

Greenbrier Valley Local Food

The Possibilities and Potential



Prepared by:

Laura Hartz
Fritz Boettner
Jason Clingerman

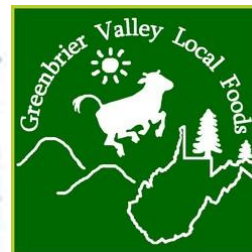
Downstream Strategies
295 High Street, Suite 3
Morgantown, WV 26505
www.downstreamstrategies.com

Prepared for:

Greenbrier Valley Economic Development Corporation
P.O. Box 33
804 Industrial Park Road
Maxwelton, WV 24957
www.gvedc.com

October 6, 2011

**Downstream
Strategies**
building capacity for sustainability



Greenbrier Valley Local Food: The Possibilities and Potential

Laura Hartz, Fritz Boettner, Jason Clingerman

ABOUT THE AUTHORS

Laura Hartz, M.S., Project Manager, Land Program. Ms. Hartz focuses on issues related to agricultural policy and sustainability. Ms. Hartz has a background in agriculture and natural resources. She is skilled in the synthesis and presentation of scientific research and policy analysis.

Fritz Boettner, M.S., Principal, GIS Program. Mr. Boettner leads the GIS program and has over ten years of professional experience in a wide array of environmental consulting activities. He uses GIS to complete projects at the local, regional, and national levels in the fields of planning, water resources, and environmental science.

Jason Clingerman, M.S., Aquatic Ecologist. Mr. Clingerman is experienced in natural resources science and management, specifically in aquatic ecology and water monitoring. He also has six years of experience utilizing GIS technologies for geographic and aquatic applications.

ACKNOWLEDGEMENTS

This project would not have been possible without the vision and guidance provided by Jim Cooper. Additionally, Stacie Gilmore, former Volunteer in Service to America with the Greenbrier Valley Economic Development Corporation, provided many of the pictures and local knowledge for the report. We also thank the residents and farmers of Monroe, Pocahontas, and Greenbrier counties who attended preliminary presentations of this content in April 2011, and provided feedback. We also thank Rich Zobel, Plant Physiologist, and William Clapham, Supervisory Plant Physiologist at the Appalachian Farming Systems Research Center; William Bryan, Professor Emeritus of Animal Science at West Virginia University; and Lewis Jett, State Vegetable Small Fruit Crops Specialist at West Virginia University Extension.

This project was developed with assistance from Ken Meter of the Crossroads Resource Center, Minneapolis, Minnesota. Ken completed an initial food system assessment for the Greenbrier Valley in April 2011; from this conversation about agriculture and the economy arose the need to address the question: What's next? This report is an initial response to that question. What comes next will be determined by the region's residents.

We offer special thanks to the West Virginia Community Development Hub and West Virginia Food and Farm Coalition for whom a statewide food system assessment is being completed. Their project team provided invaluable guidance on this project. These individuals include: Dr. Cheryl Brown, Associate Professor in Agricultural and Resource Economics at West Virginia University; Daniel Eades, Extension Specialist with the Community, Economic & Workforce Development program area of West Virginia University Extension; and Tom McConnell, Director of the West Virginia Small Farm Center.

Thank you to the McCormick Family for authorizing the use of the front page photograph of their home, Byrnside Branch Farm, in Union, West Virginia.

TABLE OF CONTENTS

FORWARD..... 1
A note on using this report from the Greenbrier Valley Economic Development Corporation.....1

EXECUTIVE SUMMARY 2

1. INTRODUCTION 3

1.1 BACKGROUND3

1.2 BENEFITS OF A LOCAL FOOD SYSTEM.....5

 1.2.1 *Economy*5

 1.2.2 *Health*5

 1.2.3 *Food security*.....6

 1.2.4 *Environment*.....6

2. CURRENT DEMAND..... 7

2.1 PRODUCTION NEEDED7

 2.1.1 *Vegetables*8

 2.1.2 *Fruits*9

 2.1.3 *Animal products*.....9

2.2 USING THE CURRENT DEMAND DATA10

3. CURRENT AGRICULTURAL PRODUCTION 11

3.1 PATTERNS IN CURRENT AGRICULTURAL PRODUCTION11

3.2 CURRENT LOCAL FOOD MARKETS14

4. POTENTIAL AGRICULTURAL PRODUCTION 15

4.1 AGRICULTURAL LAND15

 4.1.1 *Farmland classes*.....16

 4.1.2 *Farmland categories*17

4.2 INCREASING AGRICULTURAL PRODUCTION17

 4.2.1 *Berries*.....18

 4.2.2 *Lettuce and salad greens*20

 4.2.3 *Sheep, lambs, and goats*21

 4.2.4 *Grass-fed beef*.....23

 4.2.5 *Pastured poultry*25

5. CONCLUSION 26

5.1 RECOMMENDATIONS FOR ENHANCING THE LOCAL FOOD SYSTEM26

5.2 SUMMARY28

APPENDIX I: GREENBRIER VALLEY-BASED RESOURCES 32

APPENDIX II: STATEWIDE AND REGIONAL RESOURCES 33

TABLE OF TABLES

Table 1: Vegetable production needed, pounds, 2007.....	8
Table 2: Fruit production needed, pounds, 2007	9
Table 3: Meat, dairy, and honey production needed, pounds, 2007	10
Table 4: Farmland classes, 2007	17

TABLE OF FIGURES

Figure 1: Project study area	3
Figure 2: Poverty rate, 2000	4
Figure 3: Farmland uses, 2007	11
Figure 4: Farm sizes, 2007.....	11
Figure 5: Annual sales, 2007	12
Figure 6: Average crop acreage per farm, 2007	12
Figure 7: Types of farm products, 2007	13
Figure 8: Local food market outlets	14
Figure 9: Comparison of farmland designation	15
Figure 10: Farmland classes.....	16
Figure 11: Farmland categories	17
Figure 12: Suitability of greenhouse technology	18
Figure 13: Close-up, suitability of greenhouse technology near Lewisburg	19
Figure 14: High and low tunnels in West Virginia	20
Figure 15: Slope of available farmland	21
Figure 16: Remaining farmland if management-intensive grazing is used	24
Figure 17: Example pastured poultry operation	25
Figure 18: Types of institutions.....	26
Figure 19: Institutions in the Greenbrier Valley, 2011.....	27

ABBREVIATIONS

BEA	Bureau of Economic Analysis
CEO	Center for Economic Options
CISA	Communities in Sustainable Agriculture
CSA	community supported agriculture
DC	District of Columbia
GIS	geographic information system
GVEDC	Greenbrier Valley Economic Development Corporation
GVLf	Greenbrier Valley Local Foods Initiative
GVLFP	Greenbrier Valley Local Foods Publications
GVPN	Greenbrier Valley Pasture Network
MIG	management intensive grazing
NASS	National Agricultural Statistics Service
NRCS	Natural Resources Conservation Service
SNAP	Supplementary Nutrition Assistance Program
US	United States
USD	US dollars
USDA	US Department of Agriculture
VISTA	Volunteers in Service to America
WV	West Virginia
WVFFC	West Virginia Food and Farm Coalition
WVFMA	West Virginia Farmers Market Association
WVU	West Virginia University

FORWARD

A note on using this report from the Greenbrier Valley Economic Development Corporation

September 21, 2011

In commissioning this study, the Greenbrier Valley Economic Development Corporation is establishing a foundation of data and information from which we can build a stronger agricultural community in Greenbrier, Monroe, and Pocahontas counties. This report is the start to developing a broader program, the Greenbrier Valley Local Foods Initiative, which will regionalize our agricultural community, and refocus our attention on local foods. The program will highlight the inherent strength found in growing, raising and selling goods on a local and regional basis, and provide resources to assist the community in doing so.

There is, however, much more to do. This study has little value if its information is not used to the benefit of the farms and businesses in the three counties. A study that sits on a shelf, unused, is simply a vehicle for collecting dust. Therefore, our task as community members and leaders is to pose the question: How do we use this study to benefit the farms and business of the Greenbrier Valley region? What strategies do we use to stimulate our agricultural economy?

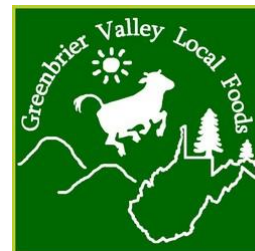
As you read, record your ideas on using the information that the report presents. At the end of the report, there is a list of references and resources where you can find more information about practices and techniques, and new products and opportunities that will prove useful as you consider ways to improve the productivity of your business.

Most importantly, the Greenbrier Valley Local Foods Initiative welcomes your ideas. The complexity of today's marketplace, business practices, and regulatory climate means that there are no simple answers, no one solution to all the problems that producers face. The solutions themselves will be many and varied, complex, and perhaps even costly. But we will continue to work. This study is an opportunity to leverage our learnings into the community, but it is just one piece of the puzzle. It will not find its own spot in that puzzle. We must do that, and together we will.

With combined efforts from all community members, we will see the *Possibilities and the Potential* of the Greenbrier Valley come to life.

Stephen Weir, Executive Director
Greenbrier Valley Economic Development Corporation

Jill G. Young, Project Coordinator
Greenbrier Valley Local Foods



EXECUTIVE SUMMARY

The Greenbrier Valley is a three-county region in southeastern West Virginia that has tremendous potential for a robust local food system and economy. Pocahontas, Monroe, and Greenbrier counties make up the 1.5 million acre region that is home to more than 56,000 people. Currently, hay and livestock-based agriculture dominate the agricultural landscape; the rest of the vista is composed of towns, rural neighborhoods, forests, and mountains. Following a groundswell of interest in local food by the communities in the region, the Greenbrier Valley Economic Development Corporation commissioned this study to frame the potential for an expanded local food system that would bring jobs to the region, create health for its residents, and ensure an adequate food supply of fresh fruits, vegetables, meats, and other goods.

This study is an answer to that call for information. It synthesizes information from the Agricultural Census, Economic Research Service, soil survey, satellite imagery, extension crop budgets, university professionals, and local residents to illustrate the potential for satisfying a portion of local food needs and for building a specialty foods export market.

This study found that there is abundant land—over 336,000 acres—in the Greenbrier Valley that is suitable for agricultural production. This land can be used for farming without cutting down any additional trees. The region’s hilly terrain is particularly well suited to grazing cows, sheep, and goats. Other potentially fruitful crops include berries and pastured poultry. Greenhouse technologies like high and low tunnels might prove especially useful, given the region’s high elevation. These are just some of the potential markets that could support a viable agricultural economy and thriving local food system. Additionally, there are more than 11 different organizations in the region and state ready to help support a local food system. With this combination of land-based and social resources, the Greenbrier Valley region is uniquely positioned to develop a robust local food system.

1. INTRODUCTION

1.1 Background

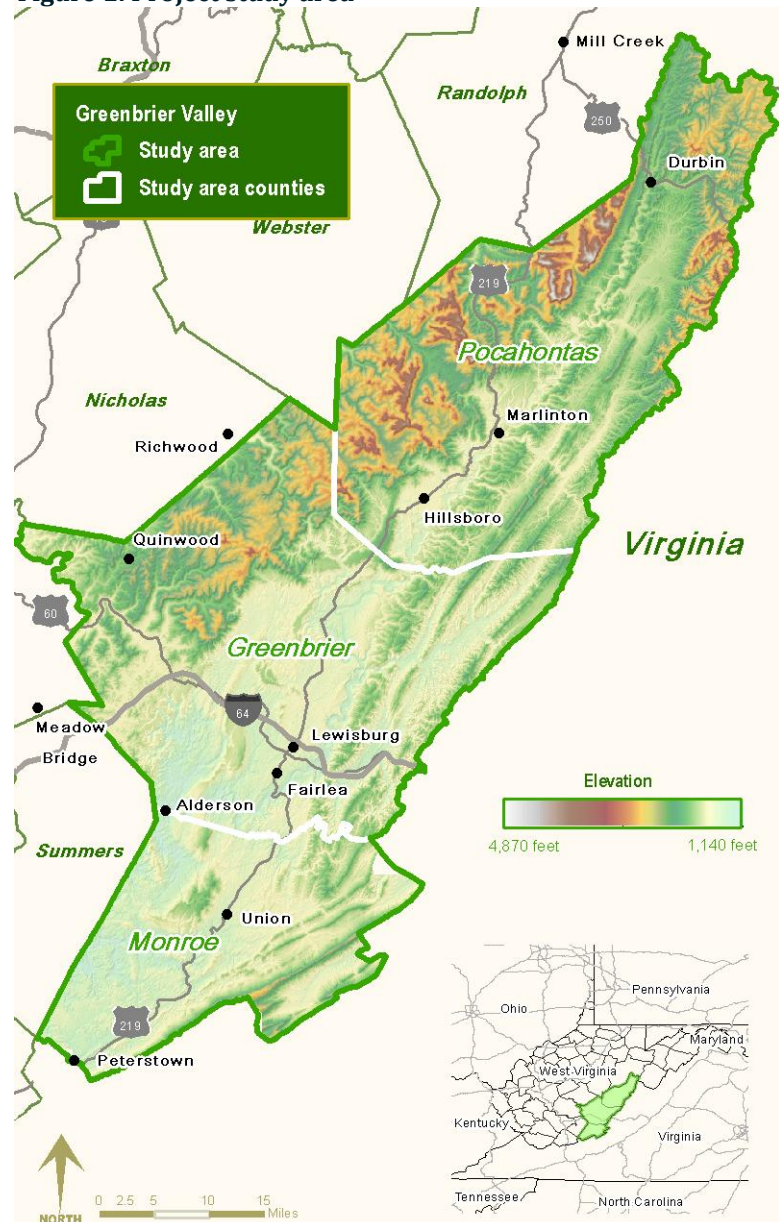
Approximately 1.8 million people live in the state of West Virginia (US Census Bureau, 2011a). If all of the food consumed by these individuals in one day were brought into the state, it would require 118 tractor trailer truck loads weighing 20 tons a piece (Market Estimator, 2011). In fact, most of the food currently consumed is produced out of state, representing more than \$4 billion flowing out the state's borders (Meter, 2011a).

However, the state is well positioned to provide its residents with food to offset a portion of these imports and lost revenue. This study highlights some of these possibilities for the Greenbrier Valley region.

Located in a scenic region in southeastern West Virginia, the Greenbrier Valley lies in the Allegheny region of the Appalachian Mountains. The region encompasses Greenbrier, Monroe, and Pocahontas counties (shown in Figure 1). With 56,694 residents and 2,435 square miles, the valley is home to 3% of the state's total population on 10% of the state's land area, demonstrating the rural quality of the region (US Census Bureau, 2011a and 2011b). The dominant industries in the area are outdoor recreation and tourism, timber, coal, and agriculture (Pocahontas County Chamber of Commerce, 2011; Greenbrier County Commission, 2011; and Monroe County, 2011). Named after one of its premiere natural assets, the Greenbrier River, the Greenbrier Valley offers beautiful scenery, rolling hills and pastures, and a close-knit—albeit widely dispersed—community.

While the region is rich in natural assets, it is poor in economic opportunities by most metrics (Figure 2). In 2009, the average income for the three counties was \$33,587. This amount is only 90% of the median household income for the state, which is even further below the national level (US Bureau of Labor Statistics, 2011). Moreover, the average adult and child poverty rates for the region are 19.1% and 27% respectively (US

Figure 1: Project study area



Source: Statewide elevation grid, 30 meter, US Geological Survey (2011). Base Map: Esri mapping data (2010).

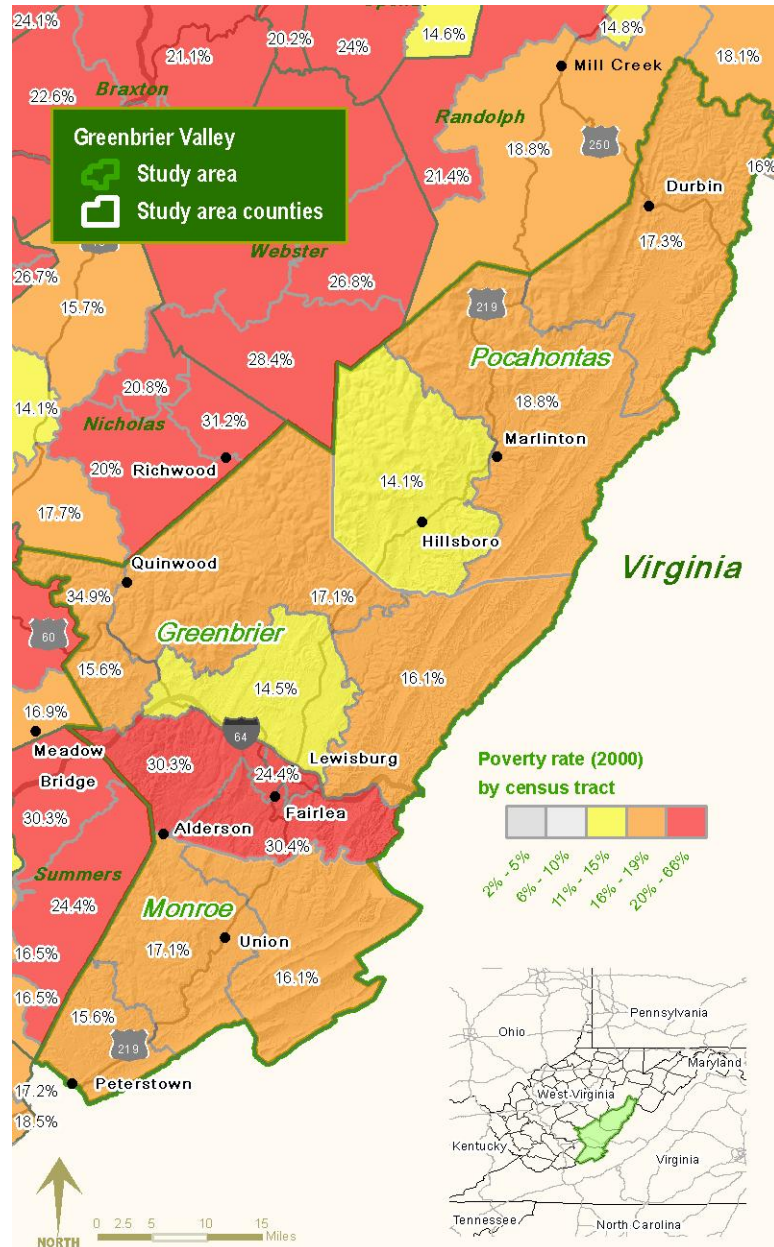
Census Bureau, 2009). These statistics do not fully reflect increased poverty levels caused by job losses and indirect effects of the economic recession. According to the Appalachian Regional Commission, the rate of job loss was more severe, and the rates of labor force growth and population growth were slower in Appalachia than in the rest of the country (Appalachian Regional Commission, 2010). West Virginia is the only state that is entirely encompassed in the 13-state Appalachian Region.

However, one positive economic trend in Greenbrier County may be linked to agriculture. Where farms in the other two counties had negative farm and proprietor income that was consistent with the statewide trend, Greenbrier County had positive on-farm income (BEA, 2011). Farms are a part of the culture of the area, and are being promoted as such (Greenbrier Convention and Visitor’s Bureau, 2011). The number of farms in Greenbrier County increased 13% from 2002 to 2007, compared with 4% in each Monroe and Pocahontas counties (Meter, 2011b). Greenbrier County’s burgeoning economic success may be attributed to its growing recognition of farms, a trend yet unrealized in the other two counties.

Monroe and Pocahontas counties also have distinguishing assets. Together, the two counties contain 11 of the region’s 13 organic farms, which make up 15% of organic farms in the state, even though the region contains only 8% of all farms (USDA, 2007a). All three counties demonstrate higher than average rates of conservation—like limited tilling, for example—accounting for 14% of total farms that use conservation practices in the state (USDA, 2007a). This statistic exhibits a willingness to innovate, which is an asset that could—if aided by the right resources—lead to creative solutions in the local food system. Additionally, the number of farms and sales of vegetables have increased 85% over 2002 levels (Meter, 2011b). The Greenbrier Valley region appears to be on the verge of a local foods movement.

Therefore, the goal of this report is to highlight the existing agricultural opportunities and the future possibilities for a bustling local food economy within the Greenbrier Valley.

Figure 2: Poverty rate, 2000



Source: US Census Bureau (2000).

1.2 Benefits of a local food system

Local food provides a variety of positive impacts to the wellbeing of the residents and environment of the region (Dillon, 2007; Martinez et al., 2010). Other benefits include enhanced food safety (Peters et al., 2008) and overall community building. The most immediate benefits for the Greenbrier Valley region relate to the economy, the residents' health and food security, and the overall benefit to the environment.

1.2.1 Economy

The positive economic impacts of a local food system are many. Primarily, these benefits take the form of income and employment by two main mechanisms: substitution (buying local food instead of food from far away) and localization (bringing processing activities into the region instead of processing food far away) (Martinez et al., 2010). Both of these methods result in more jobs and more re-circulated dollars, as an enhanced local food system can even stimulate neighboring business and increase the sharing of local skill sets (Martinez et al., 2010). "If consumers purchase food produced within a local area instead of imports from outside the area, sales are more likely to accrue to people and businesses in the area" (Martinez et al., 2010).

Farmers markets in West Virginia created 69 full-time equivalent jobs (Hughes et al., 2008).

In an evaluation of the impact of farmers markets in West Virginia, Hughes et al., (2008) found that farmers markets generated \$2.4 million in industry output and 69 full time equivalent jobs in the state.¹

"Money spent on local produce at farmers' markets, at locally owned shops, or on locally produced foods stays in the community longer, creating jobs, raising incomes, and supporting farmers" (Halweil, 2002, p. 7).

Improved economic success is particularly important to the Greenbrier Valley region's residents, many of whom earn less than 90% of the state's median income level, which is lower yet than the national level (US Bureau of Labor Statistics, 2011).

1.2.2 Health

Local food systems improve the health of residents, in addition to helping the economy. Local food is usually fresher and less processed, and may have more nutrients than its counterparts produced far away (Martinez et al., 2010). Aside from the nutrients contained in the food itself, accessible local food may lead to healthier diet choices, like eating more fruits and vegetables, because there are more available. The availability of healthy food options is associated with better health outcomes (Morland, et al., 2002). People who have a community supported agriculture (CSA)² membership may eat more fruits and vegetables (Perez et al., 2003 and Olberholtzer, 2004; as cited in Martinez et al., 2010). Additionally, local food may also improve school children's diets (Martinez et al., 2010). School-based healthy food programming increases fruit intake, and may positively increase vegetable intake (French and Stables, 2003).

"Local food systems are an invaluable resource for creating healthy communities because their actors have the ability to increase the amount of affordable fresh food available in community stores, farmers markets, low income food basket program, road side stands, and restaurants" (Dillon, 2007, p. 4).

¹ Hughes also found that farmers markets displaced some food spending at grocery stores; the net effect of farmers markets was positive at \$1 million output and 43 full time equivalent jobs and (Hughes et al., 2008).

² A CSA share is a portion of a farm's produce that is purchased prior to the season. CSAs enhance farm viability by providing guaranteed, predictable demand throughout the growing season, and pre-season capital to help with upfront expenses.

The Greenbrier Valley has room for improved access to fresh fruits and vegetables, given that the average obesity rates for the region are 30% (Centers for Disease Control and Prevention, 2011).

1.2.3 *Food security*

A necessary component of health, “food security” is a federal term that refers to the accessibility of an adequate amount of food to lead a healthy life; low income people often face low food security. Local food may increase food security for certain populations, especially via federal and state programming that enables farmers markets to accept—and in some cases double—Supplementary Nutrition Assistance Program (SNAP) benefits.³ The improvement of food security is especially important in the Greenbrier Valley region because of the high rate of poverty affecting both adults and children in the region (19.1% and 27% respectively, US Census Bureau, 2009).

1.2.4 *Environment*

An improved local food system can improve both the local and global environment. Shorter distances between consumers and producers can lessen the amount of energy spent in transporting food, and therefore lessen its greenhouse gas emissions (Peters et al., 2008; Ikerd, 2005).

“Eating local creates economic opportunities for caring farmers to care for their land” (Ikerd, 2005).

If not grown locally, fruits and vegetables travel 1,494 miles before reaching the consumer (Pirog, 2003).

Supporting local foods can help to preserve farmland (Dillon, 2007; Ikerd, 2005). Local food systems build relationships between producers and consumers, which can improve producers’ commitments to environmental stewardship (Peters, et al., 2008).

The Greenbrier Valley region has much to gain from an improved local food system, including benefits to the economy, health and food security of its residents, and environment, both local and global.

³ SNAP benefits were formerly known as food stamps.

2. CURRENT DEMAND

The 56,000 residents of the Greenbrier Valley spend \$139 million buying food each year; more than half of that—amounting to \$80 million—is spent on food consumed at home (Meter, 2011b). While markets in large population centers like Washington DC, Baltimore, New York City, and Chicago are likely candidates for high-priced specialty agricultural products, satisfying the needs of the local community is also important. This section considers the potential market in the Greenbrier Valley for Greenbrier Valley–grown products.

Substitution of Greenbrier Valley Grown goods for goods that are otherwise imported to the region would inevitably boost the economy and cause wealth to recirculate in the region. If the residents purchased even half of their fruit and vegetables from Greenbrier Valley farms, it would keep more than \$6 million in the region (Meter, 2011b).

2.1 Production needed

In order to understand the size of the potential market for Greenbrier Valley–grown vegetables, fruits, and animal products, we used the Leopold Center for Sustainable Agriculture’s Market Estimator (2011).

“Production needed” refers to the amount of a given food product that is required for a farmer to produce in order to provide the amount that a consumer would consume. Production needed also includes waste that is lost during transportation, processing, distribution, and preparation. We use production needed to estimate the amount of food required.

The Market Estimator provides data for a range of food products. We selected only those that could be reasonably grown in West Virginia. For example, we excluded citrus fruit. We also chose to focus only on vegetables, fruits, and animal products, excluding products from the categories of nuts, grains, and fat and sugar.

U.S. Food Market Estimator

1. Select Food Products
Fields left blank will include results for all items in that group or product.

Food Group: Vegetables | Sub-Group: Green Vegetable | Product: Broccoli | Sub-Product:

2. Select Market Factors

Units: Pounds | Market Target: Production Needed | Timeframe: Annually

State: West Virginia

3. Market Share
(national, state or county)

Percentage (%): 100

CALCULATE **RESET**

Pounds Production Needed Annually: 16,041,098

Per Capita Rate: 8.85
Population: 1,812,035

Breakdown of Selected Products:

Food	Percentage	Location	Population
Broccoli, Fresh	69 %	Barbour County, WV	137,498
Broccoli, Fresh	69 %	Berkeley County, WV	882,898
Broccoli, Frozen	31 %	Boone County, WV	223,093

The Market Estimator uses USDA Economic Research Service Food Availability data to estimate the amount of up to 204 products consumed annually. Visit www.ctre.iastate.edu for more information.

2.1.1 Vegetables

The vegetables most consumed in the Greenbrier Valley include potatoes, tomatoes, lettuce, sweet corn, onions, carrots, broccoli, cabbage, snap beans, and dry legumes—all of which comprise 76% of the vegetables consumed in the region, by weight (see Table 1). The top five vegetables—potatoes, tomatoes, lettuce, sweet corn, and onions—comprise 66% of all of the vegetables consumed, meaning that there is relatively little diversity in vegetable consumption. Significantly, potatoes and tomatoes far outweigh the other vegetables represented, comprising 45% of total vegetables consumed.

Table 1: Vegetable production needed, pounds, 2007

Vegetable	Per capita				Greenbrier	Monroe	Pocahontas	Greenbrier Valley
	Fresh	Frozen	Canned	Total				
Potatoes	50.38	52.80	0.78	103.96	3,607,100	1,412,401	892,601	5,912,101
Tomatoes	19.89	0.00	64.51	84.40	2,928,427	1,146,658	724,658	4,799,744
Lettuce	35.15	0.00	0.00	35.15	1,219,600	477,548	301,798	1,998,945
Sweet corn	8.64	9.36	8.35	26.35	914,266	357,991	226,241	1,498,498
Onions	21.56	0.00	0.00	21.56	748,067	292,914	185,114	1,226,096
Carrots	8.72	1.70	1.09	11.51	399,362	156,375	98,825	654,562
Broccoli	6.13	2.72	0.00	8.85	307,068	120,236	75,986	503,291
Cabbage	8.19	0.00	0.00	8.19	284,168	111,269	70,319	465,757
Snap beans	2.12	1.88	3.88	7.88	273,412	107,058	67,658	448,128
Dry legumes	7.14	0.00	0.00	7.14	247,737	97,004	61,304	406,045
Bell peppers	7.01	0.00	0.00	7.01	243,226	95,238	60,188	398,652
Chile peppers	0.00	0.00	6.36	6.36	220,673	86,407	54,607	361,687
Cucumbers	6.33	0.00	0.00	6.33	219,632	85,999	54,349	359,981
Celery	6.07	0.00	0.00	6.07	210,611	82,467	52,117	345,195
Misc. vegetables	0.00	2.87	2.68	5.55	192,568	75,402	47,652	315,623
Squash	5.02	0.00	0.00	5.02	174,179	68,202	43,102	285,482
Pumpkin	4.79	0.00	0.00	4.79	166,199	65,077	41,127	272,403
Sweet potatoes	4.57	0.00	0.00	4.57	158,565	62,088	39,238	259,891
Mushrooms	2.55	0.00	1.47	4.02	139,482	54,616	34,516	228,613
Green peas	0.00	1.73	1.11	2.84	98,539	38,584	24,384	161,508
Spinach	2.01	0.43	0.00	2.44	84,661	33,150	20,950	138,760
Garlic	2.38	0.00	0.00	2.38	82,579	32,335	20,435	135,348
Cauliflower	1.71	0.42	0.00	2.13	73,905	28,938	18,288	121,131
Asparagus	1.13	0.10	0.17	1.40	48,576	19,020	12,020	79,617
Eggplant	0.96	0.00	0.00	0.96	33,309	13,043	8,243	54,594
Collard greens	0.53	0.00	0.00	0.53	18,389	7,201	4,551	30,141
Radishes	0.53	0.00	0.00	0.53	18,389	7,201	4,551	30,141
Okra	0.40	0.00	0.00	0.40	13,879	5,434	3,434	22,748
Mustard greens	0.38	0.00	0.00	0.38	13,185	5,163	3,263	21,610
Turnip greens	0.37	0.00	0.00	0.37	12,838	5,027	3,177	21,042
Kale	0.33	0.00	0.00	0.33	11,450	4,483	2,833	18,767
Lima beans	0.04	0.28	0.00	0.32	11,103	4,348	2,748	18,198
Brussels sprouts	0.28	0.00	0.00	0.28	9,715	3,804	2,404	15,923
Escarole	0.24	0.00	0.00	0.24	8,327	3,261	2,061	13,649

Source: Production needed data from Leopold Center for Sustainable Agriculture (2008), population estimates from US Census Bureau (2011a). Fresh potatoes include dehydrated potatoes. Lettuce includes leaf lettuce and head lettuce. Dry legumes include dry edible beans, peas, and lentils.

2.1.2 Fruits

The top ten most-consumed fruits (by weight) include apples, watermelon, grapes, cantaloupe, peaches, strawberries, pears, honeydew, cherries, and plums, which comprise 98% of all fruits consumed. As described above, we excluded all citrus and tropical fruits, like oranges and bananas, because they cannot feasibly be grown in West Virginia. The top five products—apples, watermelon, grapes, cantaloupe, and peaches—comprise 82% of all fruits consumed (see Table 2). Significantly, apples comprise 43% of all fruit consumed.

Table 2: Fruit production needed, pounds, 2007

Fruit	Per capita						Greenbrier	Monroe	Pocahontas	Greenbrier Valley
	Fresh	Frozen	Can	Juice	Dried	Total				
Apples	17.77	0.84	4.19	26.84	0.93	50.57	1,754,627	687,044	434,194	2,875,865
Watermelon	15.91	0.00	0.00	N/A	N/A	15.91	552,029	216,153	136,603	904,786
Grapes	7.68	0.00	0.00	4.76	0.00	12.44	431,631	169,010	106,810	707,450
Cantaloupe	9.57	0.00	0.00	N/A	N/A	9.57	332,050	130,018	82,168	544,236
Peaches	4.58	0.42	2.89	0.00	0.22	8.11	281,393	110,182	69,632	461,208
Strawberries	6.14	1.65	0.00	0.00	0.00	7.79	270,290	105,835	66,885	443,010
Pears	3.19	0.00	2.39	0.00	0.02	5.60	194,303	76,082	48,082	318,466
Honeydew	2.12	0.00	0.00	N/A	N/A	2.12	73,558	28,802	18,202	120,562
Cherries	1.10	0.82	0.15	0.00	0.00	2.07	71,823	28,123	17,773	117,719
Plums	1.01	0.01	0.06	0.00	0.46	1.54	53,433	20,922	13,222	87,578
Apricots	0.08	0.01	0.10	0.00	0.73	0.92	31,921	12,499	7,899	52,319
Blueberries	0.56	0.27	0.00	0.00	0.00	0.83	28,799	11,276	7,126	47,201
Raspberries	0.44	0.29	0.00	0.00	0.00	0.73	25,329	9,918	6,268	41,514
Blackberries	0.00	0.07	0.00	0.00	0.00	0.07	2,429	951	601	3,981

Source: Production needed data from Leopold Center for Sustainable Agriculture (2008), population estimates from US Census Bureau (2011a). Fruits that cannot be grown in West Virginia on a large scale—like citrus and tropical fruits—have been excluded. N/A indicates product preparation data unavailable through Market Estimator.

If the entire required amount of apples—2.9 million pounds—were transported into the region on trucks, it would require about six semi-trucks every month.

Instead, if Greenbrier Valley residents grew their own apples, it would only require about 180 acres, which is about 0.01% of the entire land area of the region.⁴

2.1.3 Animal products

Of all animal products consumed, milk, chicken, beef, pork, and miscellaneous dairy are the top five products and comprise 85% of animal products consumed by weight. Milk alone comprises 31% of animal products by weight. Milk and all dairy products comprise 45% of animal products consumed (see Table 3). These dairy

⁴ The facts in the box are derived from US Market Estimator (Leopold Center for Sustainable Agriculture, 2008) and 2007 apple production yield estimates from NASS (2007). Land area is from US Census Bureau (2011a).

products require a significant amount of milk themselves. For example, it requires about 8.2 pounds of milk to make one pound of cheddar cheese (USDA, 2011).

Table 3: Meat, dairy, and honey production needed, pounds, 2007

Product	Total per capita	Greenbrier	Monroe	Pocahontas	Greenbrier Valley
Milk	181.59	6,300,628	2,467,082	1,559,132	10,326,842
Chicken	101.91	3,535,971	1,384,549	874,999	5,795,520
Beef	94.31	3,272,274	1,281,296	809,746	5,363,315
Pork	63.04	2,187,299	856,461	541,261	3,585,022
Misc. dairy	47.29	1,640,821	642,482	406,032	2,689,335
Eggs	32.76	1,136,674	445,077	281,277	1,863,028
Cheese	30.07	1,043,339	408,531	258,181	1,710,051
Turkey	16.87	585,338	229,196	144,846	959,380
Fish	6.80	235,940	92,385	58,385	386,709
Lamb	1.19	41,289	16,167	10,217	67,674
Honey	1.12	38,861	15,216	9,616	63,693
Misc. fish	0.24	8,327	3,261	2,061	13,649

Source: Production needed data from Leopold Center for Sustainable Agriculture (2008), population estimates from US Census Bureau (2007). Milk includes buttermilk, flavored milks, and milks of various butterfat compositions. Miscellaneous dairy includes butter, cream cheese, cream, sour cream, ice cream, ice milk, and miscellaneous frozen dairy. Fish includes catfish and trout. Beef tallow and lard were excluded because they are out of the scope of this report.

2.2 Using the current demand data

These data estimate the possible market share for a given agricultural product. For example, if a farmer were thinking about opening a honey business and wanted to see if there would be enough demand for her product within her county, she could use Table 3 to arrive at a ballpark figure for the potential market share.

Monroe county residents require 15,216 pounds of honey annually (Table 3). In 2006, 210,000 pounds of honey were reportedly produced in the entire state of West Virginia (NASS, 2007). If all of this honey production were equally distributed among the 55 counties in the state, Monroe County residents would require an additional 11,398 pounds of honey to meet the total required amount. In 2007 in West Virginia, one colony of bees produced 48 pounds of honey, on average (NASS, 2007).

*If Monroe County were to try to produce all of the honey that its residents needed within county bounds, it would require 317 colonies of bees, which is about one colony for every 200 acres in the county.*⁵



Production needed demand data in the Greenbrier Valley tells the same story as consumer expenditure and farmer sales data: Greenbrier Valley residents spent \$13 million on fruits and vegetables in 2008; Greenbrier valley farmers region sold only \$441,000 in fruits and vegetables in the previous year (Meter, 2011b). Even if all these fruits and vegetables were sold in the region, Greenbrier Valley farms would only be satisfying 3% of the region’s need. Measured in both pounds and dollars, there is ample room to increase local food production.

⁵ The facts in the box are derived from US Market Estimator (Leopold Center for Sustainable Agriculture, 2008) and 2007 honey production yield estimates from NASS (2007). Land area is from US Census Bureau (2011a).

3. CURRENT AGRICULTURAL PRODUCTION

The Greenbrier Valley is a unique agricultural region, unlike that of many of the large production agriculture regions such as the fertile plains of the Midwest or the Central Valley in California. The Greenbrier Valley is characterized by hills, valleys, and hollows, which lead to relatively small fields. This unique topography prohibits the type of mechanized agriculture that depends on long rows.

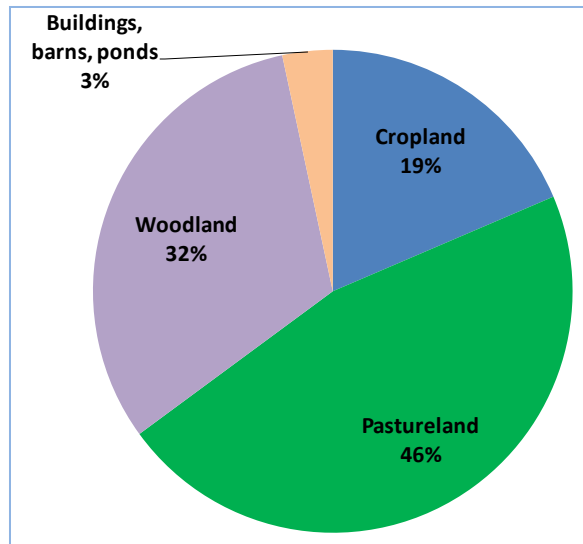
3.1 Patterns in current agricultural production

The Greenbrier Valley is home to 1,978 farms, which is less than 9% of the 23,618 farms in West Virginia (USDA, 2007a). These farms comprise 432,000 acres of farmland, 12% of the state’s total.⁶

Much of this farmland (46%) is used for pasture. The next most abundant land use category is woodland (32%), followed by cropland (19%),⁷ and land used for farm buildings, ponds, barns, and miscellaneous structures (3%) (Figure 3).

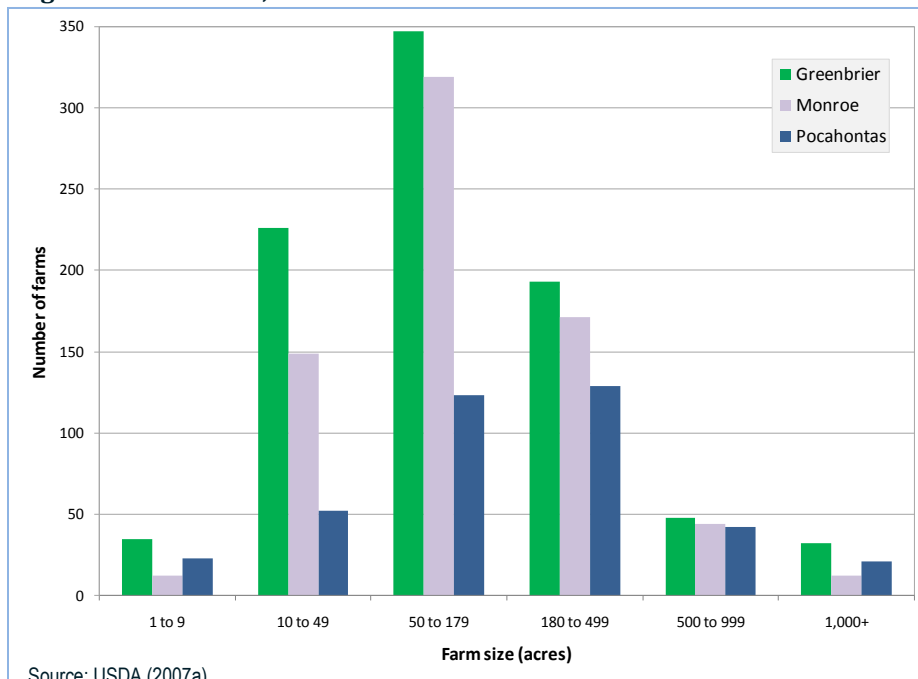
Most farms in the Greenbrier Valley region are small compared to national standards; the mean farm size for the region is 218 acres, while the mean farm size for the nation is 418 acres (USDA, 2007a).

Figure 3: Farmland uses, 2007



Source: USDA (2007a).

Figure 4: Farm sizes, 2007



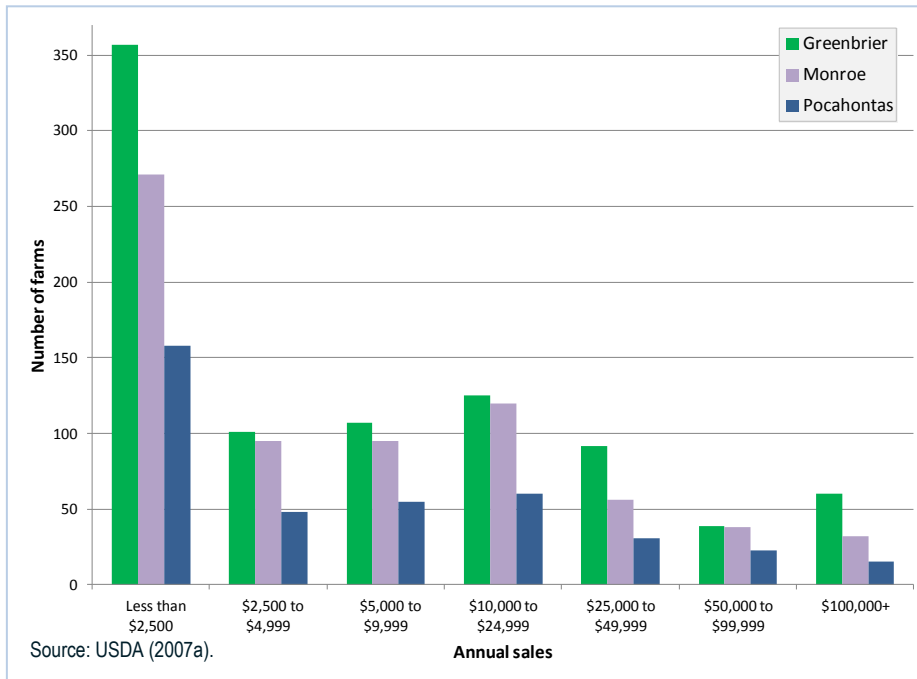
Source: USDA (2007a).

Although small compared to the rest of the country, the average Greenbrier Valley farm is larger than the average 157 acre West Virginia farm. Most farms in the Greenbrier Valley are between 50 and 179 acres.

⁶ Note that in order to be surveyed by the Agricultural Census, a farm must meet the census definition: “a farm is any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year” (USDA, 2007b, p. VII).

⁷Cropland in this context is equal to that which is used for pasture and grazing, and cover crops; and that which is harvested, cultivated in summer fallow, and idle (USDA, 2007b).

Figure 5: Annual sales, 2007



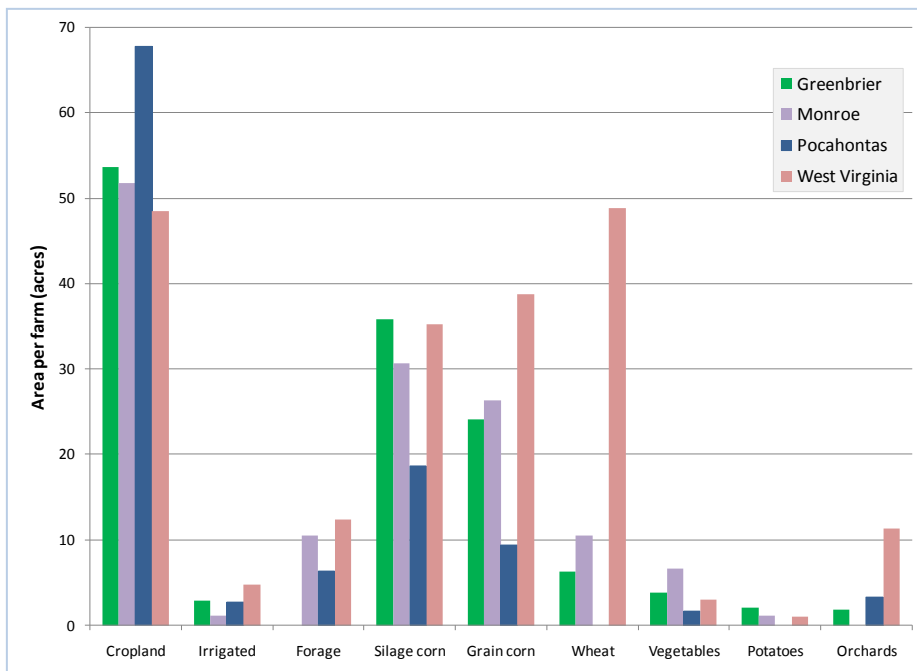
Source: USDA (2007a).

Farms in the Greenbrier Valley are generally small by sales volume statistics: Most sell less than \$2,500 a year (see Figure 4).

Only 386 farms—20% of the total 1,978—reported sales over \$25,000.

The market value of agricultural products sold on average per farm for the region was \$30,973, compared to \$25,051 for the state (USDA, 2007a).

Figure 6: Average crop acreage per farm, 2007



Source: USDA (2007a).

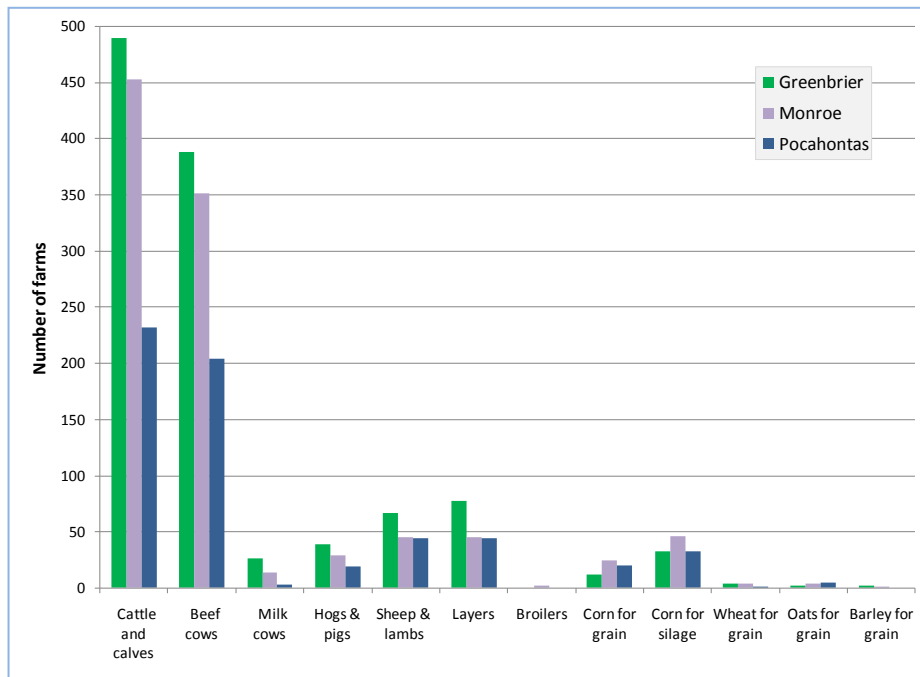
The average amount of land used for pasture, grazing, harvesting, cover crops, and idle land (“Cropland” in Figure 6) by a Greenbrier Valley farm is more than that used by the typical West Virginia farm.

For those farms that grow vegetables in the region, on average they dedicate less than 10 acres to vegetables.

In 2007, Greenbrier County ranked first of all counties in West Virginia for total number of cattle, second for hay, and third for both sheep and wool. Monroe and Pocahontas counties followed the same pattern, ranking high for cattle—second and sixth—and sheep—sixth and second, respectively (NASS, 2007).

The dominance of livestock farming is also reported in the census. Almost 60% of all farms in the region reported some type of cattle and calf operation: 490 farms in Greenbrier, 453 farms in Monroe County, and 232 farms in Pocahontas County.

Figure 7: Types of farm products, 2007



Other types of farm products, including hogs and pigs, sheep and lambs, poultry, and grains, were reported by far fewer farms (Figure 7).

In 2007, 1,259 farms in West Virginia reported having sheep and lambs, a number that has increased by nearly 10% since 2002 (USDA, 2007a).

Source: USDA (2007a).

Currently, hay and livestock-based agriculture dominate the landscape of the Greenbrier Valley region.



3.2 Current local food markets

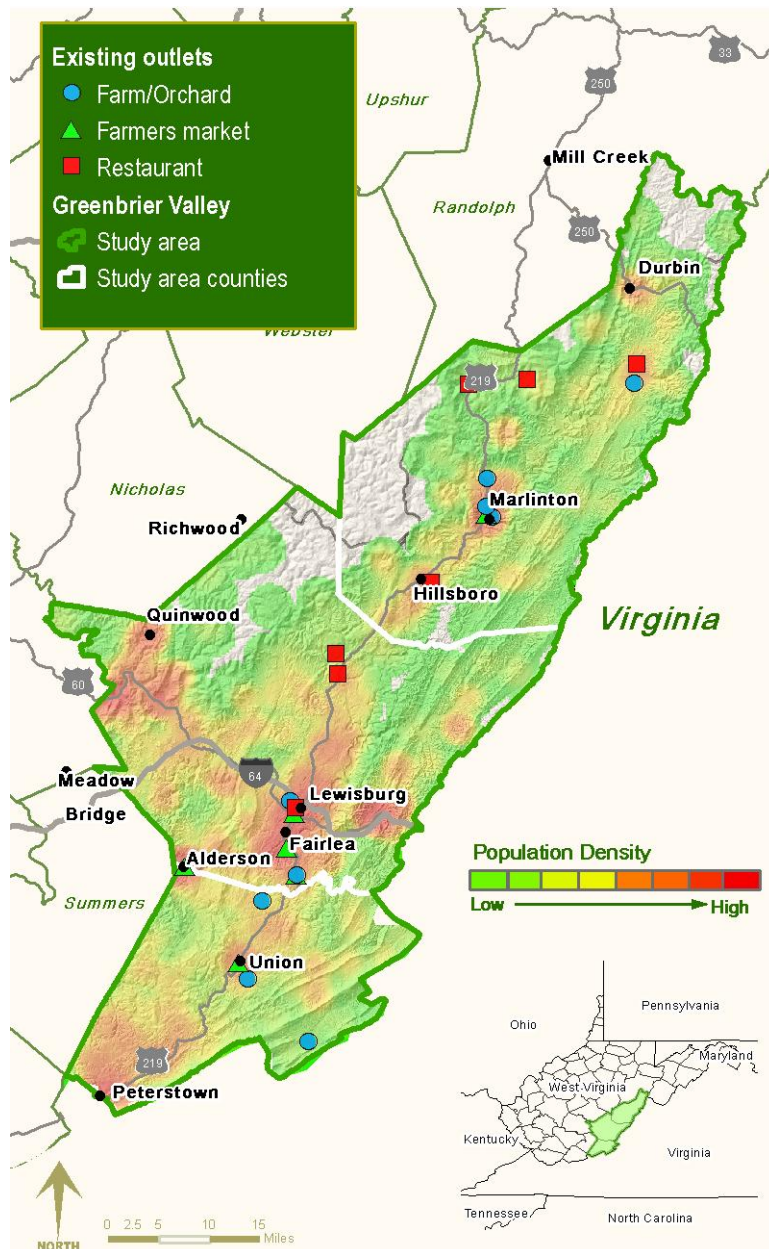
The USDA Agricultural Census presents an incomplete picture of the full range of agricultural activities in the region. Farmers are required to participate if they sold at least \$1,000 of some type of agricultural good during the current year or the previous year. This low threshold may result in over-reporting the number of farms (Farmer, 2011).

Furthermore, the Agricultural Census is most useful for state-level analysis. The Agricultural Census reports a limited amount of information on the zip code level, but not all information is available for all zip codes in West Virginia.

In order to supplement our understanding of the local food activities currently ongoing in the Greenbrier Valley region, we mapped locations that sell local food, including farmers markets, restaurants, roadside stands, and other farms (Figure 8).

Most local food market outlets are located along Route 219 and the Greenbrier River. These locations are generally correlated with population density in the region, except for south of Quinwood, which shows high population, but no local food market outlets (Figure 8).

Figure 8: Local food market outlets



Source: US Census Bureau (2000), point density analysis performed in ARCMAP using block population points. Local food outlets from Greenbrier Valley Local Foods Initiative (2011).

4. POTENTIAL AGRICULTURAL PRODUCTION

The next step toward reaching an understanding of the potential for a localized food system is to assess the actual space available to farm.

4.1 Agricultural land

For this spatial analysis of agricultural land, we relied on two primary datasets: one that describes farmland classes based on government designation (NRCS, 2011a) and a second, called “Cropscape,” based on aerial photography and remotely sensed data (NASS, 2011). Using both datasets enables us to see all of the land that is farmed or could be farmed. The two datasets show the same trend: Most agricultural production in the region occurs along the fertile Greenbrier River Valley and in the lowlands to the south and west. Figure 9 compares the two datasets.

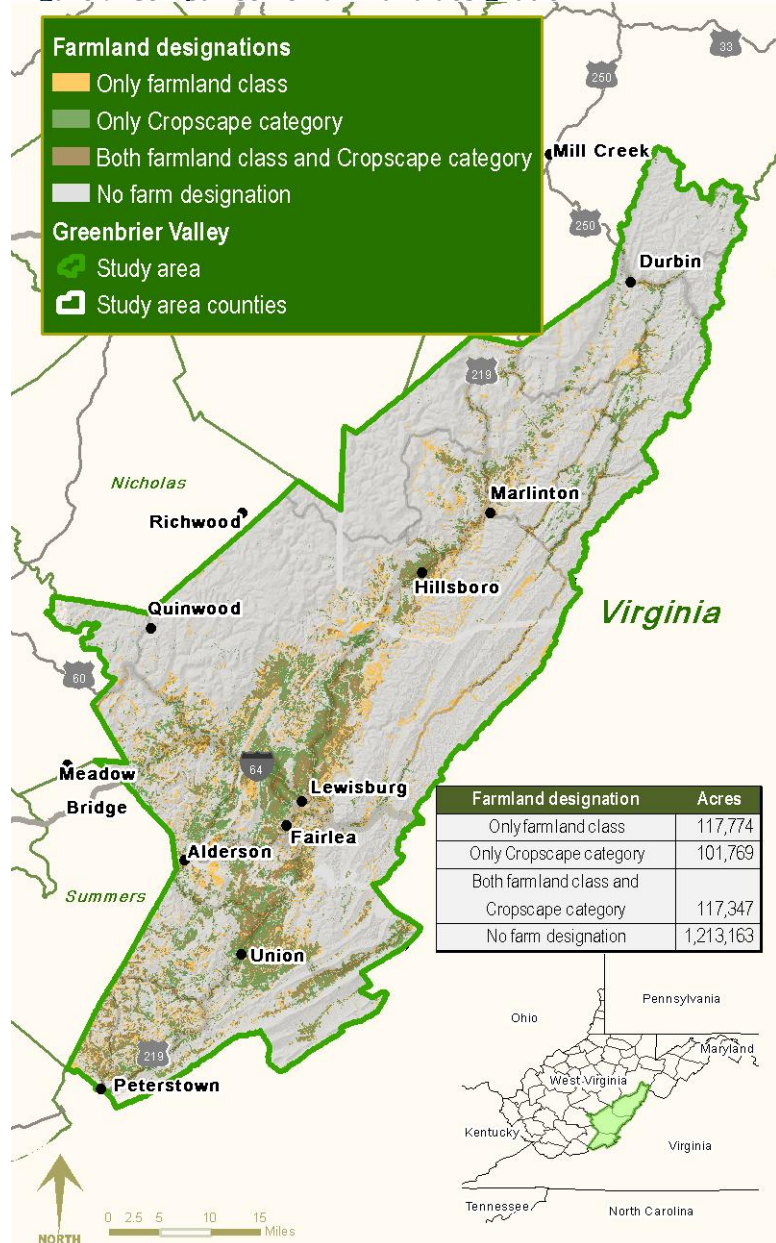
The government farmland designation is based on the county soil survey and other parameters, and is established by the Natural Resources Conservation Service (NRCS), local governments, and county commission; while Cropscape data are based on remotely sensed information (NASS, 2011). When merged, the datasets illustrate the agriculturally productive land in the region (Figure 9).

The datasets indicate that there are more than 336,000 acres of land in the Greenbrier Valley region that is suitable for agricultural production. We use this number (336,000) as the amount of farmland in the region.

There is a lot of agricultural land in the Valley. 336,000 acres is about 20% of the land area and includes land with the following types of cover: row crops, vegetables, fallow/idle cropland, shrubland, grassland herbaceous, grass/pasture, seed/sod grass, hays, orchards, pasture, and that which is designated as farmland by NRCS, local governments, and county commissions.

Our definition of farmland excludes that which is publicly-owned, forest, open water, developed, or barren.

Figure 9: Comparison of farmland designation



Source: NASS (2011) and NRCS (2011a).

4.1.1 Farmland classes

By federal law, NRCS is required to maintain a current list of all prime and unique farmlands in the country. The prime farmland designation is determined by a variety of factors:

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding (NRCS, 2011b).

Farmland of statewide importance is determined by the West Virginia Department of Agriculture. Generally, these are farmlands with soil properties that do not meet the federal standard, but are still viable for use in agricultural production. Farmland of local importance is determined by local County Commissions. NRCS works with both state and local governments to help with the classification of farmland (Delp, 2011). There is another category of farmland—unique farmland, suitable for growing specific crops like rice or cranberries—but the Greenbrier Valley region does not contain any land in this category.

The Greenbrier Valley region has more than twice as much farmland of statewide importance than of prime farmland, and almost no acres of farmland of local importance (see Figure 10). The prime farmland in West Virginia is best because of its generally higher scores in the NRCS classifications. All three counties have some amount of prime farmland; Greenbrier and Pocahontas counties have more than 25,000 acres of prime farmland each (Table 4).

Figure 10: Farmland classes



Source: NRCS (2011a)

Table 4: Farmland classes, 2007

County	Prime farmland	Locally-designated	State-designated	Total	County acreage	Percent of county
Greenbrier	35,166	7	70,868	106,041	602,330	18%
Monroe	8,753	1	63,217	71,971	655,180	11%
Pocahontas	27,775	0	24,667	52,442	302,787	17%
Total	71,694	8	158,752	230,454	1,560,297	15%

Source: NRCS (2011a).

4.1.2 Farmland categories

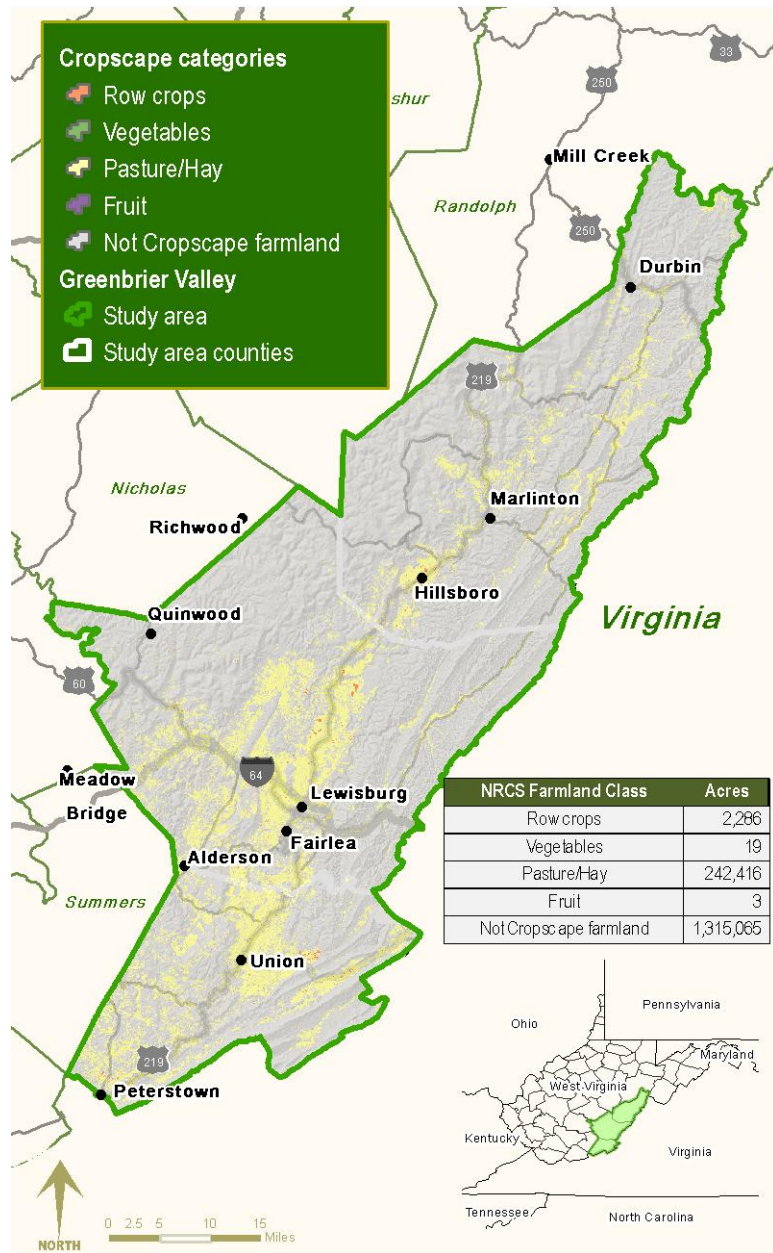
The Cropscape farmland categories follow the same general pattern as the farmland classes (Figure 11). Cropscape is a remotely sensed data set that is based on satellite imagery of actual crops.

Cropscape illustrates the predominance of pasture and hay and the relative absence of fruit and vegetable production—3 acres and 19 acres, respectively. These amounts are less than what is reported by the Agricultural Census—which reports 41 acres for apples alone—but they do represent the general land use trend for the region, which is dominated by pasture and grassland (Figure 11).⁸

4.2 Increasing agricultural production

With the abundance of agricultural land, ample opportunities exist for increasing the agricultural production of the Greenbrier Valley region. In addition, increased agricultural production has the potential to increase food security and health, as well as provide an added boost to the local economy. There are many organizations in the region that support an expanded local food system (see Appendix I).

Figure 11: Farmland categories



Source: NASS (2011).

⁸ It is because of these inconsistencies across datasets that we combine several datasets and Agricultural Census zip code data.

This section highlights just a few of the potential emerging market opportunities for specific crops in the three-county region. This section was developed with the support of agricultural experts including Tom McConnell, Director of the West Virginia Small Farm Center; William Clapham, Supervisory Plant Physiologist with the USDA Agricultural Research Service; Dr. William Bryan, Professor Emeritus of Animal Science at WVU; Ken Meter of the Crossroads Resource Center; and others.

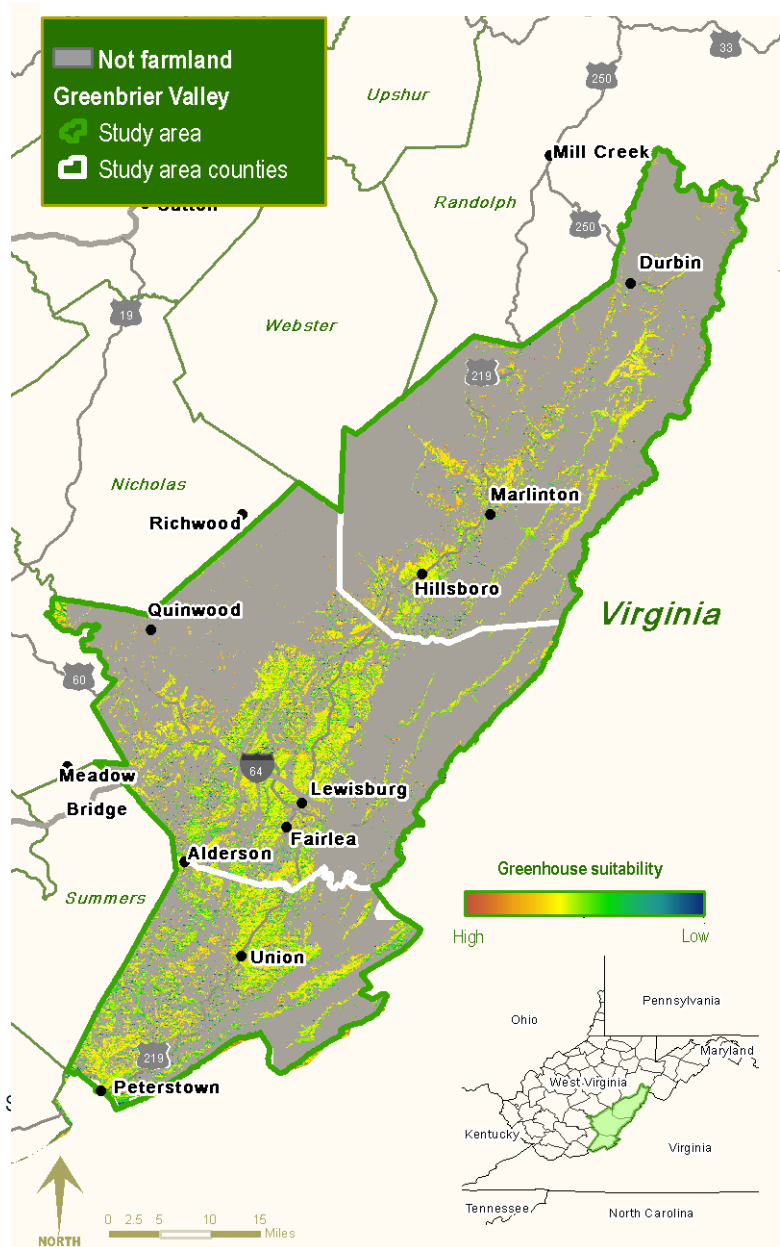
4.2.1 Berries

Berry production—especially strawberries and blueberries—could be a significant market opportunity for farmers in the Greenbrier Valley. Fresh berries add significant value to CSA shares and command high value in restaurant fare.⁹ Anecdotally, frequent visitors of Greenbrier Valley farmers markets attest that there is a shortage of blueberries and strawberries for purchase.

In some areas, the mountainous terrain and high elevation of West Virginia can shorten the productive period and total yield of berry production. Season extension technology, like high tunnels, low tunnels, and greenhouses, can extend the season by 50%, and might be especially beneficial for berry producers in the region (Jett, 2011). Figure 12 maps agricultural land that is especially suitable to high tunnels and greenhouses. For more information, visit: <http://anr.ext.wvu.edu> and search “high tunnels”.

As Figure 12 depicts, most of the farmland in the Greenbrier Valley has moderate greenhouse suitability, determined by high solar radiation or sunshine, which occurs along south-facing slopes. Some of these south-facing slopes may be level enough for agricultural production, as is the case with much of the land area in the southern portion of the Greenbrier Valley region. A close-up view of the available farmland and high levels of solar radiation illustrates suitable locations for greenhouses near Lewisburg (Figure 13).

Figure 12: Suitability of greenhouse technology



Source: NASS (2011), NRCS (2011a); Area solar radiation spatial analyst tool, ARCMAP (2010).

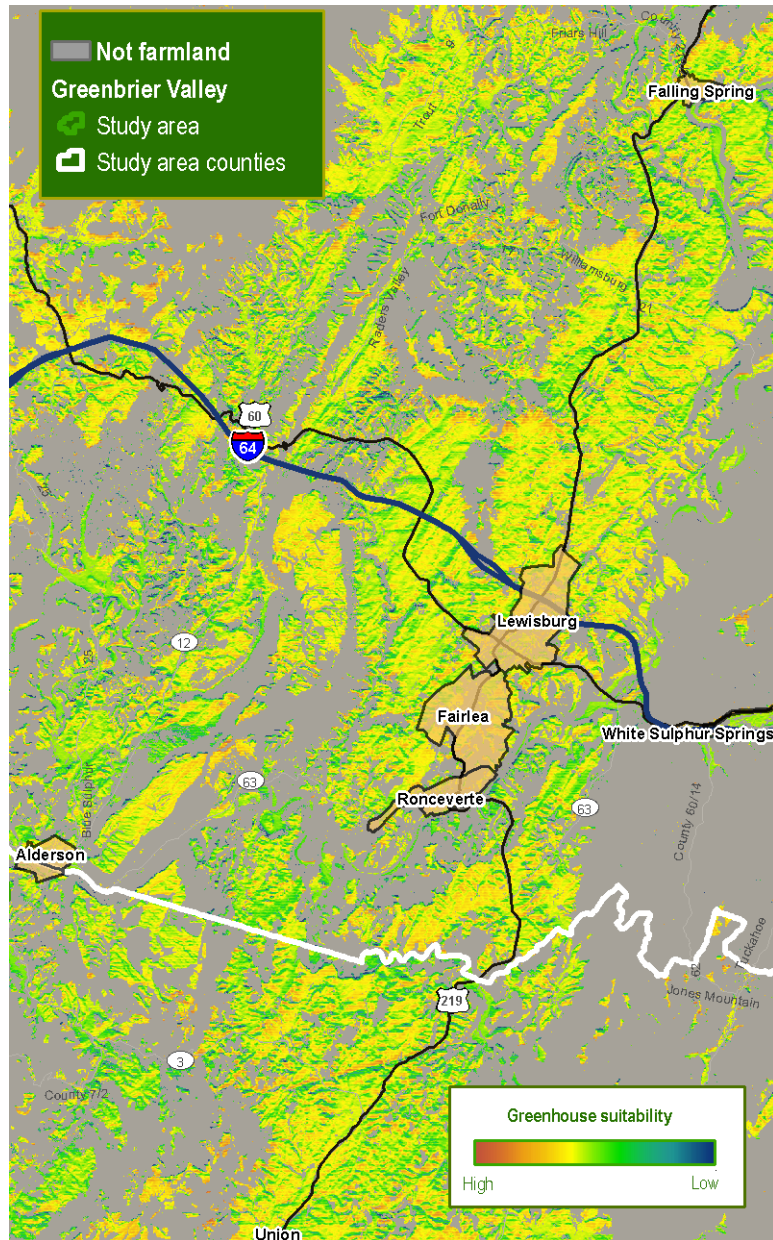
⁹ See footnote 2 for a description of CSA share.

The most likely candidates for a successful niche market include blueberries and strawberries. Raspberries also command a high market price, and, according to the West Virginia Small Farm Center Director Tom McConnell, growing raspberries is like “picking dimes off bushes” (McConnell, 2011).¹⁰

Annually, residents of the Greenbrier Valley require more than 535,000 pounds of blueberries, strawberries, raspberries, and blackberries, which is equivalent to almost 9.5 pounds of berries per person, per year (Table 2). Strawberries make up most of this amount—about 80%.

Although the WVFARM2U.org Harvest Calendar indicates that strawberries can only be harvested from June to July and blueberries and raspberries from July to the beginning of October, this short season can be greatly extended with the use of high tunnels, low tunnels, and other types of greenhouse technology (WVFARM2U.org, 2011). Strawberries grown in high tunnels are ready to harvest about five weeks earlier than fieldgrown strawberries, commanding a high market price: “The breakeven price for high tunnel strawberries was calculated to be approximately \$1.28 USD per pound... Test marketing revealed that consumers are willing to pay 3-4 times that amount for early, vine-ripened berries” (Jett, 2011).

Figure 13: Close-up, suitability of greenhouse technology near Lewisburg



Source: NASS (2011), NRCS (2011a); Area solar radiation spatial analyst tool, ARCMAP (2010).

¹⁰ However, some residents of the Greenbrier Valley region attest that fungus blight has hindered raspberry production in the past. Lewis Jett, State Vegetable Small Fruit Crops Specialist with West Virginia University Extension recommends that raspberries afflicted with rusts be treated with Nova Fungicide. Contact Lewis and WVU Extension for more information: <http://ext.wvu.edu/agriculture>

4.2.2 *Lettuce and salad greens*

Annually, residents of the Greenbrier Valley region require more than 1.9 million pounds of lettuce, which is about 35 pounds of lettuce per person, per year (Table 1). Lettuce is the third most demanded vegetable, following potatoes and tomatoes. If supplanted with other more nutritious greens like kale, mustard greens, collard greens, and spinach, this vegetable serving could provide vitamins A, C, and K, folate, and fiber.

In addition to presenting a healthy choice, fresh salad greens also present an economic opportunity. In a survey of the potential market for salad greens in the Northeast, retailers were willing to pay 19% more for locally produced lettuces and salad greens than they do for their conventional counterparts (CISA, 2009).

According to the WVFARM2U Harvest Calendar, lettuce can be grown May through October, and spinach can be seeded twice, once in May and once in August (WVFARM2U.org, 2011). This season can be substantially extended with high tunnel and greenhouse technology (Figure 14).

In his April 2011 presentation on the Greenbrier Valley Food System, Ken Meter of the Crossroads Resource Center highlighted a greenhouse in northern Minnesota that operates a salad greens CSA for its neighbors throughout the winter (Meter, 2011). The Greenbrier Valley could host many greenhouses for growing salad greens outside of its six-month growing season.

In order to enhance the economic viability of local salad greens production, farmers operating greenhouses could create a cooperative organization for the collective washing, packaging, distributing, and marketing of salad greens to Greenbrier Valley residents. This arrangement would prove especially beneficial given increasing concern from potential local food purchasers for ensured food safety. A centralized washing and packaging facility could assist compliance with good handling practices in addition to good agricultural practices, which are two federally recommended methods for ensuring food safety.

Figure 14: High and low tunnels in West Virginia



Photo credit: WesMonTy Resource Conservation and Development Council and the Sickler Farm (2011).

4.2.3 Sheep, lambs, and goats

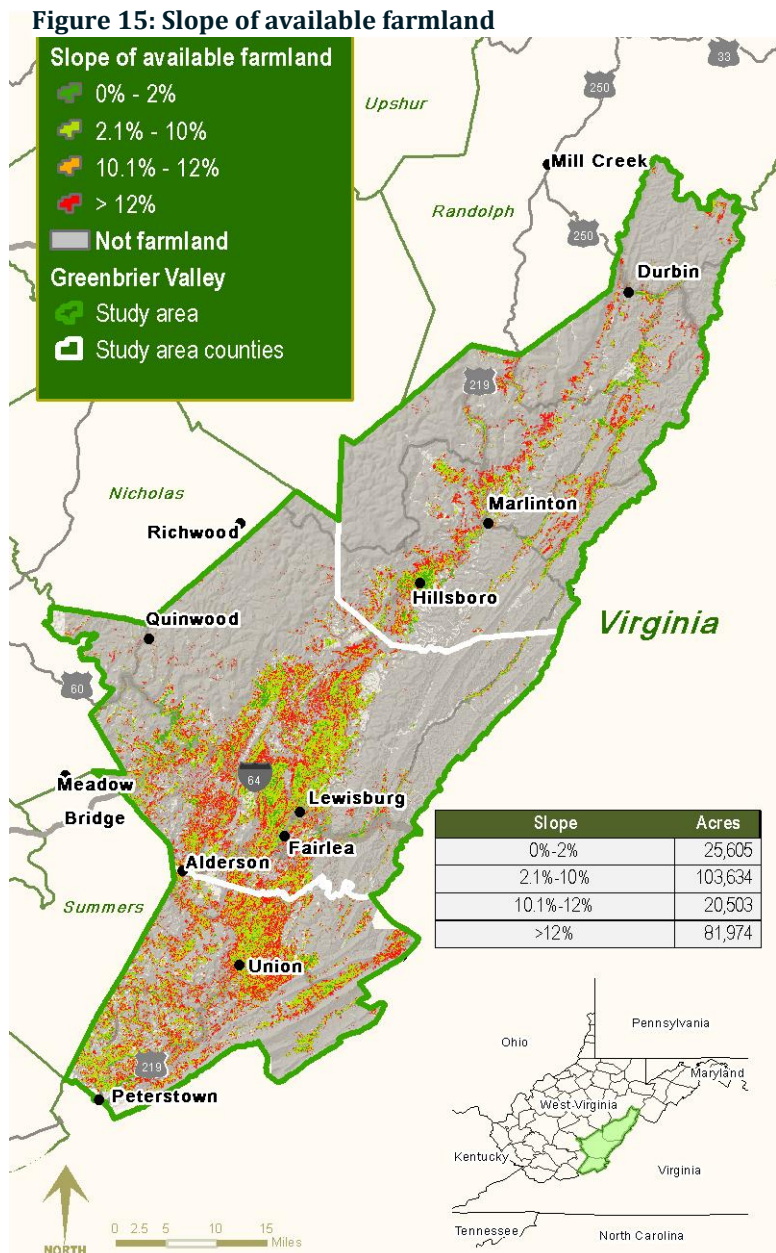
Annually, residents of the Greenbrier Valley region require more than 67,000 pounds of lamb meat, which is about 1.19 pounds of lamb per person, per year (Table 3). Researchers at the WVU Organic Farm believe that there is ample room to grow the sheep, lamb, and goat meat market in West Virginia, and in ethnic markets in nearby population centers like Washington, DC (Bryan, 2011).

Raising sheep, lambs, and goats in West Virginia has great opportunity for matching the area’s resources with a potential market. According to Dr. William Bryan, Professor Emeritus at West Virginia University and one of the region’s foremost experts on sheep production, “sheep are very promising” (Bryan, 2011).

West Virginia is also particularly well-suited to small grazers because of the dominance of grassland, some of which is on steep pasture. According to Dr. Bryan’s estimates, more than half the state could normally be in grassland, yet more than three-quarters of the state cannot be mowed for hay, due to its steep incline.

According to our analysis, there are more than 102,000 acres with slope greater than 10%; this land is especially suitable for pasturing sheep and other small grazers (Figure 15).

Slope is especially important in determining suitable agricultural products. Land with a slope of less than 2% is suitable for traditional row cropping, which can be expanded to land with a slope of up to 6% if contour cropping is used.¹¹ Any land with a slope greater than 12 to 15% is not suitable for haying, due to potential danger to the mower operator (Bryan, 2011). Therefore, more than 81,000 acres of the Greenbrier Valley’s existing farmland is not suitable for haying, but is very



Source: NASS (2011), NRCS (2011a), ARCMAP (2010).

¹¹ According to USDA, contour cropping is “Using ridges and furrows formed by tillage, planting and other farming operations to change the direction of runoff from directly downslope to around the hillslope” (NRCS, undated).

suitable for grazing small animals like sheep and goats.

In general, small grazers are more efficient at converting grass to meat than their bigger counterparts, like cows. Grass-fed lamb has the same health benefits of grass-fed beef; both result in a more favorable fat composition with higher omega 3 fatty acids than their grain-fed counterparts (Bryan, 2011). Additionally, once a pasture is filled with the maximum amount of cattle that it can feed, a farmer can add in other species, like goats and sheep, without increasing the land area required. Sheep, goats, and cattle feed selectively on different plants in the pasture; for example, sheep will eat ironweed, whereas cattle will not. Sheep and goats can even be used as weed control (Chandran et al., 2010). This pattern of grazing, called co-species grazing, results in an efficient use of pasture resources.

In Dr. Bryan's experience, the type of breed doesn't make that much of a difference in terms of meat or wool output. Rather, the management practices ultimately determine the success of the operation. For example, some breeds, like Katahdin sheep, are resistant to parasites, but a farmer could also prevent parasites by practicing excellent overall animal stewardship in giving the sheep adequate access to grassland. In short, "nutrition is more important than breed" (Bryan, 2011).

For more information on the burgeoning sheep industry in West Virginia, look for the forthcoming bulletin from Dr. Bryan and consider contacting the West Virginia Organic Farm (www.caf.wvu.edu) and the West Virginia Shepherds Federation (www.sheepwv.org).

4.2.4 *Grass-fed beef*

Annually, residents of the Greenbrier Valley region require more than 5.3 million pounds of beef, which is about 94.31 pounds of beef per person, per year (Table 3). Culturally, beef is important to West Virginians in general; Greenbrier Valley residents are no exception.

The Greenbrier Valley's landscape is particularly well suited to pastured beef production because of the prevalence of pasture and grassland. Grain-based operations require either the purchase of substantial amounts of feed or the cultivation of many acres of soy and corn. Grass-fed beef have positive health attributes when compared to their grain-fed counterparts, including: lower total fat and higher proportions of good fats, including omega 3 fatty acids and conjugated linoleic acid (Mayo Clinic, 2011). Residents of the Greenbrier Valley are already organizing to form a network of pasture-raised livestock farmers called the Greenbrier Valley Pastures Network, which links farmers markets with pastured livestock producers and is exploring becoming a cooperative (see Appendix I for more information).

In the US, most beef operations function in three phases: cow-calf, stocker, and finisher. A cow-calf operation means that the farmer maintains the cow during breeding, gestation, and calving until the calf reaches six to nine months of age and 400-700 pounds. The owner then sells off the calves (called "stockers") to gain an additional 200-400 pounds over three to eight months; finally, the stockers are sold to feedlots to be "finished" or gain their final weight (McBride and Mathews, 2011).

Cow-calf and stocker operations are quite common in West Virginia. Most farmers sell off their stockers to be finished out of state, slaughtered, processed, and then shipped back into the state at higher prices. Instead of capturing this value added by the processing of the beef, farmers in the state lose it. Given both this value-added opportunity and the sheer popularity of beef, it would seem logical to support an expanded beef livestock industry in West Virginia.

According to William Clapham, scientist with the USDA Agricultural Research Service at the Appalachian Farming Systems Research Center, beef holds promise, but there are a few stumbling blocks that need to be overcome, including seasonality and marketing (Clapham, 2011).¹² With a staggered breeding time, there would be a higher likelihood that beef cows could be slaughtered and processed in-state, representing a predictable flow of business for slaughter houses, and making them more inclined to stay in operation and cater to a farmer's cut-choice. With a breed that thrived with the sparse winter forage as its primary feedstock, farmers could be less tied to the standard pattern of calving in the spring and slaughtering in the fall. With collective marketing efforts, farmers could realize greater profits. For more information on strategies to improve the beef industry in the region, visit: www.ars.usda.gov and search "Appalachian Farming Systems Research Center."

Improved herd management is another strategy that could prove beneficial for the farmer, surrounding environment, and burgeoning agricultural industry. For all grazing animals, the use of management-intensive grazing (MIG) will increase the efficiency of pasture use. MIG requires the planning and facilitated movement of animals on to different sections of pasture at given intervals. The practice results in many environmental benefits, including: reduced soil erosion, better pasture health and diversity, and improved fish and wildlife habitat (Ohio State University Extension Service, undated).

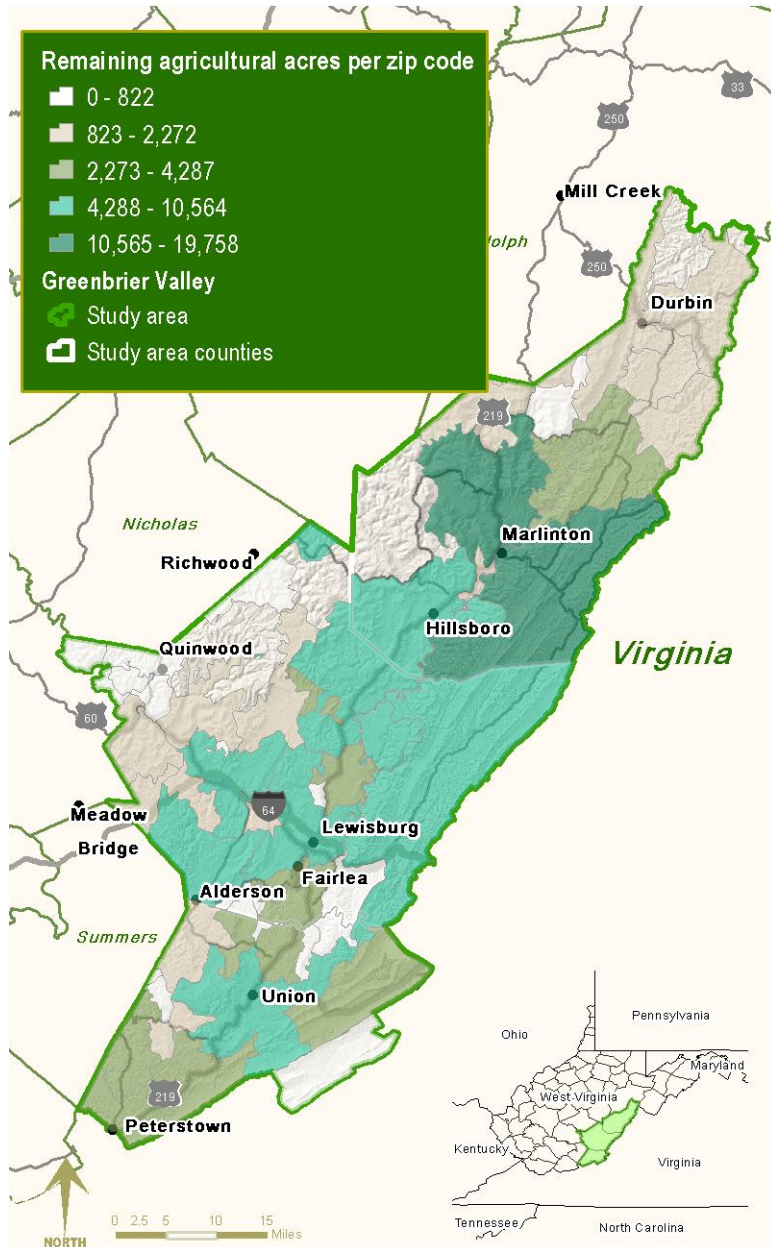
¹² The views expressed by Bill Clapham are his own and do not represent the official position of the USDA Agricultural Research Service or the Appalachian Farming Systems Research Center.

Currently, there are 1,175 farms that have a total of 75,267 cattle and calves in Greenbrier, Monroe, and Pocahontas counties (USDA, 2007a). This inventory includes those cows raised for beef and milk. If all these cows were grazed with MIG and a stocking rate of one cow per two acres,¹³ they would require just over 150,000 acres, which is less than 10% of the land area of the three counties and less than half of all of the suitable farmland.

If all the cows that currently exist in the Greenbrier Valley region were grazed with MIG and equally dispersed on existing agricultural acres, a substantial amount of agricultural land would remain available (Figure 16). The map illustrates the range of available acres, after the existing cows are accommodated (Figure 16). These remaining acres could be used to diversify the type of crops under cultivation and income streams for a farmer.

In short, Greenbrier Valley does have a viable beef industry, and could diversify into other forms of agricultural production while maintaining current beef production.

Figure 16: Remaining farmland if management-intensive grazing is used



Source: NASS (2011), NRCS (2011a), USDA (2007a).

¹³ We use one cow per two acres, which is a generous amount of land for a MIG grass-fed operation. For example, according to Ohio State University Extension Service, a high intensity cow-calf operation would require two animals (cow and calf) per two acres, and a high intensity stocker calf operation would require one cow per half an acre (Ohio State University Extension Service, undated).

4.2.5 *Pastured poultry*

Annually, residents of the Greenbrier Valley region require more than 5.7 million pounds of chicken and 1.8 million pounds of eggs, which amounts to 101.9 pounds of chicken and 32.8 pounds of eggs per person, per year (Table 3). Much of the state's supply of poultry is produced in chicken barns in the eastern panhandle of West Virginia and is then shipped out of state for repackaging and distribution. This meat is then shipped back into the state to be sold to residents after significant value has been added.

There could be a significant market niche for pastured-raised eggs and pastured chicken meat, especially if it is produced in a cost-effective manner. Similar to co-species grazing that is possible with sheep and cows, poultry can be pastured with other animals to enhance the utilization of available foodstuffs in the pasture (Figure 17). Pasturing poultry can be a cost-effective method of producing a high-quality product. (See www.appa.org for more information.)

A potential method for shortening the value chain between poultry producers and consumers is to increase the proliferation of non-contract poultry operations in the region. Without the binding requirements of contracts with large poultry companies, farmers are more likely to be willing to sell their product in state, should adequate processing facilities exist. Tom McConnell, Director of the West Virginia Small Farm Center, is organizing those who are interested in processing facilities that would service small flock owners. (See <http://smallfarmcenter.ext.wvu.edu> for more information.)

Figure 17: Example pastured poultry operation



Photo credit Green-change.com (2009).

5. CONCLUSION

5.1 Recommendations for enhancing the local food system

The Greenbrier Valley region has plenty of land area—more than 336,000 acres—to increase agricultural activities in the region. More local food can create more jobs, more dollars circulated locally, and can contribute to health in the region, among other benefits. Some potential methods of enhancing the productivity and profitability of the local food system have been mentioned above—these include:

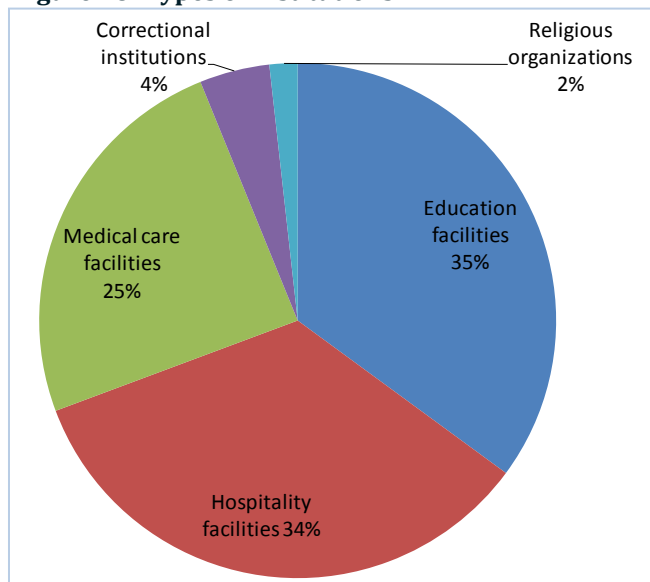
- Extending the growing season with high and low tunnels to take advantage of out-of-season prices, as in the case with berries and salad greens;
- Establishing cooperatives for the collective processing and marketing of agricultural goods, as in the case of salad greens and local beef;
- Targeting increased agricultural production to meet specific niche markets for specialty products with demonstrated, untapped demand, as in the case of goat meat;
- Efficiently using on-farm resources by co-species grazing as in the case of pastured livestock;
- Identifying food system bottlenecks and assembling a group to address them, as in the case of poultry processing in the state; and
- Using best management practices for the cultivation of current crops and animal populations, as in the case of beef and MIG.

These are only some of the possible mechanisms for enhancing the local food system by improving the economic viability and productivity of agriculture, without sacrificing sustainability and historically important crops. These recommendations are supply-side adjustments in that they improve the supply of agricultural goods by increasing the amount of land area farmed, or the productivity of the land already in cultivation.

Various demand-side adjustments could also enhance the Greenbrier Valley food system. For example, if institutions and individuals demanded more local food, there could be significant increases in the viability of the local food system.

Already, efforts by many local food enthusiasts have greatly increased the number of places using local food in their products and selling locally-produced food in their outlets. Yet, there is great potential for expanding the penetration of local foods in other outlets, especially in institutions in the Greenbrier Valley. Many institutions currently exist in the Greenbrier Valley, and could be viable venues for increased demand of local foods. There are more than 114 institutions currently, including: resorts, hotels and motels, bed and breakfasts, churches, correctional institutions, schools, hospitals, clinics, residential care homes, nursing homes, senior centers, and one university ((Figure 18).

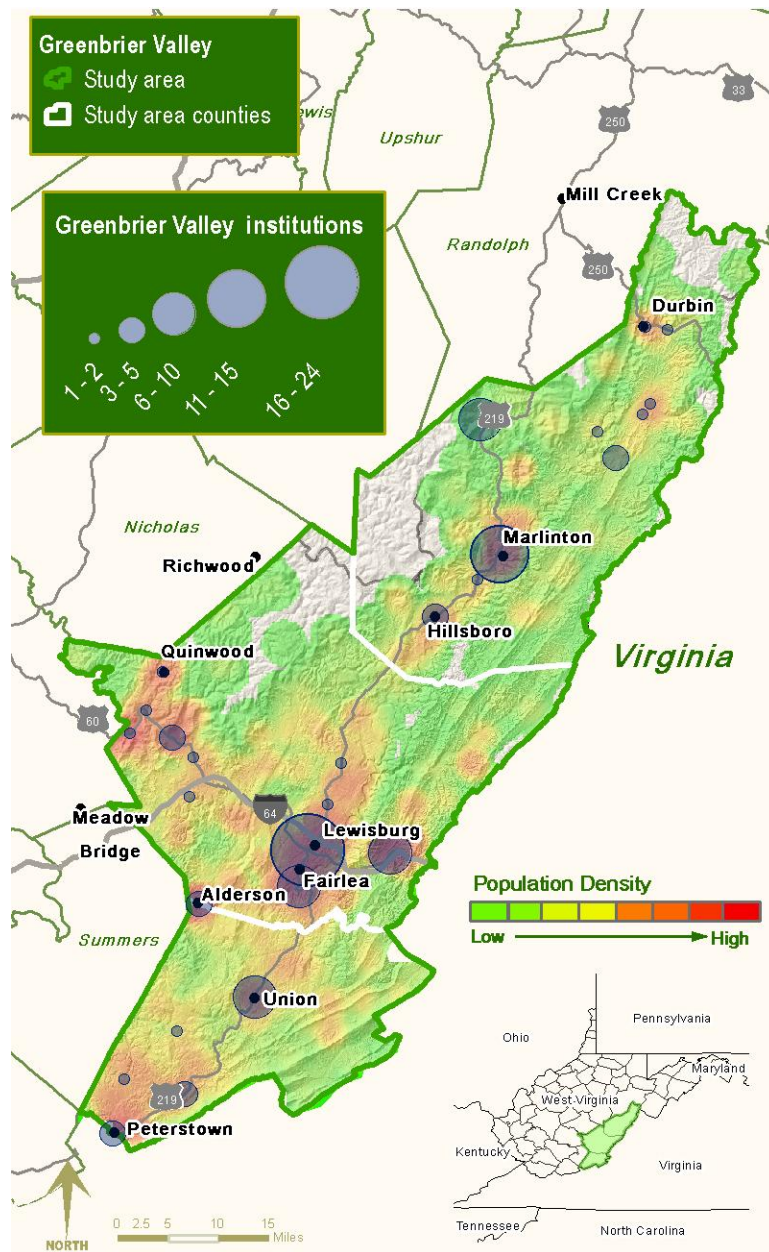
Figure 18: Types of institutions



Source: Reference USA Database (2011).

Institutions can be easy access points for getting local foods to consumers, because farmers only have to make one delivery and have some assurance in a buyer's preferences, in comparison to vending to individuals that require many delivery points and product types.¹⁴

Figure 19: Institutions in the Greenbrier Valley, 2011



Source: Reference USA Database (2011) and US Census Bureau (2000).

a high population density and a high number of institutions, 22 in total (Figure 19). These institutions could enter into a common buying network that facilitates connections with farmers.

Similarly, food hubs could benefit the region. According to the USDA, a food hub is “a centrally located facility with a business management structure facilitating the aggregation, storage, processing, distribution, and/or

It is also beneficial for food managers at institutions to purchase foods in volume from local producers, because they usually receive a fresher, higher quality product, and have the ability to charge higher prices for the value of serving local foods. The institutions that are most likely to be able to increase their local food purchases are those without government- or municipality-mandated budgets, like bed and breakfasts, resorts, and other attractions. Recreational tourism is one of the leading industries in the region, and showcasing local foods at tourism venues may prove profitable.

The best-recognized method of getting local food into institutions is via farm to school programs. County governments can support farm to school programs by providing funds for local purchasing and educating the public on the importance of it (Dillon, 2007). Although school food service directors may be concerned about the purported increased cost of local food, supplying a school with local food can give a farmer an assured market (Martinez et al., 2010).

Additionally, locations where institutional density and population density align may be particularly good points for entrance into a more regionalized local food system. For example, in the Lewisburg area, there is

¹⁴ In some cases, it can difficult for institutions with tight budgets to afford local food, although it remains ambiguous whether locally produced foods are always more expensive than their conventionally-produced counterparts (Martinez et al., 2010).

marketing of locally/regionally produced food products” (Bragg and Braham, 2011). As points of aggregation, food hubs can decrease transaction costs for farmers and local food consumers.

Linking local food to institutions and establishing food hubs are just two methods of improving the local food system, although many other strategies exist. See Appendices I and II for organizations working to create other solutions in the state and beyond.

5.2 Summary

The Greenbrier Valley region has abundant land area for expanding its existing agricultural production into a local food system that provides jobs and money to the region’s economy, and health and food security to the region’s residents.

The annual food demand of the region’s 56,000 residents presents a significant market niche, especially for potatoes, tomatoes, lettuce, sweet corn, and onions; and apples, watermelon, grapes, cantaloupe, and peaches, the top five most demanded of each vegetables and fruit food groups.

Currently, hay and livestock dominate the available agricultural lands. While there may be numerous residents that tend their own vegetable gardens and provide a lot of their own food, we do not know the full extent of these gardens or small farms. However, we do know that commercial fruit, vegetable, and grain production do not currently occur in the Greenbrier Valley. Increased agricultural production—be it small scale or commercial scale—would benefit the region and its citizens. Enhanced coordination between this increased agricultural supply and the demand of the region’s citizens, would increase the amount of local food going directly to consumers. Connecting farmers that grow food with institutions like hospitals and schools might be an especially efficient way of getting local food to a lot of consumers and guaranteeing a steady market to farmers.

This study volunteers a few ways that the region’s food system could be improved by the proliferation of a few targeted market niches—including berries, salad greens, and pasture-based livestock—and a few management strategies—including season extension and intensive grazing techniques. These highlighted possibilities are supply-side adjustments, and are just a few of the possible strategies for improving the local food economy, and adding further value to the region.

Because of the targeted focus of this report, there are many relevant components that were out of the scope of this project and remain unexplored, these include: required improvements in transportation infrastructure, willingness of farmers to adopt new practices, willingness of non-farmers to transition to farming, willingness of local and distant consumers to pay for a local product, willingness of business leaders to prioritize local foods, increased inclusion of the low-income population or those with low food security, and more. All of these are integral to realizing an improved food system, but would remain meaningless without some analysis of the land-based possibilities and potential in the region.

Given the available land area, growing interest in local foods, and availability of regional and statewide resources (see Appendices I and II), the Greenbrier Valley region is uniquely situated to significantly gain from a localized food system. This study is a preliminary step in highlighting the region’s potential and ways to achieve this possibility.

REFERENCES

- Appalachian Regional Commission, 2010. Economic Overview of Appalachia-2010. Accessed 30 September 2011. Available here: <http://www.arc.gov/images/appregion/Jan2011/EconomicOverview-1-28-11.pdf>
- Bragg, E. and J. Braham, 2011. Regional Food Hubs: Linking producers to new markets. Presentation. Know Your Farmer Know Your Food Hub Subcommittee. Accessed 22 August 2011. Available here: http://www.ngfn.org/resources/ngfn-database/knowledge/RFHUB%20Presentation_complete%20version_5.24.pdf
- Bryan, William, 2011. Professor Emeritus, Animal Sciences, West Virginia University. Telephone interview with author Hartz. 11 August 2011.
- Chandran, R., and T. Basden, T. McConnell, T. McCutcheon, E. Rayburn, 2010. Utilization and management of invasive plants in pastures using bio-control agents. Final report NRCS Conservation Innovation Grant 68-3A75-6-14.
- Clapham, William, 2011. Supervisory Plant Physiologist, USDA Agricultural Research Service at the Appalachian Farming Systems Research Center. Telephone interview with Author Hartz. 15 September 2011.
- Communities in Sustainable Agriculture (CISA), 2009. Salad Greens Marketing Study, HACCP Feasibility. Accessed 12 September 2011. Available here: <http://www.buylocalfood.com/upload/resource/Salad%20Greens%20Market%20Study%20Report.pdf?PHPSSESSIONID=bgwqkajajozltcl>
- Centers for Disease Control and Prevention, 2011. Diabetes Data and Trends. County Level Estimates of Obesity – State Maps. West Virginia, 2007, Percent of Adults. Accessed 30 September 2011. Available here: http://apps.nccd.cdc.gov/DDT_STRS2/CountyPrevalenceData.aspx?mode=OBS
- Delp, Charles, 2011. Assistant Soils Scientist, Natural Resources Conservation Service. Email communication with Author Hartz. 9 September 2011.
- Dillon, C., 2007. Counties and Local Food Systems: Ensuring healthy foods, nurturing healthy children. National Association of Counties, Center for Sustainable Communities. July 2007.
- Farmer, J. 2011. James Farmer, PhD. Earlham College. Telephone conversation with Author Hartz. 21 September 2011.
- French, S. and G. Stables, 2003. Environmental interventions to promote vegetable and fruit consumption among youth in school settings. *Journal of Preventive Medicine*. Vol. 37. p. 593-610.
- Green-change.com, 2009. Where to buy chicken tractors. Accessed 15 September 2011. Available here: <http://green-change.com/2009/01/05/where-to-buy-chicken-tractors/>
- Greenbrier County Commission, 2011. Greenbrier County, West Virginia official website. Accessed 30 September 2011. Available here: <http://www.greenbriercounty.net/>
- Greenbrier County Convention and Visitor's Bureau, 2011. Greenbrier Valley, West Virginia. Explore. Accessed 30 September 2011. Available here: <http://greenbrierwv.com/explore/c/farms/>
- Greenbrier Valley Local Foods Initiative, 2011. Website. Food finder. Accessed 30 September 2011. Available here: <http://www.greenbriervalley.org/>
- Halweil, B., 2002. Home grown: the case for local food in a global market. Worldwatch Institute. State of the

World Library. p. 7.

Hughes, D. et al., 2008. Evaluating the Economic Impact of Farmers' Markets Using an Opportunity Cost Framework. *Journal of Agricultural and Applied Economics* Vol. 40. April 2008. p. 253-256.

Ikerd, J., 2005. Presentation, "Eating Local: A Matter of Integrity" at The Eat Local Challenge, Portland, OR. 2 June 2005. Accessed 26 September 2011. Available here: http://web.missouri.edu/~ikerdj/papers/Alabama-Eat%20Local.htm#_ftn1

Jett, L., 2011. Production economies of high tunnel vegetables and strawberries. West Virginia University Extension. Accessed 5 October 2011. Available here: http://anr.ext.wvu.edu/commercial_horticulture/high_tunnels/high_tunnel_vegetables_and_strawberries

Leopold Center for Sustainable Agriculture, 2008. U.S. Food Market Estimator. Accessed 18 August 2011. Available here: <http://www.ctre.iastate.edu/marketsize/>

Martinez, S., et al., 2010. Local food systems: Concepts, impacts, and issues. USDA Economic Research Service. Economic Research Report Number 97.

Mayo Clinic, 2011. "Does grass-fed beef have any heart-health benefits that other types of beef don't?" Response by Martha Grogan, MD. Accessed 15 September 2011. Available here: <http://www.mayoclinic.com/health/grass-fed-beef/AN02053>

McBride, W. and K. Mathews, 2011. The diverse structure and organization of U.S. beef cow-calf farms. USDA Economic Research Service. Economic Information Bulletin Number 73. March 2011.

Meter, K., 2011a. West Virginia Food and Farm Economy. Highlights of a data compilation. Accessed 5 October 2011. Available here: <http://www.crcworks.org/crcdocs/wvsum11.pdf>

Meter, K., 2011b. Greenbrier Valley (West Virginia) Local Food and Farm Economy. Highlights of a data compilation. Accessed 5 October 2011. Available here: <http://www.crcworks.org/crcdocs/wvgreensum11.pdf>

Morland, K. et al, 2002. The contextual effect of the local food environment on residents' diet: the atherosclerosis risk in communities study. *American Journal of Public Health*. Vol. 92. P. 1761-1767.

Monroe County, 2011. Monroe County, West Virginia Website. Accessed 30 September 2011. Available here: <http://www.monroecountywv.net/>

National Agricultural Statistics Service (NASS), 2011. Cropland Data Layer. Accessed 9 September 2011. Available here: <http://www.nass.usda.gov/research/Cropland/SARS1a.htm>

----- 2007. West Virginia Agricultural Statistics, Bulletin No. 39. Accessed 18 August 2011. Available here: http://www.nass.usda.gov/Statistics_by_State/West_Virginia/Publications/Annual_Statistical_Bulletin/

Natural Resources Conservation Service (NRCS), 2011a. GeoSpatial Data Gateway. Accessed July 2011. Available here: <http://datagateway.nrcs.usda.gov/GDGOrder.aspx>

----- (NRCS), 2011b. National Soil Survey Handbook. Accessed 9 September 2011. Available here: <http://soils.usda.gov/technical/handbook/contents/part622.html>

-----undated. National Handbook of Conservation Practices. Section 330 "Contour Farming". Accessed 15 September 2011. Available here: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026017.pdf

Ohio State University Extension Service, undated. Getting started grazing. Accessed 15 September 2011. Available here: http://ohioline.osu.edu/gsg/gsg_2.html

Peters, C. et al., 2008. Foodshed analysis and its relevance to sustainability. *Journal of Renewable Agriculture and Food Systems*. Vol. 24. p. 1-7.

Pirog, R., 2003. Checking the food odometer: Comparing food miles for local versus conventional produce sales to Iowa institutions. Leopold Center for Sustainable Agriculture. Accessed 26 September 2011. Available here: http://www.leopold.iastate.edu/pubs/staff/files/food_travel072103.pdf

Pocahontas County Chamber of Commerce, 2011. Pocahontas County Chamber of Commerce Website. Accessed 30 September 2011. Available here: <http://pccocwv.com/>

Reference USA Database, 2011. Infogroup Reference Division, 2011. Accessed 19 August 2011.

University of Kentucky Cooperative Extension, 2010. Organic blackberries and raspberries, Accessed 12 September 2011. Available here: <http://www.uky.edu/Ag/CDBREC/introsheets/organicbrambles.pdf>

US Bureau of Economic Analysis, 2011. Regional Economic Information System. Total farm labor and proprietors' income, 2008. Accessed 5 October 2011. Available here: <http://www.bea.gov/regional/index.htm>

US Bureau of Labor Statistics, 2011. Local Area Unemployment Statistics data. County-level unemployment and median household income for West Virginia. Accessed 30 September, 2011. Available here: <http://www.ers.usda.gov/Data/Unemployment/RDList2.asp?ST=WV>

US Census Bureau, 2011a. Resident total population estimate (July 1) 2007. Accessed 18 August 2011. Available here: <http://www.census.gov/popest/archives/2000s/>

---- 2011b. State and County Quick Facts. Geography Quick Facts. Accessed 30 September 2011. Available here: <http://quickfacts.census.gov/qfd/index.html>

---- 2009. Small Area Income and Poverty Estimates. 2009 County-level poverty rates for West Virginia. Accessed 30 September 2011. Available here: <http://www.ers.usda.gov/Data/PovertyRates/PovListpct.asp?ST=WV&view=Percent>

---- 2000. Topologically Integrated Geographic Encoding and Referencing System. Spatial population data. Available here: <http://www.census.gov/geo/www/tiger/>

US Department of Agriculture (USDA) 2011. Data sets. Economic Research Service. Accessed 30 September 2011. Available here: http://www.ers.usda.gov/data/farmtoconsumer/pricespreadsdoc.htm#retail_cheddar

---- 2007a. Census of Agriculture. Volume 1. West Virginia. Accessed June 2011. Available here: http://www.agcensus.usda.gov/Publications/2007/Full_Report/

----- 2007b. Census of Agriculture. Appendix. Explanation of Terms. Accessed 30 September 2011. Available here: http://www.agcensus.usda.gov/Publications/1992/Agricultural_Atlas/textfile/glossary.asc

US Geological Survey, 2011. National Elevation Dataset. Accessed September 2011. Available here: <http://ned.usgs.gov/#>

WVFARM2U.org, 2011. Harvest Calendar. Accessed June 2011. Available here: <http://www.wvfarm2u.org/shared/content/harvestc.pdf>

APPENDIX I: GREENBRIER VALLEY-BASED RESOURCES

Greenbrier, Monroe, and Pocahontas counties are home to many organizations whose primary interest is in supporting local food systems and the farmers.

Greenbrier Valley Economic Development Corporation

Providing access to community leaders and representing the private sector, the Greenbrier Valley Economic Development Corporation (GVEDC) assists the needs of the business communities of Greenbrier, Monroe and Pocahontas counties. The GVEDC recently assumed “local food systems development” as a main focus and provides an office for Greenbrier Valley Local Foods Initiative. GVEDC is already working with Downstream Strategies on other economic diversification projects within the Greenbrier region. Jill Young is the GVEDC’s Local Foods Coordinator. For more information, visit: www.gvedc.com or call (304) 497-4300.

Greenbrier Valley Local Foods Initiative

The Greenbrier Valley Local Foods (GVLV) Initiative is a growing collection of local non-profit and for-profit groups and individuals working to improve the local food system in the valley. It represents the framework of relationships and assets used to address community food concerns, and it sponsors monthly potluck meetings, producer meetings, producer trainings, informal community meetings, three local foods VISTA volunteers, and two hands-on AmeriCorps school and garden volunteers. The VISTA volunteers have already facilitated farm tours, hosted public meetings, linked consumers with growers, and established electronic benefits transfer machines in two of the farmers markets in the region.

GVLV also houses the Greenbrier Valley Local Food Publications (GVLFP) which provides a networking base that includes an online local foods directory, a group email list, monthly emails on events and grant opportunities, and a cultural/historical publication that engages community members in sharing stories and experiences on food. GVLFP has connections to local newspapers, radio stations, historical societies, and convention and visitors bureaus to access the component of the food system that is tourism-based. For more information, visit: www.greenbriervalley.org

Greenbrier Valley Pastures Network

GVLV works closely with the Greenbrier Valley Pastures Network (GVPN)—a group of local farmers working to promote pasture-raised sustainable livestock production and consumption in the Greenbrier Valley through educational programs, marketing, infrastructure, and networking—and the Greenbrier Valley Farm Markets. In the past, GVLV has linked Monroe Farmers Market, Lewisburg Farmers Market, Ronceverte Farmers Market, and Marlinton Farmers Market participants and vendors to other food system events in the state. For more information, contact Jennifer Jones at (304) 661-6777.

APPENDIX II: STATEWIDE AND REGIONAL RESOURCES

The Greenbrier Valley is one of the most agriculturally productive regions in the state, and it benefits from the growing number of statewide and regional food and farm organizations.

West Virginia Department of Agriculture

The West Virginia Department of Agriculture provides various resources for the development of agriculture, preservation of plant and animal health, and protection of the food supply in the state. The most relevant part of West Virginia Department of Agriculture's mission, "to foster economic growth by promoting West Virginia agriculture and agribusinesses throughout the state and abroad" (West Virginia Department of Agriculture, 2002), is implemented by the Marketing and Development Division. More information can be found at www.wvagriculture.org

Collaborative for 21st Century Appalachia

The Collaborative for 21st Century Appalachia "is a grassroots organization concerned with preserving the small farm, the environment, and a more traditional way of life" (WV FARM2U, 2011). In addition to hosting the highly popular "Cast Iron Cook-Off," a culinary competition featuring Appalachian cuisine, the Collaborative provides an online list of farmers markets, roadside stands, community supported agriculture (CSA) operations, restaurants that use local food, and other resources by county. Learn more at www.wvfarm2u.org

West Virginia University Extension

West Virginia University Extension (WVU Extension) works to connect West Virginians with the knowledge gained through the land grant university system. With extension offices in each of the state's 55 counties, WVU Extension is well positioned to assist the development of an improved agricultural industry in the state. With specialists that focus on poultry, pests, aquaculture, and hay, for example, WVU Extension can assist current and potential farmers in addressing issues that might arise during production. Learn more at www.ext.wvu.edu.

West Virginia Small Farm Center

The West Virginia University Extension Small Farm Center provides education, leadership, and support to West Virginia's 23,000 farm families. The Center, under the direction of Tom McConnell, was born from his vision to help West Virginia farm families become sustainable by exploiting the local food opportunities found throughout the state and region. The Center resides at WVU in Morgantown. It offers face-to-face farmer training in nearly every county, including the West Virginia Small Farm Conference in March and the Tri-State Farm and Food conference in November. As a part of WVU Extension Service, the Center works to fulfill its mission "to offer educational programs and research in the areas of community development, agriculture and family and consumer sciences to people and communities." The Small Farm Center also publishes the Small Farm Advocate, a paper for West Virginian farmers. Learn more at <http://smallfarmcenter.ext.wvu.edu> or call Carrie See at (304) 293-2715.

West Virginia Farmers Market Association

The West Virginia Farmers Market Association (WVFMA) is a statewide organization with the goal of strengthening the viability of farmers markets across the state. WVFMA assists markets with market advertising, collaboration on shared issues like liability insurance, and education for market managers. One of WVFMA's main initiatives is their Buy Fresh Buy Local project, a way to increase brand recognition for West

Virginia-grown locally-produced goods. WVFMA is a member of the National Farmers Market Coalition (<http://farmersmarketcoalition.org>). For more information, visit: www.wvfarmers.org

West Virginia Food and Farm Coalition

Providing a statewide resource and network, the West Virginia Food and Farm Coalition (WVFFC) is establishing a statewide conversation about the development of local food systems across West Virginia, to provide healthy, locally-produced food to all citizens, especially low-income families and other vulnerable groups. They hope to form a government-sanctioned Food Council for the state. WVFFC also provides connections to many of the non-profit organizations throughout the state, organizations which the Greenbrier Valley region's food system can rely on for support, guidance, and feedback on long-term solutions. For more information, visit: www.wvhub.org/foodandfarmcoalition

Center for Economic Options

The Center for Economic Options (CEO) is an independent non-profit organization that has a long history of developing innovative and replicable model programs. CEO supports people's initiatives to create sustainable jobs for themselves and others and to contribute to their local economies, the environment, and community wealth through business ownership. To do this, CEO targets failed market systems and helps create the missing pieces that help fill gaps and enable the natural flow and vitality of responsible, locally owned enterprise. CEO hosted a conference on farm-to-school in West Virginia in September 2011. For more information, visit: www.centerforeconomicoptions.org

Central Appalachian Network

The Central Appalachian Network is a network of six nonprofit organizations that focuses on building lasting relationships, developing policy and infrastructure, providing technical and business assistance, and building value-added assets. It works across Kentucky, West Virginia, Tennessee, Ohio, and Virginia to create wealth and reduce poverty while restoring and conserving the environment. One focus is building a resilient local food system. Learn more at www.cannetwork.org

Crossroads Resource Center

Although located beyond West Virginia's borders, the Crossroads Resource Center is a non-profit organization that works with communities and their allies to foster democracy and local self-determination towards a more sustainable future. Ken Meter, the Center's director, substantially contributed to this report. You can find out more about the Center by visiting their website: www.crcworks.org