assured access to food is being recognized as a human right. As we can see in Figure 39, the food insecurity rate in the NEK (15.82%) is lower, but relatively close to the US rate of 16.60%, and significantly higher than Vermont’s rate of 13.30%.

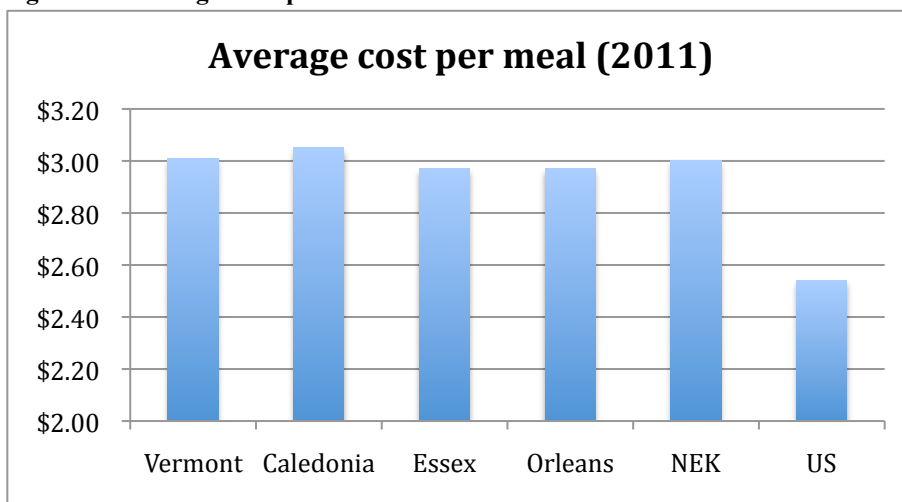
Figure 39: Food Insecurity Rate



Source: <http://feedingamerica.org/hunger-in-america/hunger-studies/map-the-meal-gap.aspx>

In Figure 40, we see that the average cost per meal is significantly higher both in Vermont and the NEK than it is in the US. In Vermont as a whole the higher cost of a meal does not translate into higher rate of food insecurity, and although the US has a lower price per meal, higher levels of food insecurity exist. The differences between the food insecurity rate within the state seem not to be associated with food costs, but is more likely to stem from income levels, since the NEK has lower median household income and higher poverty rates (See Figure 41).

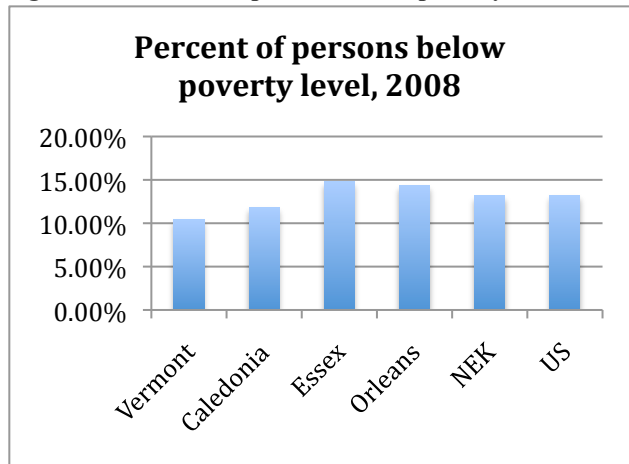
Figure 40: Average Cost per Meal



Source: <http://feedingamerica.org/hunger-in-america/hunger-studies/map-the-meal-gap.aspx>

Finally, although Figure 41 below indicates that Vermont has a lower percentage of the population below the poverty line, the NEK has the same rate as the US as a whole. Priorities need to be made for addressing food security and poverty issues both within the NEK and throughout the entire state.

Figure 41: Percent of persons below poverty level



Source: US Census

In recent years several important efforts have been initiated that seek to increase the access of low-income families and individuals who participate in the SNAP (food stamp) and WIC programs to fresh, local foods at farmers markets. There are also a considerable number of local and regional programs designed for this purpose, including NOFA-VT's Farm Share program which subsidizes CSA shares for low-income families, and the Vermont Foodbank's farm gleaning programs that harvested and donated 54.12 tons of produce from farmers fields to the local organizations in 2010. In examining trend data from these programs, it will be important to consider whether changing participation rates are the result of changes in income eligibility requirements, in funding, in awareness levels, or in the numbers of families and individuals that are eligible.

Hunger Free Vermont reports in 2010 that, 14% of all Vermont households are food insecure, 25,400 children under 18 live in food insecure households (20%), 88,000 Vermonters of all ages live in food insecure households (14%), 32% of Vermonters cannot afford either enough food or nutritious food, and 6% of all households are food insecure, ranking Vermont as the 9th hungriest state in the nation. Below is a table with more specific figures for the NEK.

Table 15: NEK food security statistics

	Caledonia	Essex	Orleans
# of residents participating in 3SquaresVT (food stamps) (% of population)	5,327 (17.48%)	1,294 (19.91%)	5,987 (22.01%)
County-wide increase in 3SquaresVT participation over the last year	4%	12.5%	5%
Children in county that are food insecure	1 in 4	1 in 4	1 in 4
% of grade school and high school students eligible for free or reduced-price meals	53%	53%	54%
% of eligible free and reduced-price meals students participating in school breakfast programs	39%	52%	46%
% of schools offering afterschool snacks through the federal snack program	40%	40%	75%
# of summer food sites	9	2	17
# of county residents served each month through the Commodity Supplemental Food Program	309	121	329

Source: Hunger Free Vermont, 2007-2009, 3 year average from US Census

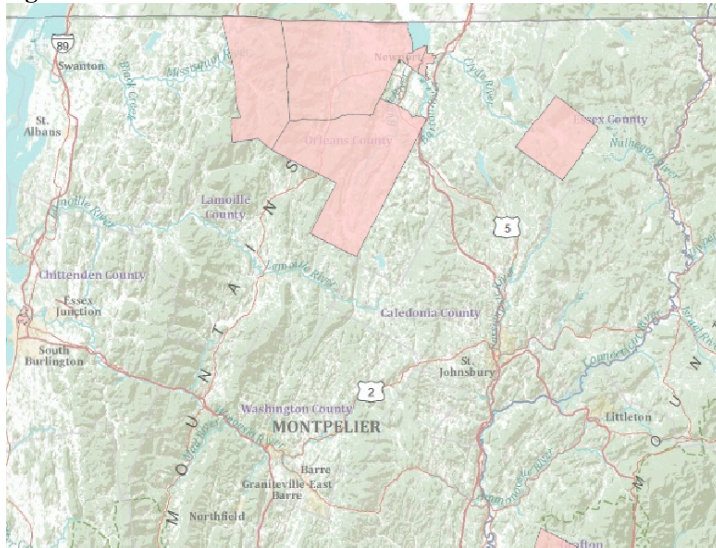
Another important aspect of food security is physical access to healthy foods, and the term “Food Desert” addresses this important issue that has only recently been recognized. The USDA defines a food desert as:

Areas where at least 20 percent of the people are at or below the federal poverty levels for family size, or where median family income for the tract is at or below 80 percent of the surrounding area’s median family income. Tracts qualify as ‘low access’ tracts if at least 500 persons or 33 percent of the population live more than a mile from a

supermarket or large grocery store (for rural census tracts, the distance is more than 10 miles). (Ver Ploeg, M. et al., 2009)

The NEK makes up most of the area that is considered a food desert within Northern Vermont, particularly Orleans County. These gaps, and other likely gaps in healthy food access in other parts of the region, need to be monitored and addressed. A recently proposed project that is designed to confront the problem includes having a mobile market that travels to these regions to bring fruit, vegetables, and healthy foods to the local population. Many more opportunities for creative approaches to this issue are possible.

Figure 42: Food Deserts in Northern Vermont



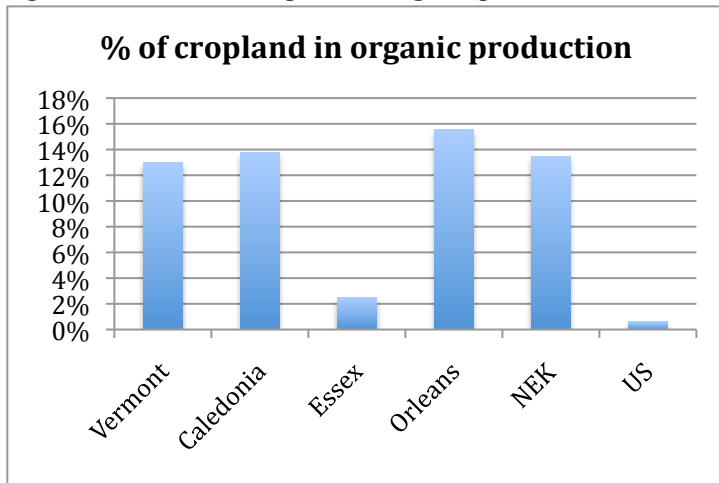
Source: USDA Food Desert Locator

Health of the Environment

The choice to use organic farming data as our environmental indicators has been made recognizing the ways in which conventional farming methods can be destructive of the environment. Increased organic production, in addition to being consistent with new directions in Vermont agriculture, offers the potential for a large positive impact on environmental quality.

Vermont and the NEK are far ahead of the US in organic farming: while only 0.63% of US cropland is in organic production, 13.02% of Vermont cropland and 13.46% of cropland in the NEK is devoted to organic production (see Figure 43 below.)

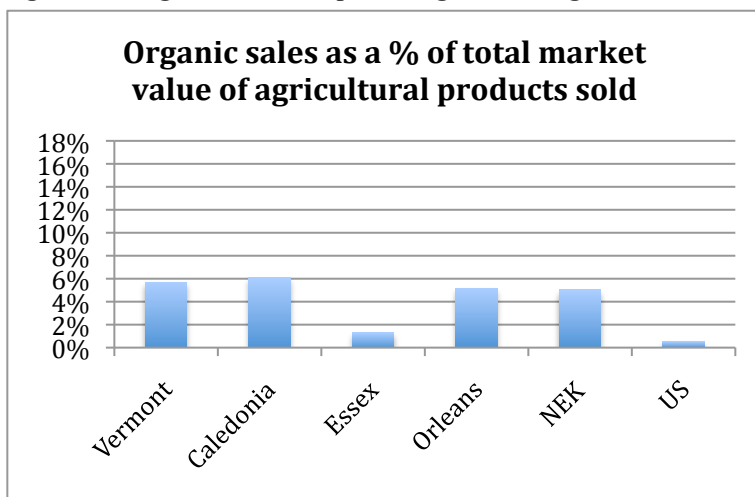
Figure 43: Percent of cropland in organic production



Source: US Census of Agriculture, 2007.

Organic sales are roughly 10 times higher in Vermont and the NEK than in the US as a whole, as indicated in Figure 44 below. As a percentage of total agricultural sales, organic sales make up 5.70% in Vermont, 5.02% in the NEK, and only 0.57% in the US.

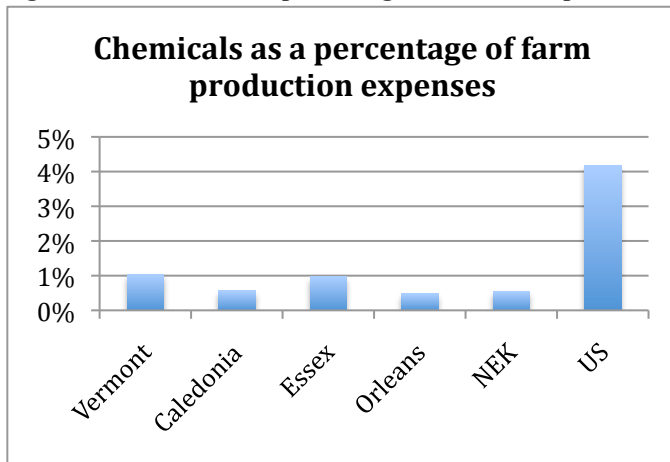
Figure 44: Organic sales as a percentage of total ag sales



Source: US Census of Agriculture, 2007.

As indicated at the outset, conventional agriculture, with its high use of chemicals, has been the source of significant environmental degradation in the US - a direction that progressively-oriented local food systems and organic production are seeking to change. As we can see from Figure 45, Vermont and the NEK use much lower levels of chemicals than the US as a whole (representing 1.03% of total farm production expenses in VT, 0.55% in NEK, and 4.18% in US). An important value of trend monitoring will be assessing whether or not these percentages decrease over time.

Figure 45: Chemicals as percentage of total farm production expenses



Source: US Census of Agriculture, 2007.

Summary

Table 16 summarizes the indicators discussed above for each of the major components of elements of a local food system, indicates the desired direction for these indicators, and compares NEK figures with those of the US as a whole. An ✖ in the “Current Conditions” column indicates that this is an indicator that is weaker than for the US and in strong need of attention in the NEK; a ✔ means that the NEK is doing better than the US average (but should still be evaluated closely). When the element name is highlighted in red, this indicates a serious

problem for the element, requiring timely policy and/or programmatic attention. When the element is highlighted in orange, the problem is less severe, but still in need of public attention.

Table 16: Food System indicators summary for the NEK

Element	Indicator	Desired Direction	Current Conditions	Comments
Demographics & Socioeconomics	Income	↑	✗	Lower than US
	% of pop. high school graduates	↑	✗	Lower than US percentage
	% of pop. college graduates	↑	✗	Lower than US percentage
Soils	n/a	n/a	n/a	Data not available
Land	Federal land conservation programs	↑	✗	Lower than US percentage
	% of land in cropland	↑	✗	Lower than US percentage
	\$ per acre (land and buildings)	↓	✗	Higher than US average
Water	% of land in irrigation	=	✓	Much lower than US percentage
	Phosphorus & Nitrogen levels	↓	✗	Phosphorus is higher than acceptable levels
Seeds & Biodiversity	“Top crops”	↑		Cannot compare to US and no previous baseline
Energy	Farms generating electricity	↑	✓	Higher than US percentage
Labor	Average farmworker payroll	↑	✓	Higher than US average
	% of labor force	↑	✓	Higher than US percentage
	Labor as % of farm production exp.	=		Higher than US percentage
Other inputs	n/a	n/a	n/a	Data not available
Support System	n/a	n/a	n/a	Data not available
Education	n/a	n/a	n/a	Data not available
Farms	Number of farms	↑	✓	Increasing between '02 and '07
	Farms / 1000 pop.	↑	✓	Higher than US average
	Cropland in vegetables	↑	✗	Lower than US percentage
	Dairy as % of total farms	=		Higher than US percentage
	Average net income / farm	↑	✗	Lower than US average
	Farms with women operators	↑	✓	Higher than US average
	Acreage with women operators	↑	✓	Higher than US average
	Market value w/ women operators	↑	✗	Lower than US average
	Farms with minority operators	↑	✗	Lower than US average
	Acreage w/ minority operators	↑	✗	Lower than US average
	Median age of farmers	↓	✓	Lower than US median
Processing	Farms w/ value added commodities	↑	✓	Higher than US percentage

Transportation	Travel time to work	↓	✓	Lower than US average
Distribution	Direct sales as % of total agricultural sales	↑	✓	Higher than US percentage
	% of farms with direct sales	↑	✓	Higher than US percentage
	Direct farm sales per capita	↑	✓	Higher than US average, but barely
	% of farms with CSA	↑	✓	Higher than US percentage
	# of farmers markets / 1000 pop.	↑	✓	Much higher than US average
Consumer	Adult vegetable consumption	↑	✗	Lower than the US percentage
Outlets	n/a	n/a	n/a	Data not available
Food Waste Recycling	Lbs. of comm. food waste composted	↑		No previous baseline to judge from
Health of Communities	Adult obesity rate	↓	✓	Lower than US average
	Homeownership rate	↑	✓	Higher than US average
Robustness of Local Economy	Unemployment rate	↓	✓	Lower than US average, but barely
	Gini coefficient	↓	✓	Lower than US average, but closing in
Food Security	% of pop. below poverty level	↓	=	Same as US average
	Food insecurity rate	↓	✓	Lower than US, but barely
	Average cost per meal	Expect some increase, but with rate of inflation	✗	Higher than US average
Health of the Environment	% of cropland in organic production	↑	✓	Much higher than US percentage
	Org. sales as % of total market value of ag products sold	↑	✓	Higher than US percentage
	Chemicals as % of farm prod. expenses	↓	✓	Much lower than US percentage

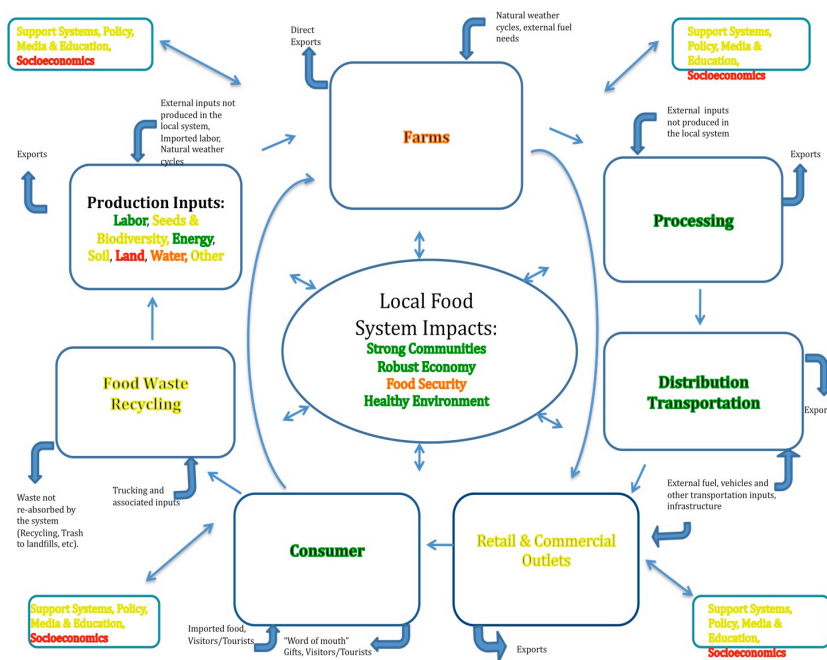
As seen above, upward movement of the indicator is usually, but not always, desirable.

Additionally, positive ratings should not suggest inaction. As with the health of an individual, prevention and protection are always more cost-effective than treatment. Finally, these indicators clearly do not cover all aspects of the elements under which they fall, and broader analysis is recommended through the implementation of the more thorough monitoring framework presented in this Capstone and summarized in Appendix 2.

The table does indicate a hierarchy of priorities with Demographics and Socioeconomics, Land, and Consumer concerns being most important; and Farms, Water, the Economy and Food Security falling just slightly behind. In all cases, sensible policy and programmatic responses will involve some combination of tackling the problem directly, addressing its causes, and examining ways in which supporting other elements of the food system can strengthen those in greatest need.

Returning now to our more generalized food systems model in Figure 46, and adding this new information specific to the NEK regarding stronger and weaker elements, permits a much more dynamic understanding of these challenges within the context of the system as a whole. In the model below, green indicates strength or good health, orange indicates mixed conditions requiring attention, red indicates a clearly unfavorable condition requiring prioritized action, and yellow indicates either a neutral rating or one that it is undefined at present.

Figure 46: Food system monitoring results model



The overall impression is relatively clear: (a) There is notable strength in the system; (b) the areas of particular weakness, many of them associated with limitations on access or resources, are clearly identifiable and are likely to be strengthened by continued vitality in the food system as a whole; and (c) there continue to be a sizeable number of “yellow” areas calling for increased efforts in this endeavor of food system trend monitoring.

Conclusion

Even with the limited nature of the NEK data compilation illustrated in Part II of this Capstone, its dependency upon secondary sources, and, in most cases, its reliance on single point in time data, the examination of this data, and particularly its comparison with state-wide and national figures, provides considerable insight into the dynamics of the region’s food system, its strengths and weaknesses, and, in turn, the identification of priorities for policy and programmatic attention.

This illustrative example hopefully makes clear the enormous value of broadening the scope of the framework by supplementing national and state data with locally collected survey data, and of collecting this data on a regular basis to be able to follow trends. In examining the “problem areas” identified above in the case of the NEK, one can only imagine the multiple opportunities which might have presented themselves earlier had food systems trend monitoring been in place to identify these problems with clarity and reasonable precision.

The story of the Hardwick area and its emerging food system discussed in Part I is a remarkable one, already seen as providing a model for other areas of our country. But the Hardwick story is a continually evolving one, and this evolution over time may prove even more important than the

story's promising beginnings. To track this evolution in all its complexity with the care that this story deserves will require nothing less than the food system trend monitoring laid out in this report – monitoring that will require the ongoing compilation of information from multiple sources, the proactive collection of additional local data, and sensitive, thoughtful analysis involving a broad array of stakeholders.

In such a complex food system, problems will continually arise. A strong pro-active monitoring system can identify these problems quickly and permit rapid correction before they become serious drains on the system as a whole.

Over time, the monitoring system will be seen as part and parcel of the food system itself and is likely to be taken up by increasing numbers of other communities interested in developing holistic local food systems that support the local community, economy and environment.

Finally, such a monitoring system, when done well, truly becomes public property: property that can be embraced and utilized by input producers, farmers, processors and consumers and the organizations which represent them. With actual evidence being so much more powerful than simple speculation, these groups can continue moving forward cooperatively and on a solid footing. Hardwick, the NEK, and the development of other local food systems throughout the country and the world, require nothing less.

References

- Abi-Nader, J. Ayson, A., Harris, K., Herrera, H., Eddins, D., Habib, D., Hanna, J., Paterson, C., Sutton, K., & Villanueva, L. (2009). Whole measures for community food systems: Values-based planning and evaluation. Fayson, VT: The Center for Whole Communities.
- Anderson, M., Fisk, J., Rozyne, M., Feenstra, G., & Daniels, S. (April 2009). Charting growth to good food: Developing indicators and measures of good food. Arlington, Virginia: Winrock International.
- Aronson, Daniel. (1998). Overview of Systems Thinking. Retrieved from <http://www.thinking.net>
- Barringer, F. (2008, August 20). Bottling plan pushes groundwater to center stage in Vermont. New York Times. Retrieved from http://www.nytimes.com/2008/08/21/us/21water.html?_r=1&em&oref=slogin
- Bureau of Labor Statistics: U.S. Department of Labor. (2010-11). Occupational Outlook Handbook: Agricultural Workers, Other. Retrieved from <http://www.bls.gov/oco/ocos349.htm>
- Bureau of Labor Statistics: U.S. Department of Labor. (2010-11). Occupational Outlook Handbook: Farmers, Ranchers, and Agricultural Managers. Retrieved from <http://www.bls.gov/oco/ocos176.htm>
- Bureau of Labor Statistics: U.S. Department of Labor. (2010-11). *Career Guide to Industries: Food Manufacturing*. Retrieved from <http://www.bls.gov/oco/cg/cgs011.htm>
- Burros, M. (2008, October 7). Uniting around food to save an ailing town. New York Times. Retrieved from <http://www.nytimes.com/2008/10/08/dining/08verm.htm>
- Carpenter, Stephen. Nonpoint pollution of surface waters with phosphorus and nitrogen. *Issues in Ecology*, No. 3, Sept. 1998: 3.
- Center for Rural Studies. Vermont Indicators Online. Burlington, VT: University of Vermont. Located at <http://www.vcgi.org/indicators/>
- Creswell, John W. (2009). *Research Design: Qualitative, quantitative, and mixed methods approaches*. Los Angeles, CA: Sage Publications, Inc.
- Dan Rather Reports, episode 72, November 17, 2009
- Dubrovsky, N.M. & Hamilton, P.A. (2010). Nutrients in the nation's streams and groundwater: National findings and implications. US Geological Survey Fact Sheet 2010-3078, 6 p.

- Feenstra, G., Jaramillo, C., McGrath, S., & Grunnell, A.N. (2005). Proposed indicators for sustainable food systems. California: Ecotrust.
- Fraser, E.D.G., Dougill, A.J., Mabee, W.E., Reed, M., & McAlpine, P. (2006). Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *Journal of Environmental Management*, 78 (2), 114-27.
- Gallup-Healthways Well-Being Index. (2010). State of Well-being: Vermont . Gallup, Inc. and Healthways, Inc. Retrieved from http://www.well-beingindex.com/files/2011WBIRankings/LowRes/VT_StateReport.pdf
- Gerbens-Leenes, P.W., Moll, H.C., Schoot Uiterkamp, A.J.M., 2003. Design and development of a measuring method for environmental sustainability in food production systems. *Ecological Economics* 46, 231-48.
- Gomez-Limon, J.A. & Sanchez-Fernandez, G. (2009). Empirical evaluation of agricultural sustainability using composite indicators. *Ecological Economics* 69, 1062-75.
- Greenberger, R. (2011, April 19). Positive deviants: Local food leaders in Hardwick, VT. Examiner.com. Retrieved from <http://www.examiner.com/sustainable-agriculture-in-boston/positive-deviants-neighbor-entrepreneurs-hardwick-vt>
- Heller, M.C., & Keoleian, G.A. (2002). Assessing the sustainability of the US food system: A life cycle perspective. *Agricultural Systems* 76, 1007-41.
- Hewett, B. (2010). The town that food saved: How one community found vitality in local food. Emmaus, PA: Rodale Books.
- Hunger Free Vermont. (2010, December). Hunger in Vermont. South Burlington, VT. Retrieved from <http://www.hungerfreevt.org/hunger.php>
- Land Stewardship Project. (2009). The monitoring toolbox: A guide to the art and science of on-farm monitoring. Retrieved from www.landstewardshipproject.org/mtb/lsp_toolbox.html
- Larouche, J. (2009). A Survey of the Nation's Lakes: EPA's National Lake Assessment and Survey of Vermont Lakes. Waterbury VT: Vermont Agency of Natural Resources
- Levinson, F.J., Rogers, L.R., Hicks, K.M., Schaezel, T., Troy, L., & Young, C. (1999). Monitoring and evaluation: A guidebook for nutrition project managers in developing countries. Washington DC: The World Bank.
- Macias, Thomas. (2008). Working toward a just, equitable, and local food system: The social impact of community-based agriculture. *Social Science Quarterly*, 89 (5). Southwestern Social Science Association.

- McKibben, Bill. (2007). *Deep Economy: The wealth of communities and the durable future*. New York, New York: Henry Holt and Company, LLC.
- Meadows, Donella H. (2008). *Thinking in systems*. White River Junction, VT: Chelsea Green Publishing Company.
- Meter, K. (2006). Evaluating farm and food systems in the US. In B. Williams & I. Imam (Eds.), *Systems Concepts in Evaluation: An Expert Anthology* (141-159). American Evaluation Association: EdgePress of Inverness.
- Moskin, J. (2005, June 1). Women find their place in the field. *New York Times*. Retrieved from <http://www.nytimes.com/2005/06/01/dining/01farm.html>
- National Research Center, Inc. (2006). *Community food project evaluation handbook*. Portland, OR: National Research Center.
- Nord, M. & Coleman-Jensen, A. (2009, November 16). Food security in the United States: Measuring household food security. USDA, Economic Research Service. Retrieved from <http://www.ers.usda.gov/Briefing/FoodSecurity/measurement.htm>
- Northeast Kingdom Waste Management District. (2011). *Annual Report for the year ending December 31, 2010*. Retrieved from <http://www.nekwmd.org/pdf/Annual%20Report%20-%202010.pdf>
- Pirog, Rich and Nick McCann. (2009). *Is local food more expensive? A consumer price perspective on local and non-local foods purchased in Iowa*. Leopold Center for Sustainable Agriculture: Ames, Iowa.
- Plan to measure happiness 'not woolly' – Cameron. (2010, November 25). *BBC News*. Retrieved from <http://www.bbc.co.uk/news/uk-11833241>
- Raftery, I. (2011, March 5). In new food culture, a young generation of farmers emerges. *New York Times*. Retrieved from <http://www.nytimes.com/2011/03/06/us/06farmers.html>
- Schiller, Bradley R. (2008). *The macroeconomy today*. New York, NY: McGraw-Hill/Irwin.
- Sustainable Seattle. Seattle, WA. Retrieved from <http://www.sustainableseattle.org/>
- The Center for Whole Communities. (2007). *Whole measures: Transforming our vision of success*. Fayston, VT: Center for Whole Communities.
- United States Department of Agriculture. (2009). *2007 US Census of Agriculture: United States summary and state data, volume 1*. Washington DC: National Agricultural Statistics Service. Retrieved from http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf

- Van Susterem, D. (2011, April 3). Fresh start: Farms and food and innovative human energy sustain a town's revival. *Boston Globe*. Retrieved from http://articles.boston.com/2011-04-03/travel/29377885_1_hardwick-ben-hewitt-town
- Vermont Agency of Agriculture, Food & Markets. (2005). Current use program. Retrieved from <http://www.vermontagriculture.com/agdev/currentuse.htm>
- Vermont Council on Rural Development. (2009). *Imagining Vermont: Values and vision for the future*. Montpelier, VT. Retrieved from http://vtrural.org/sites/default/files/library/files/futureofvermont/documents/Imagining_Vermont_FULL_Report1.pdf
- Vermont Energy Investment Corporation. (2010). *Efficiency Vermont Annual Report, 2009*. Burlington, VT. Retrieved from <http://www.encyvermont.com/stella/filelib/FINAL2009AnnualReport.pdf>
- Vermont Department of Health. (2008). *The Health Status of Vermonters*. Burlington, VT.
- Vermont Natural Resources Council. (2008, August). *VNRC Celebrates Successful Effort to Help Protect Vermont's Groundwater*. Retrieved from <http://www.vnrc.org/article/view/7093/1/632/>
- Vermont Sustainable Jobs Fund. (2011). *Farm to plate strategic plan*. Montpelier, VT. Retrieved from http://www.vsjf.org/assets/files/Agriculture/Strat_Plan/F2P%20Executive%20Summary_1.14.11_highest%20res.pdf
- Vital Communities: Local First Alliance. (2010). *White River Junction, VT*. Retrieved from www.vitalcommunities.org/localfirst
- Winnepesaukee Gateway. (2010, October 5). *Water quality and lake health*. Retrieved from <http://winnepesaukeegateway.org>
- Zinck, J.A., et al. (2004). *Approaches to assessing sustainable agriculture*. *Journal of Sustainable Agriculture*, Vol. 23(4), 87-109. The Haworth Press, Inc.

Appendices

Appendix 1: Definition of Terms

There are many terms discussed in this Capstone that are nebulous and not widely understood or agreed-upon. What follows is a summary of the terms I use in this Capstone that may fall into this category, and need to be defined.

- **Food system:** “A collaborative network that integrates sustainable food production, processing, distribution, consumption and waste management in order to enhance the environmental, economic and social health of a particular place.”⁷
- **Local:** There are many different perceptions as to what local food means, and I have come across this debate many times during my Practicum. Some believe it means, in this context, food that is grown in Vermont, some say it is food that is grown in your town. In the context of this paper, I am using “local” to mean food that is grown in Hardwick and the adjoining towns.
- **Regional:** This is also a term that is debated and generally can mean anything from a county to an entire region of the country, such as the Northeastern United States. In the context of this paper, I am using “regional” to mean the Northeast Kingdom of Vermont (the counties of Caledonia, Essex, and Orleans).
- **Farm:** A farm can mean different things to different people, as well. It could mean a hobby farm, a farm that is used to sustain or support an individual family, or a farm with millions of dollars in revenue and hundreds of acres. In the context of this Capstone and the framework, I have used the Agricultural Census’s definition of the term farm as, “any place from which \$1000 or more of agricultural products were produced and sold, or

⁷ <http://www.sarep.ucdavis.edu/cdpp/cfsdefinition.htm>

normally would have been sold, during the census year.⁸” This decision is based upon the fact that much of the data that I have gathered has come from the US Agricultural Census, and in order to have an accurate comparison of data, the definitions need to be consistent.

- **Organic:** Here again, I will use the US Agricultural Census definition of organic as, “any commodity produced according to the National Organic Program standards.”⁹
- **Sustainable:** This is a general term, referring to practices that enhance and benefit the environmental, social and economic future of the earth and society.
- **Elements (of the food system):** When we look at food and agriculture as a system, there are many different components to it, some of which may be more apparent than others, but which all relate and influence each other. A food system is a complex system and an element is what we see when we break this system down into parts.

Appendix 2: Coded interview matrix

Element	Comments	Interviewee
Soil	Phosphorus is a good indicator for soil run-off because it is not water soluble	Chuck Mitchell – Soil Conservation Service & NOFA
	More organic matter – more fertility (generally)	
	Organic matter is an indicator of carbon levels	
	Soil testing – earthworm test, rotting fence post test	
	Plant health also indicates soil health	
	Soil compaction levels – soil penetrometers measure	Jack Lazor – Butterworks Farm
	Most important indicators of soil health is organic matter, fertility and compaction	
	The health of the soil, plants and humans are connected	
	Important soil nutrients – Calcium, Magnesium, Phosphorus	
Tomato leaf testing	Bill Half – Harvest Hill Farm	

⁸ http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf

⁹ http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf

	With pasturing you can get by on poorer soils. His farm was abandoned because of poor soils. We're concerned with the soil based upon what we're doing with them.	Bruce Shields – Farm Bureau
Land	Is there enough ag land to feed the community? Land costs – are they aligned with wages/income? Act 250 increased the price of land overall. Protection programs lead to less land available to develop and leads to increased land prices	Tom Gilbert – Highfields Center for Composting Bruce Shields – Farm Bureau
Water	State has not measured the levels of ground water, but are beginning to Water quality – nutrients, sediment from erosion, pesticide levels, nitrates, e. coli More nutrients coming into the system than leaving – nutrients from chemical fertilizers coming in, but mostly dairy leaving, which doesn't have many nutrients. These nutrients need to go somewhere, and they go into the water supply Most important indicators for water are nutrients, sediment levels, and chemical/biological contaminants	Chuck Mitchell – Soil Conservation Service & NOFA
Seeds & Biodiversity	Don't discount the value of hybrids – often there are higher yielding characteristics Locally appropriate seeds are important	Bruce Shields – Farm Bureau New England Agricultural Statistics
Energy	Newer equipment much more efficient, but much more cost with maintenance – more reliable though. Single-phase power often only choice available on farms. 3-phase would increase efficiency. Amps cost you, volts don't. Many farms are located in areas where 3-phase power is not available. Lessening our dependency on oil with wind power and hydro	Bruce Shields – Farm Bureau New England Agricultural Statistics
Labor	Interns Cost of labor vs. cost of machinery % labor costs – Bill's target is 20-25% Quality of work – consistency Fairness to interns / employees More jobs are being created through farming now	Bill Half – Harvest Hill Farm New England Agricultural Statistics
Other inputs	Availability of large animal vets – not many incentives for vets to go into this field. Consolidation of manufacturing can create vulnerabilities for specialty farm equipment (if manufacturer decides it's not worthwhile to build a product anymore.	Bruce Shields – Farm Bureau
Support systems	Organic growth of businesses & systems Many bases covered – seems sufficient	Jack Lazor – Butterworks Farm Bruce Shields – Farm Bureau
Education	People need to be educated about the value of local food There are few farm tech programs available in public schools	Jack Lazor – Butterworks Farm Bruce Shields – Farm Bureau

	There is a prejudice re: unintelligence of farmers; farming perceived of as a dead-end occupation and that farming is going down the tubes. Consistently work on this, there is no institutional solution.	
Farms	<p>Incentives for farmers</p> <p>Disaggregate organic & conventional</p> <p>Organic growth of businesses & systems</p> <p>Profitability and level of satisfaction with profitability</p> <p>If there was a market available would you grow more?</p> <p>Farm bureau recommends health and entity insurance, they analyze options who have workable packages for farmers, and endorse one. Co-op, Farm Family, Nationwide. Normal insurance does not cover equipment, crops, etc</p> <p>Supplemental income for farmers – cell phone towers</p> <p>Blames Act 250 and Sign Board law for farmers not being on main roads – cannot afford it, and don't have the supplemental income (Would be interesting to investigate this) Adds to shipping and distribution costs and challenges.</p>	<p>Jack Lazor – Butterworks Farm</p> <p>Bill Half – Harvest Hill Farm</p> <p>Bruce Shields – Farm Bureau</p>
Processing	<p>Difficulties with processing: COST!! Of processing – this higher cost exists because the equipment isn't specialized on the smaller scale of production Consistency of supply of raw materials</p> <p>Measuring job creation by the VFVC is the most important thing to capture</p> <p>% of producers who use VT products in their formulation lbs of produce used in products</p> <p>How many processors move on to their own facilities and how many jobs this creates.</p> <p>If a VFVC producer is not using local food, would I count these as jobs in the food system?</p> <p>There will be an agreement that folks who use the facility report certain information.</p> <p>Slaughterhouses depended on tanneries for income. Trucking is a big issue on utilizing slaughterhouses. 100+ days to schedule an appointment, and this is difficult for farmers. Many restrictions and obstacles here.</p>	<p>Brian Norder – former director of the Vermont Food Venture Center</p> <p>Bruce Shields – Farm Bureau</p>
Transportation	<p>Transportation/trucking is a challenge</p> <p>This is important to address – there are major inefficiencies with the current system that need to be addressed (ex. Milk being sent to Franklin, MA, then trucked back up).</p>	<p>Bill Half – Harvest Hill Farm</p> <p>New England Agricultural Statistics</p>
Distribution	<p>Collective distribution would be very useful, but can also be difficult</p> <p>Distribution is expensive</p> <p>Employee-based CSA's</p> <p>Sees positive trends here</p>	<p>Jack Lazor – Butterworks Farm</p> <p>Bill Half – Harvest Hill Farm</p> <p>New England Agricultural Statistics</p>
Retail and Commercial Outlets	<p>Incentives for purchasing local food</p> <p>Constraints to local food in the schools: Money & short growing season.</p>	<p>Jack Lazor – Butterworks Farm</p> <p>Val Simmons – Food Service Director at</p>

	<p>She would love to get fruit</p> <p>Delivery can sometimes be difficult – who has the food they need? Who can deliver?</p> <p>She gets food from several local farms: Laggis Farm, Riverside Farm, Bill Half, Dolly Grey Orchard, BND Potatoes, Hazen Forestry, Sweetgrass Farm</p> <p>Has worked with FEED</p> <p>1545 ears of corn from Laggis Farm this year</p> <p>Has amounts of local food in invoices, but doesn't separate it in her books, but would work with us on that</p> <p>Would grocery stores track local sales? Would create more work, but would also benefit them to take advantage of the interest in local</p> <p>Consistency with pricing between farmers important</p> <p>Viable market with good pricing structure important</p> <p>What is the buyers price point?</p>	<p>Hardwick Elementary School</p> <p>Kit Perkins – VT Sustainable Jobs Fund (Farm to Plate)</p> <p>Bill Half – Harvest Hill Farm</p>
Consumer	<p>% of diet from local sources (in \$ or calories)</p> <p>Get estimated lbs of food gardeners grow and use (or give away)</p> <p>All demand indicators are proxy</p> <p>What are consumers interested in?</p>	<p>Tom Stearns</p> <p>Kit Perkins</p> <p>Bill Half</p>
Food Waste Recycling	<p>Highfields tracks how many tons of food scraps taken in</p> <p>Measure the scraps going to pigs, chix, etc. (From Co-op or VT Soy – as measured in 5 gallon buckets – Tom has equivalent weights)</p> <p>Measure home and commercial facilities (ex. System Highfields developed for Craftsbury Outdoor Center)</p> <p>Human manure composting (households participating)</p> <p>Measure nematode levels</p> <p>Environmental regulations contributed to the loss of tanneries (waste disposal issue)</p> <p>Farmers are composting more, the animals used to have to be brought to NY to rendering plant or farmers would bury them, which had its own problems. The composting of mortalities is a great development.</p>	<p>Tom Gilbert – Highfields Center for Composting</p> <p>Bruce Shields – Farm Bureau</p> <p>New England Agricultural Statistics</p>
Strong Communities	<p>Measurable community strength: barn-raising, baby food-chains, helping fire victims, skill-shares, public events, sharing of equipment and labor, Grange, Co-op membership numbers, Working co-op memberships, Company policies (mission statements, livable wage, culture, family/personal time policies)</p> <p>Measure the informal economy – trading, etc.</p> <p>Measure healthy lifestyles</p>	<p>Barry Baldwin & Robin Cappucino – Buffalo Mtn. Co-op</p> <p>Steve Gorelick – Sterling College</p> <p>Joseph Kiefer – Food Works</p>
Robust Economy		
Food Security	<p>Had a grant through the CAE in 08-09 : purchased 350# of ground beef, 50# of cheddar, 70 loaves of bread, 123 dozen eggs.</p>	<p>Angie at Hardwick Food Pantry</p>

	<p>Gets donations from local gardeners</p> <p>She agreed that she could separate local foods in her data collection – estimate in pounds?</p> <p>Access – physically and financially. Mechanism through subsidies (paid for currently through grants) and discounts to allow access. Buying clubs that pay more to subsidize and pay retail instead of wholesale.</p> <p>Education at food shelf</p> <p>Many low-income people want to learn, despite stereotypes</p> <p>Selling (as a farmer) at a lower price to lower income meal sites</p>	<p>Joseph Keifer – Food Works</p> <p>Bill Half – Harvest Hill Farm</p>
Healthy Environment	<p>Going organic, less pollution of the soils</p>	<p>New England Agricultural Statistics</p>
Contacts	<p>Doug at Center for Rural Studies Vern Grubinger at UVM Ext – for data Paul Costello – VT Council on Rural Development – for data Helen Jordan – VT Council on Rural Development – for data Cheryl Long – BALLE Business Alliance for Local Living Economies Nicole Dene – VT Organic Farmers – data – 434-4122</p> <p>Jim Ryan – ANR – Lamoille Watershed Coordinator</p> <p>Food Security Blanket</p> <p>Val Simmons – re: Table Hardwick Electric & Washington Electric Co-op – Energy Johanna Laggis, Peter Gebby & Russell McAlister – re: Farms</p> <p>Laurie Colgan – Child Nutrition program / services Gwen Hall Smith – Town Planner, Montpelier Carl Etneir – working with UVM team for household consumer survey</p> <p>Brian Titus – Greensboro – 533-7455 Cal Black River & Deep Root re: distribution & transportation questions</p>	<p>Tom Stearns – High Mowing Seeds</p> <p>Chuck Mitchell</p> <p>Barry Baldwin & Robin Cappucino</p> <p>Tom Gilbert</p> <p>Joseph Kiefer – Food Works</p> <p>Bill Half – Harvest Hill Farm</p>
Indicator development	<p>How can this data be used?</p> <p>Who can we partner with to gather info? Other stakeholders who have an interest</p> <p>Historical data would be interesting - to track the changes over time for acres in ag, average income, # of organic farms, # of dairy's</p> <p>Reasons for the indicators: There are natural trends that will exist and make changes whether or not the CAE is here For future research To demonstrate the effectiveness of CAE programs Economic impact</p> <p>Geographic scale: check for consistency with definition (local, regional, sub-regional, etc)</p> <p>Who is the ultimate use of food system indicators and measures? Interest groups, private sector, market research, consumers/public, policy, academia, funders</p> <p>Why are we measuring?</p> <p>Are we fulfilling our work?</p> <p>Ensuring that the data is statistically valid</p>	<p>Tom Gilbert – Highfields Center for Composting</p> <p>Tom Stearns – High Mowing Seeds</p> <p>Kit Perkins – VT Sustainable Jobs Fund (Farm to Plate)</p>

	<p>Frequency of collection? Annual? Some every 3 or 5 years, or 10</p> <p>Antecdotal indicators – to engage the public</p> <p>Local defined as Vermont + 30 miles (for F2P) Extending this boundary may make it more difficult to measure. Need to standardize definition of local.</p> <p>How do we measure strengthened communities statewide?</p> <p>Wallace Center – main indicator info for F2P from here</p> <p>Recreate the story (history) – What was our food system like in the past?</p> <p>How do we measure behavior change?</p> <p>Central VT Food Systems Council 0Farmer Survey (adapted from Intervale) Paper, electronic, phone</p> <p>#1 baseline data – USDA, School health data</p>	<p>Joseph Kiefer – Food Works</p>
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Appendix 3: Food system framework indicators

For each of these indicators, after the initial baseline, we will indicate the % change from the previous survey.

L= Local data
R= Regional data

Re: Data Source Column

- Red= Data is easily available
- Orange= Data is available with some research
- Green= Unknown / unsure about availability
- Blue= Will be available as facilities open
- Black= Available through implemented surveys

Food System	Element vision	Purpose of indicator		Proposed Indicators	Data Source
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Element							
Soils	Ag soils are protected and nutrients are replenished. They contain high levels of organic matter and microbiological activity.	The quality of the soils	1	Soil quality index score: <ul style="list-style-type: none"> Nutrient levels Organic matter Aggregate stability Soil compaction Biological activity 	L&R =Index will be monitored by local schools and/or farms		
		Degree of topsoil protection	2	Topsoil stability – Phosphorus levels in water (proxy or soil run-off)	L=? R=?		
Land	Agricultural land resources are protected, are sufficient to feed the local population, and are economically accessible (affordable).	General	3	Total land area, in acres			
		Total ag land protected	4	# of acres of agricultural land enrolled in federal land conservation programs / total # of acres of land in farms	L=FarmSurvey R=Ag Census		
			5	Total private and public conserved lands / total land area	L= R=VT Indicators		
			Total agricultural land use	6	# of acres in farms	L=FarmSurvey R=Ag Census	
				7	# of acres in farms / total land area		
				8	# of acres of cropland / # of acres in farms		
		9	# of acres of harvested cropland / # of acres of cropland				
		Agricultural land prices	10	Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed / total # of acres in cropland	L=FarmSurvey R=Ag Census		
			11	Estimated market value of land and buildings (average per acre) \$	L=Farm Survey R=Ag Census		
		Water	Water resources are used conservatively, are plentiful and clean. Pollution is minimal, ideally nonexistent	Stream stability	7	Water/stream quality index score: <ul style="list-style-type: none"> Streambanks Streambed Water clarity / sediment levels Aquatic plant growth Survey of macroinvertebrates 	L & R =Index will be monitored by local schools and/or farms
				Pollution levels	8	Nitrogen levels in water (average???)	L=? R=?
Agricultural usage levels	9			Acres of irrigated farmland / total # of acres of cropland	L=Farm Survey R= Ag Census		
	10			Total gallons used for livestock / total livestock #'s	L=Farm Survey R=Farm Survey		
Groundwater	11			Groundwater levels	L=? R=?		
Seeds & biodiversity	Seeds are increasingly locally produced and sourced, locally appropriate and widely available.	GMO use	12	# of acres of farmland planted with genetically engineered seed / total # of acres of cropland	L=Farm Survey R=Farm Survey		
		Biological diversity	13	Number of different varieties of crops and animals that are raised / # of farms	L=Farm Survey R=Farm Survey		
			14	Top five crops grown and percentages of total acres	L=Farm Survey R=Ag Census		

	Biological diversity is increasing.	Seed saving participation rates	15	# of gardeners participating in seed saving / total # of gardeners surveyed	L=CommSurvey R=CommSurvey
			16	# of farmers participating in seed saving / total # of farmers surveyed	L=Farm Survey R=Farm Survey
		Usage of local and organic seeds	17	% of farmers usage of local seed	L=Farm Survey
			18	% of farmers usage of organic seed	R=Farm Survey
			19	% of gardeners usage of local seed	L=CommSurvey
			20	% of gardeners usage of organic seed	R=CommSurvey
			21	Sales from High Mowing seeds	L=High Mowing R=High Mowing
Energy	Increasing quantities of energy needs are being produced locally and sustainably. Energy efficiency of farms is increasing.	Locally produced renewable energy production	22	# of farms generating energy or electricity on the farm / total # of farms	L=Farm Survey R=Ag Census
			23	KWh of energy produced on farms / total KWh used	L=Farm Survey R=Farm Survey
			24	# of respondents generating energy or electricity at their homes / total # of respondents	L=CommSurvey R=CommSurvey
			25	KWh of energy produced by respondents / total KWh used	L=CommSurvey R=CommSurvey
		Energy usage within the food system is decreasing generally	26	Total energy usage of farms / Total # of farms	L=Farm Survey R=Farm Survey
			27	# of farms enrolled in energy-reduction programs / total # of farms	L=EfficiencyVT R=EfficiencyVT
				# of farms that had an energy audit performed	L=Farm Survey R=Farm Survey
Farm and Food Processing Labor	Food system labor is well trained, has safe working conditions and is treated fairly.	Food system jobs are an important part of the labor force	28	Hired food processing labor (#)	L=AgProcSurvey R=AgProcSurvey
			29	Hired farm labor (#)	L=Farm Survey R=Ag Census
			30	# of food processors with hired labor / total # of food processors	L=AgProcSurvey R=AgProcSurvey
			31	# of farms with hired farm labor / # of farms	L=Farm Survey R=Ag Census
			32	# of ag-processing workers / Total # in labor force	L=AgProcSurvey R=AgProcSurvey
			33	# of farm workers / Total # in labor force	L=Farm Survey R=Ag Census
		Food system workers are paid well	34	Ag-processor payroll	L=AgProcSurvey R=AgProcSurvey
			35	Farm payroll	L=Farm Survey R=Ag Census
			36	Ag-processor payroll / total ag-processing	L=AgProcSurvey

				labor	R=AgProcSurvey
			37	Agricultural payroll / # of hired farm labor	L=Farm Survey R=Ag Census
			38	Lowest wage of ag-processing worker / livable wage	L=AgProcSurvey R=AgProcSurvey
			39	Lowest wage of farm worker / livable wage	L=Farm Survey R=Farm Survey
		Cost of labor in production	40	Food processors selected production expenses: hired labor	L=AgProcSurvey R=AgProcSurvey
			41	Food processors hired labor as % of total production expenses	L=AgProcSurvey R=AgProcSurvey
			42	Selected farm production expenses: Hired farm labor	L=Farm Survey R=Ag Census
			43	Hired farm labor as % of total production expenses	L=Farm Survey R=Ag Census
		Migrant labor	44	Migrant farm labor on farms with hired labor (# of farms)	L=Farm Survey R=Ag Census
			45	# of farms with migrant farm labor / total # of farms	L=Farm Survey R=Ag Census
		Food system workers are skilled	46	# if ag-processors satisfied with skills of labor / total # of ag-processors	L=AgProcSurvey R=AgProcSurvey
			47	# of farms satisfied with farm labor / total # of farms	L=Farm Survey R=Farm Survey
			48	# of farms with interns	L=Farm Survey R=Farm Survey
			49	# of interns at farms	L=Farm Survey R=Farm Survey
		Working conditions are safe	50	# of ag-processing injuries reported	L=AgProcSurvey R=OSHA???
			51	# of farm injuries reported	L=Farm Survey R=OSHA???
Other farm inputs	These needs are being met locally, as much as possible.	Farm supplies availability	52	Farmers feel there's an adequate supply of farm supply stores and equipment	L=Farm Survey R=Farm Survey
		Appropriate veterinary care availability	53	Farmers feel access to large animal veterinary care is adequate	L=Farm Survey R=Farm Survey
Support systems	Farmer/processor support systems (organizations, state agencies, etc) are relevant, quality, sufficient,	Perception of support	54	# of farms who feel adequately served / total # of farms	L=Farm Survey R=Farm Survey
		Demonstration of use of available resources	55	# of farms with nutrient management plans / total # of farms	L=Farm Survey R=Farm Survey
			56	# of farms with followed written business plans / total # of farms	L=Farm Survey R=Farm Survey

	and useful.		57	# of ag-processors with followed written business plans / total # of ag-processors	L=AgProcSurvey R=AgProcSurvey
Education	There is sufficient, quality support and training for future farmers and food processors. Schools emphasize the importance of healthy local foods.	Continuing Ed / Higher Ed programs	58	# of farms and ag-processors satisfied with the availability of opportunities to continue their education and training / total # of farms & ag processors	L=Farm&ProcSurvey R=Farm&ProcSurvey
			59	# enrolled in local continuing ed and undergraduate ag programs in region	L=CAE Research R= CAE Research
		Participation rates in available Ag-Ed	60	# of local students enrolled in ag-tech program / total # of students	L=School Survey R=School Survey
		School gardens	61	# of schools with gardens / total # of schools	L=School Survey R=School Survey
			62	# of schools integrating gardening into curriculum / total # of schools	L=School Survey R=School Survey
Farms	Farm numbers and production are sufficient to meet demand. They are diversified and are economically viable.	General production	63	# of farms	L=Farm Survey R=Ag Census
			64	# of farms / 1000 population	
			65	Average size of farm (acres)	
			66	# of farms producing vegetables	
			67	# of acres in vegetable production / # of farms	
			68	# of acres in vegetable production / # of acres of total cropland	
			69	# of farms in fruit, tree nuts & berry production / # of farms	
			70	# of acres in berry production / # of acres of total cropland	
			71	# of acres in orchards / # of acres of total cropland	
			72	# of farms in forage production / # of farms	
			73	# of acres in forage production / # of acres of total cropland	
			74	# of farms with bee colonies / # of farms	
			75	Pounds of honey collected	
			76	# of farms with layers / # of farms	
		77	# of poultry layers		
		78	# of farms with beef cows / # of farms		
		79	# of beef cows		
		80	# of dairy farms / # of farms		
		81	# of dairy cows		
		82	Dairy products sold / Market value of agricultural products sold		
83	# of farms in maple production / # of farms				
84	# of gallons of maple produced				
		Farm economics	85	# of farms with net gains / total # of farms	L=Farm Survey R=Ag Census
			86	# of farms with net losses / total # of farms	
			87	Net cash farm income of the operations (average per farm)	
			88	% of household income from farming operations	
			89	# of farmers with health care insurance / total # of farmers	
			90	Total market value of agricultural products sold	

		Farmer demographics	91 92 93 94 95 96 97 98 99	Average government payments received (per farm) Total government payments # of farms with female principal operators / total # of farms # of female principal operators of organic farms / # of organic farms Acreage with women as principal operator / # of acres on farms Market value of ag products sold on farms with women as the principal operator / total market value of ag products sold # of farms with minority operators / total # of farms Acreage with minorities as the operator / # of acres on farms Average age of principal operator	L=Farm Survey R=Ag Census
Processing	Infrastructure demand is being met, processing and facilities add to food security, the local economy and farm revenue.	Businesses Community	100 101 102 103 104 105 106 107 108 109 110 111	Farms produced and sold value-added commodities Farms producing & selling value-added commodities / total # of farms # of ag-processing businesses in region Total \$ value of food processed in region # of businesses leasing space at VFVC Total \$ value of food processed at VFVC Total \$ value of local crops being processed at VFVC # of processors using VT produced ag products in their formulation / total # of ag-processors Percent of processed product using VT produced ag products # of processors indicating they are able to get a consistent supply of raw materials from local farmers / total # of ag-processors # of respondents indicating they participate in food preservation activities / total # of respondents # of households using Community Kitchen facilities for food preservation / total # of respondents	L=Farm Survey R=Ag Census L=Farm Survey R=Ag Census L=AgProcSurvey R=AgProcSurvey VFVC VFVC L=AgProcSurvey R=AgProcSurvey L=AgProcSurvey R=AgProcSurvey L=CommSurvey R=CommSurvey L=CommSurvey R=CommSurvey
Transportation	Needs are being met, food and commute miles are decreasing, and the trend is toward the use of non-petroleum	General Reduction	112 113 114	# of farmers experiencing difficulties getting product to market / total # of farmers # of farmers using collective means to transport their product / total # of farmers Mean travel time to work (minutes) workers age 16+, 2000	L=Farm Survey R=Farm Survey L=Farm Survey R=Farm Survey L=CommSurvey R=US Census

	sources.	Energy source for transport	115	# of farms that use alternatively fueled vehicles for trucking / total # of farms	L=FarmSurvey R=FarmSurvey
Distribution	Local agricultural products are getting to community members, schools, and service-providers.	General	116	# of distributors associated with the VFVC	VFVC
			117	# of farms involved with a formal distribution program / total number of farms	L=Farm Survey R=Farm Survey
			118	# of schools involved with a local distribution program / total number of schools	L=School Survey R=School Survey
			119	# of schools who are interested in local food, but aren't because of real or perceived obstacles / total # of schools	L=School Survey R=School Survey
		Direct sales info	120	Value of agricultural products sold directly to individuals for human consumption / market value of [total] agricultural products sold	L=FarmSurvey R=Ag Census
			121	# of farms with direct sales	L=Farm Survey
			122	# of farms with direct sales / total # of farms	R=Ag Census
			123	\$ of direct farm sales	
			124	% of farms sales direct to consumer	
			125	Direct farm sales per capita	
			126	# of CSA farms / total number of farms	L=Farm Survey
			127	# of CSA memberships / total # of CSA farms	R=Farm Survey
			128	# of farms with farmstands / total number of farms	
			129	# of farmers markets	L-NOFA
130	# of farmers markets / 1000 population	R-NOFA			
131	# of vendors at farmers markets				
132	Total sales at farmers markets				
Consumer	Consumers are aware of food system issues, participate in the local food system, are eating healthier, and are supportive.	General	133	Average amount of \$ that respondents spend on food weekly / average household income	L=CommSurvey R=CommSurvey
			Consumption patterns	134	% of adults who eat 2+ daily servings of fruit
		135		% of youth in grades 9-12 who eat 2+ daily servings of fruit	R=VTHealthRep
		136		% of adults who eat 3+ daily servings of vegetables	
		137		% of youth in grades 9-12 who eat 3+ daily servings of vegetables	
		Direct sales participation	138	Gallons per capita, soft drinks	
			139	Lbs per capita, solid fats	
			140	Lbs per capita, pkg sweetsnacks	
			141	# of respondents that purchase local foods / total # of respondents	L=CommSurvey R=CommSurvey
			142	# of respondents participating in food production / total # of respondents	L=CommSurvey R=CommSurvey
143	Average % of food produced at the household level by respondents		L=CommSurvey R=CommSurvey		
144	Average respondents % of food purchased from local sources	L=CommSurvey R=CommSurvey			

			145	# of respondents attending farmers market / total # of respondents	L=CommSurvey R=CommSurvey
Retail and commercial outlets	Restaurants and local institutions purchase increasing amounts of local foods.	Restaurant and institutional use of local foods	146	Total # of food-related businesses & orgs purchasing local foods / total # of food-related businesses and orgs	L=Retail Survey R=Retail Survey
			147	Total sales of local foods to food-related businesses and orgs in previous year	L=Farm Survey R=Farm Survey
			148	Estimated % of food purchased from local farms and processors by food-related businesses & orgs	L=Retail Survey R=Retail Survey
			149	# of schools sourcing their food from local farms / total # of schools	L=School Survey R=School Survey
Waste management	Food wastes are being recycled via composting, animal feed and biodigesters. Waste not being re-absorbed by the system is decreasing.	Compost use	150	# of farms using compost as fertilizer / total # of farms	L=Farm Survey R=Farm Survey
			Compost production	151	# of pounds of food waste diverted from the landfill / Total estimated food waste
		152		# of farms recycling their waste / total # of farms	L=Farm Survey R=Farm Survey
		153		# of schools recycling their food waste / total # of schools	L=School Survey R=School Survey
		154		# of respondents recycling their waste / total # of respondents	L=CommSurvey R=CommSurvey
		155		# of ag-processors recycling their waste / total # of respondents	L=AgProcSurvey R=AgProcSurvey
		156	# of farms composting animal mortalities / total # of farms with livestock	L=Farm Survey R=Farm Survey	
Strong Communities	Community ties are strong and vibrant. Community members are engaged, healthy, and can depend upon one another.	Physical health	157	Low income preschool obesity rate	L=VT Dept of Health - Jessie Brosseau - 802-863-7663 R=Same
			158	Adult obesity rate	
			159	Adult diabetes rate	
			160	Heart disease rate	
		Barter economy	161	# of respondents who are involved with bartering / total # of respondents	L=CommSurvey R=CommSurvey
			162	# of farms who are involved with bartering / total # of farms	L=Farm Survey R=Farm Survey
		Local organization participation rates	163	# of co-op members (total members & working members)	L=Buff Mtn. Co-op R=
			164	# of members of North Country Farming Network	L=NCFN R=NCFN
165	# who voted in most recent mid-term election / total registered voters		L=Town Clerks R=Town Clerks		
166	# of respondents who indicated that they currently volunteer / total # of respondents		L=CommSurvey R=CommSurvey		

		Life satisfaction	167	Average score on community satisfaction index	L=CommSurvey R=CommSurvey
			168	Average score on the "Well-being Index"	L=CommSurvey R=CommSurvey
		General	169	Homeownership rate	L=CommSurvey R=US Census
			170	Crimes against property	L=Local Police R=VT Indicators
			171	Number of property crimes / 1000 pop.	
			172	Crimes against people	
			173	Number of crimes against people / 1000 pop.	
Robust Economy	The local economy is growing, ag-related businesses are increasing in number, jobs are being created and household incomes are rising.	Ag economy	174	# of ag-related business start-ups in previous year which are still functioning at present / total # started in previous year	L&R= Farm Survey & AgProcSurvey
			175	# in farm & ag-processing employment in the "area" / total workforce	L&R= Farm Survey & AgProcSurvey
			176	# of jobs created in current year on farms & in ag-processing in previous year / total workforce	L&R= Farm Survey & AgProcSurvey
		General economy	177	Unemployment rate	L=US Census R=US Census
			178	Average hh income in region/area	
			179	Gini coefficient	
Food Security	Economically vulnerable community members can access sufficient amounts of quality, nutrient-dense and healthy local foods.	General	180	Percent of persons below poverty level	
			181	Percent of children ages 0-17 in poverty	
			182	Percent of students free-lunch eligible	L&R= VT Dept. of Education
			183	Percent of students receiving subsidized school lunch	L&R= VT Dept. of Education
			184	Households receiving foodstamps	
			185	Households receiving foodstamps / total # of households	
			186	Children receiving food stamp benefits	
			187	Persons for whom poverty status was considered	
			188	Persons for whom poverty rate was considered in poverty	
			189	Persons for whom poverty status was considered in poverty / Persons for whom poverty status was considered	
			190	% of households with health insurance	L=CommSurvey

		Economic access to local, fresh food	191	# of households using emergency food (food shelves) / total households in "area"	R= L=CommSurvey R=CommSurvey
			192	# of respondents that are categorized as food insecure / total # of respondents	L=CommSurvey R=CommSurvey
			193	# of food insecure respondents that purchase local foods / total # of food insecure respondents	L=CommSurvey R=CommSurvey
			194	# of food insecure respondents that raise/grow their own food / total # of food insecure respondents	L=CommSurvey R=CommSurvey
			195	# of farms that have tiered/sliding scale rates / total number of farms	L=Farm Survey R=Farm Survey
			196	Local participation in NOFA's Farm Share program / # of hh living at or under the poverty level in "area"	L=NOFA R=NOFA
			197	# of farmers markets that accept EBT cards / total # of farmers markets	L=NOFA R=NOFA
			198	Total \$ usage of EBT cards at farmers markets / total farmers market revenue	L=NOFA R=NOFA
			199	# of pounds of food gleaned and distributed from local farms to local food pantries and organizations	L=VT Foodbank R=VT Foodbank
Healthy Environment	Environmental quality is improving, with fewer pollutants being released from farms. Farming techniques are becoming increasingly sustainable.	Farming techniques	200	Total acres used for organic production / total acres of cropland	L=Farm Survey R=Ag Census
			201	Total number of farms using organic practices / Total number of farms	L=Farm Survey R=Ag Census
			202	Total organic sales / Total market value of agricultural products sold	L=Farm Survey R=Ag Census
			203	# of farms using "conservation methods" / total # of farms	L=Farm Survey R=Ag Census
			204	# of farms practicing rotational or management intensive grazing / total # of livestock farms	L=Farm Survey R=Ag Census
		Use of agricultural inputs	205	Chemicals purchased (\$)/ total farm production expenses	L=Farm Survey R=Ag Census
			206	Gasoline, fuels, and oils purchased (\$) / total farm production expenses	L=Farm Survey R=Ag Census
			207	Fertilizers, lime and soil conditioners purchase / total farm production expenses	L=Farm Survey R=Ag Census

Appendix 4: Additional Definitions

Free school meal eligibility requirements:

Categorically eligible children are those who are automatically eligible for free benefits because of the status as one of the following:

- A member of a household, as determined by the administering agency, receiving assistance under the Food Stamp Program, the Food Distribution
- Program on Indian Reservations (FDPIR) or the Temporary Assistance for Needy Children Program (TANF) [TANF is the Federal designation; each State has its own name and acronym];
- Enrollment in a Head Start or Even Start program on the basis of meeting that program's low-income criteria;
- A homeless child as determined by the school district's homeless liaison or by the director of a homeless shelter;
- A migrant child as determined by the State or local Migrant Education Program (MEP) coordinator;
- A runaway child who is receiving assistance from a program under the Runaway and Homeless Youth Act and is identified by the local educational liaison.

Source: <http://www.fns.usda.gov/cnd/Governance/notices/iegs/EligibilityManual.pdf>

- **Poverty status** is determined by comparing annual income to a set of dollar values called thresholds that vary by family size, number of children, and age of householder. If a family's before tax money income is less than the dollar value of their threshold, then that family and every individual in it are considered to be in poverty. For people not living in families, poverty status is determined by comparing the individual's income to his or her threshold.

Source: <http://www.census.gov/prod/2010pubs/acsbr09-1.pdf>

Source, below: <http://ers.usda.gov/FoodAtlas/documentation.htm#hh2009>

- **Household Food insecurity:** Prevalence of household-level food insecurity (includes households with low and very low food security) relative to national average. Food-insecure households are classified as having either low food security or very low food security. Households classified as having *low food security* reported multiple indications of food access problems, but typically reported few, if any, indications of reduced food intake. Households classified as having very low food security reported multiple indications of reduced food intake and disrupted eating patterns due to inadequate resources for food. In most, but not all, households with *very low food security*, the survey respondent reported that he or she was hungry at some time during the year but did not eat because there was not enough money for food
Data are from an annual survey conducted by the U.S. Census Bureau as a supplement to the monthly Current Population Survey. USDA sponsors the annual survey, and USDA's Economic Research Service (ERS) compiles and analyzes the responses. The 2009 food security survey covered about 46,000 households comprising a representative sample of the U.S. civilian population of 118 million households. The food security survey asked one adult respondent in each household a series of questions about experiences and behaviors that indicate food insecurity. The food security status of the household was assessed based on the number of food-insecure conditions reported (such as being unable to afford balanced meals, cutting the size of meals because of too little money for food, or being hungry because of too little money for food). For more information, see Nord, Mark, Alisha Coleman-Jensen, Margaret Andrews, and Steven Carlson. [Household Food Security in the United States, 2009](#), ERR-108, USDA/ERS. November 2010.
- **Gal per capita soft drinks:** Gallons of soft drinks purchased per resident of the region during the year. Soft drinks include sodas (diet and caloric-sweetened carbonated beverages), fruit drinks (less than 100% fruit juice), poweraids, and other drinks other than water.
- **Farm Definition:** The census definition of a farm is any place from which \$1000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. The definition has changed nine times since it was established in 1850. The current definition was used for the 1974 Census of Agriculture and has been used in each subsequent agriculture census. This definition is consistent with the definition used for current USDA surveys. The farm definition used for each US territory varies. The report for each territory includes a discussion of its farm definition.
- **Principal operator:** The person primarily responsible for the on-site, day-to-day operation of the farm or ranch business. This person may be a hired manager or business manager. See Operators for further explanation. The term operator designates a person who operates a farm, either doing the work or making day-to-day decisions about such things as planting, harvesting, feeding, and marketing. The operator may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper. If a person rents land to others or

has land worked on shares by others, he/she is considered the operator only of the land which is retained for his/her own operation. The census collected information on the total number of operators, the total number of women operators, and demographic information for up to three operators per farm.

- **Migrant farm labor on farms with hired labor:** Operators were asked whether any hired or contract workers were migrant workers. A migrant farm worker is a farm worker whose employment required travel that prevented the worker from returning to his/her permanent place of residence the same day.
- **Total income from farm-related sources, gross before taxes and expenses:** This includes 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. The data exclude income from employment or business activities which were separate from the farm business. Categories that make up the farm-related income calculation changed between the 2002 and 2007 censuses. In the 2007 census, Crop and livestock insurance payments received from State and local government agricultural program payments are published separately. In the 2002 census, these categories were combined with Other farm-related income sources.
- **Market value of agricultural products sold:** This category represents the gross market value before taxes and production expenses of all agricultural products sold or removed from the place in 2007 regardless of who received the payment. It is equivalent to total sales and it includes sales by the operators as well as the value of any shares received by partners, landlords, contractors, or others associated with the operation. It includes value of direct sales and the value of commodities placed in the Commodity Credit Corporation (CCC) loan program. Market value of agricultural products sold does not include payments received for participation in other federal farm programs. Also, it does not include income from farm-related sources such as customwork and other agricultural services, or income from nonfarm sources. The value of crops sold in 2007 does not necessarily represent the sales from crops harvested in 2007. Data may include sales from crops produced in earlier years and may exclude some crops produced in 2007 but held in storage and not sold. For commodities such as sugarbeets and wool sold through a co-op that made payments in several installments, respondents were requested to report the total value received in 2007.
- **Net cash farm income of operation:** This concept is derived by subtracting total farm expenses from total sales, government payments, and other farm-related income. Depreciation is not used in the calculation of net cash farm income. Net cash farm income of the operation includes the value of commodities produced under production contract by the contract growers.
- **Land in farms:** The acreage designated as "land in farms" consists primarily of agricultural land used for crops, pasture or grazing. It also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, provided it was part of the farm operator's total operation. Large acreages of woodland or wasteland held for nonagricultural purposes were deleted from individual reports during the edit process. Land in farms is an operating unit concept and includes land owned and operated as well as land rented from others. Land used rent free was reported as land rented from others. All grazing land, except land used under government permits on a per-head basis, was included as "land in farms" provided it was part of a farm or ranch....
- **Total cropland:** This category includes cropland harvested, cropland used only for pasture or grazing, cropland on which all crops failed or were abandoned, cropland in cultivated summer fallow, and cropland idle or used for cover crops or soil improvement but not harvested and not pastured or grazed.
- **Harvested cropland:** This category includes land from which crops were harvested and hay was cut, land used to grow short-rotation woody crops and land in orchards, citrus groves, Christmas trees, vineyards, nurseries, and greenhouses. Land from which two or more crops were harvested was counted only once. Land in tapped maple trees was included in woodland not pastured. The 2007 census definition for harvested cropland is the same as the 2002 definition.
- **Irrigated land:** This category includes all land watered by any artificial or controlled means, such as sprinklers, flooding, furrows or ditches, sub-irrigation, and spreader dikes. Included are supplemental, partial, and pre-plant irrigation. Each acre was counted only once regardless of the number of times it was irrigated or harvested. Livestock lagoon waste water distributed by sprinkler or flood systems was also included.
- **Cropland used only for pasture or grazing:** This category includes land used only for pasture or grazing that could have been used for crops without additional improvement. Also included were acres of crops hogged or grazed but not harvested prior to grazing. However, cropland that was pastured before or after crops were harvested in 2007 was included as harvested cropland rather than cropland for pasture or grazing.
- **Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed:** Cropland idle includes any other acreage which could have been used for crops without any additional improvement and which was not reported as cropland harvested, cropland on which all crops failed, cropland in summer fallow, or cropland used for pasture or grazing. This category includes
 - Land used for cover crops or soil improvement but not harvested or grazed.
 - Land in Federal or State conservation programs that was not hayed or grazed in 2007.

- Land in Federal or State conservation programs that were planted to trees for future harvest timber, pulp, or Christmas trees.
- Land occupied with growing crops for harvest in 2008 or later years but not harvested or summer fallowed in 2007 (except fruit or nuts in an orchard, grove, or vineyard being maintained for production). Examples are acreage planted in winter wheat, strawberries, etc., for harvest in 2008 and no crop was harvested from these acres in 2007.
- Land in “skipped” rows
- **Total acres used for organic production:** This is a new item in the 2007 census. Respondents were instructed to report organic production as defined by the National Organic Standards while in 2002 only acreage of certified organically produced crops was collected. Organic acreage is divided into organic crops and organic pasture. The count of farms producing organic crops may differ from that found in other sources because this item is self reported by respondents. No attempt was made to verify reports with certifying organic organizations. The acres reported for organic crops must be less than or equal to the acres reported as cropland harvested for each operation. In 2002, data were collected for the number of acres used to raise certified organically produced crops. This was replaced in 2007 with acreage and value of sales of organically produced commodities. For certified production, only a “yes” or “no” response question was asked in the “Organic Agriculture” section. The 2007 data do not compare with 2002 Land used to raise certified organically produced crops. See **Total organic product sales:** This is a new item for the 2007 census. The data represent the value of organically produced agricultural commodities sold from operations during 2007. It was the intention of the question to collect the value of those products that were produced as organic according to the National Organic Standards. These sales may come from either crop or livestock production and are divided into three categories:
 - Sales for crops, including nursery and greenhouse crops.
 - Sales for livestock and poultry.
 - Sales for livestock and poultry products. Sales data are not comparable.
- **Layers:** This category includes table-egg type layers, hatching layers for meat-types, and hatching layers for table egg types. In 2002, this category was referred to as Layers 20 weeks and older. This is a wording change only; data are comparable.
- **Bees/honey - Colonies of Bees:** Colonies of bees were tabulated in the county where the largest value of all agricultural products were raised or produced. Colonies are often moved from farm-to-farm over a wide geographic area. Package bees are not included as separate colonies. In 2007 colonies of bees were collected in their own section to clarify to respondents that only “owned” colonies were to be reported versus any colonies on the operation. **Honey Collected:** Data are for pounds of honey produced but not necessarily sold.
- **Honey collected:** Data are for pounds of honey produced but not necessarily sold.
- **Forage – land used for all hay and all haylage, grass silage, and greenchop:** Data shown represent the area harvested with each acre counted only once if dry hay, haylage, grass, silage, or greenchop were cut from the same acreage or if there were multiple cuttings of dry hay, haylage, grass silage, or greenchop. Data exclude corn silage and sorghum silage. Quantity produced is the sum of the quantity harvested of all hay including alfalfa, other tame, small grain, and wild hay and all haylage, grass silage and greenchop after converting the all haylage, grass silage, and greenchop quantity harvested to a dry equivalent basis (13-percent moisture).....
- **Vegetables harvested for sale:** The acres of vegetables harvested is the summation of the acres of individual vegetables harvested. All of the individual vegetable items may not be shown. When more than one vegetable crop was harvested from the same acreage, acres were counted for each crop. In 2007, ginseng, potatoes, and sweet potatoes are included in vegetables harvested. In 2002, these acres were included in field crops. The 2002 data, where compared, were not adjusted to include ginseng, potatoes, and sweet potatoes acreage.
- **Land in orchards:** This category includes land in bearing age and nonbearing age fruit trees of all ages, including land on which all fruit crops failed. Respondents also reported bearing age acres and nonbearing age acres by individual fruit and nut crops. Respondents were instructed not to report abandoned plantings and plantings of fewer than 20 total fruit, citrus, or nut trees or grapevines.
- **Land in berries:** This is a new item for 2007. Data are for total land in berries. Respondents also reported harvested acres and not harvested acres by individual berry crops. In 2002, only harvested acreage was collected.
- **Maple syrup:** Data are for the number of taps set and syrup produced.
- **Value of agricultural products sold directly to individuals for human consumption:** This item represents the value of agricultural products produced and sold directly to individuals for human consumption from roadside stands, farmers’ markets, pick-your-own sites, etc. It excludes non-edible products such as nursery crops, cut flowers, and wool but includes livestock sales. Sales of agricultural products by vertically integrated operations through their own processing and marketing operations were excluded.
- **Total farm production expenses, chemicals:** These 2007 expenses include insecticides, herbicides, fungicides, and other pesticides, including costs of custom application. Data exclude commercial fertilizer purchased.

- **Total farm production expenses, gasolines, fuels, and oils:** These expenses include the cost of all gasoline, diesel, natural gas, LP gas, motor oil, and grease products for the farm during 2007. Expenses exclude fuel for personal use of automobiles by the family and others, fuel used for cooking and heating the farmhouse, and any other use outside of farmwork on the operation.
- **Land enrolled in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP):** CRP is a program established by the USDA in 1985 that takes land prone to erosion out of production for 10 to 15 years and devotes it to conservation uses. In return, farmers receive an annual rental payment for carrying out approved conservation practices on the conservation acreage. The WRP, FWP, and CREP programs are included under the CRP that offers landowners financial incentives for conservation practices. For the 2007 census, operations with land enrolled in the CRP, WRP, FWP, or CREP were counted as farms, given they received \$1000 or more in government payments, even if they had no sales and otherwise lacked the potential to have \$1000 or more in sales. 2002 data may not include FWP or CREP acreage so data are not directly comparable.
- **Total farm production expenses: Fertilizer, lime, and soil conditioners:** These 2007 expenses include fertilizer and lime including rock phosphate and gypsum, and the costs of custom application.
- **Conservation methods** - conservation methods such as no-till or limited tilling, filtering runoff to remove chemicals, fencing animals from streams and other practices

Appendix 5: Food Systems Consumer Survey



Food Systems Consumer Survey

The purpose of this survey is to get information from the community about their level of engagement with the local food system and their quality of life. This information will allow us to continue to grow and improve upon the local food system and assure that it can meet everybody's needs.

You can return this survey to the Center for an Agricultural Economy's office, located at 41 South Main St. in Hardwick (between Buffalo Mountain Co-op and Claire's Restaurant) or return it by mail using the instructions on the back of this survey. You can also take this survey online at: _____. If you would like any more information, have any questions and/or concerns, please contact Heather Davis at heather@hardwickagriculture.org or 802-472-5840, ext. 5.

Thank you for your participation!

Heather Davis
Graduate Research Fellow – Food System Monitoring and Evaluation

The Center for an Agricultural Economy
41 S. Main St., PO Box 451
Hardwick, VT 05843
www.hardwickagriculture.org

* Participation in this survey is confidential and therefore no identifying information is requested.

1.	What is your age?	
2.	What is your gender? <i>Please check one.</i>	<input type="checkbox"/> female <input type="checkbox"/> male
3.	What is your race/ethnicity? <i>Please check all that apply.</i>	<input type="checkbox"/> White / European Descent <input type="checkbox"/> Black / African Descent Asian <input type="checkbox"/> Native Hawaiian or other Pacific Islander Native American <input type="checkbox"/> Hispanic <input type="checkbox"/> More than one race <input type="checkbox"/> Other (<i>please write in</i>) _____
4.	What is your town of residence? <i>Please check one.</i>	<input type="checkbox"/> Hardwick <input type="checkbox"/> Craftsbury <input type="checkbox"/> Wolcott <input type="checkbox"/> Woodbury Cabot <input type="checkbox"/> Walden <input type="checkbox"/> Stannard <input type="checkbox"/> Greensboro Elmore <input type="checkbox"/> East Hardwick <input type="checkbox"/> Other (<i>please specify</i>)
5.	What is your current housing status? <i>Please check one.</i>	<input type="checkbox"/> own house/apartment <input type="checkbox"/> rent house/apartment staying with family or friends <input type="checkbox"/> currently without housing
6.	How many people live in your household? <i>Please check one.</i>	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9+
7.	How many of these household members are under the age of	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9+
8.	Have there been times in the past 12 months when you did not e enough money to provide adequate shelter or housing for you your family?	<input type="checkbox"/> yes <input type="checkbox"/> no
9.	What is your highest level of education? <i>Please check one.</i>	<input type="checkbox"/> some High School <input type="checkbox"/> High School diploma <input type="checkbox"/> some College Associates Degree <input type="checkbox"/> Technical Degree <input type="checkbox"/> Bachelors Degree Masters / Professional Degree <input type="checkbox"/> Doctorate
10.	What is your annual family income from all sources?	
11.	What is your current job status?	<input type="checkbox"/> Employed, part-time <input type="checkbox"/> Employed, full-time <input type="checkbox"/> Student <input type="checkbox"/> Homemaker / Parent <input type="checkbox"/> Retired <input type="checkbox"/> Unemployed, less than 1 year <input type="checkbox"/> Unemployed, disabled <input type="checkbox"/> Unemployed, more than 1 year
12.	Were you raised in Vermont?	<input type="checkbox"/> yes <input type="checkbox"/> no
13.	Were you or your parents raised on a farm?	<input type="checkbox"/> yes <input type="checkbox"/> no
14.	Do/did you farm commercially or work on a farm? <i>Please check one.</i>	<input type="checkbox"/> yes, currently <input type="checkbox"/> previously, but not currently <input type="checkbox"/> never
15.	If you answered "currently" or "previously" to the previous stion, how long have/had you been involved with farming? <i>ase check one.</i>	<input type="checkbox"/> less than 1 year <input type="checkbox"/> 1-3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years 11-14 years <input type="checkbox"/> 15-19 years <input type="checkbox"/> 20+ years
16.	If you garden, do you save any seed from one year to use in next year?	<input type="checkbox"/> yes <input type="checkbox"/> no
17.	Do you purchase organic seed?	<input type="checkbox"/> yes <input type="checkbox"/> no
18.	Do you purchase locally grown seed?	<input type="checkbox"/> yes <input type="checkbox"/> no
19.	Do you produce any of your own electricity?	<input type="checkbox"/> yes

		no
20.	If yes to question #19, what percentage of your electricity use you produce?	<input type="checkbox"/> 0-20% <input type="checkbox"/> 21-40% <input type="checkbox"/> 41-60% <input type="checkbox"/> 61-80% <input type="checkbox"/> 81-100%
21.	If yes to question #19, how many KWh do you produce per month?	
22.	If yes to question #19, how many KWh do you use per month?	
23.	If you are, or have been, involved with agriculture at any level, do / did you experience any difficulties in producing your own food at the level that you desire? <i>Please check all that apply.</i>	<input type="checkbox"/> access to land <input type="checkbox"/> pest problems <input type="checkbox"/> start-up costs <input type="checkbox"/> soil quality problems <input type="checkbox"/> lack of information <input type="checkbox"/> lack of time other (please explain) _____
24.	Do you grow / raise any of the following for your personal / family consumption? <i>Please check all that apply.</i>	<input type="checkbox"/> garden <input type="checkbox"/> poultry <input type="checkbox"/> livestock <input type="checkbox"/> none <input type="checkbox"/> other _____
25.	If you are involved with food production in your household, what is the estimated percentage of food that you produce yourself? <i>Please check one.</i>	<input type="checkbox"/> 0-20% <input type="checkbox"/> 21-40% <input type="checkbox"/> 41-60% <input type="checkbox"/> 61-80% <input type="checkbox"/> 81-100%
26.	Do you do any food processing at home? <i>Please check all that apply.</i>	<input type="checkbox"/> canning <input type="checkbox"/> freezing <input type="checkbox"/> drying <input type="checkbox"/> none <input type="checkbox"/> other _____
27.	Do you use a community kitchen facility to process your own food?	<input type="checkbox"/> yes <input type="checkbox"/> no
28.	If no to question # 27, are you interested in using a community kitchen facility to process your own food?	<input type="checkbox"/> yes <input type="checkbox"/> no
29.	How many minutes does it take you to commute to work?	
30.	How do you commute to work? <i>Please check your primary mode of transportation.</i>	<input type="checkbox"/> Personal vehicle <input type="checkbox"/> Carpool with others <input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Public Transportation <input type="checkbox"/> Other (specify) _____
31.	Does your work supervisor always create an environment that is trusting and open?	<input type="checkbox"/> yes <input type="checkbox"/> no
32.	Are you satisfied with your job or the work that you do?	<input type="checkbox"/> yes <input type="checkbox"/> no
33.	Does your level of household income meet your household needs?	<input type="checkbox"/> yes <input type="checkbox"/> no
34.	What is the estimated total amount that your family spends on food every week?	<input type="checkbox"/> yes <input type="checkbox"/> no
35.	Do you eat two or more servings of fruit per day, on a typical day?	<input type="checkbox"/> yes <input type="checkbox"/> no
36.	Do you eat three or more servings of vegetables per day, on a typical day?	<input type="checkbox"/> yes <input type="checkbox"/> no
37.	Do children in your household (if applicable) eat two or more servings of fruit per day, on a typical day?	<input type="checkbox"/> yes <input type="checkbox"/> no
38.	Do children in your household (if applicable) eat three or more servings of vegetables per day, on a typical day?	<input type="checkbox"/> yes <input type="checkbox"/> no
39.	Do you purchase locally grown and/or processed foods?	<input type="checkbox"/> yes <input type="checkbox"/> no
40.	What type of locally-produced products do you purchase? <i>Please check all that apply.</i>	<input type="checkbox"/> maple <input type="checkbox"/> dairy <input type="checkbox"/> baked goods <input type="checkbox"/> bread <input type="checkbox"/> vegetables <input type="checkbox"/> processed foods (ex. salsa, condiments, etc.) <input type="checkbox"/> fruit / berries <input type="checkbox"/> meats

41.	If you answered no to question #39, do you want to buy local foods, but feel unable to for any reason?	<input type="checkbox"/> yes <input type="checkbox"/> no							
42.	If you answered yes to question #39, will you please estimate percentage of food that you purchase are locally produced / consumed? <i>Please check one.</i>	<input type="checkbox"/> 0-20%	<input type="checkbox"/> 21-40%	<input type="checkbox"/> 41-60%	<input type="checkbox"/> 61-80%	<input type="checkbox"/> 81-100%			
43.	If you answered yes to question #39, from the following list, please specify the three most important reasons you buy local foods. <i>Please check only three.</i>	<input type="checkbox"/> product quality <input type="checkbox"/> supporting local farmers / economy <input type="checkbox"/> sustainability <input type="checkbox"/> value/prices <input type="checkbox"/> product variety <input type="checkbox"/> produced organically <input type="checkbox"/> other _____							
44.	Based on the following, rank the locally produced items purchased most frequently (<i>1=most frequent, 5=least frequent</i>)	_____ fruits _____ vegetables _____ meat _____ plants/flowers Other (<i>please specify</i>) _____							
45.	What is the maximum you are willing to spend on a local food item if the same item costs \$1.00 at the supermarket?	<input type="checkbox"/> < \$1.00	<input type="checkbox"/> \$1.00	<input type="checkbox"/> \$1.10	<input type="checkbox"/> \$1.25	<input type="checkbox"/> \$1.50	<input type="checkbox"/> \$2.00	<input type="checkbox"/> \$2.10	<input type="checkbox"/> \$2.25 +
	What factors do you consider when selecting which foods to purchase? <i>Please circle one number per question.</i>	Very important	Fairly Important	Slightly important	Not important				
46.	Health	1	2	3	4				
47.	Locally grown / produced	1	2	3	4				
48.	Cost	1	2	3	4				
49.	Ease of preparation	1	2	3	4				
50.	Do you experience any of these difficulties in accessing locally grown foods? <i>Please check all that apply.</i>	<input type="checkbox"/> cost <input type="checkbox"/> seasonal availability <input type="checkbox"/> availability in stores <input type="checkbox"/> no constraints <input type="checkbox"/> other _____							
51.	Do you shop at a local farmer's market?	<input type="checkbox"/> yes <input type="checkbox"/> no							
52.	If yes, how often do you go? <i>Please check one.</i>	<input type="checkbox"/> 1-2 times / season <input type="checkbox"/> 3-5 times / season <input type="checkbox"/> 6-10 times / season <input type="checkbox"/> 1 time / week <input type="checkbox"/> more than once / week							
53.	Do you currently recycle your food waste at your household? (Composting, for animal feed, etc.)	<input type="checkbox"/> yes <input type="checkbox"/> no							
54.	Do you use compost in your garden, if you have one?	<input type="checkbox"/> yes <input type="checkbox"/> no							
55.	Do you currently participate in any bartering?	<input type="checkbox"/> yes <input type="checkbox"/> no							
56.	If yes to question #54 above, does any of this bartering involve locally produced food?	<input type="checkbox"/> yes <input type="checkbox"/> no							
57.	Do you currently participate in any volunteer work?	<input type="checkbox"/> yes <input type="checkbox"/> no							
58.	Do you currently have health insurance coverage?	<input type="checkbox"/> yes <input type="checkbox"/> no							
59.	Have you visited a dentist in the past 12 months?	<input type="checkbox"/> yes <input type="checkbox"/> no							
60.	During an average week, do you exercise for at least 30 minutes on 3 out of 7 days?	<input type="checkbox"/> yes <input type="checkbox"/> no							
61.	Do you smoke?	<input type="checkbox"/> yes <input type="checkbox"/> no							
62.	What is your height? (in pounds)								
63.	What is your weight? (in feet and inches)								

64.	Have you ever been told by a physician or nurse that you have diabetes?	<input type="checkbox"/> yes <input type="checkbox"/> no
65.	Have you ever been told by a physician or nurse that you have high cholesterol?	<input type="checkbox"/> yes <input type="checkbox"/> no
66.	Do you have health problems that prevent you from doing any of the things that people your age normally do?	<input type="checkbox"/> yes <input type="checkbox"/> no
67.	Have you ever been told by a physician or nurse that you have depression?	<input type="checkbox"/> yes <input type="checkbox"/> no
68.	Did you experience feelings of happiness a lot of the day yesterday?	<input type="checkbox"/> yes <input type="checkbox"/> no
69.	Did you experience stress during a lot of the day yesterday?	<input type="checkbox"/> yes <input type="checkbox"/> no
70.	Did you learn or do something interesting yesterday?	<input type="checkbox"/> yes <input type="checkbox"/> no
71.	Have you used emergency food sources during the past year? (e.g., Food shelf).	<input type="checkbox"/> yes <input type="checkbox"/> no
72.	Do you or any household members ever worry that your household would not have enough food? <i>Please check one.</i>	<input type="checkbox"/> often <input type="checkbox"/> sometimes <input type="checkbox"/> never
73.	Do you or any household members have to eat a limited variety of foods due to a lack of resources? <i>Please check one.</i>	<input type="checkbox"/> often <input type="checkbox"/> sometimes <input type="checkbox"/> never
74.	Do you or any household members have to eat fewer meals in a day because there was not enough food? <i>Please check one.</i>	<input type="checkbox"/> often <input type="checkbox"/> sometimes <input type="checkbox"/> never
75.	Have there been times in the past 12 months when you did not have enough money to buy food that you or your family needed?	<input type="checkbox"/> yes <input type="checkbox"/> no
76.	Do you feel safe walking alone at night in the city or area where you live?	<input type="checkbox"/> yes <input type="checkbox"/> no
77.	Is the city or area where you live getting better as a place to live?	<input type="checkbox"/> yes <input type="checkbox"/> no
78.	Are you satisfied with the city or area where you live?	<input type="checkbox"/> yes <input type="checkbox"/> no
79.	Do you feel satisfied about the quality of your relationships overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
80.	Are you satisfied with your life overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
81.	The Center for an Agricultural Economy sponsors a number of community projects. <i>Please check all that you would be interested in participating in.</i>	<input type="checkbox"/> Atkins Field Community Agricultural & Education Center <input type="checkbox"/> Vermont Food Venture Center – incubation facilities for value-added agricultural businesses <input type="checkbox"/> Hardwick Community Gardens <input type="checkbox"/> Ag-related business planning (farms and value-added products) <input type="checkbox"/> Kingdom Farm and Food Days - Free community event featuring a local food dinner, farm tours, and workshops <input type="checkbox"/> Food access / food security projects like the Food Access Fund, Meals for the People, and Soup for Supper, Grow an Extra Row <input type="checkbox"/> Vermont Farm Fund (Emergency loan program for farmers)

Any comments, questions, or concerns?

Appendix 6: Food Systems Food Processor Survey



Food Systems Food Processor Survey

The purpose of this survey is to get information from food processors regarding their participation with the local food system, their contribution to the local economy, as well as the vitality of their businesses. This information will allow us to continue to grow and improve upon the local food system and assure that it can meet everybody’s needs.

You can return this survey to the Center for an Agricultural Economy’s office, located at 41 South Main St. in Hardwick (between Buffalo Mountain Co-op and Claire’s Restaurant) or return it by mail using the instructions on the back of this survey. You can also take this survey online at: _____. If you would like any more information, have any questions and/or concerns, please contact Heather Davis at heather@hardwickagriculture.org or 802-472-5840, ext. 5.

Thank you for your participation!

Heather Davis
Graduate Research Fellow – Food System Monitoring and Evaluation

The Center for an Agricultural Economy
 41 S. Main St., PO Box 451
 Hardwick, VT 05843
www.hardwickagriculture.org

* Participation in this survey is confidential and therefore no identifying information is requested.

1.	What is your role within the company?	<input type="checkbox"/> Owner <input type="checkbox"/> Manager <input type="checkbox"/> Co-owner <input type="checkbox"/>
2.	What is your age?	
3.	What is your gender? <i>Please check one.</i>	<input type="checkbox"/> female <input type="checkbox"/> male
4.	What is your race/ethnicity? <i>Please check all that apply.</i>	<input type="checkbox"/> White / European Descent <input type="checkbox"/> Black / African Descent <input type="checkbox"/> Asian <input type="checkbox"/> Native Hawaiian or other Pacific Island <input type="checkbox"/> Native American <input type="checkbox"/> Hispanic <input type="checkbox"/> More than one race <input type="checkbox"/> Other (<i>please write in</i>) _____
10.	What is your highest level of education? <i>Please check one.</i>	<input type="checkbox"/> some High School <input type="checkbox"/> High School diploma <input type="checkbox"/> some College <input type="checkbox"/> Associates Degree <input type="checkbox"/> Technical Degree <input type="checkbox"/> Bachelors Degree <input type="checkbox"/> Masters / Professional Degree <input type="checkbox"/> Doctorate
13.	What is your current job status?	<input type="checkbox"/> Employed, part-time <input type="checkbox"/> Employed, full-time <input type="checkbox"/> Student <input type="checkbox"/> Homemaker / Parent <input type="checkbox"/> Retired <input type="checkbox"/> Unemployed, less than 1 year <input type="checkbox"/> Unemployed, disabled <input type="checkbox"/> Unemployed, more than 1 year
14.	Were you raised in Vermont?	<input type="checkbox"/> yes <input type="checkbox"/> no
15.	Were you or your parents raised on a farm?	<input type="checkbox"/> yes <input type="checkbox"/> no
16.	Do/did you farm commercially or work on a farm? <i>Please check one.</i>	<input type="checkbox"/> yes, currently <input type="checkbox"/> previously, but not currently <input type="checkbox"/> never
17.	If you answered “currently” or “previously” to the previous question, how long have/had you been involved with farming? <i>Please check one.</i>	<input type="checkbox"/> less than 1 year <input type="checkbox"/> 1-3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> 11-14 years <input type="checkbox"/> 15-19 years <input type="checkbox"/> 20+ years
18.	How many years have you been in business?	
19.	Do you consider your business... <i>(Please check all that apply).</i>	<input type="checkbox"/> start-up <input type="checkbox"/> mature <input type="checkbox"/> struggling <input type="checkbox"/> stable <input type="checkbox"/> scaling-up <input type="checkbox"/> strong <input type="checkbox"/> evolving <input type="checkbox"/> closing
20.	Are you satisfied with the availability of opportunities to continue your education and training in this field?	<input type="checkbox"/> yes <input type="checkbox"/> no
21.	Do you have hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
22.	How many jobs have you added to your business in the past year? (+ or -)	
23.	How much did you pay in labor expenses last year in total?	
24.	How many employees do you currently have?	
25.	How many of these are employed part-time?	

26.	How many of these are employed full-time?	
27.	How many full-time equivalent jobs do you currently provide?	
28.	What is the lowest wage you pay an employee?	
29.	What is the highest wage you pay an employee?	
30.	What is the average wage you pay your employees?	
31.	How many work-related injuries have you had in the past year, for you and your employees?	
32.	Are you satisfied with the skills of your hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
33.	Are you generally able to find the skilled labor you need when you need it?	<input type="checkbox"/> yes <input type="checkbox"/> no
34.	Do you have a current business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
35.	If yes, do you generally follow your business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
36.	What was the total retail value of what you produced last year? (in dollars)	
37.	What was your increase or decrease in revenue last year? (+ or -)	
38.	Was your business profitable last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
39.	Did your business experience an increase in profits last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
40.	What are your total production expenses? (in dollars)	
41.	Do you use locally produced inputs in your product formulation?	<input type="checkbox"/> yes <input type="checkbox"/> no
42.	What type of locally-produced products do you purchase? (Please check all that apply).	<input type="checkbox"/> maple <input type="checkbox"/> dairy <input type="checkbox"/> baked goods <input type="checkbox"/> bread <input type="checkbox"/> vegetables <input type="checkbox"/> processed foods (ex. salsa, condiments, etc.) <input type="checkbox"/> fruit / berries <input type="checkbox"/> meats
43.	What percentage of your purchases for your food inputs are locally produced grown product?	
44.	What is the dollar amount that you spend on locally produced product inputs?	
45.	If you purchase local foods, how do you order/receive them? (Please check all that apply).	<input type="checkbox"/> Direct from farmer <input type="checkbox"/> Non-profit distributor <input type="checkbox"/> Commercial distributor
46.	If you use locally produced products inputs, were you able to get a reliable supply of product from local farmers?	<input type="checkbox"/> yes <input type="checkbox"/> no
47.	If you use locally produced products, have you had a positive experience working with suppliers, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
48.	If you do NOT use locally produced products, do you want to buy local foods, but feel unable to for any reason? (If yes,	<input type="checkbox"/> yes

	<i>please specify reason(s)</i>	<input type="checkbox"/> no
49.	If you use locally produced product inputs, please choose from the following list the three most important reasons you buy local foods. <i>(Please check only three.)</i>	<input type="checkbox"/> product quality <input type="checkbox"/> supporting local farmers / economy <input type="checkbox"/> sustainability <input type="checkbox"/> value/prices <input type="checkbox"/> product variety <input type="checkbox"/> produced organically <input type="checkbox"/> other _____
50.	Do you raise/grow any of your own product inputs?	<input type="checkbox"/> yes <input type="checkbox"/> no
51.	If yes, what percentage of your product inputs do you raise/grow yourself?	
19.	What exactly do you do with your food waste? <i>(Please check all that apply).</i>	<input type="checkbox"/> compost, on site <input type="checkbox"/> compost, hauler picks up <input type="checkbox"/> feed to animals <input type="checkbox"/> used in energy production <input type="checkbox"/> other _____ <input type="checkbox"/> throw away in trash
20.	Does anybody collect your used cooking oil for use in fuel production?	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> not applicable
53.	Does your business participate in any bartering for products or services?	<input type="checkbox"/> yes <input type="checkbox"/> no
54.	Is any of your business debt held by family, friends or local sources?	<input type="checkbox"/> yes <input type="checkbox"/> no
55.	If yes, what percentage?	
56.	How many minutes does it take you to commute to work?	
57.	How do you commute to work? <i>Please check your primary mode of transportation.</i>	<input type="checkbox"/> Personal vehicle <input type="checkbox"/> Carpool with others <input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Public Transportation <input type="checkbox"/> Other (specify) _____
58.	Are you satisfied with your job or the work that you do, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
59.	Do you own the facilities you use to produce your product?	<input type="checkbox"/> yes <input type="checkbox"/> no
60.	Do you use co-packer services?	<input type="checkbox"/> yes <input type="checkbox"/> no
61.	Do you use the facilities at the Vermont Food Venture Center?	<input type="checkbox"/> yes <input type="checkbox"/> no
62.	If no, are you interested in using the services provided by the Vermont Food Venture Center?	<input type="checkbox"/> yes <input type="checkbox"/> no
63.	Are you satisfied with the facilities that you use to produce your product?	<input type="checkbox"/> yes <input type="checkbox"/> no

Please make comments, suggestions, concerns and/or ideas regarding any of the above questions, as well as regarding the local food system. (Ideas for improvement, barriers to using local product, etc.)

Appendix 7: Food Systems Retailer Survey



Food Systems Retailer Survey

The purpose of this survey is to get information from food retailers about their level of engagement with the local food system, their contribution to the local economy, as well as the vitality of their businesses. This information will allow us to continue to grow and improve upon the local food system and assure that it can meet everybody’s needs.

You can return this survey to the Center for an Agricultural Economy’s office, located at 41 South Main St. in Hardwick (between Buffalo Mountain Co-op and Claire’s Restaurant) or return it by mail using the instructions on the back of this survey. You can also take this survey online at: _____. If you would like any more information, have any questions and/or concerns, please contact Heather Davis at heather@hardwickagriculture.org or 802-472-5840, ext. 5.

Thank you for your participation!

Heather Davis
Graduate Research Fellow – Food System Monitoring and Evaluation

The Center for an Agricultural Economy
41 S. Main St., PO Box 451
Hardwick, VT 05843
www.hardwickagriculture.org

* Participation in this survey is confidential and therefore no identifying information is requested.

1.	What is your role within the company?	<input type="checkbox"/> Owner <input type="checkbox"/> Manager <input type="checkbox"/> Co-owner <input type="checkbox"/>
2.	What is your age?	
3.	What is your gender? <i>Please check one.</i>	<input type="checkbox"/> female <input type="checkbox"/> male
4.	What is your race/ethnicity? <i>Please check all that apply.</i>	<input type="checkbox"/> White / European Descent <input type="checkbox"/> Black / African Descent

		<input type="checkbox"/> Asian <input type="checkbox"/> Native Hawaiian or other Pacific <input type="checkbox"/> Native American <input type="checkbox"/> Hispanic <input type="checkbox"/> More than one <input type="checkbox"/> Other (<i>please write in</i>) _____
10.	What is your highest level of education? <i>Please check one.</i>	<input type="checkbox"/> some High School <input type="checkbox"/> High School diploma <input type="checkbox"/> some C <input type="checkbox"/> Associates Degree <input type="checkbox"/> Technical Degree <input type="checkbox"/> Bachelor <input type="checkbox"/> Masters / Professional Degree <input type="checkbox"/> Doctora
13.	What is your current job status?	<input type="checkbox"/> Employed, part-time <input type="checkbox"/> Employed, full-time <input type="checkbox"/> Student <input type="checkbox"/> Homemaker / Parent <input type="checkbox"/> Retired <input type="checkbox"/> Unemployed, less than 1 y <input type="checkbox"/> Unemployed, disabled <input type="checkbox"/> Unemployed, more than 1
14.	Were you raised in Vermont?	<input type="checkbox"/> yes <input type="checkbox"/> no
15.	Were you or your parents raised on a farm?	<input type="checkbox"/> yes <input type="checkbox"/> no
16.	Do/did you farm commercially or work on a farm? <i>Please check one.</i>	<input type="checkbox"/> yes, currently <input type="checkbox"/> previously, but not currently <input type="checkbox"/> never
17.	If you answered “currently” or “previously” to the previous question, how long have/had you been involved with farming? <i>Please check one.</i>	<input type="checkbox"/> less than 1 year <input type="checkbox"/> 1-3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8 <input type="checkbox"/> 11-14 years <input type="checkbox"/> 15-19 years <input type="checkbox"/> 20+ years
18.	How many years have you been in business?	
19.	Do you consider your business... <i>(Please check all that apply).</i>	<input type="checkbox"/> start-up <input type="checkbox"/> mature <input type="checkbox"/> struggling <input type="checkbox"/> stable <input type="checkbox"/> scaling-up <input type="checkbox"/> strong <input type="checkbox"/> evolving <input type="checkbox"/> closin;
21.	Do you have hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
22.	How many jobs have you added to your business in the past year? (+ or -)	
23.	How much did you pay in labor expenses last year in total?	
24.	How many employees do you currently have?	
25.	How many of these are employed part-time?	
26.	How many of these are employed full-time?	
27.	How many full-time equivalent jobs do you currently provide?	
28.	What is the lowest wage you pay an employee?	
29.	What is the highest wage you pay an employee?	
30.	What is the average wage you pay your employees?	
31.	How many work-related injuries have you had in the past year, for you and your employees?	
32.	Are you satisfied with the skills of your hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
33.	Are you generally able to find the skilled labor you need when you need it?	<input type="checkbox"/> yes <input type="checkbox"/> no

34.	Do you have a current business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
35.	If yes, do you generally follow your business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
36.	What was the total retail value of your sales last year? (in dollars)	
37.	What was your increase or decrease in revenue last year? (+ or -)	
38.	Was your business profitable last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
39.	Did your business experience an increase in profits last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
40.	What are your total production expenses? (in dollars)	
41.	Do you sell locally produced products at your store?	<input type="checkbox"/> yes <input type="checkbox"/> no
42.	What type of locally-produced products do you sell? (<i>Please check all that apply.</i>)	<input type="checkbox"/> maple <input type="checkbox"/> dairy <input type="checkbox"/> baked goods <input type="checkbox"/> bread <input type="checkbox"/> vegetables <input type="checkbox"/> processed foods (ex. salsa, condiment <input type="checkbox"/> fruit / berries <input type="checkbox"/> meats
43.	What percentage of your sales are locally produced products?	
44.	What is the dollar amount that you spend on locally produced product?	
45.	If you sell local foods, how do you order/receive them? (<i>Please check all that apply.</i>)	<input type="checkbox"/> Direct from farmer <input type="checkbox"/> Non-profit distributor <input type="checkbox"/> Commercial distributor
46.	If you sell locally produced products, were you able to get a reliable supply of product from local farmers?	<input type="checkbox"/> yes <input type="checkbox"/> no
47.	If you sell locally produced products, have you had a positive experience working with suppliers, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
48.	If you do NOT sell locally produced products, do you want to sell local foods, but do not to for any reason? (<i>If yes, please specify reason(s)</i>)	<input type="checkbox"/> yes <input type="checkbox"/> no
49.	If you sell locally produced products, from the following list, please specify the three most important reasons you buy local foods. (<i>Please check only three.</i>)	<input type="checkbox"/> product quality <input type="checkbox"/> supporting local farmers / econ <input type="checkbox"/> sustainability <input type="checkbox"/> value/prices <input type="checkbox"/> product va <input type="checkbox"/> produced organically <input type="checkbox"/> other _____
19.	What exactly do you do with your food waste? (<i>Please check all that apply.</i>)	<input type="checkbox"/> compost, on site <input type="checkbox"/> compost, hauler pick <input type="checkbox"/> feed to animals <input type="checkbox"/> used in energy produ <input type="checkbox"/> other _____ <input type="checkbox"/> throw away in trash
20.	Does anybody collect your used cooking oil for use in fuel production?	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> not applicable
53.	Does your business participate in any bartering for products or services?	<input type="checkbox"/> yes <input type="checkbox"/> no
54.	Is any of your business debt held by family, friends or local sources?	<input type="checkbox"/> yes <input type="checkbox"/> no
55.	If yes, what percentage?	

56.	How many minutes does it take you to commute to work?	
57.	How do you commute to work? <i>Please check your primary mode of transportation.</i>	<input type="checkbox"/> Personal vehicle <input type="checkbox"/> Carpool with others <input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Public Transportation <input type="checkbox"/> Other (specify) _____
58.	Are you satisfied with your job or the work that you do, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no

Please make comments, suggestions, concerns and/or ideas regarding any of the above questions, as well as regarding the local food system more generally. (Ideas for improvement, barriers to using local product, etc.)

Appendix 8: Food Systems Institutional Survey



Food Systems Institutional Survey

The purpose of this survey is to get information from local institutions about their level of engagement and experiences with the local food system. This information will allow us to continue to grow and improve upon the local food system and assure that it can meet everybody’s needs.

You can return this survey to the Center for an Agricultural Economy’s office, located at 41 South Main St. in Hardwick (between Buffalo Mountain Co-op and Claire’s Restaurant) or return it by mail using the instructions on the back of this survey. You can also take this survey online at: _____. If you would like any more information, have any questions and/or concerns, please contact Heather Davis at heather@hardwickagriculture.org or 802-472-5840, ext. 5.

Thank you for your participation!

Heather Davis
 Graduate Research Fellow – Food System Monitoring and Evaluation

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* Participation in this survey is confidential and therefore no identifying information is requested.

1.	What purpose does your institution serve? <i>(Please check all that apply).</i>	<input type="checkbox"/> Preschool/Daycare <input type="checkbox"/> School, primary <input type="checkbox"/> School, secondary <input type="checkbox"/> School, higher ed <input type="checkbox"/> School, continuing ed <input type="checkbox"/> Homeless shelter <input type="checkbox"/> Women's shelter <input type="checkbox"/> Substance rehab center	<input type="checkbox"/> Services for special needs individuals <input type="checkbox"/> Community meal site <input type="checkbox"/> Senior Center <input type="checkbox"/> Nursing home <input type="checkbox"/> Hospital <input type="checkbox"/> Meals on Wheels <input type="checkbox"/> Prison / Jail <input type="checkbox"/> Other _____
2.	How many years has your school/organization been serving the community?		
3.	How many individuals do you serve food to on a daily basis, on average?		
4.	Do you serve children under 18 years of age?	<input type="checkbox"/> yes <input type="checkbox"/> no	
5.	Do you purchase local foods for the meals you serve?	<input type="checkbox"/> yes <input type="checkbox"/> no	
6.	What type of locally-produced products do you purchase? <i>(Please check all that apply).</i>	<input type="checkbox"/> maple <input type="checkbox"/> baked goods <input type="checkbox"/> vegetables <input type="checkbox"/> fruit / berries	<input type="checkbox"/> dairy <input type="checkbox"/> bread <input type="checkbox"/> processed foods (ex. salsa, condiments, etc.) <input type="checkbox"/> meats
7.	If yes, how long have you been purchasing local foods for your meals?	<input type="checkbox"/> yes <input type="checkbox"/> no	
8.	If you purchase local foods, what estimated percentage of your purchases for your food inputs are locally-produced?		
9.	If you purchase local foods, what is the dollar amount that you spend on locally produced food?		
10.	If you purchase local foods, were you able to get a reliable supply of product from local farmers or distributors?	<input type="checkbox"/> yes <input type="checkbox"/> no	
11.	If you purchase local foods, how has your experience been, overall? <i>(Please provide any comments regarding this).</i>	<input type="checkbox"/> very positive <input type="checkbox"/> positive <input type="checkbox"/> somewhat positive	<input type="checkbox"/> somewhat negative <input type="checkbox"/> negative <input type="checkbox"/> very negative
12.	If you purchase local foods, how do you order/receive them? <i>(Please check all that apply).</i>	<input type="checkbox"/> Direct from farmer <input type="checkbox"/> Non-profit distributor <input type="checkbox"/> Commercial distributor	
13.	If you purchase local food, please specify from the following list the three most important reasons you buy local foods. <i>(Please check only three.)</i>	<input type="checkbox"/> product quality <input type="checkbox"/> sustainability	<input type="checkbox"/> supporting local farmers / economy <input type="checkbox"/> value/prices <input type="checkbox"/> product variety

		<input type="checkbox"/> produced organically	<input type="checkbox"/> other _____
14.	If you do NOT purchase local foods, do you want to buy locally produced foods, but feel unable to for any reason? <i>(Please explain).</i>	<input type="checkbox"/> yes	<input type="checkbox"/> no
15.	Do you raise/grow any of your own food for your facility?	<input type="checkbox"/> yes	<input type="checkbox"/> no
16.	If yes, do you have a garden on-site?	<input type="checkbox"/> yes	<input type="checkbox"/> no
17.	If yes, what estimated percentage of the food that you use in your kitchen do you raise/grow yourself?		
18.	If yes, are the people you serve involved with the garden?	<input type="checkbox"/> yes	<input type="checkbox"/> no
19.	What exactly do you do with your food waste? <i>(Please check all that apply).</i>	<input type="checkbox"/> compost, on site <input type="checkbox"/> feed to animals <input type="checkbox"/> other _____	<input type="checkbox"/> compost, hauler picks up <input type="checkbox"/> used in energy production <input type="checkbox"/> throw away in trash
20.	Does anybody collect your used cooking oil for use in fuel production?	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> not applicable	
	The following questions are only for schools.....		
21.	How many students are enrolled in your school?		
22.	If you have a school garden, do you integrate the garden into the curricula at all?	<input type="checkbox"/> yes <input type="checkbox"/> no	
23.	Do you have any curricula addressing healthy eating habits?	<input type="checkbox"/> yes <input type="checkbox"/> no	
24.	What percentage of your students are subsidized lunch eligible?		
25.	What percentage of your students receiving subsidized school lunches?		
26.	What percentage of your students are free-lunch eligible?		
27.	Do you have any food system related programs? <i>(If yes, please describe).</i>	<input type="checkbox"/> yes <input type="checkbox"/> no	
28.	How would you best categorize this/these program(s)? <i>(Please check all that apply).</i>	<input type="checkbox"/> Agricultural <input type="checkbox"/> Culinary <input type="checkbox"/> Food systems development	<input type="checkbox"/> Alternative energy <input type="checkbox"/> Business
29.	If yes, how many students are enrolled in this/these program(s)?		

Please make comments, suggestions, concerns and/or ideas regarding any of the above questions, as well as regarding the local food system more generally. (Ideas for improvement, barriers to using local product, etc.) _____

Appendix 9: Food Systems Farm Survey

Appendix 10: Food System Restaurant Survey



Food Systems Restaurant Survey

The purpose of this survey is to get information from restaurants about their level of engagement with the local food system, their contribution to the local economy, as well as the vitality of their businesses. This information will allow us to continue to grow and improve upon the local food system and assure that it can meet everybody's needs.

You can return this survey to the Center for an Agricultural Economy's office, located at 41 South Main St. in Hardwick (between Buffalo Mountain Co-op and Claire's Restaurant) or return it by mail using the instructions on the back of this survey. You can also take this survey online at: _____. If you would like any more information, have any questions and/or concerns, please contact Heather Davis at heather@hardwickagriculture.org or 802-472-5840, ext. 5.

Thank you for your participation!

Heather Davis
Graduate Research Fellow – Food System Monitoring and Evaluation

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* Participation in this survey is confidential and therefore no identifying information is requested.

1.	What is your role within the company?	<input type="checkbox"/> Owner <input type="checkbox"/> Manager <input type="checkbox"/> Co-owner <input type="checkbox"/>
2.	What is your age?	
3.	What is your gender? <i>Please check one.</i>	<input type="checkbox"/> female <input type="checkbox"/> male
4.	What is your race/ethnicity? <i>Please check all that apply.</i>	<input type="checkbox"/> White / European Descent <input type="checkbox"/> Black / African Descent <input type="checkbox"/> Asian <input type="checkbox"/> Native Hawaiian or other Pacific Islander <input type="checkbox"/> Native American <input type="checkbox"/> Hispanic <input type="checkbox"/> More than one race <input type="checkbox"/> Other (<i>please write in</i>) _____
10.	What is your highest level of education? <i>Please check one.</i>	<input type="checkbox"/> some High School <input type="checkbox"/> High School diploma <input type="checkbox"/> some College <input type="checkbox"/> Associates Degree <input type="checkbox"/> Technical Degree <input type="checkbox"/> Bachelors Degree <input type="checkbox"/> Masters / Professional Degree <input type="checkbox"/> Doctorate
13.	What is your current job status?	<input type="checkbox"/> Employed, part-time <input type="checkbox"/> Employed, full-time <input type="checkbox"/> Student <input type="checkbox"/> Homemaker / Parent <input type="checkbox"/> Retired <input type="checkbox"/> Unemployed, less than 1 year <input type="checkbox"/> Unemployed, disabled <input type="checkbox"/> Unemployed, more than 1 year
14.	Were you raised in Vermont?	<input type="checkbox"/> yes <input type="checkbox"/> no
15.	Were you or your parents raised on a farm?	<input type="checkbox"/> yes <input type="checkbox"/> no
16.	Do/did you farm commercially or work on a farm? <i>Please check one.</i>	<input type="checkbox"/> yes, currently <input type="checkbox"/> previously, but not currently <input type="checkbox"/> never
17.	If you answered “currently” or “previously” to the previous question, how long have/had you been involved with farming? <i>Please check one.</i>	<input type="checkbox"/> less than 1 year <input type="checkbox"/> 1-3 years <input type="checkbox"/> 4-7 years <input type="checkbox"/> 8-10 years <input type="checkbox"/> 11-14 years <input type="checkbox"/> 15-19 years <input type="checkbox"/> 20+ years
18.	How many years have you been in business?	
19.	Do you consider your business... <i>(Please check all that apply).</i>	<input type="checkbox"/> start-up <input type="checkbox"/> mature <input type="checkbox"/> struggling <input type="checkbox"/> stable <input type="checkbox"/> scaling-up <input type="checkbox"/> strong <input type="checkbox"/> evolving <input type="checkbox"/> closing
20.	Are you satisfied with the availability of opportunities to continue your education and training in this field?	<input type="checkbox"/> yes <input type="checkbox"/> no
21.	Do you have hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
22.	How many jobs have you added to your business in the past year? (+ or -)	
23.	How much did you pay in labor expenses last year in total?	
24.	How many employees do you currently have?	
25.	How many of these are employed part-time?	
26.	How many of these are employed full-time?	
27.	How many full-time equivalent jobs do you currently provide?	

28.	What is the lowest wage you pay an employee?	
29.	What is the highest wage you pay an employee?	
30.	What is the average wage you pay your employees?	
31.	How many work-related injuries have you had in the past year, for you and your employees?	
32.	Are you satisfied with the skills of your hired labor?	<input type="checkbox"/> yes <input type="checkbox"/> no
33.	Are you generally able to find the skilled labor you need when you need it?	<input type="checkbox"/> yes <input type="checkbox"/> no
34.	Do you have a current business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
35.	If yes, do you generally follow your business plan?	<input type="checkbox"/> yes <input type="checkbox"/> no
36.	What was the total retail value of your sales last year? (in dollars)	
37.	What was your increase or decrease in revenue last year? (+ or -)	
38.	Was your business profitable last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
39.	Did your business experience an increase in profits last year?	<input type="checkbox"/> yes <input type="checkbox"/> no
40.	What are your total expenses? (in dollars)	
41.	Do you use locally produced products at your restaurant?	<input type="checkbox"/> yes <input type="checkbox"/> no
42.	If yes, what type of locally-produced products do you purchase? <i>(Please check all that apply).</i>	<input type="checkbox"/> maple <input type="checkbox"/> dairy <input type="checkbox"/> baked goods <input type="checkbox"/> bread <input type="checkbox"/> vegetables <input type="checkbox"/> processed foods (ex. salsa, condiments, etc.) <input type="checkbox"/> fruit / berries <input type="checkbox"/> meats
43.	What percentage of your purchases for your food inputs are locally produced products?	
44.	What is the dollar amount that you spend on locally produced product?	
45.	If you purchase local foods, how do you order/receive them? <i>(Please check all that apply).</i>	<input type="checkbox"/> Direct from farmer <input type="checkbox"/> Non-profit distributor <input type="checkbox"/> Commercial distributor
46.	If you use locally produced products inputs, were you able to get a reliable supply of product from local farmers?	<input type="checkbox"/> yes <input type="checkbox"/> no
47.	If you use locally produced products, have you had a positive experience working with suppliers, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no
48.	If you do NOT use locally produced products, do you want to use local foods, but feel unable to for any reason? <i>(If yes, please specify reason(s))</i>	<input type="checkbox"/> yes <input type="checkbox"/> no
49.	If you do use locally produced products, from the following list, please specify the three most important reasons you buy local foods. <i>(Please check only three.)</i>	<input type="checkbox"/> product quality <input type="checkbox"/> supporting local farmers / economy <input type="checkbox"/> sustainability <input type="checkbox"/> value/prices <input type="checkbox"/> product variety <input type="checkbox"/> produced organically <input type="checkbox"/> other _____
50.	Do you raise/grow any of your own food for use in the	<input type="checkbox"/> yes

	restaurant?	<input type="checkbox"/> no
51.	If yes, what percentage of the food that you use in the restaurant do you raise/grow yourself?	
19.	What exactly do you do with your food waste? <i>(Please check all that apply).</i>	<input type="checkbox"/> compost, on site <input type="checkbox"/> compost, hauler picks up <input type="checkbox"/> feed to animals <input type="checkbox"/> used in energy production <input type="checkbox"/> other _____ <input type="checkbox"/> throw away in trash
20.	Does anybody collect your used cooking oil for use in fuel production?	<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> not applicable
53.	Does your business participate in any bartering for products or services?	<input type="checkbox"/> yes <input type="checkbox"/> no
54.	Is any of your business debt held by family, friends or local sources?	<input type="checkbox"/> yes <input type="checkbox"/> no
55.	If yes, what percentage?	
56.	How many minutes does it take you to commute to work?	
57.	How do you commute to work? <i>Please check your primary mode of transportation.</i>	<input type="checkbox"/> Personal vehicle <input type="checkbox"/> Carpool with others <input type="checkbox"/> Walk <input type="checkbox"/> Bicycle <input type="checkbox"/> Public Transportation <input type="checkbox"/> Other (specify) _____
58.	Are you satisfied with your job or the work that you do, overall?	<input type="checkbox"/> yes <input type="checkbox"/> no

Please make comments, suggestions, concerns and/or ideas regarding any of the above questions, as well as regarding the local food system more generally. (Ideas for improvement, barriers to using local product, etc.)
