



The
UNIVERSITY
of VERMONT

James M. Jeffords
Vermont Legislative Research Service



Economic Impact of Agriculture in Vermont

This report combines and summarizes research collected regarding the economic impact of agriculture in Vermont. The research was collected from government agencies, Vermont organizations, and academic sources. This report strives to present the data in a way that will give a general sense of the impact agriculture has on Vermont's economy through direct and indirect means. Since analysts cannot come to a consensus regarding which measurements of direct and indirect influences to include in the overall impact, each has been presented in a separate section.

Agriculture in Vermont

According to the National Resources Inventory Annual Report published in 2007 by the U.S. Department of Agriculture's Natural Resources Conservation Service "[c]ropland, pastureland, rangeland, and forest land comprise the majority of the Nation's land resources and thus

- The condition of these lands directly or indirectly influences the environment enjoyed by the nation, meeting the nation's objectives for natural resources
- Environmental quality will depend on how these lands are used and conserved."¹

Vermont's land use in 2003 consisted of forest land (4,129,400 acres), crop land (586,500 acres—143,300 non-cultivated and 443,200 cultivated), federal land (422,600 acres), developed land (346,500 acres), pastureland (314,400 acres), water areas (260,800 acres), and other rural land (93,400 acres).² See Figure 1 for a visual breakdown of Vermont land use.

The number of farms in Vermont has increased from 6,571 in 2002 to 6,984 in 2007, a six-percentage point change; however, the average size of farm has decreased six percentage points during the same time from 189 acres in 2002 to 177 acres in 2007.³

¹ United States Department of Agriculture Natural Resource Conservation Service, *National Resources Inventory 2003 Annual NRI: Land Use* (February 2007): 4. <http://www.nrcs.usda.gov/technical/NRI/2003/nri03landuse-mrb.html>. Accessed February 22, 2010.

² United States Department of Agriculture Natural Resource Conservation Service, *National Resources Inventory 2003 Annual NRI: Total Surface Area by Land Cover/Use* (February 2007), <http://www.nrcs.usda.gov/technical/NRI/2003/statereports/2003summaryreport.pdf>, accessed March 24, 2010.

³ United States Department of Agriculture Census of Agriculture, *2007 Census of Agriculture: State Profile, Vermont* (2007): 1. http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Vermont/cp99050.pdf. Accessed February 22, 2010.

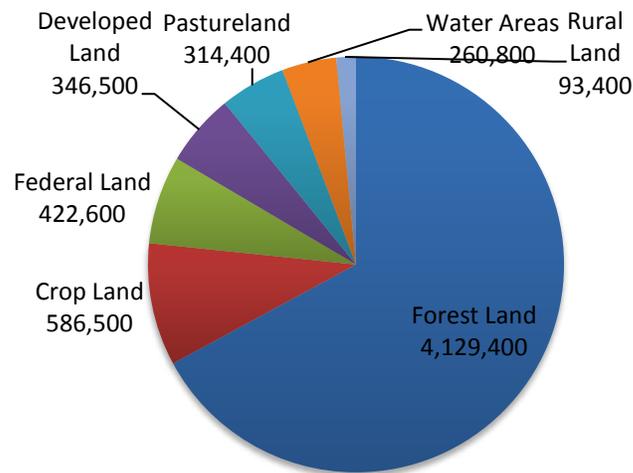


Figure 1: Land Use in Vermont as of 2003

Source: United States Department of Agriculture Natural Resource Conservation Service, *National Resources Inventory 2003 Annual NRI: Total Surface Area by Land Cover/Use* (February 2007), <http://www.nrcs.usda.gov/technical/NRI/2003/statereports/2003summaryreport.pdf>, accessed March 24, 2010.

Direct Economic Effects

Direct economic effects include agriculture’s contribution to the State’s Gross Domestic Product, tax revenues the state collects, and how much agriculture contributes to employment in Vermont. These are the economic indicators traditionally used to analyze the value of agriculture, and they do not take into account any of the positive or negative externalities agriculture produces.⁴ Table 1 below shows agriculture’s affect on these factors from 2002 to 2008.

Gross Domestic Product

Annual cash receipts from all agricultural commodities in Vermont in 2008 were \$687,801,000.⁵ Although commodity cash receipts have a tendency to fluctuate, in recent years agricultural cash receipts have increased greatly, even with inflation taken into account. Vermont’s agricultural sector has consistently accounted for less than 2% of the state’s GDP (see Table 1 and Figure 2).

⁴ United States Department of Agriculture Economic Research Service, *Annual Cash Receipts, 1924-2008, Vermont* (Updated February 2010). <http://www.ers.usda.gov/Data/FarmIncome/FinfidmuXls.htm>. Accessed February 22, 2010.

⁵ United States Department of Agriculture Economic Research Service, *Annual Cash Receipts, 1924-2008*.

Year	GDP for industry code 3 ⁶ (agriculture, forestry, fishing and hunting) in millions of chained 2000 dollars	GDP for industry code 3 (as a percentage of all industry total)	Taxes on Production and Imports (millions of current dollars) ⁷	Agriculture related employment (Farm employment + Agriculture and forestry support activities) ⁸	Agriculture related employment as a percentage of total state employment
2002	252	1.29%	18	11,741	2.89%
2003	289	1.40%	19	11,221	2.75%
2004	340	1.56%	20	10,426	2.51%
2005	377	1.66%	22	10,145	2.41%
2006	283	1.20%	24	9,697	2.29%
2007	479	1.95%	26	10,175	2.37%
2008	410	1.61%	N/a	10,542	2.42%

Table 1: Gross Domestic Product, Tax Revenues, and Employment (measured in millions of chained⁹ 2000 dollars).¹⁰

Source: Bureau of Economic Analysis (BEA)

When comparing the agriculture’s contribution to GDP in Vermont, New England, and Minnesota¹¹ in Figure 2 below, the percentage of total GDP that Vermont’s agricultural sector contributed from 2002 to 2007 was consistently more than three times that of the percentage all of New England states agricultural sector’s contribution to its GDP. Vermont agriculture’s contribution to its GDP was also roughly analogous to Minnesota’s agricultural contribution.

⁶ US Department Of Commerce Bureau Of Economic Analysis, *Regional Economic Accounts, NAICS 1997-2008, Real GDP By State (millions of chained 2000 dollars), Vermont, All Industries, All Years*.

⁷ US Department Of Commerce Bureau Of Economic Analysis, *Regional Economic Accounts, NAICS 1997-2008, Taxes on Production and Imports(millions of current dollars), Vermont, All Industries, All Years*.

⁸ United States Department of Commerce Bureau of Economic Analysis, *State Personal Income and Employment: SA25 Vermont 2008* (Revised October 2009). <http://www.bea.gov/regional/index.htm>. Accessed February 22, 2010.

⁹ Chained dollars are a measure of the real value of money, accounting for changes in the purchasing power of the dollar. This has been done in the past by expressing real amounts in terms of a base year, usually one close to the year(s) being used for analysis. Chained dollars use the second year in a given pair of years, with its weights, as the base year for the next pair of years, and so on. This method is more closely related to a given period of time covered, and less susceptible to distortion over time.

¹⁰ US Department Of Commerce Bureau Of Economic Analysis, *Regional Economic Accounts, NAICS 1997-2008, Real GDP By State (millions of chained 2000 dollars), Vermont, All Industries, All Years* (Updated June 2, 2009). <http://www.bea.gov/regional/gsp/>. Accessed January 28, 2010.

¹¹ Minnesota was chosen because the percentage of GDP agriculture contributes is comparable to that of Vermont’s. Minnesota is also a state known for the significant role agriculture plays in their economy.

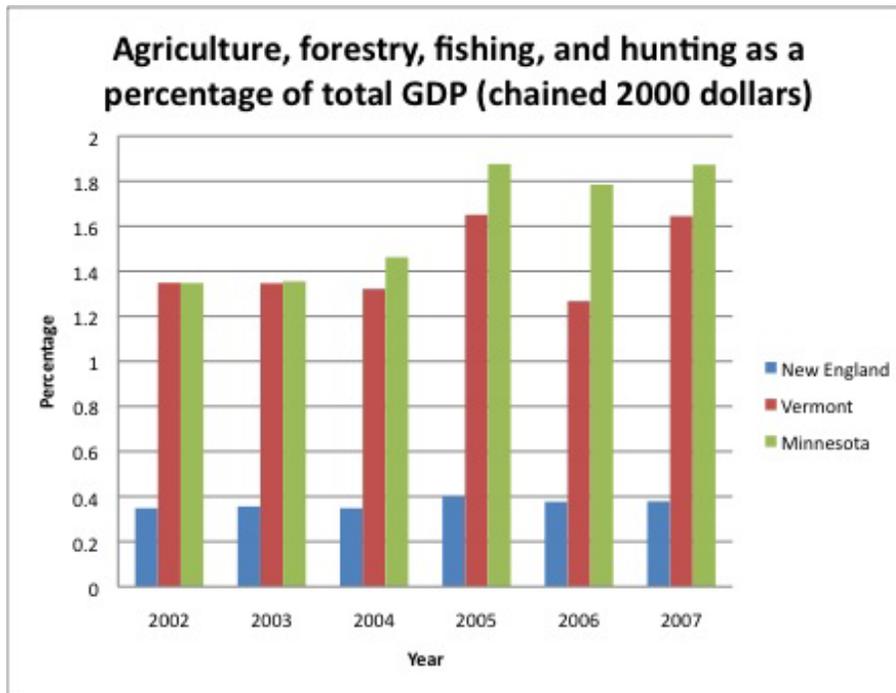


Figure 2: Comparison of New England, Vermont, and Minnesota GDPs

Source: US Department Of Commerce Bureau Of Economic Analysis, *Regional Economic Accounts, NAICS 1997-2008, Real GDP By State (millions of chained 2000 dollars), Vermont, Minnesota, New England, All Industries, All Years* (Updated June 2, 2009). <http://www.bea.gov/regional/gsp/>. Accessed March 17, 2010.

Tax Revenues

Vermont farms paid \$18 million in taxes in 2002, according to the BEA—another way that farms contribute to the economy (see Table 1 above).¹²

Employment

In 2008, farm-related earnings (farm earnings combined with agriculture and forestry support activities) constitute approximately 1% of earnings by Vermonters.¹³ Farm-related employment (farm employment combined with agriculture and forestry support activities) makes up approximately 2% of total employment in Vermont (see Table 1 above).¹⁴

¹² US Department Of Commerce Bureau Of Economic Analysis, *Regional Economic Accounts, NAICS 1997-2008, Taxes on Production and Imports (millions of current dollars), Vermont, All Industries, All Years* (Updated June 2, 2009). <http://www.bea.gov/regional/gsp/>. Accessed March 1, 2010.

¹³ United States Department of Commerce Bureau of Economic Analysis, *State Personal Income and Employment: Annual Personal Income and Employment 1969-2008, SA05 Vermont 2008* (Revised October 2009). <http://www.bea.gov/regional/index.htm>. Accessed February 22, 2010.

¹⁴ United States Department of Commerce Bureau of Economic Analysis, *State Personal Income and Employment: SA25 Vermont 2008*.

Forestry and Timber

A majority of Vermont's landscape is composed of forested land. In 2005 the Forest Service estimated there to be 4,570,700 acres of forestland and 4,479,700 acres of timberland.¹⁵ Respectively, these estimates showed a .2% and .3% decrease in acreage from 2005.¹⁶ The timber industry provides three primary purposes to the state: revenue, jobs, and energy. The following are findings from the United States Forest Service from 2005:¹⁷

- Vermont's Forestry industry contributed 1 billion dollars to the economy;
- Forest-based industry employed 6,379 people;
- "Wood provides the energy for approximately 6% of electrical and heating use in Vermont."

In addition to the typical agricultural sectors most people associate with agriculture (i.e. dairy, beef, crop production etc.), the forestry industry is vital economic contributor to Vermont' agricultural sector and should be considered when calculating Vermont's agricultural value.

Indirect Economic Effects

In addition to gross domestic product, tax revenues, and employment, there are ways agriculture may have an indirect effect on Vermont's economy. For example, dairy, one of Vermont's more significant agricultural commodities, can generate jobs for milk haulers, veterinarians, jobs at food processing plants, at animal food and fertilizer companies and stores, and at equipment dealers. Another indirect economic effect could be through food processing that uses dairy products. Companies that produce "ice cream, butter, powdered milk, yogurt, cottage cheese, and infant formula also start with Vermont milk."¹⁸ This "ripple effect" does not get included when estimating direct economic impacts.

As noted earlier, the United States Department of Agriculture estimated the value of Vermont Farms to be \$687,801,000.¹⁹ This estimate, however, excludes the property value, value of infrastructure, value of machinery, etc. In assessing indirect economic effects, it is important to identify the direct transfer of goods services within an economic system as well as the subsequent transfers;²⁰ these secondary transactions are considered indirect economic impacts. Within the agricultural sector, indirect effects extend to but are not limited to infrastructural benefits, social benefits, aesthetic benefits, and the impact of tourism and related industries. In one study,²¹ the Vermont Sustainable Agriculture Council

¹⁵ North East Forest Association, *The Economic Importance and Wood Flows from Vermont's Forests*, Concord: North East Forest Association (2007): 2-3.

¹⁶ North East Forest Association, *The Economic Importance and Wood Flows from Vermont's Forests*, Concord: North East Forest Association (2007): 2-3.

¹⁷ North East Forest Association, *The Economic Importance and Wood Flows from Vermont's Forests*, Concord: North East Forest Association (2007): 2-3.

¹⁸ Grubinger, V., K. Mulder, and D. Timmons, *Vermont's Agriculture: Generating Wealth from the Land*, Burlington: Vermont Sustainable Agriculture Council (April, 2005). <http://www.uvm.edu/~susagctr/Documents/CouncilReport05.PDF>. Accessed March 1, 2010.

¹⁹ United States Department of Agriculture Economic Research Service, *Annual Cash Receipts, 1924-2008*.

²⁰ Costanza, R., *Ecological Economics: The Science and Management of Sustainability*. New York: Columbia University Press (1991).

²¹ The study takes into account various indirect factors using the multiplier effect as an estimating mechanism and using IMPLAN software modeling. IMPLAN® uses the input data to create "extremely detailed Social Accounting Matrices and Multiplier Models." The software is used to depict local economies for more than 1,000 public and private institutions that range in scope from state to metropolitan economies. The developers provide data from state and federal agencies

(SAC)²² expanded the definition of agricultural value to have three major contributions: 1) current value of farms (\$681 million), farm- related production values (\$1.05 billion), and the money spent on wages and input purchases (\$887 million).²³ The Sustainable Agriculture Council uses the multiplier effect²⁴ to account for the amount of money that stays within the community and circulates within the local economy.²⁵ This calculation is different than the term “turnover” which “number of times some of the initial dollar that is received from outside the community, changes hands within the community.”²⁶ Ultimately, the Sustainable Agriculture Council estimated that the total value of Vermont's agricultural sector is \$2.62 billion.²⁷

A report on the economic impact of agriculture in Utah used a similar input-output approach, utilizing IMPLAN modeling and reporting the direct, indirect and induced impacts of agriculture.²⁸ Another study on the economic impact of agriculture and forestry in Virginia done by Dr. Terance J. Rephann leaves out many of the indirect impacts mentioned above due to the difficult nature of quantifying and fully representing them. Rephann points out that

Recreation and tourism impacts are not fully reflected in the impacts because of the difficulty of measuring all consumer expenditures associated with agritourism and forest recreation. For instance, the effects of Virginia agricultural commodities sold in wineries and on farms is captured in this analysis. However, tourist spending on transportation, lodging, and other products and services is not.²⁹

Although there have been reports that take indirect effects into account, To adequately quantify and integrate all the possible indirect costs and benefits of agriculture and forestry is an exceedingly difficult and inconsistent task. It is routinely left out of reports from other states (Virginia, Utah) on the economic impact of agriculture.

(including the Census of Agriculture) that provide the interrelationships of the different entities. For more information please visit www.implan.com.

²² The Vermont Sustainable Agricultural Council, an extension of the UVM Center for Sustainable Agriculture, is funded by Vermont's Agency for Agriculture, and is dedicated to accurately estimating the true value of Vermont's Agriculture.

²³ Grubinger, V., K. Mulder, and D. Timmons, *Vermont's Agriculture: Generating Wealth from the Land*.

²⁴ The multiplier effect essentially increases the base amount by multiplying it by a certain number to gauge the value of money put into the economy. The purpose is to take into account the fact that people spend a portion of their money, which turns into wages, which turns into more purchases, etc.)

²⁵ The non-profit Institute for Local Self-Reliance and a consulting firm called Civic Economics calculate that for every \$100 spent at a locally owned store, \$45 remains in the local economy, compared with about \$13 for the same \$100 spent at larger corporate store. See Weisul, K., "Consumers Buy Into 'Buy Local,'" *BusinessWeek SmallBiz*. http://www.businessweek.com/magazine/content/10_09/b4168057813351.htm. Accessed February 26, 2010.

²⁶ Miller, W.P and T. Armbruster, *Economic Multipliers: How Communities Can Use Them for Planning*, Little Rock: University of Arkansas Cooperative Extension Service (2006).

²⁷ Grubinger, V., K. Mulder, and D. Timmons, *Vermont's Agriculture: Generating Wealth from the Land*.

²⁸ Ward, Ruby A., Paul M. Jakus, and Dillon Feuz. *The Economic Impact of Agriculture on the State of Utah*. Dept. of Applied Economics, Utah State University (January 25, 2010). <http://www.slideshare.net/StateofUtah/the-economic-impact-of-agriculture-on-the-state-of-utah>. Accessed March 15, 2010.

²⁹ Rephann, Terrence J., Ph.D. *The Economic Impact of Agriculture and Forestry on the Commonwealth Of Virginia: The Study In Brief*, Weldon Cooper Center For Public Service, University of Virginia (September, 2008). <http://www.vdacs.virginia.gov/news/pdf/AgSummary%20September16.pdf>. Accessed March 15, 2010.

Agritourism

When considering the economic impact of agriculture in Vermont, it is important to consider the part that agriculture plays in one of Vermont's biggest industries, tourism. When investigating the role that agriculture plays in Vermont tourism, The Vermont Department of Tourism and Marketing (VDTM) examined activities undertaken by visitors to Vermont. Its research shows that viewing, cultural, and learning activities were the primary activities of those visiting in summer (representing 30% of seasonal visitors) and fall (representing 25% of seasonal visitors).³⁰ Other activities engaged in less than viewing, cultural, and learning included rest/relaxation, shopping, trail/street/road, outdoor adventure, winter/snow, boating/floating, and sports.³¹ Figure 3 below shows the number of visitors that engaged in viewing, cultural, and learning activities while in Vermont, according to how many times they visit Vermont annually.

Figure 4 below shows specific types of viewing, cultural, and learning activities. Those included in the figure are the six most-participated in activities. 37% of Vermont's visitors participated in Visiting a Farm/Nursery. Six other activities followed Visiting Farm/Nursery with smaller rates of participation.

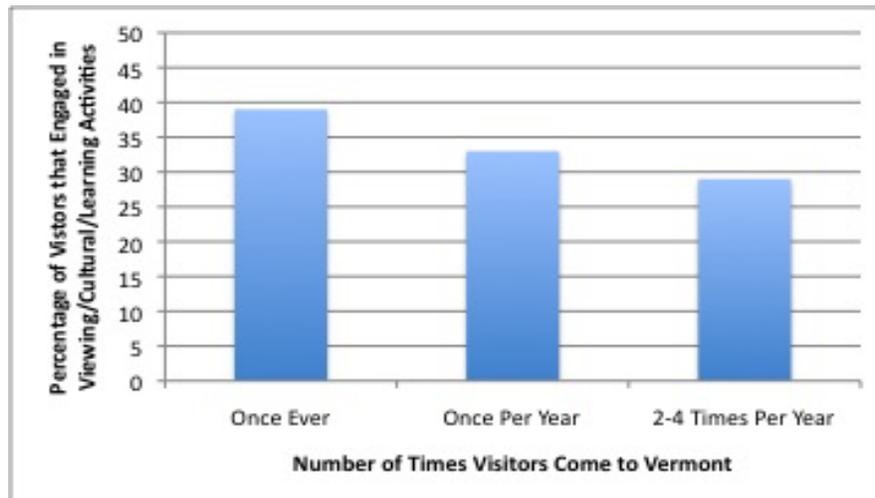


Figure 3: Visitor Activities

Source: Vermont Department of Tourism and Marketing, *Inquiry Analysis: Where Do Farms Fit in? A Brief Summary of Vermont Visitor Interests and Activities* (February 2010): 3.

<http://www.vermontpartners.com/pdf/Where%20do%20Farms%20Fit%20In.pdf>. Accessed February 24, 2010.

³⁰ Vermont Department of Tourism and Marketing, *Inquiry Analysis: Where Do Farms Fit in? A Brief Summary of Vermont Visitor Interests and Activities* (February 2010): 4.

<http://www.vermontpartners.com/pdf/Where%20do%20Farms%20Fit%20In.pdf>. Accessed February 24, 2010.

³¹ Vermont Department of Tourism and Marketing, *Inquiry Analysis: Where Do Farms Fit in? A Brief Summary of Vermont Visitor Interests and Activities*.

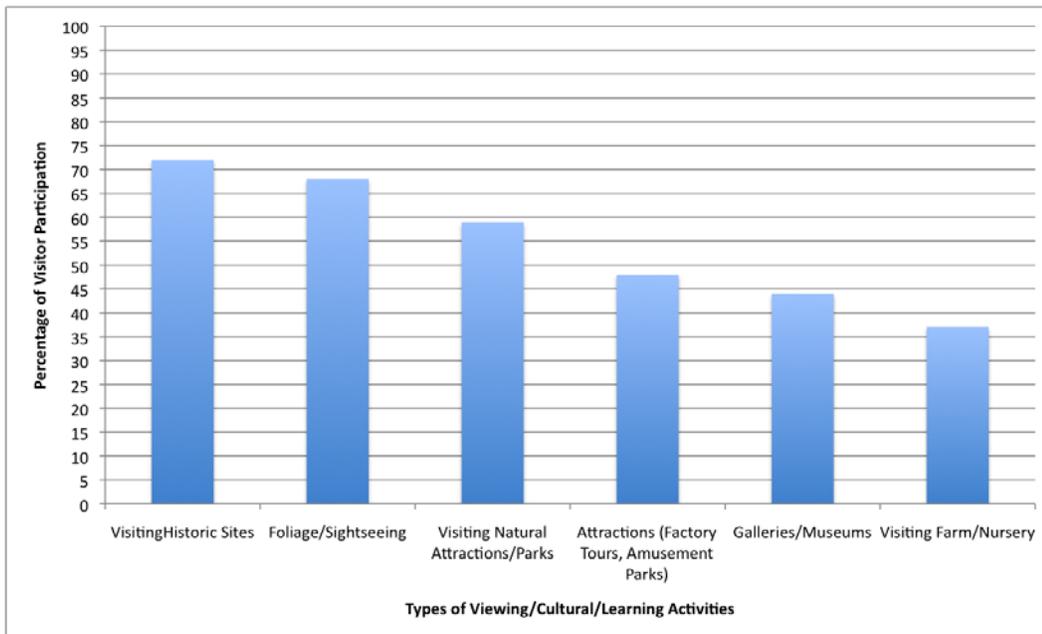


Figure 4: Viewing/Cultural/Learning Activities

Source: Vermont Department of Tourism and Marketing, *Inquiry Analysis: Where Do Farms Fit in? A Brief Summary of Vermont Visitor Interests and Activities* (February 2010): 6.

<http://www.vermontpartners.com/pdf/Where%20do%20Farms%20Fit%20In.pdf>. Accessed February 24, 2010.

Shopping was an important activity for tourists in Vermont as well. When researching shopping habits of visitors to Vermont, the VDTM found that 95% (of the 93% of visitors who had engaged in shopping activities) reported having purchased locally produced food products. Sixty nine percent of visitors engaging in shopping activities reported buying Vermont products or crafts.³² Again, it is important to take into account the role agriculture takes in Vermont’s tourism industry, and how much the tourism industry affects Vermont’s economy.

The VDTM’s research³³ for 2007 showed visitor spending in general on goods and services to be worth \$1.61 billion. It notes that, “this estimate does not include spending by second and vacation home owners on durable goods, or the initial purchase or construction of a second home.” The top three expenditures were in the categories of Food and Beverage at \$411.6 million, Lodging at \$321.2 million,

³² Vermont Department of Tourism and Marketing, *Inquiry Analysis: Where Do Farms Fit in? A Brief Summary of Vermont Visitor Interests and Activities*.

³³ The VDTM explains in their report *The Travel and Tourism Industry in Vermont: A Benchmark Study of the Economic Impact of Visitor expenditures on the Vermont Economy — 2007* that, “In preparing each estimate reported in the following pages, Economic Policy Resources, Inc. has reconciled independent data sources to verify the accuracy of the estimates. This high standard of impact analysis stands out by providing clear and justifiable benchmark estimates of visitor impact on the overall state economy, industry employment and output.” See page two.

and Gasoline at \$308.7 million.³⁴

VDTM research also shows that, “Visitors to Vermont in 2007 contributed an estimated \$206.9 million in tax and fee revenues to state coffers in the General, Transportation and Education Funds,”³⁵ representing approximately 9.1% of total taxes and fees revenues for the state. When looking at the “Top 4 Contributions to State Revenue,” visitors to Vermont contributed to these revenue sources: 49.5% of Vermont’s Rooms and Meals Tax (\$58.8 million out of a total \$118.7 million); 18.3% of Vermont’s Gasoline Tax (\$11.6 million out of a total \$63.5 million); 8.2% of Vermont’s State Education Property Tax (\$72.6 million out of a total \$882.2 million); 8.5% of Vermont’s Sales and Use Tax (\$28.5 million out of a total \$336.9 million).³⁶ Tourism and “Visitor spending [also] directly and indirectly supports 37,490 jobs for Vermonters (approximately 12% of all jobs).”³⁷

Conclusion

Farms and agriculture characterize significant shares in Vermont’s culture and economy. By providing open space and by playing a large role in Vermont’s cultural and historical identity, farms and agriculture appear to be part of what brings visitors to Vermont. Tourism alone as an industry was worth \$1.61 billion in 2007 (overall). Agriculture also provides for the people that live in Vermont through direct market income, employment opportunities, and tax revenue benefits. Various indirect factors also contribute to agriculture’s impact on the Vermont economy. When examining data from 2002 and 2008, direct monetary impacts from agriculture from GDP and tax revenues contributed \$705,801,000 to Vermont’s economy. In 2008, earnings from employment within the agricultural sector made up 1% of earnings in Vermont, and agricultural-related employment made up 2% of total employment in Vermont. As noted in the Indirect Economic Impacts section, the value-added worth of agriculture in Vermont has been estimated to be \$2.62 billion.

Based on IMPLAN software estimates, USDA data, and BEA data, there is arguably a considerable amount of money attributable to the agricultural sector in Vermont; however, without being able to compare its full economic impact, including indirect factors of agriculture, with every other economic sector, it is difficult to accurately estimate the overall quantifiable economic significance of agriculture in Vermont. With those caveats, our best estimate of the value of agriculture in Vermont is below.

³⁴ Vermont Department of Tourism and Marketing, *The Travel and Tourism Industry in Vermont: A Benchmark Study of the Economic Impact of Visitor expenditures on the Vermont Economy — 2007* (2007): 6.

http://vermontpartners.com/pdf/Research_Brochure_2007.pdf. Accessed February 24, 2010.

³⁵ Vermont Department of Tourism and Marketing, *The Travel and Tourism Industry in Vermont*.

³⁶ Vermont Department of Tourism and Marketing, *The Travel and Tourism Industry in Vermont*.

³⁷ Vermont Department of Tourism and Marketing, *The Travel and Tourism Industry in Vermont*.

Breakdown of Estimates of the Value of Agriculture (in millions of dollars)

Value of farm production ^{38,39}	\$681
Value of farm related food industry production ^{38, 39}	\$1,047
Secondary impact of farm production (wages, fuel, equipment, etc.) ^{38, 39}	\$391
Secondary impact of farm related food production ^{38, 39}	\$496
Forest based manufacturing and value of shipments ⁴⁰	\$998.9
Forest related recreation and tourism ⁴⁰	\$485
Christmas trees/maple products ⁴⁰	\$22.4
Value of agritourism ⁴¹	\$10
Total estimated value of Agriculture	\$4,131.3

The report was compiled at the request of Representative Kitty Toll by Ian Altendorfer, Daniel Holland, and Anna Isaacson under the supervision of Professor Anthony Gierzynski on 17 March 2010.

Disclaimer: This report has been prepared by undergraduate students at the University of Vermont under the supervision of Professor Anthony Gierzynski. The material contained in the report does not reflect the official policy of the University of Vermont.

³⁸ Grubinger, V., K. Mulder, and D. Timmons, *Vermont's Agriculture: Generating Wealth from the Land*, Burlington: Vermont Sustainable Agriculture Council (April, 2005). <http://www.uvm.edu/~susagctr/Documents/CouncilReport05.PDF>. Accessed March 1, 2010.

³⁹ The data is taken from the SAC report to provide a breakdown of the total value of agriculture. The data did not include the forestry industry, therefore it is appropriate to add these values as the data sets are mutually exclusive.

⁴⁰ These values are from 2005 data, and therefore it should be noted that they are not necessarily representative of 2000 data that would normally be inserted here. However, given that the forestry industry performed almost identically in 2000 and 2005 they are a likely a good estimate of what the data would be.

⁴¹ Aubrey R. Davis, Judy Price, Joe Sampson, Dave Mikelson, Dianne Johnson, John Miyares, Jackie Hartford, *Vermont Agri-Tourism 2002*, New England Agricultural Statistics Service (April 30,2004), http://www.nass.usda.gov/Statistics_by_State/New_England_includes/Publications/agtour04.pdf, accessed March 26, 2010.