

Prepared for: the Vermont Maple Sugar Makers Association

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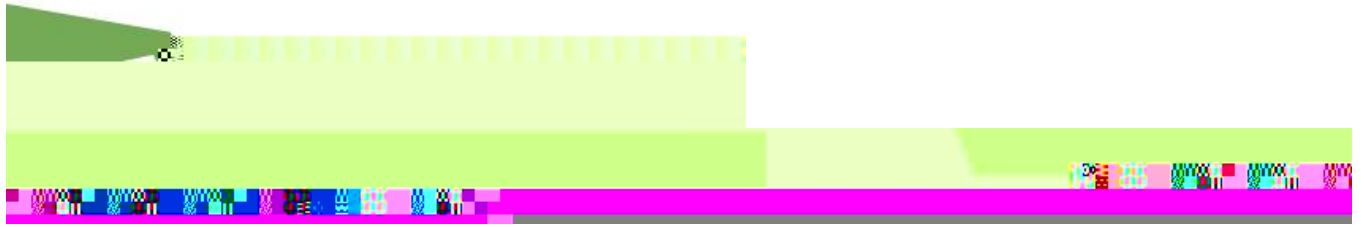


## The Economic Contribution of the Vermont Maple Industry

The Center for Rural Studies (CRS) is a nonprofit, fee-for-service research organization that addresses social, economic, and resource-based problems of rural people and communities. Based in the College of Agriculture and Life Sciences at the University of Vermont (UVM), CRS provides consulting and research services in Vermont, the United States, and abroad. The research areas are divided into five main areas: Agriculture, Human Services and Education, Program Evaluation, Rural Community and Economic Development, and Vermont Community Data. The mission of CRS is to promote the dissemination of information through teaching, consulting, research and community outreach. Primary emphasis is placed upon activities that contribute to the search for solutions and alternatives to rural problems and related issues. Bringing decades of experience to its work, CRS recognizes that answers to critical and timely questions often lie within a community or organization.

For any questions or comments about this report, please contact Florence Becot, Research Specialist at the

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It was a pleasure to conduct the economic contribution study of the maple industry, an industry so synonymous with Vermont. The authors of this report would like to acknowledge the Vermont Maple Sugar Makers Association for funding this study. Matthew Gordon, executive director of the association, was always available for questions and his insights on the industry were always appreciated.

The following research assistants helped with data collection and data entry: Sydney Durand, Weiwei Wang and Michael Fife. We would like to thank Dave Swenson from Iowa State University and Becca Jablonski from Colorado State University for their feedback on the methods used to conduct the analysis. We also would like to acknowledge the University of Vermont Extension Proctor Maple Research Center for sharing their contact list for the survey.

Last, but not least, we want to thank all of the maple sugar makers, the packers, equipment manufacturers, equipment dealers and installers who took the time to answer the surveys and interviews and who were willing to share their information. Though we cannot name them individually because there are too many and we want to keep their names confidential, we are well aware that the information we asked from them was tedious and sensitive. While their economic information was crucial to conduct this study, their insights were particularly helpful to better understand the maple industry.

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Vermont maple producers are the top producers in the US and the sector has grown tremendously in

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Vermont is the largest maple producer in the United States accounting for 42% of the production (USDA - National Agricultural Statistics Service, 2015). In Vermont, maple is a key agricultural enterprise. Based on cash receipts, maple is the fourth most valued agricultural commodity in Vermont and when livestock is removed, maple is the second most valued agricultural commodity closely behind the greenhouse and nursery industry (USDA - New England Agricultural Statistics, 2013). According to the latest census of agriculture, there were 1,553 maple producers in 2012 while the maple industry estimates that the number of producers actually ranges between 1,800 and 3,000. Vermont maple production has grown tremendously over the years,

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In collaboration with VMSMA, CRS designed a survey instrument to collect information from maple producers about their operations including 2013 production levels, expenditures and sales, labor, marketing and equipment. A paper survey was mailed to 2,952 producers in Vermont during the third week of August 2014 and reminder postcards were mailed a couple of weeks later. The list of addresses were from the Vermont Maple Sugar Makers Association (1,111 names), and the University of Vermont Extension (2,398 names). The two lists were merged and duplicates were removed. The list from UVM Extension included organizations that are not directly involved in the production of maple products such as service providers (state and federal agencies), financial institutions and educational institutions. Out of the 2,952 survey mailed, 130 were returned due to bad addresses, 166 were not or no longer were maple sugar producers, and a total of 298 completed surveys were returned. The results based on a group of this size have a margin of error of plus or minus 5.1 percent with a confidence interval of 95 percent. This means that we can be 95 percent certain that our results are within plus or minus 5.1 percentage points of the true population value.

Once the returned surveys were entered in a database we conducted univariate and bivariate analysis to summarize the data. Bivariate analysis is conducted by comparing the responses to questions from different groups. For instance gallons produced by the number of taps. The results from different groups of respondents are considered statistically significant if the values of the statistical tests used during the bivariate analysis are inferior or equal to 0.1. In this study we used Chi<sup>2</sup> and F tests. The results of the statistical tests are reported using the following convention. Statistical significance: \* = 0.10 level (10%), \*\* = 0.05 level (5%), \*\*\* = 0.01 level (1%). Statistical significance means that the response to the same question by different groups of producers is not likely to have happened by accident or by chance.

There were two open-ended questions at the end of the survey where respondents could provide their opinion on the biggest opportunities and threats to the maple industry in the next five years. These questions were analyzed by two researchers who read all of the responses and categorized the answers using keywords based on the responses. The number of categories based on keywords was then reduced to avoid redundancy and overlaps and comments were re-categorized to match the new categories. There wa u-5(n)3(ses.)8(ed i)10(i(o)-53(d)3(s)8ETBT1 0 05du)6Ctsce7.49 TmTm[( )-3(d[( )] TJET EMC /P #MCI

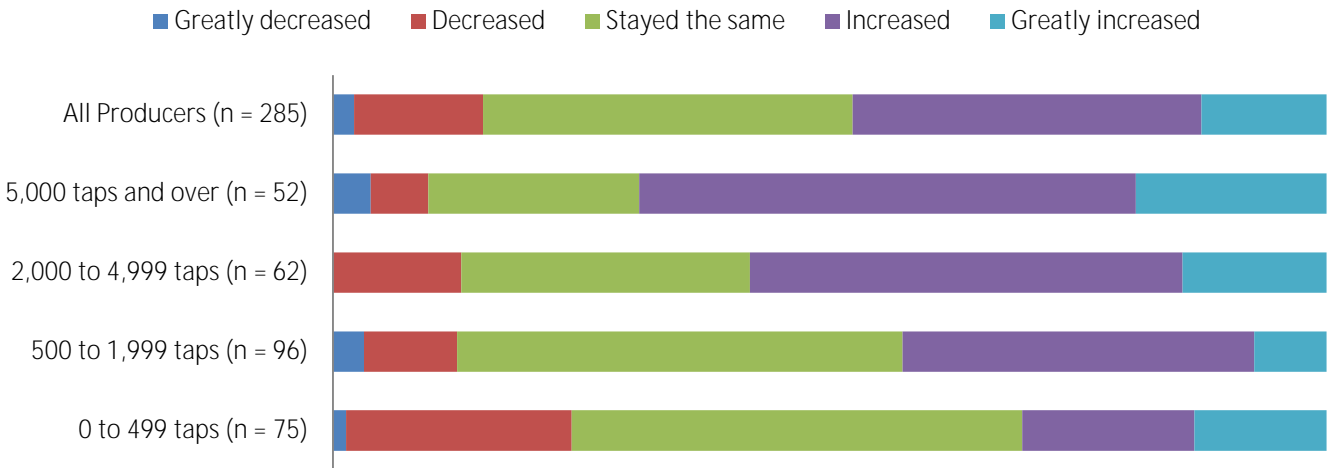




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In the last five years, 47.7% of the producers reported that maple production increased or greatly increased and 37.2% of the producers reported that the production stayed the same. Figure 2 shows that bigger-scale operations saw a greater production increase while smaller-scale operations saw production remaining constant. Also of note, the producers with 0 to 499 taps reported the highest proportion (22.7%) of decreased production.

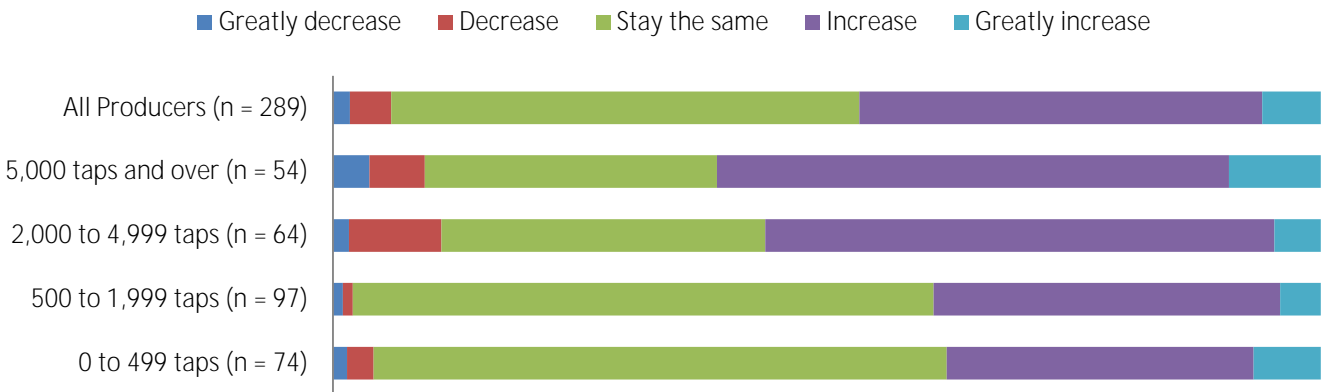
Figure 2. Perceived change in production over the last five years in percent (n = 285)



Notes.  $\chi^2 = 34.203$ , statistical significance at the 0.01 level.

Looking at the anticipated changes in the next five years, producers are split between constant production (47.4%) or increasing production (40.8%) (Figure 3). Similarly to five year production trends, larger-scale producers will increase their production in greater quantities: for producers over 2,000 taps about 51% will increase their production while about 30% of the producers between 0 and 1,999 taps will increase their production.

Figure 3. Anticipated change in production over the last five years in percent (n = 285)



Notes.  $\chi^2 = 27.311$ ,  $p = 0.007$

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On average, maple production represented 57.8% of the total gross agricultural and forestry sales of the respondents and the larger scale the operation, the larger the proportion of gross sales are from maple sales (Figure 4).

Figure 4. Percentage of sales from maple production (n = 259)



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Figure 5. Market channels for maple products in 2013 in percent (n = 269)

Notes. \*\*\*indicates statistical significance at the 0.01 significance level.

Producers were asked what they perceive to be the biggest threat to the maple industry in the next five years as well as the biggest opportunity. The responses to these questions were open ended and through a classification process nine main threats and seven main opportunities were identified. The





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Expenses for equipment, materials and supplies represented the largest expenses for maple producers. The average use of equipment, material and supplies by producers is presented in Figure 7. 66.4% of the equipment and supplies are purchased from maple equipment dealer/manufacturer, 19.3% are purchased from other such as private sales and auction, 7.4% from hardware stores and 1.9% online.



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Figure 8. Point of purchase for equipment related to maple production in percent (n = 298)

Figure 9. State of purchase for equipment related to maple production in percent (n = 298)

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percentage of respondents who said that they had unpaid labor in 2013 (89.9%), including themselves, family members, and neighbors, seem to confirm this claim.

Table 7. Number of paid workers including owner operator (n = 101)

Number of paid workers	0 to 499 taps	500 to 1,999 taps	2,000 to 4,999 taps	5,000 taps and over	Total
Full time year-round					
Average	0.1	0.7	1.2	1.2	1.1*
Minimum	0.0	0.0	0.0	0.0	0.0
Maximum	1.0	3.0	5.0	5.0	5.0
Part time year-round					
Average	0.3	1.1	1.1	1.0	0.9*
Minimum	0	0	0	0	0
Maximum	1.0	7.0	3.0	2.0	7.0
Full time seasonal					
Average	0.1	0.6	0.6	2.1	0.9*
Minimum	0	0	0	0	0



An economic contribution study measures the economic activity from existing businesses and industries and places a value on their contribution to the local economy, in this case the state of Vermont. This type of study calculates the amount of money that cycles through the economy as a result of these businesses or industries. For this study, we are looking at the economic activity of the maple industry supply chain including maple products producers, packers, equipment makers, equipment manufacturers, and installers in Vermont.

Economic contribution studies should not be confused with economic impact studies. From a theoretical perspective, economic contribution and economic impact studies are two different types of studies. An economic impact study allows to make estimates of possible scenarios on the studied economy. For instance, what would the impact be on the economy if a major plant decided to double its production or if a plant decided to close its doors? Since we are looking at an existing industry, the economic contribution studies method is most appropriate because it calculates how much economic activity in Vermont is associated with the maple industry.

The economic contribution of an industry accounts for three effects in the economy: the direct, indirect and induced effects. Taking a sugar operation as an example:

The **direct effect** results from the expenditures in goods, services and labor associated with running the operation. For instance, a sugar operation hires one part-time worker in the spring to help in the sugar house.

The **indirect effect** results from the suppliers of the sugar makers purchasing goods and services and hiring workers to fill the order from the sugar maker. For instance, an equipment manufacturer purchasing stainless steel to build an evaporator pan purchased by a sugar maker.

The **induced effect** results from the effects of the changes in household income due to the economic activity from the direct and indirect effects. Here we are looking at how employees from sugar operations or from an equipment plant spent their pay check, for instance, buying food at the grocery store or paying the mortgage on their house.

The sum of the direct, indirect and induced effects is the total contribution (Figure 10). In a contribution study, the direct effect includes the economic activity of the businesses in the maple syrup supply chain, it does not look at the amount of production that stayed in the state and the amount that left.

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Figure 10. Representation of economic contribution studies and the effects measured

For each of the effects (direct, indirect and induced), the results will include the output for the effect, also referred to as total sales, value added, labor income and employment.

The output/total sales are usually the largest numbers. However, they do not represent the best measure as “double counting” usually occurs because the output number includes the total amount of sales revenue from all industries. In the case of the study, the maple products can be sold multiple times. For instance, when the maple producer sells the syrup to the packer, when the packer sells the syrup to a retailer, and last when the final customer purchases the syrup from the supermarket.

The value added number is considered to be a more conservative and accurate measure of the economic activity. It is a similar measure to the gross national product (GDP) and it includes



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averages to the population of maple producers in Vermont for the economic contribution analysis. Interviews to collect this type of information are laborious as they require the producers to give very detailed and somewhat sensitive financial information. VMSMA gave the name of fifteen maple producers, all were contacted and ten agreed to be interviewed. The interviews were conducted over the phone or in person between November 2014 and January 2015 and lasted on average one hour. They were audio recorded and notes were taken during the interviews. Producers were asked to provide input and output data from 2013 (the year of study) including sales, operating expenses, payroll and number of paid workers.

Data from the maple producer surveys were used to gather information on the size of the industry including total expenditures, sales, payroll, taxes and number of workers. The results from the surveys were extrapolated to the entire maple producers sector, which totaled 1,553 producers in Vermont according to the last census. The 298 responses to the survey constitute a representative sample of the maple producer industry with a margin of error of plus or minus 5.1 percent and a confidence interval of 95 percent. When extrapolating the survey data to the entire industry, we used the size categories that could be matched with those used in the census of agriculture (1 to 499 taps; 500 to 1,999 taps; 2,000 to 4,999 taps; 5,000 taps and over) and the number of farms in each of these categories at the state level (respectively, 509 – 509 - 310 and 225 operations). We then used the averages from the survey for each of these categories based on the number of taps and multiplied by the number of farms in these categories. Using the same procedure, we modeled a maple sector with 1,800 maple producers because VMSMA estimates that the number of producers is higher than reported in

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### Model scenarios

We followed the 'Multi-Industry Contribution analysis' procedure from the IMPLAN knowledge database including modifying commodity production and modifying trade flows. Additional procedures in IMPLAN to set up the model included aggregating some of the sectors to work with the data available and the limited granularity of information,

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followed by the maple production sector \$66 million and the retail sector \$31 million. The three sectors with the highest contribution to value added are maple production, food manufacturing and the retail (equipment) sector. In terms of jobs, the highest number was in maple production followed by agriculture and forestry and food manufacturing.

Table 13. Scenario 2: Top 10 industries impacted by the economic activity of the maple industry ranked by value added

Sector	Employment	Labor Income	Value Added	Sales
Food manufacturing	R	R	R	R
Maple production	3,470	\$12,648,738	\$17,315,722	\$65,707,725
Retail – equipment	R	R	R	R
Agriculture and forestry	94.6	\$4,307,574	\$6,194,567	\$16,993,587
Professional and scientific services	75.6	\$4,038,536	\$4,930,853	\$7,891,258
Real estate establishments	41.8	\$636,382	\$4,664,712	\$6,426,873
Non-food manufacturing	R	R	R	R
Retail – building materials	53.5	\$2,167,083	\$3,014,681	\$4,342,999
Food services and drinking places	66.7	\$1,455,747	\$2,051,499	\$3,861,968
Building contractors	37	\$1,511,724	\$1,627,462	\$3,196,019

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Vermont maple producers are the top producers in the US and the sector has grown tremendously in Vermont over the years with a 131% growth in production between 1992 and 2014. Maple is a key

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Table 14. Employment, labor income and value added multiplier from economic contribution studies of the maple syrup production industry in Vermont, Quebec, Canada and Maine

States	Vermont, 2014	Quebec, 2009 <sup>z</sup>	Maine, 2013 <sup>y</sup>
Employment multiplier	1.06	1.49	1.41
Labor income multiplier	1.73	N/A	1.45
Value added multiplier			

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- Animals
- Invasive species
- Climate change
- Growth of the industry
  - Growth in number of producers
  - Market expansion
  - Market instability
- Maple industry
  - Support for small-scale producers
  - Lack of unity from producers
  - Aging producers

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Over regulation. Expense of expanding and updating.
Need to open state and federal forest lands for sugaring
Volume and state involvement
1) Over supply=lower prices 2) Insects, growth of maple producers affecting price per pound
Asian Beetle
Potentially the Asian longhorn beetle. Also climate change.
Lack of promotion of Real Maple Syrup and Associated products causing a decline in price due to oversupply.
Climate change.
Too much syrup being made-prices fall. Die back off old trees.
Overproduction--too many new big operations
Over-production that will drive down prices.
Junk from China, Over regulation will eventually shut down the industry as it has our Vermont farmers.
Over production, global warming.
Laws that are brought in.
Climate change. Increase in costs for all aspects of sugaring i.e. fuel, equipment, taxes
Too much syrup produced
Tapping small trees and removing too much sap from trees.
The weather. Global Warming
Over expansion without expanding markets next 5 years. Climate change- next 25-50 years
Over production

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Over-regulation from US Govt and unfair disadvantages to a small producer like myself from state of VT rules. Regs, fees etc. Competition from mega-sized producers that will leave small producers at disadvantage.
Over production If there is such a demand for syrup and market is expanding why aren't buyers getting to producers to buy their syrup.
Supply out pacing demand, Canada, looseness of "Organic" maple syrup. People are gaining and advantage by calling theirs organic and they do nothing different.
Climate and forest health
Global warming

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Regulations and expense Tree diseases
Price of fuel
Operations too large, increase price sugarbush
You never know.
overproduction
The big operators like Sweet Tree and Bernard and ?? producing a lot of maple syrup in ??
Over production. Too many people are getting into production now there's a little money to be made and it will probably bill it for a long time.
I think acid rain is causing a lot of maple crowns to dye back and put undo stress on the maple trees.
Over producing maple

Threats to sugarbush: ALB; warming trends. Threats to syrup prices: increased supply-esp. (also US-CAN exchange rate) inc. in U.S. such that it destabilizes Quebec's price control.



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overproduction
maple thrip
overproduction combined with slowing wholesale sales
production outpacing sales, de-valuing the US dollar (thank you liberal policies)
some forest pest/invasive (such as asian longhorn beetle)
Growing faster than demand
Canadian syrup
too many huge producers coming on board
Fake maple claims in products and task syrup reducing demand for pure maple therefore creating a surplus.
overproduction
1. Crazy weather 2. if it's found that tubing adds undesirable substances (like BPA?) to sap. Too much money going to big producers who do not put it back into local economies
Regulations
1. Failure of state of VT to budget money and actually support VT maple industry and timber industry in general 2. Asian Long Horn Beetle
Weather? Weather? Weather?
state regulations threatening small producers, climate change and insects
overproduction
price dropping from overproduction- equipment price rising, FDA and local regulations pushing us little guys out.
VMSMA getting greedy unfair dues by changing different size producers different ??? and giving them the (cut off...) same rights
1. Overproduction and loss of real maple 2. price has gotten to the point where it is a luxury food item, Industrialization of the maple business
Climate change, prices falling due to production in Canada and the destruction of the VT "Fancy" brand at the state level
added taps in woods, demand will not keep up with supply
food modernization requirements and weather patterns and equipment costs and fuel costs all impact the return on investment to sugar makers. If this balance becomes unstable, that's a big problem
Cost and oversupply
Over production
Overproduction, lack of central marketing operation
overproduction and lower prices because of It-Some invasive species, e.g., Asian longhorn beetles- Overregulation by state or sugarmakers association
Climate change.
Expansion too rapid.
Bug infestation-Warming weather
Bug infestation
Tree disease





## The Economic Contribution of the Vermont Maple Industry

Climate change. Over production, but this is just a suspicion I have leaned on no facts. I am also concerned about the reliance on R.O. to concentrate sugar contents.
Weather-insects- infiltration of sub grade mislabeled syrup
Government control and invasive insects
Asian longhorn beetle
Asian longhorn beetle-overproduction, possibly caused by investment groups-NOT getting marketing dollar from producers or people just selling sap
Overproduction
Not enough bottlers to handle global market demands
Dying trees-weather changes
Pricing making maple products into luxury item but consumers NOT willing to pay-Younger generation NOT interested
producers increasing in size and flooding The market-tree diseases
Large factory industries pushing out small operators
Weather changes
Overproduction
Politicians and lawyers unnecessarily taking controlling of VMSMA
Open ended production increases
Market flooding
weather changes-Over The top by the industry

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There is a huge opportunity to expand retail sales so long as syrup prices are STABLE and produce quality remains high.
Expanding markets in the US and overseas, focusing on the health benefits and versatility of the products.
Growing demand
Overseas market
Increased value-added products, opportunity to think outside the box. maple container- ex: sap water
Eliminate maple pests

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Good prices
Capitalizing on the unique value of VT maple syrup products via internet use, and avoiding the over burdening rules, regulations, inspection and certifications, while keeping good food standards deployed logically.
Sell to China and Japan. Rising middle class and love of the "finer things".
VT products quality marketing
Better market place
Expansion of demand for maple products nationwide and worldwide.
Verification of the health and benefits of maple syrup over other sweeteners. I.e. Benefits for diabetics or hypoglycemics.
Quality and growing market
The marketing of maple products both in the U.S. and world wide.
2/16" tubing
Because of the shift from processed sugar to natural products, I believe by promoting Maple in that aspect- there could be a huge potential domestic mkt.
Increased market 1) Local 2) Wider

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Increasing global markets esp. Europe and Asia.
Export - our overseas friends and family love syrup but can't get it in Europe- Why not? More producers
Increase in marketing resulting in higher level local and global demand
None
Marketing
VT being the biggest in the USA
Increase marketing to spread the good word of maple as a natural/local sweetener
increase sales worldwide
finding new markets to keep prices up
-Keep wholesale price high- create a large overseas market- Market the "Heath" benefits of Maple!!!
More sales
I don't know where VT farms and small business people would be without the sugar industry in the last 10 years. The recession hit us hard, and without good syrup prices, we would be much worse off.
Expanding markets
Packers working to establish new global markets. Increased production putting more money into the economy.
Put sugar industry back hands of Association.
Desire for quality. Natural Food
?
Quality of VT syrup
Global markets
Advanced technology and new techniques
Lower our production costs so prices can stay lower.
Customer demand for natural sweeteners.
Expansion into new markets because of amounts available.
If over producing causes the price of syrup to drop more people will be able to buy it.
Global promotion of maple products

Expanding markets

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Overseas markets for value added products, teaching our children and young people the joys and traditions of sugaring
Getting maple marketed to places as a substitute for conventional sweeteners
The public becoming aware of the goodness of our production, it's not just a treat, it's healthy
More overseas marketing
There is a tremendous opportunity to promote maple outside the maple belt. The industry needs to do some quality marketing.
Opening up new markets for maple
Promotion as a natural sweetener.
Use of the expansion.
overseas exports
Selling retail if there's a good market
Selling abroad and expansion
Global market
Converting pancake syrup users to pure maple syrup users

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change in people behavior, expanding market for people who claim they are using maple when they are not
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Overseas sales, use web to our advantage
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Some responses were edited to remove personal information

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Need to open state and federal forest lands for sugaring

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I work full time and syrup another 3-4 hours a day building my maple business over the last 18 years- I have put all fund back into the business, plus.
Thank you
My wife and I operate a habit operation, do not intend to ever make a profit. We do not tap every year. In 2013, for example, we were unable to sugar due to knee problems for both of us.
We are more of a hobby operation
Vermont producers need to be less self-centered about annually selling all the maple produced in Vermont and get more focused on increasing total sale of all maple regardless of where it was produced. The more people nationwide that fall in love with maple, the more maple will be sold and the more Vermont maple will be sold.
Perhaps the market channel question could be worded better: our sales all originate here are the farm, about 10-15% are walkins and the rest is mail order (phone and internet) most destined outside Vermont.
Like dairy farming, I fear the small operation will be squeezed out. Regulations and getting "gouvernement" involved will be the death of small time operators who just want a way to pay property taxes, fertilizers... We have invested most of our retirement for a "hobby" to be regulated and how to do it. Help is minimal, cost is much!!!
The questions seem based on 2013 production, but there's been a big increase in production each year; for instance, in 2013 we had 3500 taps; made 1800 gal. In 2014, we had 7500 taps and made about 3400 gal. Many producers we know have done the same.
I don't have much to give you yet. I am starting a sugaring operation soon. The is 2/3 built. When it's done, I will have web cameras and invite the public. The purpose is as much about education and the environment as it is about making syrup.
Very few people can afford to buy everything new in one year.
My operation strictly sells saps to other producers. Tropical storm Irene damaged lines and tanks and operation has been idle since. Anticipate tapping again for 2015 season.
I am concerned about the disadvantage which to me, looms for the small producers vs the mega-sized producers. For example, the cost of registrations, certifications and so forth. Especially in Vermont. .
Have a place for smaller farm representation in state and sugar maker organizations.
I would be interested to know how many producers gain their income from maple production only. The reason I am decreasing is old age and nearing retirement and hard to get GOOD help
I set up sugaring operation in 2013 from SCRATCH. The total expenditure for sugaring, equipment, sugar house, pipeline etc was about \$400,000. Had 7,000 taps this spring, will have 11,000 next spring.
Thanks for studying this. I would be glad to discuss further. I look forward and appreciate your help.P.S. keep responses anonymous.
Since 2013 was such a favorable year for production compared to 2014 in Champlain Valley, production data is likely to be unrealistic to sustain!
Obviously from my answers you can tell that we sell none of our syrup. What we produce we give away or use ourselves. This is the case with hundreds of hobby sugar makers. How does your survey account for people like us?!\
To sell to new clients in the US that have never tried real syrup before.
almost all of my equipment came from Canada but was from C.D.L. and Lapierre but was purchased in VT
Only big producers seem to get all the grants. The little guy gets left behind as always. I would like to increase my RO so I could decrease my fuel cost. But I'm told no money. Because someone else is more important. As always.

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Sugaring is going down the same road as dairy farming. We are moving towards two types of operations: large producers using lots of technology, paid help and lots of taps, and small producers using old technology, help from family/friends, and a small number of taps.

This is a family sugaring operation we all enjoy in between our full time businesses'. Our syrup is used for gifts, retail sales and personal use.

I have been a backyard sugarmaker for 40 years and come from a long line of sugarmakers and farmers. I have real mixed feelings about the new grading system and I also worry of the industrialization of sugaring. I CAN tell the difference in taste between R.O. and 'old fashioned' wood fired, boiled down syrup. Mine is better!

I would like to see more state and federal land be available for maple sugaring.

Price of equipment and supplies coupled with short labor supply means product prices will drive syrup off the general market

I am looking to start a Christmas tree farm, and honey bees. Does UVM research have any literature or help for77. (o)-5(f sug)5(ari)4(n)3(7. (o21 0 0 1 278.21 60225(o)-5(kin)31nec reml n)3 g[( )]w9.4w[( )]w9.4w[( )]4W\*5