

Harvard Agriculture and Its Climate Resilience

An Interactive Qualifying Project
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Abstract

The project aimed to inventory the town of Harvard's agriculture and understand agriculture's response to climate change. The team developed an interview guide with the help of Harvard's Agricultural Advisory Commission. Farmers on the Chapter 61/A lands lists and Ag Comm gathering list were contacted about participating in an interview or online survey. Farmers who responded were interviewed based on their preference. An agricultural inventory and 3 GIS map layers were developed based on interview responses. Future work on the project could create a more comprehensive inventory and GIS map. To encourage environmentally sustainable farming, Harvard should publicize agricultural information such as information about the Ag Comm and best practices.

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- Chris Ryan and the Community Resilience Working Group
- William Scanlan, Independent Architecture and Planning Professional
- Dr. Robert Traver
- All interviewees

Executive Summary:

Purpose and Goals

The team sought to understand the town of Harvard's agricultural community and its climate resilience. This meant understanding how Harvard farmers run their farms, what steps they have taken to adapt to climate change, and what steps they are planning on taking in the future. The project also included understanding any barriers to climate adaptation they are facing. The team took an in-depth look at the climate change practices that have been and will be implemented in Harvard. The team hopes to encourage more changes to be implemented in the town as a whole.

Deliverables

There were three deliverables for this project:

1. Interview/Survey - The team developed a set of questions to interview the Harvard Agricultural Advisory Commission and farmers in town. These questions were split into four major topics, which were agricultural practices, climate change, taxes and regulations, and business practices.
2. Inventory of Agriculture - The team developed a spreadsheet documenting Harvard's agriculture including animals and crops that are managed, land owned, and sustainable practices used.
3. Updated GIS Map - The team created 3 GIS map layers of the Harvard agricultural lands. Map layers include farm and farm related businesses within Chapter 61 and 61A properties. We also include farms that are not in the Chapter 61/A programs and display what the farms grow or raise.

Methods

1. Agricultural Commission Interviews- The team interviewed Harvard's Agricultural Advisory Commission, interviewing individual members of the commission as a pilot study and using their responses to create a final version of our survey.
2. Additional Farmer Interviews- The survey was edited based on feedback from the Agricultural Commission and we interviewed farmers from across the town of Harvard and gathered the data using an online survey.
3. GIS Techniques- To make the GIS map, the team used information such as addresses, acreage, and types of crops and livestock. This involved obtaining a copy of Harvard's GIS map and updating it to include all current 61 and 61A properties, as well as the properties from interviews which are not included in the Chapter 61 programs. This GIS map serves as a visual representation of the inventory of Harvard agriculture.

Results

The team contacted 53 people for interviews and completed 19 interviews. The team organized the data to depict patterns and common themes in Harvard's agriculture and its environmental sustainability. One example of information gained from the interviews is that most respondents use some form of environmentally sustainable practices on their farms.

Ten of these practices stood out in the survey results, including: organic farming, limited to no chemical use, natural pest practices such as fly predators, irrigation ditches, and Integrated Pest Management for pest control, composting, holistic management and spin farming methods, recycling food waste, using manure for fertilizer, and doing handwork whenever possible.

Another example of information from our results is that most respondents are not aware of best practices in Harvard that mitigate climate change within agriculture. A third information point is that town policies may compromise town agriculture, given that 7 out of 19 respondents reported that they would run their farms differently in the absence of any regulations.

The GIS map was another significant result of this project. The team updated Harvard's map of chapter 61 and 61A properties and created a GIS map layer of all farming properties belonging to the respondents of the interviews. This map lists who is farming what products, and where.

Recommendations

For the Project:

- Complete a comprehensive farm list by including additional farms which are not in the chapter 61/A programs.
- Increase the number of respondents by tailoring the communication methods to the demographics targeted.
- Explore in depth the impact of town/state regulations on farm viability and environmentally sustainable practices.

For Harvard:

- Publicize Agriculture Information. This information should include best practices, chapter 61 programs, potential for a machinery exchange, and the role of the agricultural advisory commission and how to contact them.
- Publication Methods. This can be done in a variety of ways including a resource guide in print and online, an Agricultural Advisory Commission website, and social media like Nextdoor and Facebook.

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Introduction

Agriculture drives the community of Harvard, Massachusetts. Unprecedented climate change patterns harm Harvard because they negatively impact agriculture in the community. Efforts to protect and maintain agriculture play an important role in the community, and there are multiple factors involved in protecting and maintaining agriculture. While climate resilience is a central factor, other factors include agricultural practices, impactful taxes and regulations, and business practices. Harvard can improve town agriculture by addressing all of these factors according to the needs of the farmers. An inventory of Harvard agriculture is necessary to gauge farmers' needs, inside and outside of climate change. The goal of this project is to inventory Harvard agriculture and gain an understanding of its response to climate change.

The impacts of climate change are numerous and widespread. Annual temperatures in Massachusetts have increased by 3°F over the past century. The warm temperature in the summer has been above average and even some winter seasons have experienced this warming trend. Patterns of very low temperatures have been observed as well, especially at night. The precipitation varies every year with either extremely dry or wet seasons (Runkle et. al, 2017). The changes to climate result in changes in precipitation patterns, quantity and intensity of drought/heat waves, sea level, and temperatures (Jackson, n.d.). These changing climate patterns threaten Harvard agriculture, which is an essential part of the Harvard community that must be preserved.

The Climate Action and Resilience Plan is a response to the impacts of climate change on Harvard. This plan is a necessity to work toward a resilient future for the town. This project

follows the Climate Action and Resilience Plan and focuses on the agricultural portion of the plan. This project provides an overview of agriculture and investigates how agriculture is responding to climate change. The deliverables were to develop an interview/survey, take inventory of the agriculture, and update 61/A GIS maps.

To provide the best resources and support towards the farmers and community, it is important to take as complete an inventory of the agriculture as possible. The best way to approach this objective is by speaking to the members in the community who are involved in agriculture. The team designed, revised, and piloted interviews and surveys before implementation with the purpose of gaining the most information about the agriculture in town. The cumulative data from the tested interview and online survey was used to create a GIS map layer of Harvard agricultural lands as well an inventory spreadsheet of these lands and the interview responses associated with them. The data collected and shared with the town will give insight on how to better support the community and prepare for unexpected climate change patterns. Most importantly, this project will be a step towards building a resilient future for the town of Harvard.

Background

Harvard is a small town situated in Worcester County, Massachusetts. This Boston suburb is home to 6,610 people. The community of Harvard can be described as having a “rural, agrarian character” (Town of Harvard Community Resilience Working Group Charge, 2020). This agricultural character contributes a great deal to the town’s sense of community. The agricultural community consists primarily of apple orchards, but there are many other farms with

various sizes and purposes. These include horticulture, hobbyists, husbandry, and stables. The focus on agriculture adds to the economy not only through farming but through a significant amount of day tourism. With many opportunities for farming, there are several obstacles that farmers face.

High taxes and regulations pose threats in that they limit the way farmers run their farms. Local property taxes cause financial stress for farms, especially those with "small profit margins" (Cooley and Harriman, 2020). Relief can come in the form of Chapter 61A programs which allow for tax reduction, but only farms with 5 acres or more qualify. Smaller farms can be half this size or less.

Food health and safety laws are also a barrier for some farmers because the laws make it difficult for some farms to sell products. Farmers can sell products easily on their own property, but selling outside the farm is difficult with other state-imposed regulations such as product transportation laws. Besides these state-wide regulations, local regulations can discourage tourism through the need for traffic control, serving licenses, and building codes. All of these compromise the viability of small agricultural enterprises. Threats to farmers do not come exclusively from taxes and regulations, however.

Climate change is an imminent threat to successful agricultural practices. Shorter winters, late frosts, and heavy rains are just a few of the challenges that farmers face. The town of Harvard plans to develop a climate action and resilience plan to combat these difficulties (Town of Harvard Community Resilience Working Group Charge, 2020). This plan will be executed through the office of the Director of Community and Economic Development. The Director works with the Community Resilience Working Group (CRWG). The mission of this group is to

educate, counsel, and encourage the residents to cooperatively form a strong community with their participation in the Municipal Vulnerability Preparedness program (Municipal Vulnerability Preparedness (MVP) program, 2020). The plan will include practical solutions to reduce emissions and improve the resilience of local farms to climate change. Policies, programs, and projects will be targeted to modify the town's contribution to climate change and to prepare for inevitable impacts of climate change.

The CRWG was appointed to lead the community in executing the plan. They oversee the ongoing programs and projects aimed at improving sustainability in Harvard. The main focus of the CRWG is to address the issues the town faces. They act as a focal point of knowledge about climate resilience for the town with each member bringing their unique perspective. The group plans to bring awareness to the town about the need to implement practices that combat climate change. Several steps have been taken towards a sustainable Harvard such as establishing an Energy Advisory Commission. With several town boards represented in the CRWG, the group will function as a liaison between these boards.

Within this mandate, the project will assist the town's understanding of its agricultural sector. The agriculture portion focuses on the preservation and sustainability of the agricultural community since it is essential for the economy and culture. Strengths, weaknesses, opportunities, and threats will be identified as well as the best practices to ensure a resilient future.

A key deliverable for this project was to update the GIS map of the agricultural lands in Harvard. This map will allow the CRWG to gauge the scale of their project. In order to create a geographic information system (GIS) map layer of the Harvard agricultural lands, we used

ArcGIS software (What is ArcGIS? | ArcGIS for Developers, 2020). GIS is an interactive map online that stores and displays data. The map includes layers of farm and farm related businesses within chapter 61 and 61A properties as well as properties that are in neither of the programs. In Massachusetts, chapter 61 programs “give landowners an opportunity to reduce property taxes” (Chapter 61 Programs). This project focused on Chapter 61 properties (forestry) and 61A (agriculture). Besides mapping the 61/A properties, the map also displays what each farm grows and raises based on the data from the interviews.

Creating an inventory of agriculture will allow the town to better support all the farm and farm related businesses in Harvard. Designing an appropriate interview/survey for the farmers will allow us to include questions regarding regulations and taxes that impact farmers as well as how climate change affects farmers’ current practices. Constructing 61/A GIS layers will allow the town and community to visually see the properties owned and their inventory such as crops and animals they manage. By developing our three deliverables (interview/survey, inventory of agriculture, updated GIS map), we hope to contribute to Harvard’s progress of building a resilient future.

Methodology

Introduction

This section outlines the methods the project team used to gain an overview of agriculture in Harvard and how it is affected by climate change. The team developed an interview guide, distributed interviews and surveys, coded interview responses, displayed data from the interview and survey, and created an updated GIS map of Harvard. Each of the methods allowed the team

to gather data that can be used to help the Harvard Agricultural Advisory Commission and the CRWG support sustainable Harvard agriculture.

Developing an Interview Guide

The team developed an interview guide with questions designed to gain information on Harvard agriculture. The interview guide addresses the following topics: agricultural practices, climate change, taxes and regulations, and business practices. The agricultural practices section is a main contributor to the inventory, as it contains information such as names and addresses associated with all agricultural properties, as well as what is grown or raised on those properties. The climate change section addresses another goal of the project in that it allows the team to understand and report on the impacts of climate change on Harvard agriculture, and what farmers are doing to mitigate these impacts. The taxes and regulations section allows for insight into farmers' perspectives on the taxes and regulations that influence them, and their answers may help to inform Harvard on future changes and additions of regulations. The business practices section explores the economic aspects of farming and serves as an informative section in respect to the interactions between farms and their customers.

Once the topics to be addressed in the interview guide were decided, the team worked together to produce a preliminary list of questions. The team then discussed the questions with Dr. Robert Traver as well as Christiane Turnheim, a member of the Harvard Agricultural Advisory Commission (Ag Comm) and the CRWG. The discussion focused on what questions would lead to the data the team needed while still ensuring a concise interview. The team edited the interview guide based on feedback. The interview guide was then piloted on six additional

members of the Ag Comm. Pilot testing allowed several flaws in the guide to be fixed. One example of a flaw was redundant question content. In this case, questions were condensed into a single, better-fitting question. The team revised the guide and composed the final interview guide used in the interviews with farmers.

Distributing Interviews and Surveys

Once the interview guide was developed and critiqued, the team planned how to gain the greatest possible number of responses. The team created a Google Forms survey using the interview guide in order to effectively organize these responses. In phone and Zoom interviews, the interviewer asked the questions on the Google Forms survey and entered the interviewees' responses into the survey. Interviewees who elected to take the online survey were sent the link to the Google Forms survey through email and filled the survey out themselves. As a result, all the interview answers from the three forms of interviewing were organized in Google Forms.

The team reached out to potential interviewees through phone and email. Potential interviewees were found using Harvard's list of Chapter 61 and 61A properties, an attendance list from an Ag Comm gathering, the Harvard phone book, and word of mouth. In total, 53 potential interviewees were contacted. Potential interviewees were asked what interview method they preferred: phone call, Zoom, or online survey. The team then conducted the interview using the method of the interviewee's choice. Most interviews were conducted by one team member, but some interviews included two to five team members. Early in the process, all team members were present for the interviews so that a consistent approach could be developed. After these initial interviews, conducting interviews with only one team member provided the team an

opportunity to conduct more interviews by running several simultaneously. The team collected 19 completed interviews.

Coding Interview Responses

After conducting interviews, the team coded the information. The coding consisted of classifying the responses from the interview into categories. These categories were based on the original categories that made up the interview guide: agricultural practices, climate change, taxes and regulations, and business practices. The team read through the responses to each question and began to organize themes based on the similarities and differences of the responses (Coville, 2010). When coding the responses, the team focused on the questions that would provide the most information about agricultural practices and sustainability practices. Some of these questions include: “What, if any, environmentally sustainable practices do you use to run your farm?”, “Are your agricultural practices currently affected by climate change?”, “Do tax policies impact or limit the way you run your farm?”, and “Do you know of any best practices in Harvard that mitigate climate change within agriculture? If so, what are they? If not, do you have any suggestions?” The data collected from these questions was selected to be the most helpful to the Ag Comm and CRWG to promote sustainability. Questions relating to agricultural practices included acreage, crops/livestock managed, and machinery used. The team also looked into tax policies, regulations that impact farmers positively or negatively, and business practices.

Displaying Data

Following coding, the team planned the best ways to display the data collected from the interview/survey. The team focused on displaying data regarding agricultural practices and

sustainable practices. Responses from the interview/survey were either yes/no or short answers. The responses with yes/no answers were displayed on an infographic for efficiency. Infographics “give an easy to understand overview of a topic” (Nediger, 2019). This infographic displays facts about Harvard agriculture such as the number of farmers who responded that sell products/services (13), land owned by farmers versus total agriculture land in Harvard, etc. The rest of the data was displayed on bar graphs. Bar graphs “makes it easy to compare responses from different answer options” (Gitlin, n.d.). The inventory of crops and animals managed, interest in a machinery exchange, and awareness of chapter 61 programs and if farmer’s land belonged to a chapter 61 program are displayed. The bar graph allows the reader to compare the different responses that were received.

Creating an Updated GIS Map

The GIS map provides Harvard with an updated picture of the 61, 61A, and non 61/A farms in town. The team used ArcGIS software and information from the interviews to create a GIS map. The map includes two updated layers and one new layer to provide a visual representation of agriculture in Harvard. The updated layers map Chapter 61 and 61A properties and the new layer maps an agricultural inventory for the town.

The team started with a copy of a Harvard GIS map from the 2016 Harvard Open Space Plan to use as a base. The map was originally prepared for the plan by Jason Stanton, the GIS and IT Director of the Montachusett Regional Planning Commission. William Scanlan, a former town planner for Harvard worked with Jason to send the team a copy of the map. The 2016 map

contained layers for roadways, Chapter 61 and 61A properties, and community boundaries which the team transferred to the updated map. Chris Ryan, the Director of Community and Economic Development, connected the team with the Assessor's office of Harvard to get a copy of the Chapter 61 and 61A land lists for the town. The team used the land lists along with the Assessor's tax parcel data from the MassGIS website to make updates to the 2016 61 and 61A layers. The tax parcel data and the land lists used were the most recent version at the time of this project and they were last updated by the Assessor in 2019. The tax parcel data was used to add parcels to the right location on the map based on its location identification while the land lists were used to add information such as the owner name, parcel number, and number of acres to each parcel.

After updating the 61/61A lists, the team created a new layer for an agricultural inventory. The inventory layer maps farms and farm related businesses that participated in our survey, including six agricultural properties that are not in the Chapter 61 or 61A program. The inventory includes information such as the owner name, location of the property, acreage, parcel number, and what types of crops or livestock are raised on the property. The methods used allowed the team to create a map that displays the current Chapter 61 and 61A properties and an inventory of Harvard agriculture. The new layers provide a foundation to help inform the town on what agricultural resources are available and where to find them.

Results

This section highlights the results from each category of the interview/survey questions and the findings that followed from the team's creation of the three GIS layers. The four question categories for the interview/survey include agricultural practices, climate change, taxes and regulations, and business practices. Machinery exchange is a subcategory of agricultural practices, whereas farm economy, barriers to selling, and farm products are subcategories of business practices. Some responses such as land owned, crops/animals managed, and gasoline/diesel/water used on the farms are shown in graphs to display the results visually. The questions and responses from the interviews/surveys can be found in more detail in Appendix B.

Agricultural Practices

Questions 3 and 5 through 8 in the agricultural practices category ask the number of acres owned by farms and how many acres are devoted to different purposes such as livestock, crops, housing and facilities.

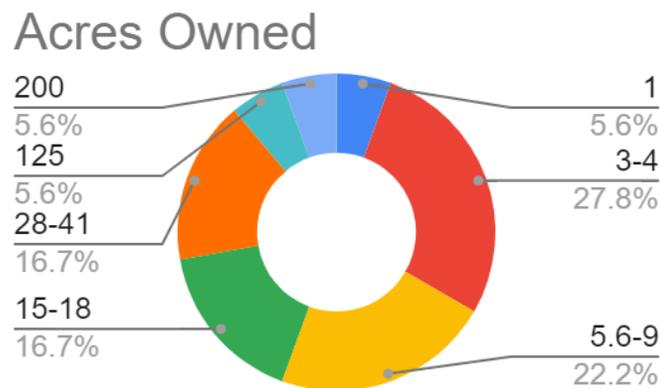


Figure 1: Total amount of land owned in acres.

Acres for Livestock

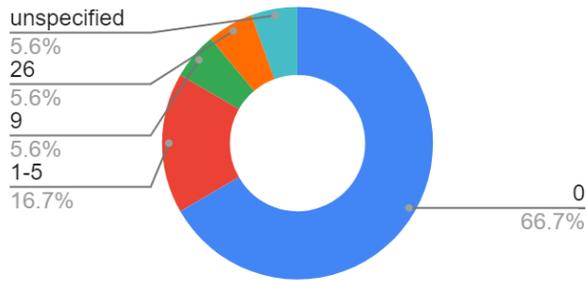


Figure 2: Total acres used for livestock.

Acres for Crops

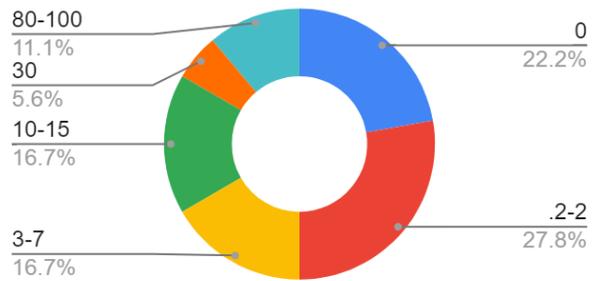


Figure 3: Total acres used for crops.

Acres for Housing

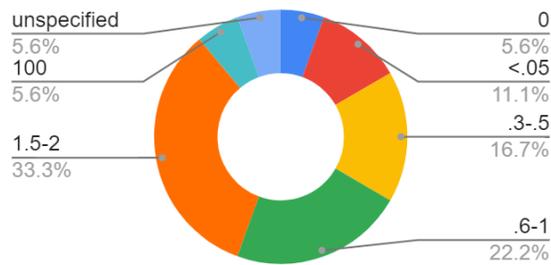


Figure 4: Total acres used for housing.

Acres for Facilities

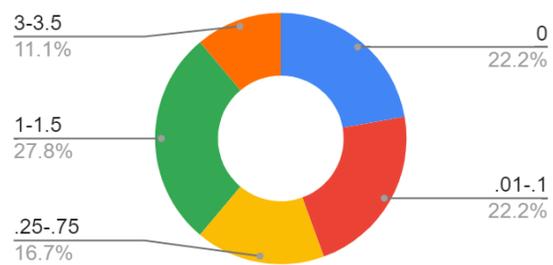


Figure 5: Total acres used for facilities.

The next graph displays how many farmers grow each crop and raise each animal. More information on quantities can be found in appendix B, question 4.

Number of farmers who grow each farm product

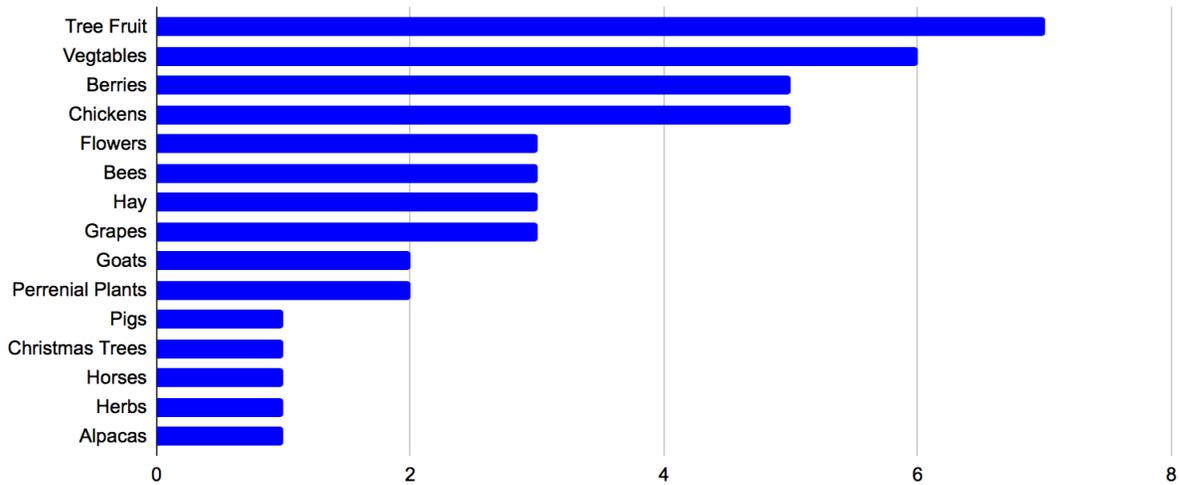
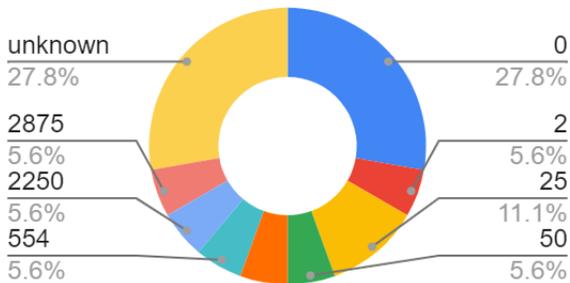


Figure 6: Number of farmers who grow each farm product.

The next two graphs display the amount of gasoline and diesel consumed by machinery on the farm (question 9). Only one farmer reported using electricity to power machinery on their farm—35000 kilowatt hours.

Gallons of Diesel / Year



Gallons of Gasoline / Year

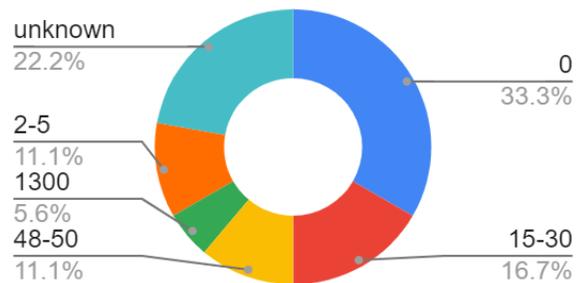


Figure 7: Gallons of diesel used per year. Figure 8: Gallons of gasoline used per year.

The equipment used by farmers in Harvard includes diesel and gasoline tractors of various sizes with mowers, front end loaders, tillers, and balers off the tractors, gators, log

splitters, mowers, sprayers (manual and other), fork trucks, trucks, tree planters, harrows, plows, cultivators, coolers, chainsaws, and other unspecified rental equipment (question 9).

Question 12 asks respondents “How much water is consumed by your farm? Where does the water come from? What is it used for?” Thirteen of 17 respondents who use some form of irrigation get their water from a well. One respondent also gets part of their water from a pond on the property. The remaining four used either household water supply or did not specify.

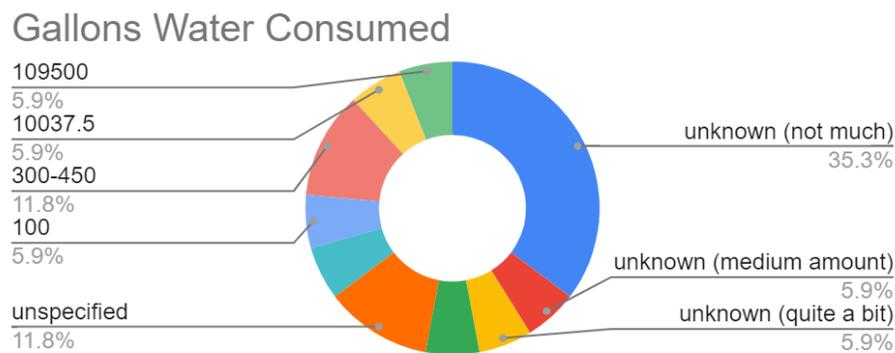


Figure 9: Gallons of water consumed.

Farms generated waste such as manure, firewood brush, grain bags, plant matter (rotten apples, etc.), cardboard, and plastic (question 13). Those with manure waste either sold it (1), gave it away (1), reused it on their farm (4), or allowed it to decontaminate in a stockpile as was the case with the pig farmer. Brush was burned, cardboard recycled, and plant matter composted or fed to animals. Plastic and grain bags were thrown away, one farmer noting Harvard does not have a program to recycle grain bags.

Eleven of 17 farmers who responded to question 14 regarding chemical usage stated they did not use chemicals. The others used chemicals such as lime, Roundup (and other glyphosates), BurnOut II, vinegar water, and pesticides and herbicides (1 respondent each).

Question 15 asked respondents “Do you have any plans to expand your farm? If so. In what ways?” Thirteen farms do not plan to expand. One farm plans to expand with more animals (increase from 18 to 30-40) and will add a neighboring 10-acre plot if funds become available. Another plans to use additional land they already own, and one farmer would like to add more blueberry bushes because they are a high value crop. Another farmer plans to expand their land by 20% and the final farm wishes to purchase the other shares of their land owned by family members in order to sell all of it to a conservation trust to preserve the integrity of the land.

Question 16 asked respondents “Do concerns for environmental sustainability motivate any of your agricultural practices? If so, in what way?” Fourteen farmers stated they practice environmentally motivated farming. These practices include beekeeping for pollination, buying less commercial produce, composting, being cognizant about contaminants, limiting pesticide use, recycling, avoiding man made or toxic chemicals, spraying only when necessary, and employing sustainable practices whenever possible.

Machinery Exchange

In our survey, question #11 asked if respondents would be interested in a machinery exchange. Four farms said they were willing to participate in a machinery exchange. They offered a tiller, a log splitter, a chipper, a small backhoe, a v-series compact tractor, a diesel tractor, and unspecified machinery. Two respondents stated they might participate and offer a tree planter, a blossom thinner, and unspecified machinery.

Climate Change

There were a variety of answers in response to the questions about climate change. Question 17 asked respondents “Are your agricultural practices currently affected by climate change?” Two farms did not specify whether they believed their agricultural practices were impacted by climate change. Six farms reported that their practices were not impacted by climate change. Ten farms reported being impacted by climate change. One further explained the main effect was due to changing weather. All farms that are currently seeing impacts from climate change anticipate more changes in the future, as do two farms not currently reporting impacts. One was not sure whether to expect more changes.

In response to the question about agricultural practices in response to climate change (question 19), respondents identified several changes that they would make or already have made. These include rotational grazing, solar panels, a change in planting schedules, needing to apply for a greenhouse grant to be able to plant in spring, worrying about hoof rot sooner in the year, planting to maintain soil and take up surface water, bridges for horses, and using up more hay due to animals being inside for longer. One farmer answered that they are using less energy to try and mitigate climate change. No farmers had plans for future implementation of climate change practices but two stated that they would adapt if it became necessary.

Furthermore, three farmers do not use sustainable practices and one did not specify sustainable practice use. The other farmers use sustainable practices in some form or another in the following ways: composting waste, avoiding chemicals (herbicides, pesticides, etc.), employing natural pest practices (i.e. using fly predators to eat fly larvae, no standing water), using Integrated Pest Management, feeding food scraps from their own home or from the local

school to the animals, handworking where possible, organic farming, recycling, regenerative farming, and reusing all animal waste.

Of those who specified, three said that their prices were affected by climate change, and one of these indicated that the cost of building a needed greenhouse would affect profits (question 23).

Only one respondent knew of Harvard-specific best practices (question 22). He noted that farm and ranch resources are available on Spectrum CATV. Other respondents offered suggestions: avoid using chemicals to control the smell of manure, converting to non-chemical products, and planting more fruit trees.

Tax Policies

Most respondents were familiar with Chapter 61 programs (question 24). Specifically, sixteen of 18 respondents were familiar with the Chapter 61 programs. Eleven were in 61A and one was a dual 61/A property. Of those who were familiar with the programs, four respondents were not in them.

Ten farms believe that they are not inordinately impacted by tax policies (question 26). The remaining eight all stated local policies impacted them, four of those were impacted by state policies, and of those stating impact from state policies one was impacted by federal policies.

Those affected only by local tax policies stated they were impacted in the following ways. They all benefited from 61/A but one reported concern about the requirement to stay at a certain income to remain in the program, and if they were to leave they would have to pay ten years of back-taxes. Additionally, Harvard encourages non-farmers to keep land in an agriculture

producing revenue state. Those who reported that they were impacted by state taxes additionally reported that taxes were too high and higher taxes meant less income.

Six farmers had concerns about challenges due to changing taxes and regulations (question 28). Respondents expressed concern about how taxes are rising while incomes remain fixed. This is forcing many people out, especially older people in or above their seventies who can't afford those taxes. The taxes go to the state, not the town, and the town only gets property taxes, which sends the message that they are not interested in farms with low property taxes. Too many of these taxes are supported by homeowners. The properties are not very marketable and losing 61/A would lead to the need to sell the property.

Regulations

Where applicable (15 farms), eight farms stated they were unaffected by food, health and safety regulations (question 29). Three farms did not specify. The other farms raised concerns as follows: do not sell due to being unsure of law compliance, it prevents them from selling cooked products due to kitchen inspections, they can't do food samples due to water restrictions, and a comment which simply stated "pigs and cattle".

Where applicable (17 farms), nine stated zoning and nuisance laws did not affect them and two of these attributed that non-interference to Harvard's status as a Right to Farm community (question 30). One farmer stated that such laws had a positive impact because the farm was a 61A property. One farm did not specify. Other farmers raised concerns as follows: the zoning and nuisance laws limit the number of workshops a farm can hold per year, require stable

permits and waste management, restrict barn proximity to the road, bar kennels from farms, and affect land-use in relation to conservation rules.

Five of 18 farms had seasonal employees and of those farms, four had year-round employees (questions 31 and 32). All other farms did not employ additional workers. Two farms housed seasonal workers on the premises. Farms with employees state the following regulations affect them: salaries add tax complexity, the US government H-2A regulations for hiring temporary agricultural workers, and one has to have multiple insurance policies which cover the same thing. One farmer stated that they have to file 500 dollars in employee taxes even though this farmer does not have employees.

Seven farms would run their businesses differently in the absence of regulations (question 34). These different ways include the following: selling food/drinks in the shop, more agritourism, selling to hikers and giving free samples, inviting people to try beekeeping, selling more, having more pigs, and running a dog daycare. Eight farms stated they would not run their farms differently, and one even stated they simply would not follow regulations if they did not agree with them. Three farms did not specify.

Eleven respondents found no barriers to farmers rights in Harvard (question 35), three did not specify, and four found significant barriers as follows: inability to find people in town willing to farm the land, inability to tap into agritourism opportunities, the Select Board is uneducated about farmers' needs, and small farms get "the short end of the stick". The concerns related to smaller farms include the town does things for big farms, whereas small farms don't get exemptions, can't sell food, are limited in events, and don't find it easy to make a profit.

Farm Economy

Question 37 asked respondents if their farm was for-profit or nonprofit. Only farms that do not sell their produce labelled themselves as nonprofits (5 of 18). Of the for-profit farms, three stated none of their income comes from the farm, two said very little income, one said half, three stated most, two said all, and two did not specify (question 36).

Barriers to Selling

Question 39 asked respondents who do not sell “what prevents you from selling?” Three of 4 are not interested in selling and one does not produce enough to do so.

Farm Products

The Farm Products section of the interview was given only to farmers who sell their products. Three of 12 respondents sell exclusively in Harvard, eight sell both within and outside of Harvard, and one respondent sells exclusively outside of Harvard. Three respondents sell to friends or neighbors outside of their usual selling methods. All farmers who sell exclusively in Harvard sell their products exclusively on their farm. The farmer who sells only outside of Harvard sells off their farm. Farmers selling within and without: one sells off the farm, five sell on and off, and two sell exclusively on the farm (question 44).

Customers to the farmers in Harvard include residents of Harvard, Littleton, Boston, the MetroWest area, and one resident of Maine. Some of these customers are individual farmers, including goat and dairy farmers and farmers associated with horse stables. Other customers

include wholesale buyers, retail buyers, restaurants, a packer, and individuals in the community such as neighbors (question 42).

Products sold included alpaca products and souvenirs, fruits including apples, peaches, nectarines, blueberries, raspberries and blackberries, vegetables, eggs, honey, hay, cashmere goat fiber, goats, beeswax, pine trees, and plants. Services sold included farm workshops, cooking workshops, chicken and egg anatomy studies, horsemanship, and horse boarding (question 41).

Question 46 asked “How competitive is your market, and how do you deal with it?” Two of 11 farms stated competition was limited or not a concern. The orchards stated that the biggest competition was for wholesale customers. A horse farm stated the main competition was other horse farms. One farmer stated that eggs were competitive which is interesting given that other egg farmers said the competition was not significant. One farmer stated Westward Orchards would be a competitor were it not for the fact they use different selling strategies (farmstand vs. wholesale, restaurants, and packing). Bee farmers stated the market was getting more competitive but did not specify current level of competition. A Christmas tree farm stated competition was similar in the area. In the goat market, the level of competitiveness depends on their bloodline.

Two farmers deal with competition by having competitive prices. One stated repeat customers were essential, and another simply sells by word of mouth. The horse farm reported different housing options for the horses, a low key atmosphere, and toeing the line between an open and closed farm.

Question 48 asked “What about your farm appeals to customers?” Both orchards interviewed believe the appeal of their farm comes from a lack of crowding. One orchard

additionally stated they are an old orchard which is small but not too small. Chicken farmers stated their appeal comes from free range and open space practices, and the recognition that they take good care of their chickens. Bee farmers referenced chemical free hives, hives easily visible from the road, and a natural setting. The Christmas tree farm has appeal because it is inexpensive and friendly. The alpaca farm sees their appeal in the perception of alpacas as exotic/unusual animals and the fact that the farm is open to the public year-round, as well as to their alpaca therapy program.

Marketing methods include word of mouth (2 farms), the Cashmere Goat Association, newspaper ads, e-commerce, “other advertising” and “traditional methods” (each 1 farm). Seven of 11 respondents use some form of social media in their advertising, of these six use farm websites, four use Facebook, and three use Nextdoor. There was one response for each of the following: Twitter, Instagram, Pinterest, and Craigslist. Five of 11 respondents collaborate with other farms in their advertising (question 50).

Ten of 11 respondents stated that the community encourages environmental sustainability, while all 11 stated that the consumers care about environmental sustainability. Seven of these farmers use sustainability in their advertising (question 54).

For more details on the questions and responses from the interview/survey see appendix B. The next segment of the section highlights our findings from the three GIS layers that were created.

GIS Layers

Several findings emerged from working on the GIS Layers. After comparing the 2016 base map that we started with to the map we updated with the 2019 data that we received from

the Assessor, we discovered changes among the 61/A properties between the years 2016 and 2019. They are as follows: 5 properties changed hands or changed owners for Chapter 61, while 6 changed for Chapter 61A. Five properties joined Chapter 61 while 3 properties joined 61A. Two properties left the Chapter 61 program and 10 left 61A. The total properties in each chapter according to the 2019 data are 57 for Chapter 61 and 80 for Chapter 61A. These changes are documented in Table 1 below.

Table 1: Findings from 61/61A Layer Updates

Changes in 61/61A properties from 2016 to 2019	Chapter 61	Chapter 61A
Changed Hands	5	6
New	5	3
Removed	2	10
Total Properties in Chapter for 2019	57	80

In addition to the two layers for 61/A properties, the team created an agricultural inventory layer using responses from the interview/survey. This layer highlighted agricultural properties belonging to interview/survey respondents and displayed what crops and/or livestock were managed at each location.

After creating the inventory layer, the team discovered that the interview respondents own a total of 36 parcels altogether. Respondents owning multiple parcels included Carlson

Orchards with 10 parcels, Westward Orchards with 6 parcels, and Three Penny Farm with 4 parcels. The remaining respondents own 1 parcel each.

Final Comments

Several farmers offered concerns/comments that were not explicitly requested by the survey questions. These include remarks by one respondent who expressed concern about the town manager's lack of understanding and connection with people in the town and the opinion that things could be better. This respondent also expressed concern that the town is losing farms and farmland over time, especially in respect to people who convert other types of farms into horse farms. He emphasized that the goal for the town should be to maintain the integrity of the land. Another respondent mentioned that small family farms are in a rough position and that the town needs to help small agricultural businesses take advantage of as many agritourism opportunities as possible. A final respondent stated that the community is neutral on environmentally friendly farming.

Discussion

The goals of this project were to inventory Harvard agriculture and to understand agriculture's response to climate change. The team achieved these goals by using interview responses to create an agriculture inventory and GIS map layers. The GIS layers serve as a visual inventory of Harvard agriculture by displaying the locations of all current Chapter 61 and 61A properties, as well as by displaying the locations of all agricultural properties belonging to interview respondents and to what is grown or raised on these properties. The interview

information was used to create an inventory that has been organized as a spreadsheet catalog. The full inventory includes information on farmers' agricultural practices, responses to climate change, perspectives on taxes and regulations, and business practices.

Machine use emerged as an important topic within agricultural practices. The survey recorded what types of machinery were used on farms, what powered that machinery and how much fuel was used. The team also gauged interest in a machinery exchange. Seven of nineteen respondents reported at least some interest. A Harvard facilitated exchange might give farmers an opportunity to farm more efficiently and at a lower cost. This opportunity may encourage farmers to enlarge their farms and even lead more Harvard residents to begin farming.

Also within agricultural practices the farmers talked about their response to climate change. In order to practically respond to climate change, most respondents use some form of environmentally sustainable practices. Many of these farmers care about environmental sustainability. As a result, these farmers may be likely to respond positively to information offered by the town on how to farm in an environmentally sustainable way. Unfortunately, 18 of 19 respondents are not aware of best practices promoted by Harvard that mitigate climate change within agriculture. The conclusion may be drawn that since many farmers already use some environmentally sustainable practices, the idea of further improving their practices based on input from the town is likely to be received positively.

Responses to taxes and regulations comprise another important set of results. Several survey questions pertained to taxes and regulations. Answers varied, and overall it appeared that different regulations affected different farmers in different ways. One revealing question asked whether farmers would run their farms differently in the absence of any regulations. Since 7 of

19 respondents answered “yes” to this question, it appears that town regulations may compromise town agriculture in some cases. The results suggest that the town should consult with the general farmer population before implementing any new regulations that may affect them.

The inventory also includes information on farmers’ business practices. Thirteen out of nineteen respondents reported that they sell farm products and/or services. Based on the interviews, most farmers depend on farm products and/or services for at least some of their income. Environmental sustainability is relevant to business practices as well, as six out of eleven farmers report using environmental sustainability for marketing purposes. Given that much of Harvard agriculture helps sustain livelihoods, the town and farmers should keep business viability in mind when making changes to regulations and practices that are motivated by climate resilience. Another important result to consider within this topic is that three respondents reported that their product prices or profits had been affected by climate change. If climate change continues to affect farms, and the impact of climate change expands, farm businesses will suffer. When making changes to agriculture in the interest of addressing climate change, climate resilience and business viability must be carefully balanced.

Overall, this project made a good start to inventory Harvard agriculture and gain awareness of agriculture’s response to climate change. Through the inventory and the GIS map layers, the results demonstrate the variety of crops and livestock managed in the town, as well as the different ways in which farmers are managing them. Part of this management is an awareness of climate change, which was evident in the responses, and a plan for how to respond to it.

Harvard can and should work together with farmers to make agriculture's response to climate change as efficient and effective as possible.

Recommendations

For the Project

If the Town of Harvard or another WPI IQP group wishes to continue this project, the team recommends:

- Complete comprehensive farm list
- Increase number of respondents
 - Example: Add social media, texting, in-person contact, and mailings to contact methods
- Explore in depth the impact of town/state regulations on farm viability and environmentally sustainable practices

For Harvard

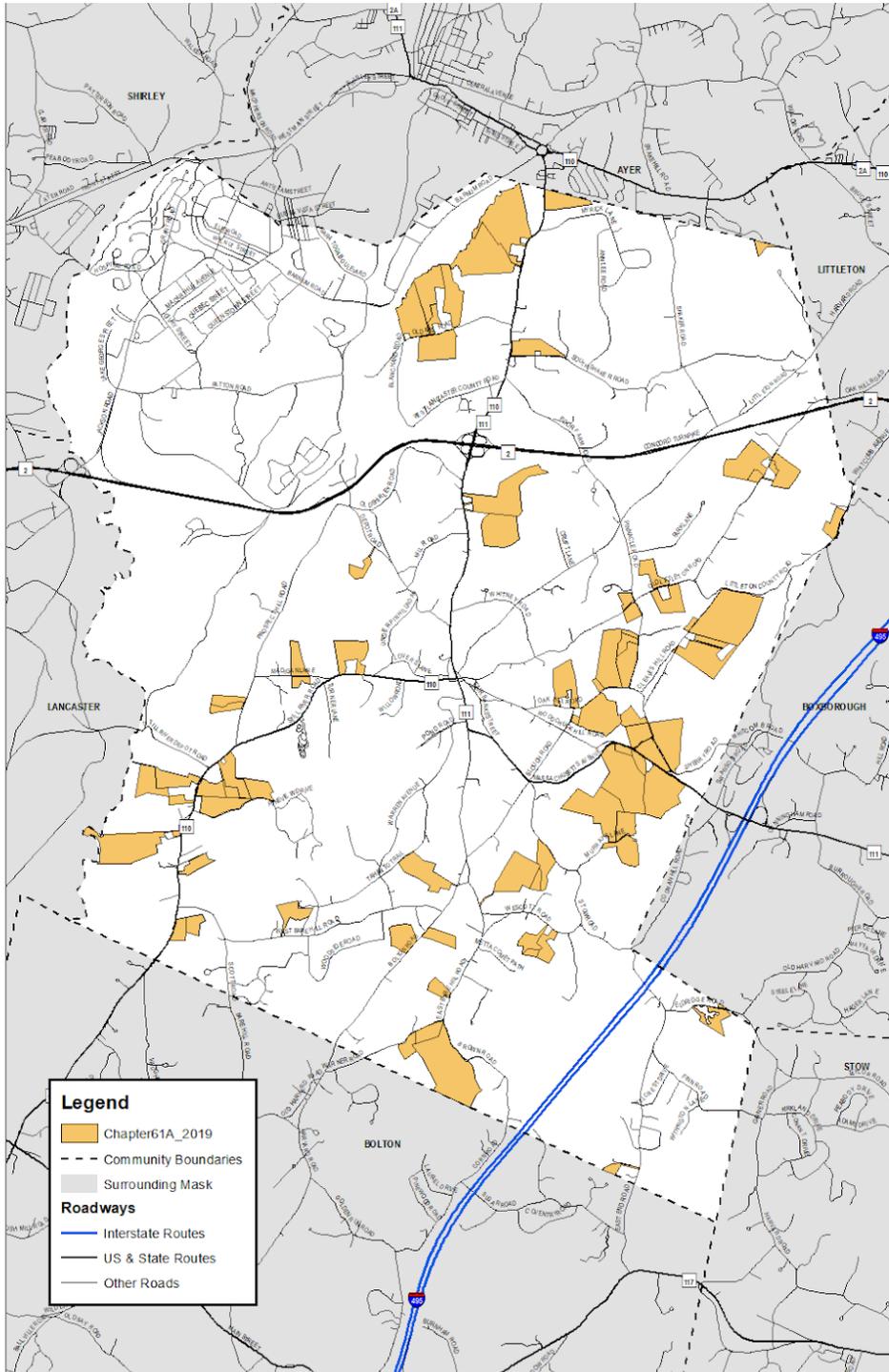
For the town of Harvard, the team recommends:

- Organize a machinery exchange
- Publicize agricultural information. Include:
 - Information about the Ag Comm and its services, best practices, Chapter 61 programs, machinery exchange, networking with other farmers
 - Publication methods: Resource guide published in print and online, social media such as Facebook and Nextdoor, Ag Comm website

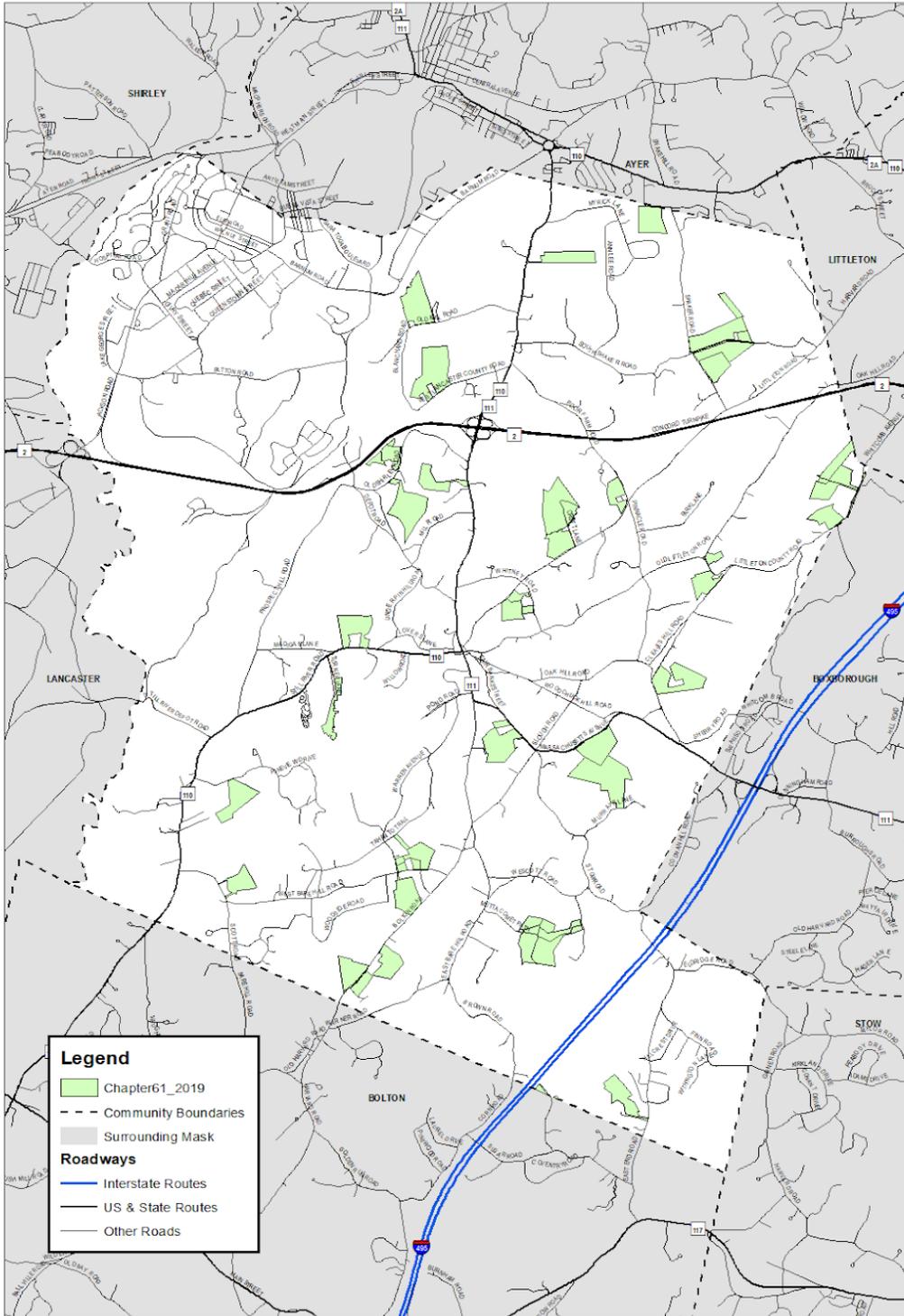
In summary, raising awareness about agricultural opportunities and resources for farmers in the town will promote agriculture, and if more people are aware of and in contact with the Ag Comm, the Ag Comm will have a clearer picture of the community that it is serving and its needs.

Appendices

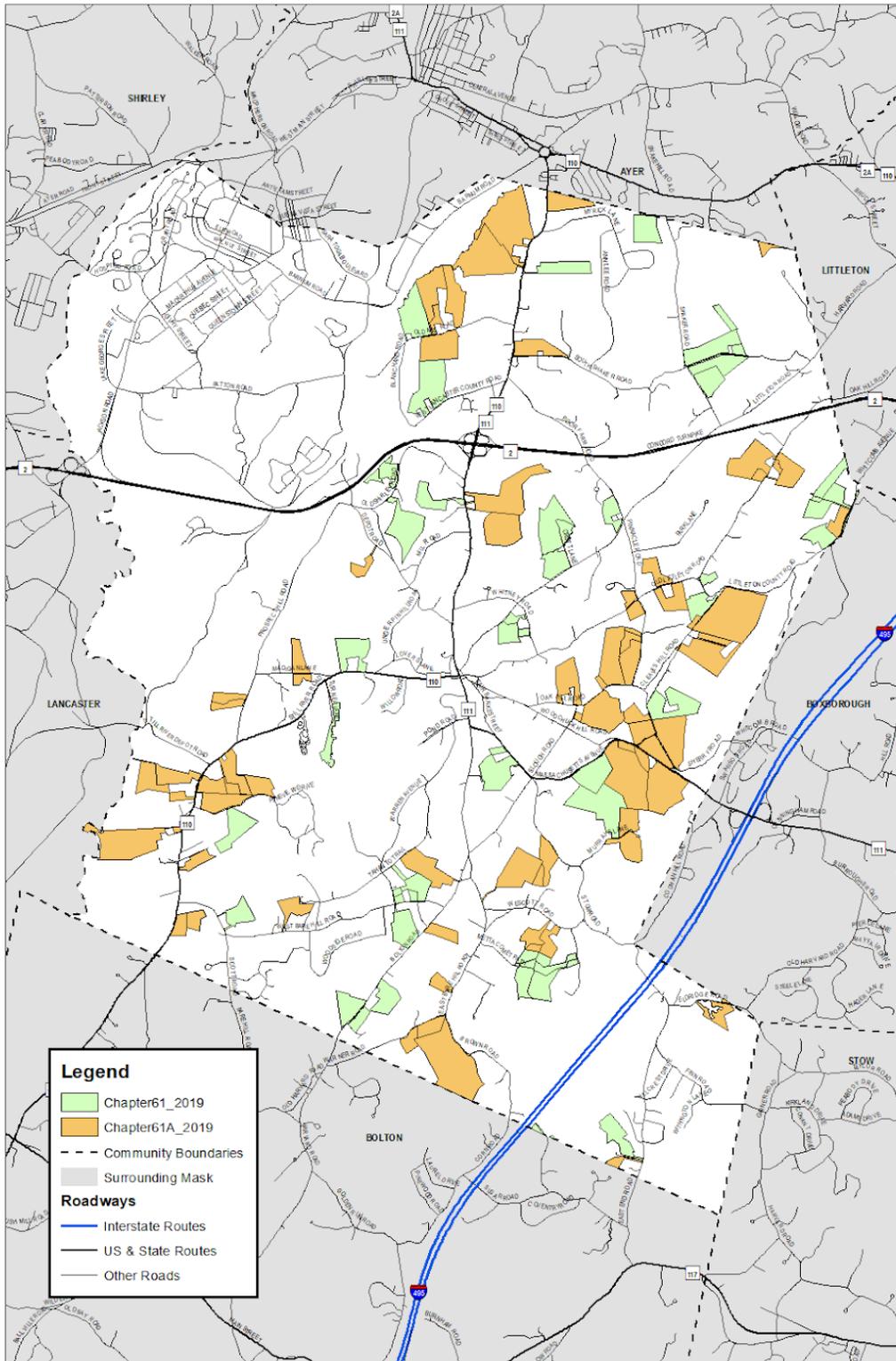
Appendix A: GIS Maps and Layers



Chapter 61A Layer



Chapter 61 Layer



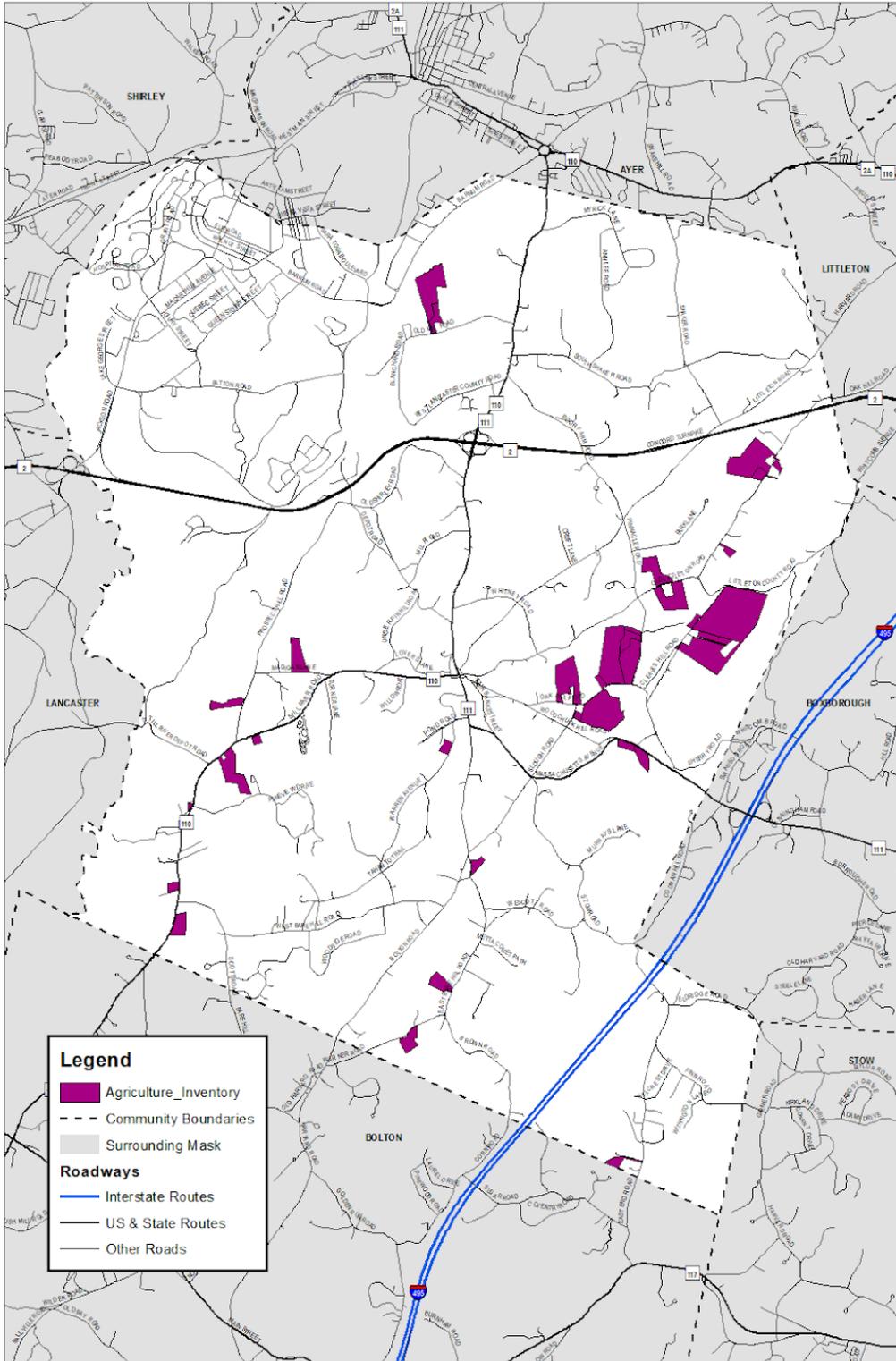
Legend

- Chapter61_2019
- Chapter61A_2019
- - - Community Boundaries
- Surrounding Mask

Roadways

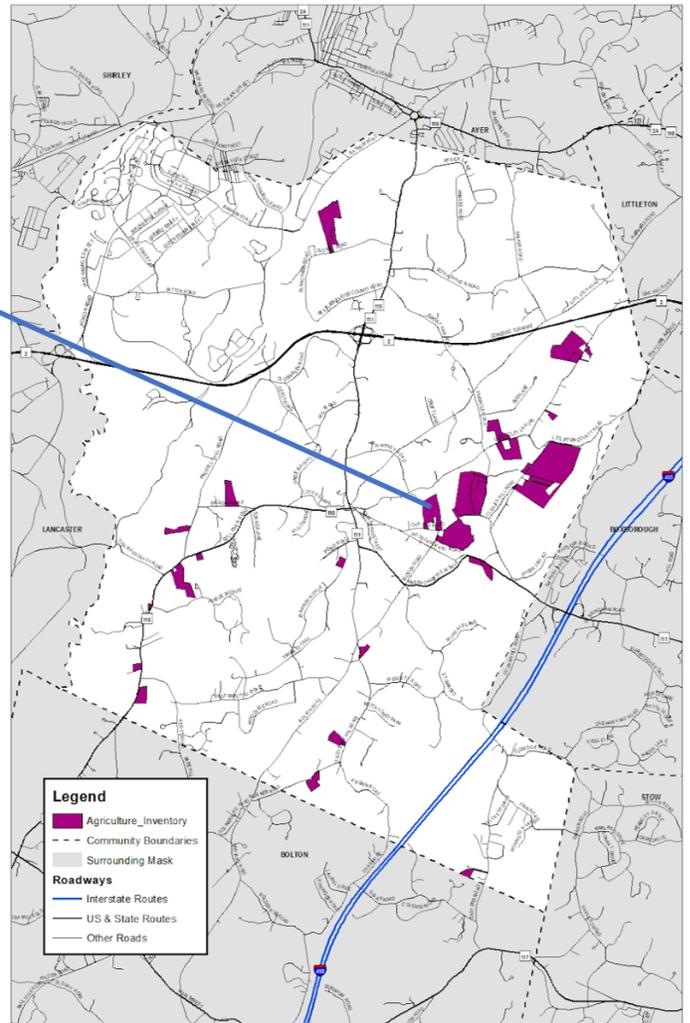
- Interstate Routes
- US & State Routes
- Other Roads

Chapter 61 and 61A Layers

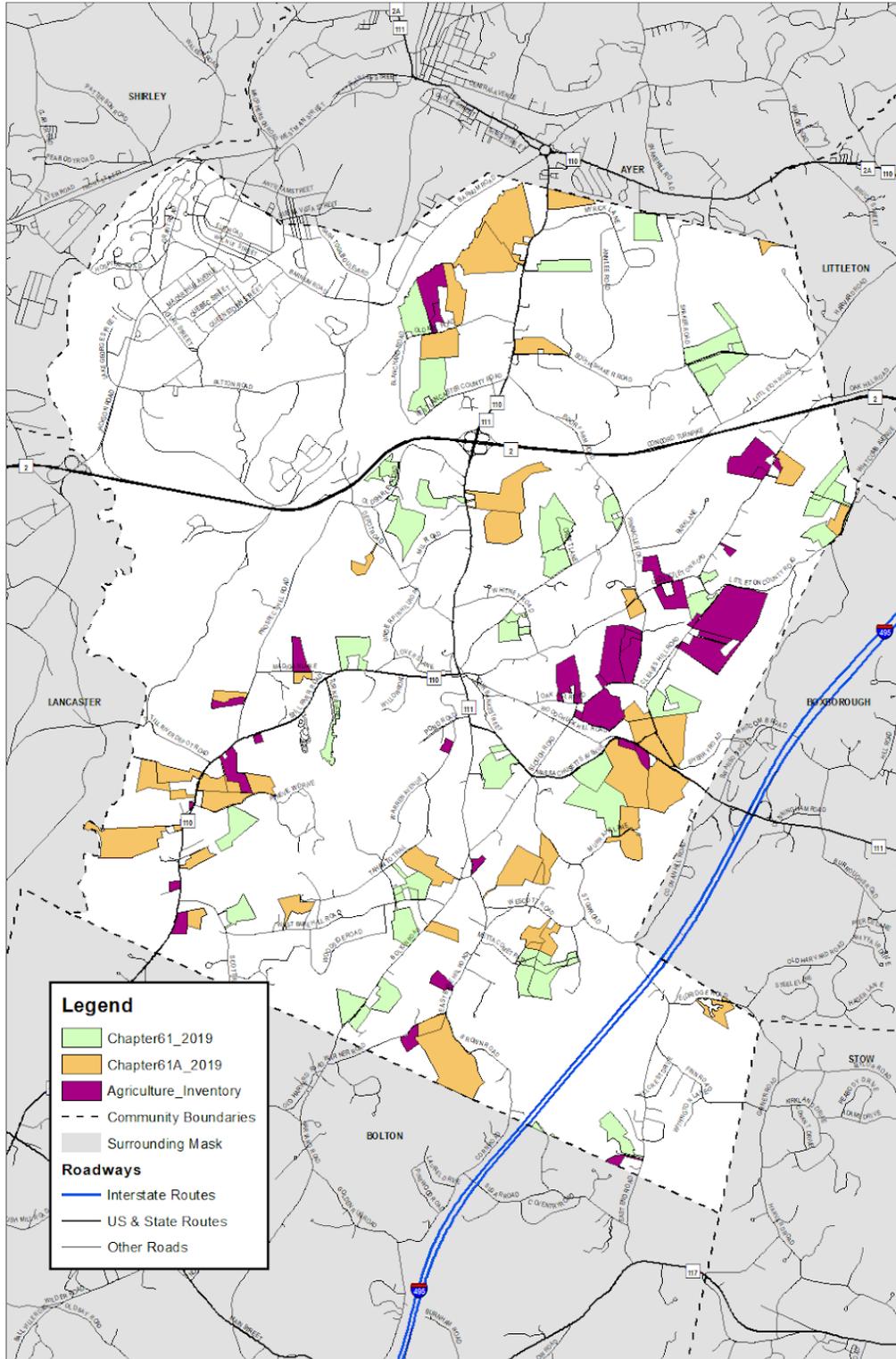


Agricultural Inventory Layer

Location: 194,268.738 916,689.244 Meters	
Field	Value
Shape	Polygon
LOCATION	Oak Hill Rd
LIVESTOCK	None
NO_MATCH	N
LOC_ID	M_194314_916692
POLY_TYPE	FEE
NAME	Chris and Kerri Green (Westward Orchard)
SOURCE	ASSESS
CROPS	apples
SHAPE_Area	98982.067046
CHAPTER_61_STATUS	61A
ACRES	25.15
LAST_EDIT	20120501
SHAPE_Leng	1857.492865
MAP_PAR_ID	18/ 54/ / /
MAP_NO	18
TOWN_ID	125
FID	12
BND_CHK	
PLAN_ID	



Example of Parcel Information



All Layers: 61, 61A, Agricultural Inventory

Appendix B: Survey Responses

Harvard MA Agricultural Survey

Agricultural Practices

General Farm Practices

1. What is your name?
2. Where is your farm/land located (address)?
 - #1. 58 Old Mill Rd Harvard, MA
 - #2. 159 East Bare Hill Rd
 - #3. 16 Warren Ave Harvard, MA
 - #4. 115 Oakhill Rd
 - #5. 167 Still River Rd
 - #6. 106 East Bare Hill Road; In Harvard, bordering Bolton
 - #7. 90 Oak Hill Road, 188 Mass Avenue, 146 Littleton County Road
 - #8. 170 Prospect Hill Road
 - #9. 338 Stow Rd
 - #10. 304 Still River Rd
 - #11. 240 Still River Rd
 - #12. 295 Old Littleton Road
 - #13. N/A
 - #14. Dunroven Farm 62 Old Mill Road
 - #15. 327 Still River Road
 - #16. 224 Old Littleton Road
 - #17. As a landscape contractor and certified horticulturist I consult or work at multiple properties in Harvard
 - #18. 199 Still River Rd
 - #19. 26 Madigan Ln
3. How much land do you own at each location?
 - #1. 5.6 acres, 5 acres for farm, the rest is home
 - #2. Just under 9 acres
 - #3. 3.1 acres
 - #4. Owns 100 acres, lease 25 acres on top of that
 - #5. 3 acres
 - #6. 8.3 acres
 - #7. 200 acres owned
 - #8. 15 acres
 - #9. 31 acres
 - #10. 3 acres
 - #11. Property itself is 1 acre, leases 12 acre field across street where a farmer (Paul Willard) grows pumpkin and corn

- #12. 41 acres
- #13. 3.75 acres
- #14. 28 acres
- #15. 100%
- #16. Less than 3 acres
- #17. None
- #18. 17.9 acres
- #19. 16 acres total

4. What crops/animals do you manage, grow, or raise? How many of each kind?

- #1. 21 Alpacas
- #2. had sheep but got rid of them, now raise chickens (2 dozen), large variety of veggies, blueberries, raspberries, currants, apples, pears, strawberries, "everything except corn" (5 acres unused pasture) (1 acre of gardens/fruit trees) firewood
- #3. No crops/animals. Two acres of perennial plants.
- #4. apples (60), peaches and nectarines (20-25), cover about 80 acres, (1 acre each) raspberries and blueberries
- #5. cashmere goats (8) and chickens (17 layers, 15 chicks), big vegetable gardens (120x15ft), fruit trees and grapevines (just a few of each)
- #6. flowers, raspberries, blueberries, blackberries. Adding cherries, pears, apples. Has bees.
- #7. No animals; Have tree fruit, peaches, pears, vegetables (lots of types). 10,000 bushels of apples. For produce maybe 2,000 bushels of mixed vegetables. For any week 50 boxes of tomatoes, 20-30 boxes of peppers, 4 boxes cabbages and carrots. Peaches 800 bushels.
- #8. Timothy hay
- #9. Bees
- #10. fruit trees (almost 1 acre) and berries: apples , persimmons, peaches, pears, nectarines, grapes, wild blueberries, blackberries, raspberries, strawberries
- #11. pigs and goats, cattle within the month
- #12. christmas trees on about 2 acres
forestry plan with state -- some removing of hardwoods and firewood every 15 years or so,
vegetables (green beans lettuce kale swiss chard squash yellow red tomato asparagus carrots beets garlic summer squash butternut acorn raspberries sage oregano thyme rosemary eggplant brussel sprouts) and flowers, One Chicken, 3 acres are used by carlson orchards
- #13. vineyard 100 vines; 60 fruit trees; 5000 sq ft vegetable garden; 1 or 2 dozen chickens
- #14. Horses; 30
- #15. We raise culinary herbs, winter-hardy Buxus (Boxwood) and winter-hardy Lavender. We also produce, market and sell other perennials and flowers.
- #16. Vegetable garden for home use

#17. .25 acres grapes, about 12 peach trees, about 15 pear trees, about 3.5 acres apples

#18. Hay

#19. Hay, Honey, Eggs, and Berries

5. How many acres of your farmland is used for livestock?

#1. 4 alpacas per acre

#2. Free range

#3. 0

#4. 0

#5. goats (abt 1.5 acres), chickens have small area but can also roam free

#6. 0

#7. No answer

#8. None

#9. None

#10. 0

#11. 0

#12. no livestock

#13. N/A

#14. 26 acres used for farm

#15. 0

#16. 0

#17. 0

#18. 0

#19. 1

6. How many acres of your farmland is used for crops?

#1. 0

#2. 1

#3. 0

#4. 80

#5. 1

#6. 5

#7. 100

#8. 15

#9. 30

#10. 2

#11. 0

#12. 2

#13. 3

#14. 0

#15. 7

#16. 0.2

- #17. 0
- #18. 14.9
- #19. 10

7. How many acres of your farmland is used for housing?

- #1. 0.6
- #2. 1.5
- #3. 1.0 acre
- #4. 0, have a worker's dormitory
- #5. house, barn, goat barn, 2 chicken houses
- #6. 1500 sq ft
- #7. 100 acres used for home
- #8. 1.5
- #9. 1
- #10. 2000 sq ft
- #11. No answer
- #12. house is 1.6 acres
- #13. .75
- #14. 1-2
- #15. 1.5
- #16. 0.3
- #17. 0
- #18. 2
- #19. 0.50

8. How many acres of your farmland is used for facilities?

- #1. Probably less than half an acre
- #2. 60X30 ft barn
- #3. 1
- #4. 3 acres
- #5. Just the barn, not a very big barn
- #6. About 3,000 sq ft
- #7. About 3 or 4 acres; we have parking lots
- #8. Part of the housing acreage
- #9. None
- #10. 0
- #11. About 1 acre
- #12. 4 garage slots
- #13. .75
- #14. 1-2
- #15. 1.5
- #16. 0.1
- #17. 0

#18. 1 - barn

#19. 0.25

9. What machinery is used on the farm? How is it powered?

#1. Tractor is diesel, gator is gasoline

#2. front end loader (off diesel tractor), tractor (diesel), mower(off tractor), log splitter, electric lawn mower battery powered

#3. Don't know

#4. tractors, sprayers, fork trucks in the buildings, implements on the tractors (mowers, sprayers), tree planter, harrows, plows; diesel

#5. ride-on lawnmower (gasoline)

#6. Tractor with tiller and mower attachments and a small cultivator. Mix of diesel and regular gas

#7. Tractors, cultivators, forklift, coolers. Diesel fuel or electricity

#8. tractors - mowing and baling equipment and trucks gas

#9. Small lawn tractor

#10. gas engine tractor to cut grass, manual spray cans

#11. small tractor, diesel powered

#12. two medium tractors, gas and diesel, mowers, chainsaws, log splitters

#13. Big lawnmower

#14. Small tiny tractor & Mid sized tractor used to move manure from barn areas up to windrow and for any big deliveries such as bedding for stalls; use smaller tractor for rim maintenance

#15. Tractor (diesel)

#16. Ride on lawnmower

#17. chain saws, back pack sprayer, hand saws, 2 customers have a tractor and a sprayer, tractors are diesel and the rest of the equipment is gasoline, hand saws are man powered

#18. Tractor (diesel), lawn mower (gasoline)

#19. Kubota Diesel Tractor plus rental equipment as needed.

10. Please give us an idea of how often the machinery is used and how much (gas/electricity/other) is used within those time periods.

#1. Gas per year: probably less than 50 gallons a year

#2. don't know, probably 50 gal diesel per year

#3. We have landscapers who work once a week in the gardens. They do use machinery at times. I have no idea how that machinery is powered

#4. up and down, use about \$9000 of diesel fuel per year

#5. not much, don't use it very often

#6. "No idea. We don't use it very often. Maybe a couple of gallons."

#7. How much per year: "Fuel could be 20,000, Electricity 30 or 40 thousand. Fuel could maybe be 25."

#8. 2 to 3 times a year

#9. Weekly

#10. 5 gallons/year

#11. "Too much. Don't know off the top of my head."

#12. diesel 25 gal and gas 30 gal

#13. gas; Maybe a gallon a week over the summer, so probably 15 gallons

#14. One is gas, one is diesel; No, small tractor is run about ½ hr per day and larger is routinely run less than an hour per day" Used for the driveway. If you need that number I can probably scrunge it up. Smaller tractor gas tank maybe 5 gal and maybe done 5 times a week; big tractor usually done once a week.

#15. No answer

#16. every weekend and we used about 4 gallons of gas per month in the summer

#17. 3 or 4 mowings, 6 or 7 sprays

#18. Tractor: 1-2 times per month in summer & fall. 20-30 gallons diesel per year.

Mower: every 10 days in spring to fall. 5 gallons gasoline every other use.

#19. Diesel tractor used 15-20 hours per week during season

11. Would you participate in a machinery exchange in Harvard? (ex: rent, lease, pro bono) If so, what machinery?

#1. No answer

#2. yes, always offering tractor to neighbors if they need it, difficult lending equipment bc not everyone knows how to use it

#3. NA

#4. done small implements with other farms, such as tree planter, probably should be doing more but lots of wholesale apple growers downsizing/going out of business, blossom thinner is timely so two farmers might need it on the same day, pros and cons

#5. No

#6. No, almost every weekend we need it.

#7. Probably not because it could break and we'd need to use it at the same time.

#8. our crop is harvested by someone else

#9. No

#10. yes, doesn't have much to give but wants to get a hold of a rotor tiller, but everybody needs it at the same time

#11. land leasing: The land I lease is actually conservation land, so it can be accessed by farmers or a normal resident. A forage program is run and anyone can come and participate if they want to learn how to raise livestock.

#12. wants to borrow a backhoe, v-series compact tractor just put some gas in it 2 mile radius

#13. N/A (she gave us this idea)

#14. N/A

#15. Perhaps

#16. tiller, log splitter, chipper, small backhoe

#17. No

#18. No

#19. I have participated in an exchange for haying but now just have it outsourced

12. How much water is consumed by your farm? Where does the water come from? What is it used for?

#1. Have a private well. Each animal on average drinks at most a half a gallon of water per day

#2. stream and pond, drilled well, no idea how much water is consumed, not much bc don't water crops, use water for "swimming", give water to chickens, have well for the house

#3. Irrigation system gets water from our well.

#4. trickle irrigation from deep wells on the farm, 3 artesian wells, loaded with iron, trees got too much iron, looking for equipment that will take the iron out, used for apples and peaches, does not know how much water, "quite a bit"

#5. have a well, have a dug well too, collect water off the roof in rain barrels for gardens, also old cistern; chickens and goats get water, gardens depends on if it rains or not

#6. We have a well. I don't know exactly how much water. We water the vegetable and flower garden every morning in the summer. Normally we don't water the orchards.

#7. Not too much irrigation is done. We don't water the vegetables too much. If we had to, we'd put in a well.

#8. Water only used to clean equipment

#9. Household only

#10. Comes from a well on the property, no idea how much water is used, irrigate blueberries and strawberries, don't water much

#11. Probably about 300 gallons a week. I get the water right from my well.

#12. water the garden vegetables every day from the well unsure how much maybe 100 gallons

#13. Water comes from a well; They garden using natural ways; they don't water their vineyard

#14. Well water. 30 horses each get 10 gal of water a day. Water waste goes readily back and into the ground again.

#15. Don't know.

#16. a few gallons per day May-September; we have private well water; watering vegetables

#17. 1 customer uses water from nearby ponds for irrigation during dry weather

#18. Not used

#19. 25-30 gallons per day; 25 from drilled well and the rest from a pond

13. What types of waste does your farm generate? What strategies do you use for waste management/disposal?

#1. Primary one is manure. I'm hesitant to call that waste because we actually sell it. I've sold more in the past month than in the 4 or 5 years we've had the farm because of an increase in gardening interest

#2. try to be zero waste, lots of firewood brush, pile and burn it, some of it let rot into compost, biggest amount of trash is grain bags for chicken food, town doesn't recycle those

#3. Mulch Piles

#4. very little waste, rotten apples composted, dump into manure pile, recycle cardboard and plastic, attempt to recycle stuff but no market for recycled products

#5. goat manure and chicken manure, composted and use it on the garden

#6. Plant Material. Composted

#7. not too much as far as waste; cardboard boxes are recycled; most food is put to good use. Some food kitchens take extra stuff; we have a compost pile. plastic containers are expensive.

#8. None

#9. Household only

#10. don't generate waste, "we use everything right here"

#11. manure is generated from the animals. We partner with the elementary school and the kids gather compost and food scraps and put them in a recycling bin. I pick them up once a week and give them as food scraps to the pigs. At the moment we stockpile the waste and let it decontaminate. Pig waste is a bit different than other animal waste

#12. no waste generated, compost vegetable matter

#13. chicken and horse waste; we spread it on gardens, trees and use it as fertilizer; we don't ever have a pile of waste it gets used. Food scraps go to the chickens

#14. Manure, relationship w/ landscaping company. Manure breaks down quickly because of bedding used. Twice a year they come and take a manure pile away. We have our usual trash, but most of that gets recycled.

#15. None

#16. we have a series of large compost pile for garden waste, kitchen waste, and lawn waste

#17. brush is generated and it is usually burned

#18. None

#19. Minimal waste produced; all animal manure used on fields immediately.

14. What specific brands of chemicals do you use on the farm? (i.e. fertilizer, weed control, pest control) Do you know if any might be environmentally damaging?

#1. Weed control we have issues with weeds in our pastures. Generally try not to use herbicides. I've experimented w/ earth friendly herbicides w/ limited success, so it's generally hand pulling unfortunately

#2. None

#3. Don't know.

#4. fertilizer for fruit trees, pesticides for fruit (fungicides and insecticides), herbicides under the trees; Nutrient Ag fertilizer, Pesticides and herbicides wide variety (find online at UMass fruit advisor website)

#5. None

#6. Weed control: Plant to cover open soil, don't use any herbicides, methods are strictly organic, use tilling, harvesting is manual mostly her husband. Pest Control: Not cutting trees as much as orchards would because it would put more stress on the trees and make them vulnerable to diseases and pests. Grows mint and garlic in the orchard to ward off pests. Has sprays (example Fish kelp) that enhance the defense system of the trees. Avoided pesticides and focuses on making the plants strong enough to deal with pests without intervention.

#7. not too much weed control; for vegetables we just do regular cultivation with a cultivation tractor; as little as possible because it costs money; For harvesting we can find local help

#8. fertilizer and lime

#9. Absolutely none

#10. glyphosate for weed control, not used where the crops are, just out by the road

#11. none

#12. hand spray for fungus natural oils, do spray once a season 4 antique apple trees with vegetable spray from home depot for wasps. none environmentally damaging

#13. no chemicals

#14. Proper use of my pastures; I don't overgraze and I rotate my pastures so I don't have a problem with weed control. Have a bit of buttercup. Not a toxic plant to the horses and if I need to get rid of any, I used vinegar water to get rid of them and handpick them.

#15. Burnout II

#16. We use Roundup in very small amounts to keep poison ivy levels down. Yes we know it's bad, but we're all allergic to poison ivy. We have a lawn fertilizer service treat lawn 3x per summer (spring summer fall).

#17. 1 customer is certified organic and I use organic methods plus IPM strategies and synthetic chemicals for my other customers

#18. Not used currently

#19. None - all organic

15. Do you have any plans to expand your farm? If so, in what ways? What would be the challenges to doing so?

#1. Like to expand the number of animals. Have 21 now and 2 more coming in a few weeks. Our plan is to get into the 30-40 range and I wouldn't mind having more land, but cost is a huge restrictive factor on that. There's a 10 acre undeveloped parcel next door which I would acquire if I had the money.

It's currently forested too, so we'd have to clear it or do selective clearing to make it usable for pasture.

#2. no, bc "I'm getting on in age", would like someone to use the pastures but no one wants to do that, don't want horses on it bc don't consider horses agriculture

#3. No

#4. no, "we're replanting"

#5. would love to, but "I'm getting old", uses neighbors lot for goats but no place to expand it to

#6. We are working on projects using more of the land, but right now the priority is adding plants that can be used for medicinal purposes. Our plan is to start workshops in the farm about food production, beekeeping demonstrations. Beehives are about 100 yards away from the farm. Not planning on purchasing additional land, just expansion on existing land.

#7. Not really. We just try to figure out the good niche or happy spot. We've grown a bit. Changed what we've been doing. Mass as a whole is not really a farm community, it's all techs and business at the end of the day.

#8. land constraint

#9. No

#10. maybe a little bit, but not much, might increase 20%; land we already own

#11. I'm probably as big as I can get around here. It's grown as much as it can grow. There's just not enough available land.

#12. possibly wants to buy the other shares of his land from sisters who each own 1/3 in order to maintain land and sell it to a conservation trust or give it away (restricts open space land so it can't be developed). he is hoping his daughter or someone like her would come back and run the farm with small farm animals like when he was growing up also he could lease land to people to actually farm which he is open to he wants the land to be used for more than just looks

#13. We don't really want to expand our farm. We don't have the resources for that.

#14. No, there's no opportunity to expand. Private property on one side. The other side is taken as well. If they agreed to give me a piece of property for no money, I would, but can't afford it now.

#15. No

#16. We would have more planting areas if we had time to take down more trees and expand the bed area. Not in the current plan to do so as we grow enough to feed ourselves plus give some away to friends/neighbors.

#17. No

#18. No plans to expand currently

#19. Perhaps add more blueberry bushes since it's a high value crop

16. Do concerns for environmental sustainability motivate any of your agricultural practices? If so, in what way?

#1. No answer

#2. all of them, very concerned about the environment, "it pisses me off when my neighbors spray for mosquitoes", produce electricity with photovoltaic panels

#3. Don't use Roundup or other toxic chemicals in gardening.

#4. try to be conservative and do sustainable practices wherever we can, use third party consultant for IPM (Integrated pest management), determine what to spray with and when we need to spray, only spray when we need to

- #5. yes, farmers are very aware of what the environment is, grow a lot of fruits and vegetables
- #6. No
- #7. Definitely motivates us.
- #8. No answer
- #9. Yes, to eliminate all man made chemicals
- #10. no, motivation for farming is food
- #11. "I'd say it is. What we're doing on a small scale. It teaches it to my son and others."
- #12. very conscious about trash and oil and household contaminants and use of low use low pesticide use tries to do the right thing be conscious of recycling even engine oil keeping groundwater safe
- #13. they use organic farming
- #14. Question not asked
- #15. Yes, we have been providing courses on regenerative agriculture, pasture-raised livestock and other farm and ranch decision-making tools and techniques.
- #16. Yes we like to garden to reduce what we have to buy that's commercially produced. And we compost as much as we can to reduce what we have to throw out.
- #17. Yes, IPM and organic methods both consider environmental sustainability
- #18. Not at present. I'm concerned about future weather changes
- #19. Yes - we have our own bees to pollinate our crops

Climate Change

- 17. Are your agriculture practices currently affected by climate change?
 - #1. Yes
 - #2. Other: Weather is crazy, hard to use historical dates to predict weather
 - #3. Other: Don't know
 - #4. Other: not drastically, but early spring and a month of cold causes apple leaves to burn, limiting blossoms
 - #5. Yes
 - #6. Yes
 - #7. Yes
 - #8. Yes
 - #9. No
 - #10. No
 - #11. No
 - #12. No
 - #13. Other: question not asked
 - #14. Yes
 - #15. Yes
 - #16. No
 - #17. No
 - #18. No
 - #19. Yes

18. Do you expect any changes due to climate change in the future?

- #1. Yes
- #2. Yes
- #3. other: don't know
- #4. Yes
- #5. Yes
- #6. Yes
- #7. Yes
- #8. Yes
- #9. No answer
- #10. Yes
- #11. No
- #12. Yes
- #13. Other: question not asked
- #14. Yes
- #15. Yes
- #16. No
- #17. Yes
- #18. Other: not able to predict
- #19. Yes

19. What, if any, changes have been made on your farm to adapt to climate change?

- #1. More of a focus on rotational grazing, but I don't know if it's directly related to climate change Healthier pastures might make them more resilient to climate change.
- #2. Solar panels
- #3. No answer
- #4. haven't had to make changes, haven't been affected that much
- #5. have to wait until early May to put plants out, have to worry about hoof rot earlier with wet winter
- #6. Hard time planting/seeding "because it's so wet"
Warmer winters difficult for apples, not enough "chill hours"
Applied for grant for a greenhouse so that they can plant in the spring
A greenhouse is expensive, will take a couple years to get the money back, affecting profits
- #7. No more plans what's working now is fine
- #8. No answer
- #9. Use less energy everywhere
- #10. No
- #11. None
- #12. none, just changing planning schedules and such day to da stuff hasn't changed much, fruit growing earlier
- #13. Question not asked

#14. We do planting to help maintain soil and take up surface water. I've built bridges so horses don't disturb the soils too much. The Horses live in sheds, but with the extreme weather, it's just damp. I use up more hay and buy more hay since they're not on the grass. I have to be more careful about how I rotate the pastures. There's lots of pine. In transitional soil areas such as a pasture going into a wetland we have planted trees & shrubs; helps with pickup of water.

#15. None as yet, but plans are in the works.

#16. No answer

#17. None. I've been farming in the area for over 30 years and each season is different and unique. We adapt to the unique challenges of each season and buy crop insurance.

#18. No answer

#19. None yet but anticipate problems with erratic spring thaw / freeze on some crops

20. If no changes have been implemented, are there plans to put some into place?

#1. No answer

#2. No

#3. No

#4. No

#5. No

#6. No

#7. No

#8. No

#9. No answer

#10. No

#11. No

#12. Other: if they become necessary

#13. Question not asked

#14. Yes

#15. Yes

#16. No

#17. No

#18. No

#19. No answer

21. What, if any, environmentally sustainable practices do you use to run your farm?

#1. No answer

#2. compost all waste, all our own compost and manure, no chemical use

#3. No

#4. practicing IPM is the biggest

#5. no chemical use, use the manure, careful what to feed the goats, don't spray the trees

#6. We compost, No herbicides, only organic products instead of chemicals. In the orchard we are not cutting the trees that much because that would put a lot of stress on

the trees and make them susceptible to pests. We grow plants in the orchard that ward off pests like mints and garlic to protect the trees.

#7. all organic farming practices

#8. No answer

#9. Do handwork wherever possible, compost everything

#10. Compost

#11. Just the recycling portion of getting the food through the school and giving it to the animals.

#12. recycling, composting

#13. question not asked

#14. We use fly predators which are mini wasps that eat the fly larvae and put them out and about. The fly predators eat larvae before they can get born & multiply. We don't have standing water, we've worked on irrigation ditches to prevent that, to prevent mosquitoes. I don't use chemicals that are harmful to the environment.

#15. We employ the top 2 best practice frameworks for regenerative ag; i.e. Holistic Management and Spin Farming methods, tools, and training.

#16. We use the compost created to refill/freshen the garden beds each year.

#17. Composting

#18. Limited use of chemicals

#19. Reusing all animal waste as manure; composting all organic materials and re-using

22. Do you know of any best practices in Harvard that mitigate climate change within agriculture? If so, what are they? If not, do you have any suggestions?

#1. "I'm not aware of any best practices." I know there's a lot of discussion in the town about these types of things which is a positive sign.

#2. no, suggestions: "Yeah, get rid of the president, get some of these environmental laws back"

#3. No

#4. no, no suggestions

#5. no, suggestion: new people moving to harvard complain abt manure smell causing farmers to use chemicals, avoid that

#6. I would not know. Individual farmers try to have some good practices, but I don't see any as a town.

#7. Harvard has no practices to manage climate change

#8. No answer

#9. Convert to products that do not require chemical applications.

#10. no, suggestions: plant more trees, plant more fruit trees

#11. "None that I've paid too much attention to because it doesn't apply to a small scale operation like mine."

#12. No

#13. question not asked

#14. I don't know about Harvard specifically? They thought erosion control was good. As a farmer, I just talk to the other farmers since we deal with it on a daily basis. Don't know any for all of Harvard.

#15. The best practice that has alluded most of us is the availability of farm and ranch courses on Spectrum CATV. There are several channels such as RFD-TV <https://www.rfdcc.com/browse> I specifically like the Ag-PhD show. Very good on fungicides and related guidance.

#16. No answer

#17. No

#18. No answer

#19. None known

23. Are your farm product prices affected by climate change? In what ways?

#1. No answer

#2. No

#3. No

#4. No

#5. No

#6. Getting a greenhouse will affect profits

#7. No answer

#8. if it is too wet, cannot harvest/bale the hay. too wet hay rots

#9. Yes

#10. No

#11. No

#12. No

#13. question not asked

#14. N/A

#15. Loss of crops through drought.

#16. No. We don't produce enough to sell.

#17. No, prices have been increasing any way to keep up with expenses

#18. Events that affect price of hay - up or down

#19. Not as of yet

Business Practices

Tax Policies

24. Are you familiar with Chapter 61 programs? ["Chapter 61 programs give Massachusetts landowners... an opportunity to reduce... property taxes in exchange for providing important public benefits like clean water, wildlife habitat, rural character, wood products, food, and outdoor recreation." (61: forestry, 61A: agriculture)]

#1. Yes

#2. Yes

#3. No

#4. Yes

- #5. Yes
- #6. Yes
- #7. Yes
- #8. Yes
- #9. Yes
- #10. No
- #11. Yes
- #12. Yes
- #13. Yes
- #14. Yes
- #15. Yes
- #16. Yes
- #17. Yes
- #18. Yes
- #19. Yes

25. Is your land in a Chapter 61 Program?

- #1. Yes, 61A
- #2. Yes, 61A
- #3. No
- #4. Yes, 61A
- #5. No
- #6. yes , 61A
- #7. Yes, 61A
- #8. Yes, 61A
- #9. Yes 61, 61A
- #10. No, i'm not familiar with chapter 61 programs
- #11. No
- #12. Yes, 61A
- #13. No
- #14. Yes, 61A
- #15. Yes, 61A
- #16. No
- #17. No
- #18. Yes 61A
- #19. Yes, 61A

26. Do tax policies impact or limit the way you run your farm? (ex: property, income, payroll)

Select all that apply.

- #1. Yes Local, State
- #2. Yes, Local
- #3. Tax policies do not affect the way i run my farm
- #4. Tax policies do not affect the way I run my farm

- #5. Tax policies do not affect the way I run my farm
- #6. Tax policies do not affect the way I run my farm
- #7. Tax policies do not affect the way I run my farm
- #8. Yes, local
- #9. Yes, local, State
- #10. Tax policies do not affect the way I run my farm
- #11. Tax policies do not affect the way I run my farm
- #12. Yes, local
- #13. Tax policies do not affect the way I run my farm
- #14. Tax policies do not affect the way I run my farm
- #15. Yes, local
- #16. Tax policies do not affect the way I run my farm
- #17. Tax policies do not affect the way I run my farm
- #18. Yes local, state, federal
- #19. Yes, Local

27. How do these tax policies impact or limit the way you run your farm?

- #1. the higher the taxes, the less income we have to pay the bills, so if taxes were lower, we'd be closer to the goal of having the farm sustaining us.
- #2. 61A enables to keep farm for lower taxes, benefit "taxes in general are too high"
- #3. No
- #4. no, they stay reasonable, property taxes on farm buildings rising though
- #5. N/A
- #6. No
- #7. N/A
- #8. need to produce a certain income stream each year to remain in 61A, not always easy.
- #9. Without these programs we would leave harvard
- #10. No affect
- #11. "No, but what might be true with hobby farms, but how I manage the farm is dependent on outside income from my normal job."
- #12. has to generate enough gross income to get tax exemption, if you stop being in the tax program you have to pay back taxes for 10 years. the land but not necessarily the person has to generate income
- #13. Question not asked
- #14. N/A
- #15. They encourage non-farmers to keep their land in an agriculture-producing revenue state.
- #16. No answer
- #17. No answer
- #18. Yes
- #19. Allows for expanded hay production since land is taxed at a lower rate.

28. What are the challenges to changing taxes and regulations?

#1. No answer

#2. biggest challenge is that taxes in town are forcing a lot of people out of town, especially older people, can't afford taxes, maybe abatement for seniors who have lived in town for all/ most of their lives, they're getting priced out, seen people have to move because of taxes on their property are too much "when you're 70 or 80", they don't realize how much a lot of people have given to this town over the years

#3. No

#4. haven't felt the need to change

#5. N/A

#6. "the entire structure"

Towns would have benefit from supporting farms, get some of the money the farms make, taxes would go to state

None of the money would go to the town, town gets property taxes

Town is not interested in farms who pay low property tax

Interest for the town "is not so much into the farms"

"Entire structure needs to be changed here" to give town more incentive

#7. No answer on food regulations

#8. No answer

#9. Too many taxes supported by homeowners

#10. N/A

#11. No answer

#12. taxes keep going up but income is fixed, he thinks town is cognisant of farmers and there's a culture of conservation and preservation and open space

#13. Question not asked

#14. N/A

#15. Marketability of the estate

#16. No answer

#17. No answer

#18. If one were to lose the agricultural easement, one might consider selling a portion of the property for future housing development

#19. Nothing comes to mind here

Regulations

29. How do regulations such as food health & safety laws impact or limit the way you run your farm?

#1. NA

#2. No

#3. NA

#4. None

#5. No

#6. It limits how we run the farm. Could do food samples, but I can't because there are restrictions on water. Some of the regulations in Harvard are limiting.

#7. no answer

#8. No answer

#9. None

#10. No

#11. No answer

#12. No

#13. If we followed the food, health, and safety laws we'd need our kitchen inspected. That'd prevent us from selling products that are cooked. We sell fresh products instead

#14. N/A

#15. We have taken the state courses on Good Harvest Practices and other compliance-related matters.

#16. I don't attempt to sell any of my produce because I'm unsure of what food health & safety laws I would need to comply with to do so.

#17. for example: observing days to harvest requirements between pesticide applications and harvest and reentry restrictions after an application

#18. They don't at the moment

#19. Not affected due to the nature of the products

30. How do regulations such as nuisance laws and zoning impact or limit the way you run your farm?

#1. not currently, although we're looking to expand our farm and zoning may affect that negatively. For the most part I'd say no.

#2. 61A, impacts positively

#3. NA

#4. none, anticipate problems bc wants agritourism

#5. no, bc harvard is right to farm community

#6. limited in the number of workshops i can have per year.

#7. We have a farm community if someone has complaints. You'd use the right to farm bylaw as a backup to mitigate the problem. If a neighbor bothered your farm for example.

#8. No answer

#9. None

#10. No

#11. There are zoning regulations as far as stable permits and waste management. There are some food and safety regulations with pigs and cattle.

#12. no but only because zoning has been in place for a really long time and it doesn't affect him bc he is just maintaining what he has. the only thing he wants to do is build back the barn that burned down the foundation is still there but! it's very close to the road so that might conflict with zoning and he'd ave to go out of his way and convince the zoning people to grandfather it that it's ok to be close to the road

#13. Zoning doesn't affect us at all. It's more important with bigger farms. If we wanted to become a bed and breakfast for example, we'd need to deal with zoning."

What we've seen with climate change in Harvard: Apple trees dying out; too hot in the winter; pests are getting worse and finding ways to deal with them; huge storms destroying crops

#14. The town has things they want to put in place which I find needs to be better fleshed out. It could in one way bring opportunity to farmers, but is also limiting on who can do what. I'd like them to expand on what businesses would be appropriate for farms. I have no problem with a bed and breakfast, but with a farm starting a restaurant in a residential area. Most of our farms are in residential areas. Why are you (the board) allowing a restaurant, but not something like a kennel? It's called the Rural Heritage Bylaw or something like that, can't remember the name. It supposedly increases opportunities for farmers.

#15. Harvard is not allowing farms to tap into agri-tourism revenue streams which, in many cases, help a farm family to start their retirement / emergency savings as well as to build their working capital.

#16. None

#17. They don't

#18. They don't at the moment

#19. Conservation Commission rules impact the farm since we have a pond and brook.

31. Does your farm have year-round employees?

#1. Yes they are housed elsewhere

#2. No

#3. No

#4. Yes, they are housed elsewhere

#5. No

#6. No

#7. Yes they are housed elsewhere

#8. No

#9. No

#10. No

#11. No

#12. No

#13. No

#14. Yes, they are housed elsewhere

#15. No

#16. No

#17. No

#18. No

#19. No

32. Does your farm have seasonal employees?

- #1. Yes they are housed elsewhere
- #2. No
- #3. No
- #4. yes , they live on my farm
- #5. No
- #6. No
- #7. Yes they live on my farm
- #8. No
- #9. No
- #10. No
- #11. No
- #12. No
- #13. No
- #14. Yes, they are housed elsewhere
- #15. Yes they are housed elsewhere
- #16. No
- #17. No
- #18. No
- #19. No

33. How do laws relating to employee regulations affect how you run your farm?

- #1. We only started having emps in the past year or so. Again the salaries of the employees are added on and the complexity of the taxes, hiring a farm to do our payroll are additional costs.
- #2. No
- #3. NA
- #4. H2A regulations: US government regulations, try to hire H2A workers
- #5. N/A
- #6. Not at all, just my husband and me for the most part.
- #7. Follow them all
- #8. No answer
- #9. None
- #10. No affect
- #11. N/A
- #12. has to file 500 to state even without employees
- #13. Question not asked
- #14. We have to have insurance in multiple layers. Employee Insurance, property insurance, business insurance. I'm all for coverage, but don't like redundancies; Multiple insurances that cover the same thing.
- #15. Yes
- #16. NA
- #17. No answer
- #18. They don't at the moment

#19. Not affected by this

34. Would you run your farm differently in the absence of any regulations? If yes, How so?

#1. We have a small shop in our barn selling alpaca products. I'd love to sell coffee and baked goods to service our visitors that come. I think they'd enjoy that. Things get complicated when trying to sell food.

#2. no "if it's a stupid regulation, I wouldn't abide by it"

#3. NA

#4. run into agritourism regulations, some people in the community don't think it goes with agriculture

#5. No

#6. We might try to sell something to the people hiking by our property or give samples. Invite people to do beekeeping and give out honey to taste.

#7. No extra selling if regulations weren't in place

#8. No answer

#9. No

#10. No

#11. "The only reg in the town is a limit on the number of pigs. 3, which is what I have. If that didn't exist, I'd have a larger population of pigs."

#12. No

#13. Question not asked

#14. It wouldn't be a farm-related branch, but I'd offer dog daycare. Under the regulations that'd be considered a commercial business, not a farm. I think that'd be better for a residential area than a restaurant.

#15. Yes

#16. No

#17. I actually appreciate the regulation and think of them more as guidelines

#18. No

#19. No

35. Do you encounter barriers to farmers' rights in Harvard? If so, what are those barriers?

#1. No I wouldn't say so

#2. yes, can't find anyone to farm the land, "people just aren't into it"

#3. NA

#4. no because we are a right to farm town

#5. no, neighbors are not close by so they're not complaining

#6. If the town does something for farms, they do it for the big farms.

Small farms are limited in events.

Small farms need more help but do not get these exemptions.

I Want to sell raspberry lemonade and ice cream, but there are regulations against that.

To farm in Harvard, it's not very easy to make it profitable.

#7. No barriers to farmers rights

#8. No answer

#9. No

#10. No

#11. "I'm new to Harvard, only been here a couple years, none that I've run into so far. It's a rural area. I think it depends on the general feel of the town and people seem to be more accepting."

#12. No

#13. Question not asked

#14. Sometimes it's the boards that run Harvard that aren't very educated in what it means to farm. They need education to understand the impact of things they want to put in place and how it will affect farmers. An example is an erosion control regulation that luckily failed and was voted down in a town meeting because it was redundant. It would've put more of a strain on property owners.

#15. Allowing farms to tap into agritourism opportunities.

#16. No

#17. I don't but I hear of concerns regarding pesticide applications by neighbors of large orchards

#18. I haven't encountered any issues yet

#19. No

Farm Economy

36. What portion of your income comes from farm products or services?

#1. We have a small shop in our barn selling alpaca products. I'd love to sell coffee and baked goods to service our visitors that come. I think they'd enjoy that. Things get complicated when trying to sell food.

#2. about 0, what we get for the eggs basically pays for the feed

#3. none

#4. 100%

#5. Very little

#6. Its source of income is still too small for full dependency. Not planning on being completely dependent. Hoping farm will pay for itself (property taxes are high) Want to "deliver most of the food that we need"

#7. Mostly. I work on the farm, full-time job. Wife has a photography business. Other than that it's mostly just the farm.

#8. No answer

#9. Not significant

#10. don't sell, still new, intention is not to sell

#11. None

#12. almost none, maybe 1% he's semi retired it's not a farm that Makes Money

#13. Their farm is a source of income but that income is mostly from the farm classes -- 95% of their income

#14. Whole income

#15. 50%

#16. 0

- #17. Minimal
- #18. Tax easement only
- #19. Very small portion

37. Your farm is... for profit or nonprofit?

- #1. Profit
- #2. Nonprofit
- #3. No answer
- #4. Profit
- #5. Nonprofit
- #6. Profit
- #7. Profit
- #8. Profit
- #9. Profit
- #10. Nonprofit
- #11. Nonprofit
- #12. Profit
- #13. Profit
- #14. Profit
- #15. Profit
- #16. Nonprofit
- #17. Profit
- #18. Nonprofit
- #19. Profit

38. Do you sell farm products or services?

- #1. Yes
- #2. Yes
- #3. No
- #4. Yes
- #5. Yes
- #6. Yes
- #7. Yes
- #8. Yes
- #9. Yes
- #10. No
- #11. No
- #12. Yes
- #13. Yes
- #14. Yes
- #15. Yes
- #16. No
- #17. No

- #18. No
- #19. Yes

Barriers to Selling

39. What prevents you from selling?

- #1. No answer
- #2. No answer
- #3. NA
- #4. No answer
- #5. No answer
- #6. No answer
- #7. No answer
- #8. No answer
- #9. Not interested in selling, farm is still new, only second year into farming so just have saplings
- #10. No answer
- #11. No answer
- #12. No answer
- #13. No answer
- #14. No answer
- #15. No answer
- #16. Don't produce enough
- #17. Other: as the consultant or contractor, that is not part of my job. The produce is utilized or sold by my clients
- #18. Not interested in selling
- #19. No answer

40. Have you tried to sell products before? If so, what happened?

- #1. No answer
- #2. No answer
- #3. NA
- #4. No answer
- #5. No answer
- #6. No answer
- #7. No answer
- #8. No answer
- #9. No answer
- #10. Not tried
- #11. No
- #12. No answer
- #13. No answer
- #14. No answer
- #15. No answer

#16. No

#17. I used to run a very successful PYO operation in Bolton

#18. No

#19. No

Farm Products

41. What specific products do you sell? How much of each (pounds, bushels, whatever is applicable)

#1. We sell apparel, hats, scarves, mittens, sweaters, stuffed animals, souvenir things like keychains, nesting balls (alpaca fiber you hang up like you would a bird feeder and birds make their nests out of that), dryer balls which are sustainable, t-shirts, notecards
We got 150,000 in gross sales last year

#2. sell 3 or 4 dozen eggs/week, fruits/vegetables varies, might be a couple of quarts per week, freeze/can most of it

#3. No answer

#4. 30,000 bushels apples, 4000/5000 half-bushels peaches and nectarines, couple tons of blueberries, half ton of raspberries

#5. eggs (6 dozen/ week), raw cashmere goat fiber (2 pounds/ year) , goats (2-3 per year)

#6. Selling flowers, raspberries, blackberries, various berries, honey, herbs, herbal teas, creams. Seasonal vegetables. Things they can eat go to the farm stand. 200 lbs honey, 500 lbs raspberries, 200 lbs blackberries and blueberries, 100 lbs tomatoes

#7. 10,000 bushels of apples. for produce maybe 2,000 bushels of mixed vegetables. For any week 50 boxes of tomatoes, 20-30 boxes of peppers, 4 boxes cabbages and carrots. Peaches 800 bushels.

#8. HAY 3000 bales

#9. Honey, bee wax

#10. No answer

#11. No answer

#12. christmas trees, 80 per year, will be less this coming year just going to sell to church friends

#13. They sell their eggs and vegetables and will likely just be producing wine for nonprofit celebrations / fundraising events. Plan to make cider and hard cider with the apples. The other fruit jams jellies canning. Excess of fruit will be sold. They have two horses which are show horses but also used in educational classes they hold on the farm. Offer farm workshops for kids about current topics in farming, organic agriculture, hands on planting and harvesting, cooking workshops, natural horsemanship, chicken and egg studies (anatomy and makeup)

#14. horse lessons etc.

#15. Plants - Hundreds

#16. No answer

#17. No answer

#18. No answer

#19. 450-500 bales of feed hay; 200 dozen eggs; 40-60 pounds of honey; 20-30 quarts of berries

42. Who are your customers? (chain stores, local stores, restaurants, client base)

#1. Sell exclusively retail not wholesale. Our customers are for the most part the visitors to our farm.

We have a lot of visitors that are local but also lots coming from Boston, RI, NJ, all over. If I'd guess, it's probably half and half between locals and people coming more than 10-15 miles away.

#2. neighbors, "they claim we have the best eggs ever"

#3. No answer

#4. 75% of production go to wholesale, 25% goes to retail

#5. eggs: people in Harvard, goats: members of the cashmere goat association, fiber: another cashmere goat farmer in ME

#6. residents, locals, individuals. Whoever comes by our farmstand here in Harvard

#7. not too many restaurants, bit of wholesale to other stands, ourselves, sell apples to a packer

#8. end users: dairy farms and horse stables

#9. Local outlets

#10. No answer

#11. No answer

#12. people driving by, people who know them, 1/2 to each, some people in littleton

#13. Question not asked

#14. People boarding horses and the person who teaches lessons. The people who board here hire me to train their horses; The customers' horses are owned privately from all facets of socioeconomic layers. Most are women, I only have a couple men, only 1 teenage boy. Lots are from the healthcare industry but they can't come now because of the pandemic. The people are coming from Boston, Metro West, in town, some are retired gentlemen. Lots of people in the biotech industry.

#15. Metro-west consumers.

#16. No answer

#17. No answer

#18. No answer

#19. Client base - local only

43. Where do you sell your products?

#1. On your farm

#2. On your farm

#3. No answer

#4. On your farm, off your farm

#5. On your farm, off your farm

#6. On your farm

#7. On your farm

- #8. Off your farm
- #9. Off your farm
- #10. No answer
- #11. No answer
- #12. On your farm
- #13. On your farm
- #14. On your farm
- #15. On your farm
- #16. No answer
- #17. No answer
- #18. No answer
- #19. On your farm

44. Do you sell only within Harvard?

- #1. Yes
- #2. Yes
- #3. No answer
- #4. I sell both within and outside of harvard
- #5. I sell both within and outside of harvard
- #6. Yes
- #7. I sell both within and outside of harvard
- #8. No i only sell outside of harvard
- #9. I sell both within and outside of harvard
- #10. No answer
- #11. No answer
- #12. I sell both within and outside of harvard
- #13. No answer
- #14. I sell both within and outside of Harvard
- #15. I sell both within and outside of harvard
- #16. No answer
- #17. No answer
- #18. No answer
- #19. I sell both within and outside of Harvard

45. Do you sell products to neighbors and friends without using your usual method of selling? (ex: outside of the farmstand)

- #1. No
- #2. No
- #3. No answer
- #4. No
- #5. No
- #6. No
- #7. No

- #8. No
- #9. No
- #10. No answer
- #11. No answer
- #12. Yes
- #13. No answer
- #14. No
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Yes

46. How competitive is your market, and how do you deal with it?

- #1. I'd say we have limited competition.
- #2. I don't worry about it, probably getting more competitive because more people are getting chickens
- #3. No answer
- #4. wholesale customers, not trying to steal wholesale customers from other farmers and they don't steal ours, be competitive about prices
- #5. eggs: not very competitive, goats: depends on their bloodlines, sell by word of mouth
- #6. Competition: Westford orchards, but competition is limited because we have different strategies. Not much overlap even if it is the same product.
- #7. There's definitely competition on the wholesale market. Yes.
- #8. No answer
- #9. Getting more competitive constantly
- #10. No answer
- #11. No answer
- #12. there's other farms in the area but he gets repeat customers and sells them all 30/tree, leaves cash box and saw out it's more nice for social interaction than anything else
- #13. Question not asked
- #14. There are lots of horse farms. Not all offer what I offer like different housing options than other farms, a low key atmosphere which is attractive to some clientel, different disciplines, and we're somewhere in the middle of a very open farm and a very closed farm.
- #15. Highly competitive
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Eggs and honey are competitive

47. Does the town culture affect who buys from which farms? If so, how?

- #1. We're the only alpaca farm in town that I know of, so I don't think that applies for us.
- #2. "I doubt it", only 2 or 3 big farms
- #3. No answer
- #4. No
- #5. yes, "the culture has changed some but I think it does"
- #6. No. People might feel like they want to support small farms or local farms, but the town culture doesn't dictate it.
- #7. not really. It's like you going to Target vs. Walmart, but if one was closed, you'd go to the next one down the street.
- #8. No answer
- #9. No
- #10. No answer
- #11. No answer
- #12. doesn't know but people have habits that's all they get used to. there's more competition between the 3 orchards than anything else, but it's still friendly competition
- #13. Question not asked
- #14. I suppose it's based on who you know. If there's a farm right around the corner of your house versus one far away, you'd go to the closer one.
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Yes

Marketing/Public Relations

48. What about your farm appeals to customers?

- #1. In general, alpacas are still considered somewhat exotic and unusual. The alpacas themselves are a bit different. We're unique in the amount that we're open to the public. We invite customers in to be close to the animals and people seem to enjoy that. We focus on spreading the education of alpacas. And we have a therapy program as well" There are a lot of alpaca farms that are only open seasonally
- #2. people love walking by it and seeing the open space, egg customers claim they're the best eggs ever
- #3. No answer
- #4. retail: not a zoo, try to keep everything under control, pride ourselves on not being a zoo (not overcrowded), however have to be busy to be sustainable
- #5. eggs: like it because they know I take good care of my chickens
- #6. Cashmere Goat Association
- #7. It's organic. They like the farmstand. It's small, local, and they can see the beehives from the road and know that the honey is really from here.
- #8. we're not too big, but not too small. We're 100 years old. Not just to pick apples. Not a circus atmosphere. CSA has changed it. It's gotten more people to go through the door because of the vegetables.

- #9. A very natural setting
- #10. No answer
- #11. No answer
- #12. cheap, friendly
- #13. Question not asked
- #14. We're a professional business w/ lowkey atmosphere. Everyone is accepted for where they are with their relationship with their horse and we work from there. Not a high stress-environment.
- #15. We are positioned as an historic herb farm which gives us some level of uniqueness.
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Free range, chemical free hives

49. What kinds of marketing methods do you use?

- #1. No answer
- #2. No
- #3. No answer
- #4. Word of mouth
- #5. Nextdoor, craigslist
- #6. No
- #7. we have a website & my wife does other advertising
- #8. No answer
- #9. Traditional
- #10. No answer
- #11. No answer
- #12. newspaper ads few weeks a year, not this year
- #13. Question not asked
- #14. Website and facebook page.
- #15. Integrated social media and e-commerce.
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Word of mouth

50. What forms of social media, if any, do you use to promote your farm?

- #1. Farm website, Facebook
- #2. Do not use social media to promote my farm
- #3. No answer
- #4. Farm website, facebook
- #5. No
- #6. Farm website, nextdoor

- #7. Farm website
- #8. No answer
- #9. I do not use social media to promote my farm
- #10. No answer
- #11. No answer
- #12. I do not use social media to promote my farm
- #13. Other: question not asked
- #14. Farm website, facebook
- #15. Farm website, facebook, instagram, twitter, nextdoor, pinterest
- #16. No answer
- #17. No answer
- #18. No answer
- #19. I do not use social media to promote my farm

51. Do you collaborate with other farmers/businesses for marketing purposes?

- #1. Yes
- #2. No
- #3. No answer
- #4. Yes
- #5. No
- #6. No
- #7. Yes
- #8. No answer
- #9. No
- #10. No answer
- #11. No answer
- #12. No
- #13. No answer
- #14. Yes
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. No

52. Does environmental sustainability play a role in your marketing?

- #1. Yes
- #2. No
- #3. No answer
- #4. Yes
- #5. No
- #6. Yes
- #7. Yes

- #8. No answer
- #9. Yes
- #10. No answer
- #11. No answer
- #12. No
- #13. No answer
- #14. No
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. No

53. Do customers care about environmentally sustainable practices?

- #1. Yes
- #2. Yes
- #3. No answer
- #4. Yes
- #5. Yes
- #6. Yes
- #7. Yes
- #8. No answer
- #9. Yes
- #10. No answer
- #11. No answer
- #12. Yes
- #13. No answer
- #14. Yes
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Yes

54. Does the community encourage environmentally friendly farming?

- #1. Yes
- #2. Yes
- #3. No answer
- #4. Yes
- #5. No
- #6. Yes
- #7. Yes
- #8. No answer

- #9. Yes
- #10. No answer
- #11. No answer
- #12. Yes
- #13. No answer
- #14. Yes
- #15. Yes
- #16. No answer
- #17. No answer
- #18. No answer
- #19. Yes

Final Comments

55. Do you have any final comments?

- #1. No answer
- #2. town manager is not in tune with the town, doesn't understand the people in the town or the town, not a positive influence, call him out about putting too much salt on the roads in the winter but he doesn't care the town has lost so much farmland and farm over the years, it's really losing its character, trying to maintain what little farms we've got left, a lot of those farms are turning into horse farms, horse farm is not productive bc they don't produce and only consume, take up a lot of space that could be used for pasturing sheep/cattle/something that could provide food
- #3. No answer
- #4. No answer
- #5. think the community is neutral on environmentally friendly farming
- #6. No
- #7. No
- #8. We maintain our hay field but sell the hay uncut to someone who cuts, bales and delivers it. much easier to do it this way. We do not have to maintain big equipment.
- #9. No answer
- #10. hopes to get together with Ag Commission regularly after covid
- #11. I can email you some contacts of people that have smaller farms.
- #12. not really, value of open space/ livestock/ it's important and a big deal in terms of why people come to this town, no one wants to see ,more houses goal to maintain integrity of the land not open for commercialization
- #13. No answer
- #14. No answer
- #15. I would like to see your team deliver your report to the Board of Selectmen and the message should be that a Right-To-Farm policy does nothing for the farms and ranches in town. The town needs to understand that the small family farm is in a very tough position, financially. Thus, the selection, in cooperation with the agricultural committee needs to be very aggressive in helping these small ag businesses to take advantage of as many agritourism opportunities as they can.

- #16. No answer
- #17. No answer
- #18. No
- #19. Nothing comes to mind

56. May we contact you with any further questions?

- #1. Yes
- #2. Yes
- #3. No
- #4. Yes
- #5. Yes
- #6. Yes
- #7. No answer
- #8. No answer
- #9. Yes
- #10. Yes
- #11. Yes
- #12. Yes
- #13. No answer
- #14. No answer
- #15. Yes
- #16. Yes
- #17. Yes
- #18. Yes
- #19. Yes

57. If yes, please enter your preferred contact information

- #1. harvardalpacas@gmail.com
- #2. 978-456-3695
- #3. No answer
- #4. 617-968-4180
- #5. ataylor31@charter.net
- #6. No answer
- #7. No answer
- #8. No answer
- #9. Email or phone
- #10. danp@sodinc.net
- #11. No answer
- #12. Phone
- #13. No answer
- #14. No answer
- #15. phil@1782farm.com

#16. email as I work during the day and typically assisting with homeschool efforts at night

#17. 617-512-9243

#18. 978-456-6962

#19. Steve.Nigzus@gmail.com

58. Do you know any other members of the Harvard agricultural community who may be interested in taking this survey? If so, please enter their contact information here so that we can reach out to them.

#1. No answer

#2. No answer

#3. No answer

#4. Pam Doe, Pam Lawson, Larry Doe, Linda Huffman (frog pond farm)

#5. 110 East Bear Hill is selling vegetables

#6. No answer

#7. No answer

#8. No answer

#9. No answer

#10. No answer

#11. No answer

#12. No answer

#13. No answer

#14. No answer

#15. No answer

#16. Jim Burns, Maple Sugar Producer on Ayer Road

#17. No answer

#18. No answer

#19. None come to mind

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