Community Farmland Connections

A guide to the use of GIS mapping for discovering underutilized farmland and expanding its use for agriculture

Produced by New Entry Sustainable Farming Project

This guide was produced by:

New Entry Sustainable Farming Project
155 Merrimack Street, 3rd floor
Lowell, MA 01852
978-654-6745
www.nesfp.org

In collaboration with:

Land For Good (landforgood.org)

Natural Resources Conservation Service of Massachusetts (http://www.nrcs.usda.gov/wps/portal/nrcs/site/ma/home/)

Created by Becca Weaver

Edited by Noelle Fogg

Design by Sam Anderson

Cover photo by Adrien Bisson (adrienbisson.com)

Developed with funding from the Northeast SARE (Sustainable Agriculture Research and Education) Program

TABLE of CONTENTS

Introduction and Background

Introduction

Preserving and utilizing local farmland offers a range of community benefits, from preserving cultural heritage and open space, to promoting local food and the social, environmental, and economic benefits that come with it. Working with towns and their agricultural commissions, New Entry Sustainable Farming Project's Community Farmland Connections project uses spatial analysis to identify unused viable farmland and encourage landowners to lease their land to a farmer. Through spatial analysis using Geographic Information Systems (GIS) and subsequent community education and outreach, this process can be a valuable way to increase the amount of viable farmland that is utilized in a given community. It can also expand opportunities for new and existing farmers in the area.

By combining soil data, land use cover, local assessor's data, and wetlands boundaries, parcels are identified that would be best suited for agricultural use. Depending on the town, some of the prime areas for agriculture continue to be in active agricultural use, however, in some areas these parcels have already been converted to other uses. By reaching out to landowners in different areas, community groups can facilitate matches of prime farmland with beginning and existing farmers, in order to increase both new agricultural opportunities and local food for the town, county, and state. The process of land identification and landowner outreach can be a part of a larger strategy to increase local food production in a given area. The intention of this type of work is to increase utilization of farmland, not to change the ownership of land that is already in active agriculture.

This guide is intended to help municipal groups and/or agricultural non-profits think creatively about how to support new and beginning farmers finding land in the state. It draws on the experience of the New Entry Sustainable Farming Project, a farmer-training program in northeastern Massachusetts, as we sought to find small parcels of farmland for the farmers graduating off of our incubator farm. It outlines step by step the spatial analysis and community process we went through with communities around Massachusetts. We hope it helps other communities and non-profits in other areas to undergo this process themselves.

About Massachusetts Agriculture

Massachusetts has a thriving local food economy that is growing every year. At $42 million, the Commonwealth ranks 9th nationally in total

value of direct sales of farm products.[1] However, despite these economic successes, many sites that are prime for agriculture are already spoken for in Northeast Massachusetts, as development pressure is high in the region. The state has lost over 100,000 acres of farmland since 1982.[2] Moreover, MA farmland is among the most expensive in the nation, with prices upward of $12,000 per acre.[3] Although Massachusetts has seen a resurgence of interest in local food and farming, accessible farmland remains a formidable barrier to young and beginning farmers in the region. Facing a dwindling supply and rising cost of acreage, many skilled farmers in the region are unable to procure farmland on which they can grow food for their communities. However, with the resurgence of the local food movement, farmers are finding that leasing small plots of land can in fact make for a profitable vegetable business.

Benefits

Over the past few years New Entry Sustainable Farming Project has learned a lot about this process. There are many benefits to this type of work:

- Geospatial analysis through GIS is a quick way to assess a community's farmland resources
- Empowering a local agricultural community with valuable information about farmland resources in their area
- Expanding the farmland base in a given community for new or existing farmers
- Educating non-farming landowners in a community about the benefits of farming
- Increasing community support for farming

Limitations

Depending on the town or municipal body, this process may not be appropriate or may take too much staff time for successful farmer-farmland matches to occur.

- Though the GIS analysis is simple for an experienced user, creating the right relationships and educational programming in an area for town residents may be time-prohibitive. However, if this project is just a part of a larger town-wide strategy to increase local food production, security, and economic activity, then the benefits seem to be worth the time spent.
- It takes at least 50 hours of staff time over a year to work with a given community.
- The community organizing involved requires significant time for each actual farmland match that is made.
- Many times, while the land found is suitable for farming, the parcel may not be near agricultural amenities, such as a water source, a farming neighbor who can offer custom tractor work, or an agricultural supply store.
- The map generated using GIS needs to be ground-truthed. If the data is even a few years old things may have changed and the information not as useful.

1 Massachusetts Department of Agricultural Resources. 2007. Massachusetts Ag Facts & Statistics. http://www.mass.gov/agr/facts/index.htm.

2 U.S. Department of Agriculture. 2009. Summary Report: 2007 National Resources Inventory, Natural Resources Conservation Service, Washington, DC, and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. 123 pages. http://www.nrcs.usda.gov/technical/NRI/2007/2007_NRI_Summary.pdf.

3 Massachusetts Department of Agricultural Resources. http://www.mass.gov/eea/agencies/agr/statistics/

Background

About New Entry Sustainable Farming Project and the Farmland Matching Service

New Entry Sustainable Farming Project's (New Entry) mission is to improve our local and regional food systems by training the next generation of farmers to produce food that is sustainable, nutritious, and culturally-appropriate and making this food accessible to individuals regardless of age, mobility, ethnicity, or socio-economic status. In doing this work, we provide critical training, career development, and economic opportunity to new farmers. Much of New Entry's farmer training is on incubator farm in Northeastern Massachusetts. Farmers can use the incubator farm for 3 years to start building up their farm business, but then need a new location in the area to cultivate the earth to continue farming. Therefore, New Entry operates a Farmland Matching Service to help graduated farmers find land and continue agricultural production.

The Farmland Matching Service helps landowners and farmers connect, develop relationships, and develop appropriate land-use agreements. The Service helps landowners keep their farmland in production or turn their land into active

agricultural land by matching them with farmers who are looking for land. The matching service assists qualified beginning farmers and experienced growers in locating suitable land to start farming or to expand the acreage of their agricultural business in Massachusetts and surrounding Northeast states. New Entry maintains a database of available farmland and farmers looking for land. During the matching process New Entry provides landowners and farmers with technical assistance in evaluating the suitability of land for farming and of considerations one may encounter in a lease agreement.

History of Community Farmland Connections

Each year, 3-8 farmers graduate from New Entry's incubator farm who would like to find small parcels of farmland to rent in our region so they can continue their new farm businesses. With a lack of available farmland in the area, we needed to think outside the box for our farmers. What kind of land in the area could be used for farming but isn't right now? Much of the prime farmland soil in our area has been developed for residential lots. However, many towns in this area have large-lot requirements for residential parcels. Could we find out which parcels are most suitable for farming and approach private landowners to see if they'd like to rent their land for food production?

Our project started in 2009, at a time of increasing interest in local foods and sustainability. Many MA residents have become interested in supporting local agriculture and are thinking about how to best use their resources to this end. When trying to find the right property owners to approach, we realized a simple screen for parcel size was not enough to ascertain if the property could adequately be farmed. We also needed to include a screen for soil type, land use type, and a buffer for wetlands. We began by having interns individually look up each property on the NRCS soil-mapping database. This process worked, but progressed painfully slowly. Utilizing Geographic Information Systems proved to be a much faster and more effective way to find suitable properties.

Identifying the properties is only one part of the process. Reaching out to the landowners is another significant step in increasing the utilization of farmland. By working with individual communities, we used local knowledge to assist in methods that would best reach their community members, while offering them the valuable service of mapping their farmland. The first community we worked with after using GIS to analyze their town's agricultural land was Groton, MA. The agricultural commission decided to send letters to the landholders of potential farmland and invite them to a landowner forum in order to educate landowners about the issues involved and increase the visibility of agriculture. The forum was well attended by town residents and surrounding community members. A handful of landowners were interested in leasing land and we made two farmland matches in the spring following our fall landowner forum.

The Community Farmland Connections Process

Overall Process

We primarily partnered with agricultural commissions in Massachusetts in order to find underutilized farmland and connect its landowners to farmers who could potentially use their land. The steps varied among communities, but most often they included the following:

1) **New Entry presents the Community Farmland Connections project at an agricultural commission meeting.** Many agricultural commissions are happy to partner with us on this project, as it increases awareness of agricultural issues in their town and helps farmers in their area. They also are happy to have assistance in mapping their farmland resources.
2) **The agricultural commission, if interested, invites New Entry back.** Many agricultural commissions see this work as aiding their mission. However, some agricultural commissions are not interested in working with an outside group.
3) **New Entry identifies properties in town with prime soils of 2 acres or more that are not currently used for agriculture.** Identification of these properties is done through the spatial analysis process that is described in the "Guide to the Geo-spatial Analysis" section of this document.
4) **The Agricultural Commission reviews the map and accompanying data.** The agricultural commission has on-the-ground information about the specific parcels that were identified and can offer perspective on the results of the analysis. We can even create a new map together identifying the specific types of agriculture already taking place in the town, as well as the areas that could potentially be used for farming.
5) **The agricultural commission strategizes with New Entry about outreach.** The commission members know their town the best and can think about what kinds of outreach strategies and educational initiatives are needed and will be best received.
6) **New Entry and the agricultural commission prepare outreach materials and organize a landowner forum.** Often times, commission members decide to endorse a letter written and sent by New Entry to the landowners of the identified farmland to invite them to a meeting about agriculture in their community and how to lease land to a farmer. The details of the landowner forum are described later in this guide.

Levels of Community involvement

As an outside organization working with various communities with different goals, it was critical that we allowed the community members themselves decide on specific elements of how this process would work best in their town. We would present what was possible through the GIS analysis and also describe the opportunities a community has with this type of map. Levels of involvement included:

- Communities endorsing New Entry's work and signing a letter to be sent out to landowners in their town of agricultural land. New Entry was in charge of outreach and the information session.
- Communities vetting all the properties found on the map individually to determine the best property owners to whom to reach out and which landowners we should not contact.
- Communities helping us put together a landowner information session and presenting their perspective and other information at that session.
- Communities wishing to be the keepers of the information and landowners interested in leasing can contact them and they can connect them to local farmers.
- Communities choosing not to work with us because they are happy with the level of farming already going on in their area and did not wish to have outsiders involved.

Lessons Learned

Though many communities that we worked with we consider to be success stories, there were some mistakes that we made along the way that led us to some important lessons.

- Let the process be community lead. Give ideas but not ultimatums. Communities themselves often have the best ideas to offer that will make a process like this successful for their area.
- Communities can be insular. Some take offense to outside groups getting involved in issues they see as town-specific. Don't push your involvement with these communities. It's their choice.
- Sometimes landowners are taken aback by the amount of data that is available to the public about their land resources. Make sure to let people know early on that all of this information is public and can be accessed easily through state and federal websites.

Potential Agenda for Leasing Land Workshop

When sending letters to landowners, we invited them to an info session about the GIS process and about leasing land to farmers. The agenda varied depending on the community and what the agricultural commission wanted to include in the meeting, but would generally include the

following:

- I**ntroduction from someone in the town** (board of selectman, agricultural commission, etc). Including local community members is a very important part of gaining citizen buy-in for the legitimacy for this project.
- **Presentation on leasing land for agriculture.** We wanted to make sure to give people plenty of background so that they could look up more information and resources themselves. We would often cover the following topics:
  - **Benefits, importance of preserving and expanding farmland.** Sometimes a representative from a local land trust presented this information.
  - **What to expect from agriculture on your land.** Many people are unfamiliar with what real-live agriculture would actually look like on their land. We included many pictures here of what different types of agriculture look like and what activities they involve. This was important because we found some people in suburban environments envision large stretches of rolling hay fields when they think of agriculture, not machines, animals, people, plastic mulch, trellises, greenhouses, etc.
  - **Setting goals for your land and the basics of leasing your land to a farmer.** Leasing land for agriculture is not for everyone so we wanted to give people a framework for establishing their own needs and goals for their land. It is important that people know what they're getting into for the longevity and sustainability of a lease situation. Resources that are good to draw on for this section are Land For Good's pamphlets on "Making My Land Available for Farming: Where Do I Start?"[1] and "A Landowner's Guide to Leasing Land for Farming."[2]
- **Presentation from farmers and landowners in a lease arrangement.** We found it was helpful for people to envision what an agricultural lease situation could look like if we invited farmer and landowner pairs in who were already engaged in such a relationship. Audience members could ask questions directly to people already experienced in this area.

Case Study: Community Involvement in Topsfield, MA

Step 1: When we approached theTopsfield Agricultural Commission, they were very eager to work on an agricultural project for their town. We described the possibilities of the project and the process that we have used with other communities involving outreach and education. They saw our GIS analysis and subsequent landowner outreach as a good fit for their town, which was largely developed into large-lot residential estate properties.

Step 2: The Topsfield Agricultural Commission invited New Entry's Land Match Coordinator to come to their agricultural commission meetings monthly to work on the map and project collaboratively. Topsfield is an example of a community that became very involved with this project.

Step 3 : New Entry staff prepared the spatial analysis of Topsfield agricultural land to get a picture of how much farmland in Topsfield was unused and how much of it was still in agricultural

1 http://landforgood.org/wp-content/uploads/LFG-Making-My-Land-Available-For-Farming-Guide.pdf
2 http://landforgood.org/wp-content/uploads/LFG-Landowners-Guide-To-Leasing-To-A-Farmer-Handbook.pdf

August 2012

Dear Topsfield Property Owner,

We are in the midst of an exciting period of opportunity for local agriculture due to a resurgence of interest in locally-produced foods. A weak link in the revival of regional agriculture is access to land for the beginning farmer. New farmers are critical to sustaining our agricultural base and to replacing an aging farmer population. Those interested in starting agricultural careers are increasingly challenged as barriers to entry are significant and traditional venues for education are declining.

We are writing you today with support from the Essex County Agricultural Society, and Essex County Greenbelt because we share goals of preserving farmland and maintaining a thriving agricultural community in Topsfield. To increase opportunities for new farmers in the area, we are working to inventory our existing agricultural lands and uncover underutilized properties which have the potential to support agricultural production. These properties could be leased to a farmer. Even one-acre parcels are being used for food production in our region. *Your property may have valuable soil and land characteristics that could help a farmer start or expand his/her business and produce food for the region*.

- To learn more, we invite you to attend a workshop on leasing land to a farmer on **October 23rd at 6:30 at Alfalfa Farm Winery (**267 Rowley Bridge Road in Topsfield**). RSVP: www.tinyurl.com/TopsfieldLandLease.**
- If you are already using your land for agriculture, we'd like to hear about it for Topsfield's Agricultural inventory! **Take 5 minutes to tell us about your land at: www.tinyurl.com/TopsfieldAgriculture.**

Please contact Becca Weaver, Farmland Matching Coordinator at bweaver@comteam.org or (978)-654-6745 if you have any questions. Please feel free to forward this letter and invitation to any landowners or organizations that might be interested.

Sincerely,

Trudi Perry, Chair
Topsfield Agricultural Commission

Becca Weaver, Farmland Coordinator
New Entry Sustainable Farming Project

Who we are:
The Agricultural Commission's mission is to preserve, revitalize and sustain Topsfield's agricultural industry and to promote agricultural-based economic opportunities. Activities include, but are not limited, to: serving as facilitators for encouraging the pursuit of agriculture in Topsfield; promoting agricultural-based economic opportunities in Town; acting as advocates and educators on farming issues; working for preservation of prime agricultural lands; and pursuing all initiatives appropriate to creating a sustainable agricultural community.

The mission of New Entry Sustainable Farming Project is to assist people with an interest in small-scale commercial agriculture to begin farming in Massachusetts. Through this work, we: support the vitality and sustainability of the region's agriculture, build long-term economic self-reliance and food security among participants and their communities, and expand access to high-quality foods. For more information on our program, please visit our website at http://nesfp.nutrition.tufts.edu/farmland.

production.

Step 4: Together we looked at the results of the analysis to ascertain which landowners would be appropriate to contact and which we should leave alone. We could also see which properties were no longer viable farmlands, because of development or another event, making the map inaccurate. The process of vetting the properties was done using Google Earth and a projector in order to use technology with which the commission was more comfortable. In addition, the commission members pointed out which parcels were already used for agriculture and what type they were used for in order to generate a map of current agricultural use in Topsfield.

Step 5: After this parcel analysis, we sent letters to landowners in the community that were signed by both New Entry staff and the chair of the Topsfield Agricultural Commission. (*See sample letter on page 10.*)

Step 6: The commission helped organize a landowner forum, including finding a venue, ordering snacks, and outreach. We also engaged some other non-profit organizations in the area, including the local land trust. Together we presented information at a landowner information session encouraging Topsfield landowners to lease their land to farmers. At the end of our work together the commission had the feeling that they had started very valuable work and wanted to make a landowner forum a more regular and regional event.

We consider working with Topsfield to be a huge success because of the level of community involvement in the process and the way it seemed to empower feeling commission members to do valuable work. Work like this helped them increase the awareness of agricultural issues in the area. However, supporting this level of involvement also required a fair amount of staff time because of the many months of agricultural commission meetings, and even scheduling special ones to analyze the map. Goals for this work should be clarified first before deciding what level of involvement is best to have with a certain community and capacity is available.

Case Study: Farmer Matching in Groton, MA

In the spring of 2012, Seona Ban Ngufor, small-scale vegetable farmer and resident of Lowell, MA, signed a lease to use one acre of land that was identified through Community Farmland Connections. Seona Ban Ngufor came to the United States from Cameroon with ample farming experience but few resources. The Lowell resident works most of her days as a nurses' assistant, but on the nights and weekends she runs her own farming business. After taking a business planning class with the New Entry and farming on their incubator farm sites for three years she has struggled to find secure land tenure. Seona approached New Entry's Farmland Matching Service Coordinator for help finding a farm site within reasonable distance to her home in Lowell where she could grow vegetables. The Town of Groton fit her needs and we had already begun working with this town.

In the spring of 2011, staff began to work with the agricultural commission in Groton, MA. We showed commission members a map of their town that we generated using Geographic Information Systems (GIS). Using GIS, we overlaid the soils, land cover, and wetlands data in order to find parcels of land that are uniquely suited to agriculture. In towns like Groton, many of the small parcels that fit the criteria are found in the big backyards of suburban residents whose homes were built when a farm was sold and subdivided. For an

established farmer with big farm equipment, these parcels are unusable. However, to farmers like Seona, an acre of fertile land can be enough to start a profitable vegetable farm business.

The Groton Agricultural Commission members were excited about the outreach project. They wanted to identify any available, unused farmland, as farmers in the region often come to them to find out if there is any available land in the town. Commission members approved a letter to be sent out to landowners, informing them of their unique agricultural resources and informing of them of the opportunity to rent their land to a beginning farmer. In addition, the commission encouraged New Entry to contact other organizations in town (like Groton Local, a buy-local group and the Sustainability Commission) to garner support for the outreach efforts. They also decided that just sending a letter wasn't enough, but that the letter should also invite landowners to a workshop on how to lease land to a farmer. The commission members said the Groton Grange would be the perfect place to hold such a meeting.

With support from the Groton Agricultural Commission, the Groton Grange, Groton Local, and the Groton Sustainability Commission, the letters were sent in late September to all the landowners identified in the GIS analysis. In early November a workshop was held at Groton Grange. Staff from New Entry and Land For Good spoke about the realities and best practices of leasing land to a farmer. Seona spoke about her search for land and her farming business. Landowners came to the meeting from Groton and surrounding areas for a variety of reasons; some of them were curious about the letter they received, others wanted to learn how to do their part for sustainable agriculture in their area.

One of the Groton landowners approached us at the end of the meeting. She said she had received a letter about her land and was very interested in leasing it to a farmer. She had always wanted to do something with her few acres of land, though work and family obligations always got in the way. New Entry staff went out to see her land and meet with her to talk about the options. We mentioned that Seona was looking for land and we wanted to connect the two of them. We gave Susan some more resources about renting land to a farmer, that Land For Good had developed as a part of their collaborative Land Access Project which New Entry is a part of. With those resources, the two of them were able to talk through the details of the farm business and come to an agreement about the use of the land.

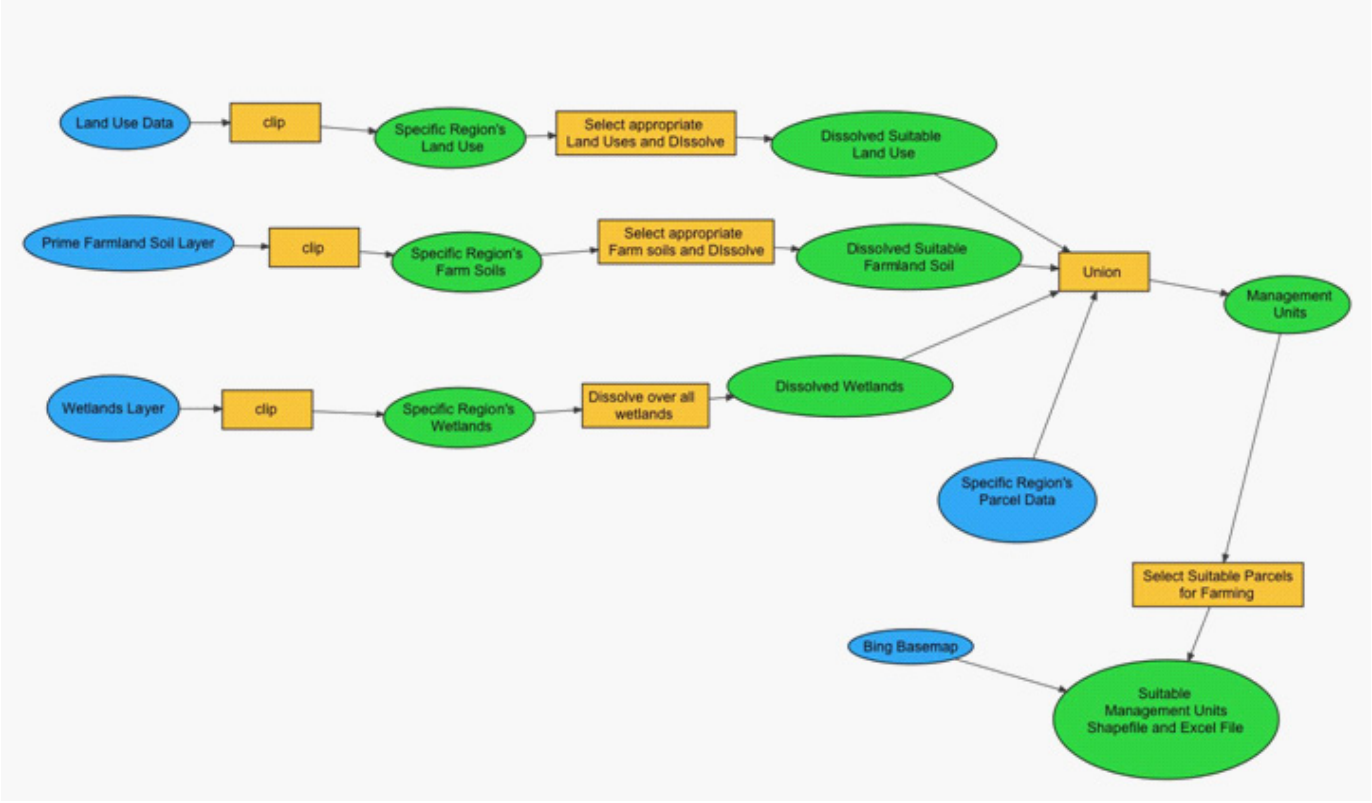
Through this innovative approach to making farmland connections, we were able to successfully place a farmer on land that was once thought lost to development. Securing land was just the beginning of Seona's challenges. Turning a field once in grass and sod into productive farmland wasn't easy. She also needed to set up an irrigation system and needed to borrow capital for other infrastructure projects like a hoop house. However, without access to land, she wouldn't even have the opportunity to farm to grow food for the region.

A Guide to the Geo-spatial Analysis

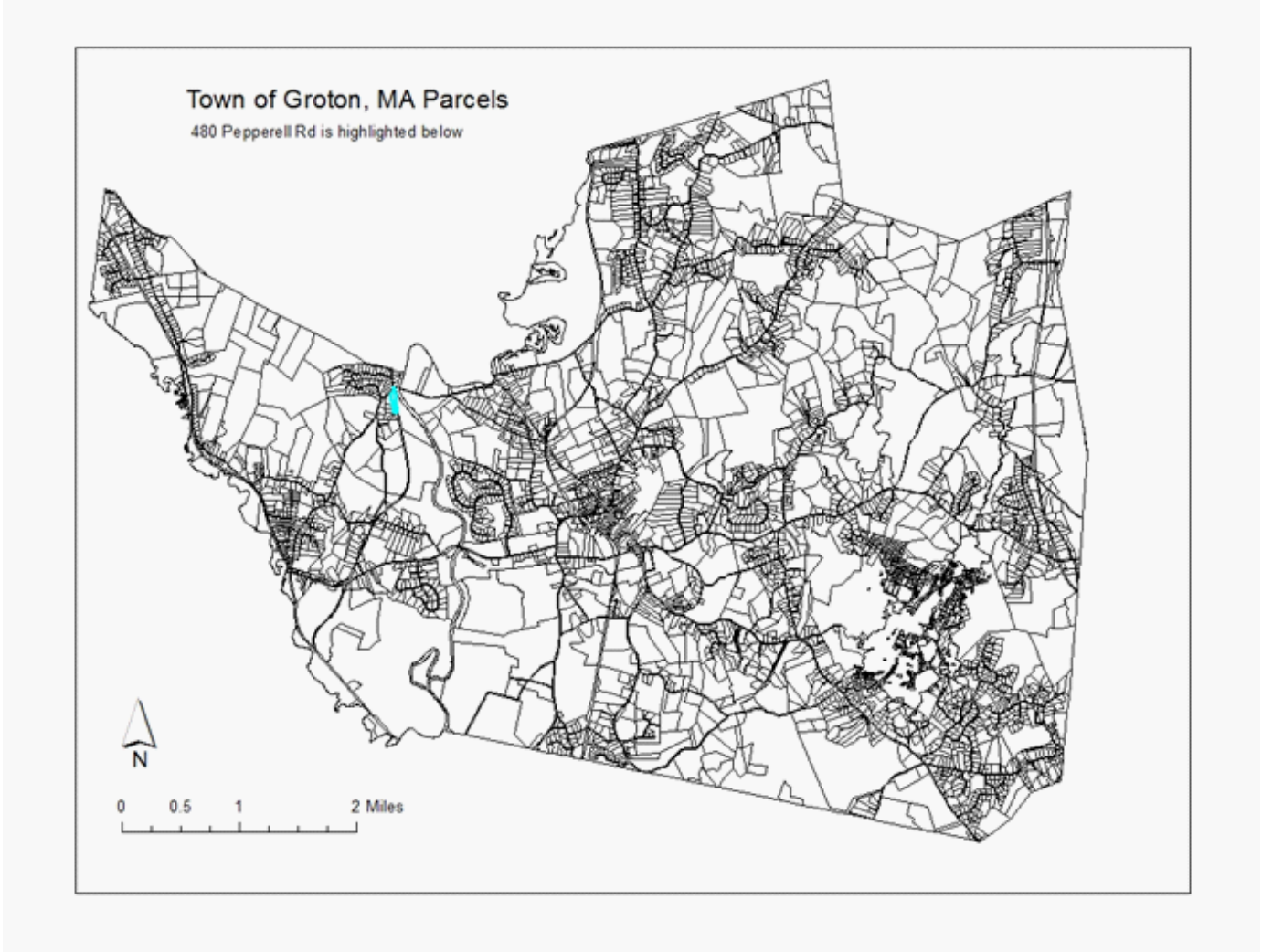
Summary of Geo-Spatial Analysis

To do this analysis, one must be familiar with performing spatial analyses using an Esri ArcMap, or an equivalent computer program. Your local NRCS GIS professional may be able to help you with this analysis.

Parcel Data is overlaid onto soil, land use, and wetlands data to find parcels that contain deforested prime farmland soil greater than two acres in an individual parcel, and occurring outside of wetlands protected by the Department of Environmental Protection (DEP) under the Wetlands Protection Act. For New Entry's work, data is sourced from Mass GIS, a state spatial information repository.



A visual representation of the steps involved in assessing farmland in a particular region using GIS.



Parcel data for the town of Groton, Massachusetts.

Description of Data Layers

For our work we were lucky enough to have a vast repository of data from Mass GIS.[1] Other states and areas may have a different level of readily accessible data to use for this project.

Parcel Data Layer

Many communities have digitized parcel data that can be downloaded from a central GIS website. In other areas, you may have to contact the town individually for their parcel shape files. In Massachusetts, this data is available for most communities through MassGIS and comes with various amounts of information depending on the level of the parcel data available. For this analysis and project, it is necessary to have the parcel boundaries and their sizes, but not much more than that. The owner information can be added on later in Excel.

1 http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/

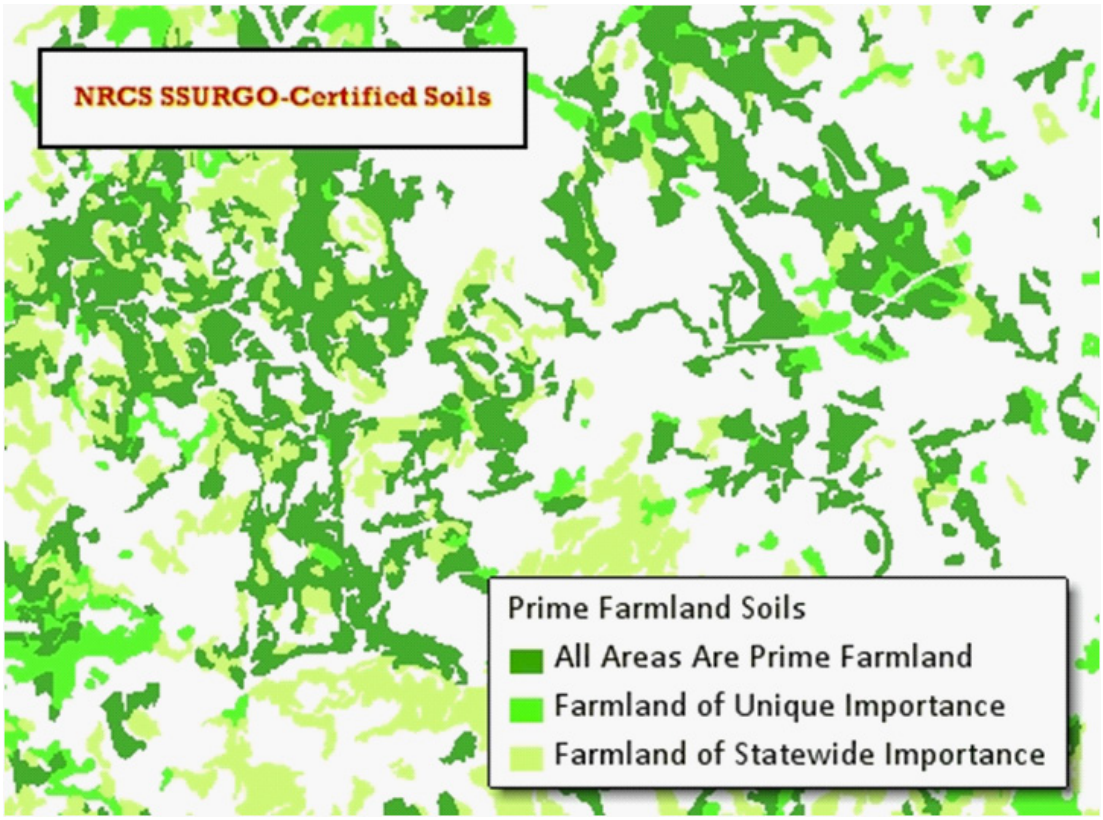
Prime Farmland Soil Data Layer

Using the NRCS SSURGO soils data layer one can isolate the soils that are considered suitable for farming. The three categories included in the layer suitable for farmland are: prime farmland, farmland of unique importance, and farmland of statewide importance. The prime farmland and farmland of statewide importance were included for this analysis (*see definitions at right*). Farmland of unique importance in Massachusetts generally refers to wetlands for cranberry growing.

Soils Definitions (NRCS, Nov. 2010)

All Areas are Prime Farmland - Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). For a full definition, see http://soils.usda.gov/technical/handbook/contents/part622.html#04.

Farmland of Statewide Importance - This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops, as determined by the appropriate state agency or agencies. Generally, these include lands that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.



The prime farmland soils layer of the NRCS SSURGO data.

(Image from Mass GIS at: http://www.mass.gov/anf/images/itd/massgis/datalayers/soils-pfarml.jpg)

Different wetlands classifications in Massachusetts.

(Image from Mass GIS: http://www.mass.gov/anf/images/itd/massgis/datalayers/depwet2.jpg)

Wetland Considerations

Though the farmland soils we are isolating most likely do not overlap with wetland areas that are protected under the wetlands protection act, we wanted to screen for wetlands just to be sure. Even though sustainable farming can have very little, if not positive impact on the water system, the preservation of these areas is especially important for ecosystem health. Therefore, any area that was considered a wetland (each of the categories below) was not included in the definition of suitable land.

Wetlands Definitions- DEP (January 2009)

POLY CODE	WETCODES	DESCRIPTION
1	9,22	RESERVOIR (PWSID CODED)
2	4,7,8,20, 21,23	MARSH
3	12,14,15,16, 24,25,26	WOODED SWAMP
4	5	CRANBERRY BOG
5	11,27	SALT MARSH
6	9,22	OPEN WATER
7	10,13	TIDAL FLAT/ROCKY SHORE
8	1,2,3,6,17,18,19	BEACH/DUNES
9	9	OPEN WATER TIDAL, BRACKISH, SALT POND
10	9	OPEN WATER OCEAN
88	88	NOT INTERPRETED

Suitable Land Uses

Although soil suitable for farming is found in areas that are currently classified as agriculture, much of the prime farmland soil in Northeastern Massachusetts is also found in areas that have been developed into low or very low residential zones or is under forest. Therefore, the suitable land-uses that were interested in included cropland, pasture, low density residential, very low density residential, brushland/successional (referred to in this report as transitional), orchard, nursery, and open land. We did not include forested land covers because of the prohibitive cost of development for a farmer who was only leasing land.

It is possible to have two separate suitable land use layers, one with land that is already classified as agricultural (the categories not in bold below) and another that is not currently classified as agricultural (the categories in bold below). This has the main advantage of allowing a community or organization to see how much of the land that could be suitable for farming is actually used for agriculture. Depending on your community's situation, you may or may not want to reach out to all the landowners. It is helpful to answer these questions before sending letters to landowners:

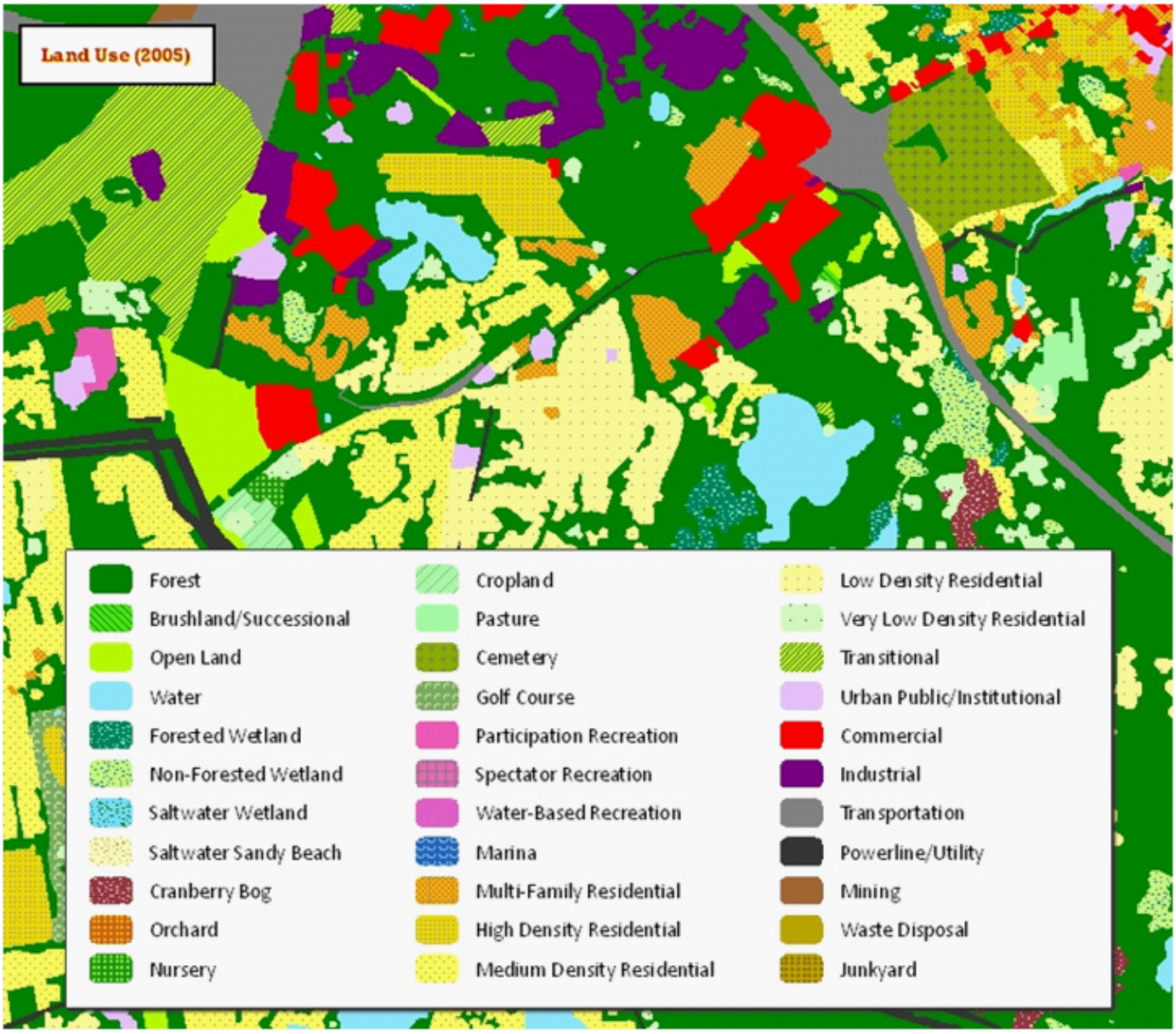
- Is it worth it to develop residential backyards into small acreage for farming purposes? What kind of capital do your farmers have? What kind of lease arrangements would be necessary to make sure the investment was worth it?

Land Use Code Definitions (2005)

LAND USE CODE	NAME	DESCRIPTION
1	Cropland	Generally tilled land used to grow row crops. Boundaries follow the shape of the fields and include associated buildings (e.g., barns). This category also includes turf farms that grow sod.
2	Pasture	Fields and associated facilities (barns and other outbuildings) used for animal grazing and for the growing of grasses for hay.
13	**Low Density Residential**	Housing on 1/2 - 1 acre lots. See notes below for details on Residential interpretation.
38	**Very Low Density Residential**	Housing on > 1 acre lots and very remote, rural housing. See notes below for details on Residential interpretation.
40	**Brushland/ Successional**	Predominantly (> 25%) shrub cover, and some immature trees not large or dense enough to be classified as forest. It also includes areas that are more permanently shrubby, such as heath areas, wild blueberries or mountain laurel.
35	Orchard	Fruit farms and associated facilities.
36	Nursery	Greenhouses and associated buildings as well as any surrounding maintained lawn. Christmas tree (small conifer) farms are also classified as Nurseries.
6	**Open Land**	Vacant land, idle agriculture, rock outcrops, and barren areas. Vacant land is not maintained for any evident purpose and it does not support large plant growth.

- Are farmers retiring in the area that would appreciate knowing there are new farmers waiting to lease or buy their land?
- Are there agricultural areas that could change use? Such as a hay field being used to produce food for people or another higher value crop?

A main limitation using this land use data for us in MA is that it is from aerial photography taken in 2005. Depending on the area, there may be many land use shifts in 5-10 years. In our project we found that some parcels that had come out in our screen had since shifted into properties that had already been developed or land that had been cleared had started reverting back to forest.



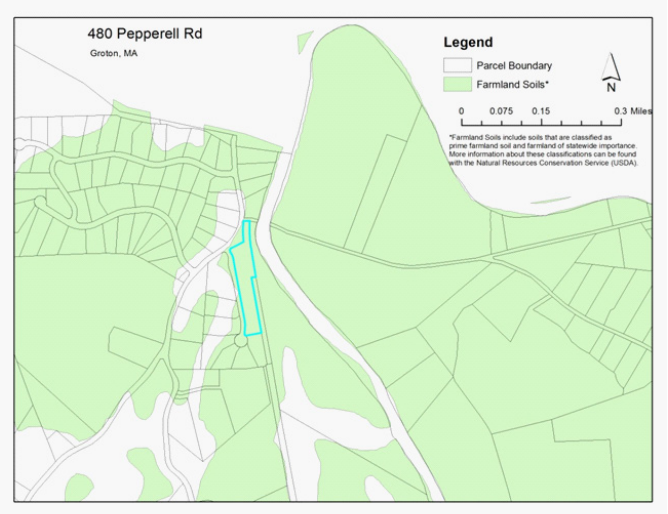
An area of Massachusetts and its different land use categories.

(Image from: Mass GIS at http://www.mass.gov/anf/images/itd/massgis/datalayers/lus2005.jpg)

Step by Step Description of Geo-Spatial Analysis

The functions for performing this analysis in ArcMap are typed in bold below.

1) Define town boundary or other geographic area you will be using for the analysis and make a shape file of this area.
2) Clip the shape files below (the rest of your data) to this town boundary.
   a. Parcel data (if not already covering the same area)
   b. Soils data
   c. Land use data
   d. Wetlands data
3) Dissolve boundaries between the different types of wetlands to create one large shape of wetlands. You may also want to create a 25-100' buffer around wetlands, depending on the laws and regulations in your area.
4) Select suitable classes of soil (see above table).
   a. The NRCS SSURGO meta data should give you information on how to create a "prime farmland layer" by using the join function (see http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/soi.html).
   b. Then simply select those classified as "prime farmland" and "farmland of statewide importance." Do not include soils designated as "farmland of unique importance."
   c. Export your soil selection to a new shapefile.
5) Dissolve boundaries between the soil types included in your suitable soils shape file to create one large shape of suitable farmland
6) Select suitable classes of land use (see above table and description of which land use categories to include) and export your selection to a new shape file.
7) Dissolve boundaries between the land use types to create one large shape of suitable land use.
8) Cross tabulate the dissolved wetlands, farmland soils, and suitable land uses onto the parcel data by preforming a union function. This will create a field for each parcel for the wetlands, farm soils, and land use. There will either be a 0 or a -1 in this field. A zero means that the particular field overlaps within the parcel, and a -1 means that it does not. If within one parcel there is both land that overlaps and land that does not overlap, multiple entries for that parcel



This image shows the shape file of the soils suitable for farming in green (Prime Farmland and Farmland of Statewide Importance) with the boundaries between soils dissolved. The parcel highlighted is a residential property whose landowners, when contacted, leased their land to a local farmer for agricultural production.

will be created to show the different shape overlaps.

a. The above cross tabulation will be referred to as "management units"

b. Add a field to the data and calculate the area of each management unit.

9) It is now time to select your suitable management units. These are the areas of land that fit your given criteria. At New Entry, these were parcels that had more than two acres of soil suitable for farming, that wasn't forested or developed, and that was outside of wetland boundaries. (Soil suitable for farming is generally outside of wetland soils anyway). Make the selections as follows:

a.Parcels:

i. Select actual parcels of land, and not areas that cover roadways, etc. In Mass GIS, this generally means that you will be selecting parcels whose designation = FEE

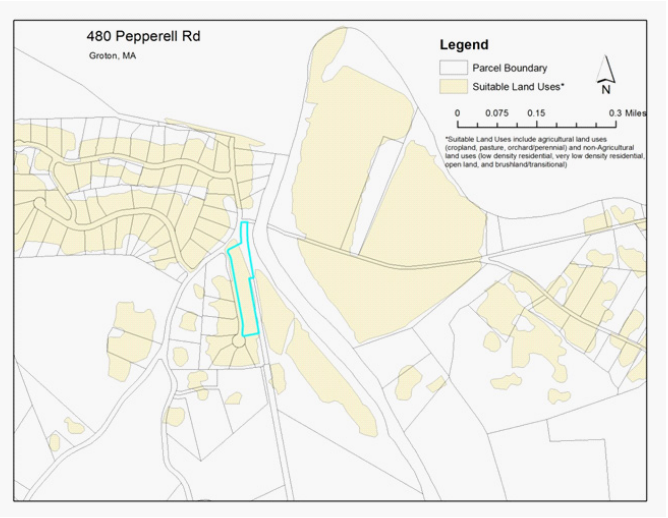
ii. You may also want to select only parcels that are greater than a certain acreage. In Massachusetts, you may want to only choose parcels that would benefit from 61A agricultural use property tax.

b. Farmland: select management units that overlap with the farmland shape, most likely meaning that this field = 0.

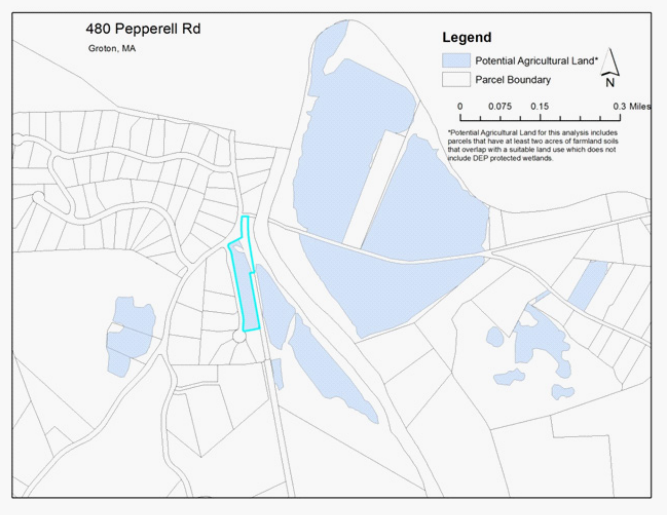
c. Land use: select management units that overlap with the suitable land uses that you chose, most likely meaning that this field = 0.

d. Wetlands: select management units that do not overlap with the wetlands shape, most likely meaning that this field = -1.

e. Size: select management units whose area fits your criteria. Your selection will be based on the new field you created in



The image above shows the suitable land uses in beige, with the boundaries between different land uses dissolved. Parcel boundaries are shown for reference. The parcel highlighted is a residential property whose landowners, when contacted, leased their land to a local farmer for agricultural production.



The image above shows the result of our screen for suitable soils, suitable land uses, suitable size, and avoiding wetlands. The parcel highlighted is a residential property whose landowners, when contacted, leased their land to a local farmer for agricultural production.

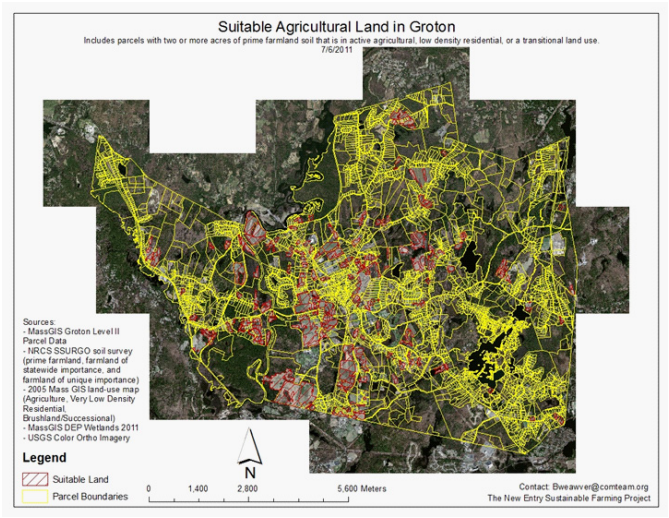
step 8b.

i. For our farmers and in Massachusetts, we decided that if a parcel had at least 2 acres that fit our designated conditions, we would include this parcel. You can choose your own size

ii. Select the management units whose area >= your desired size

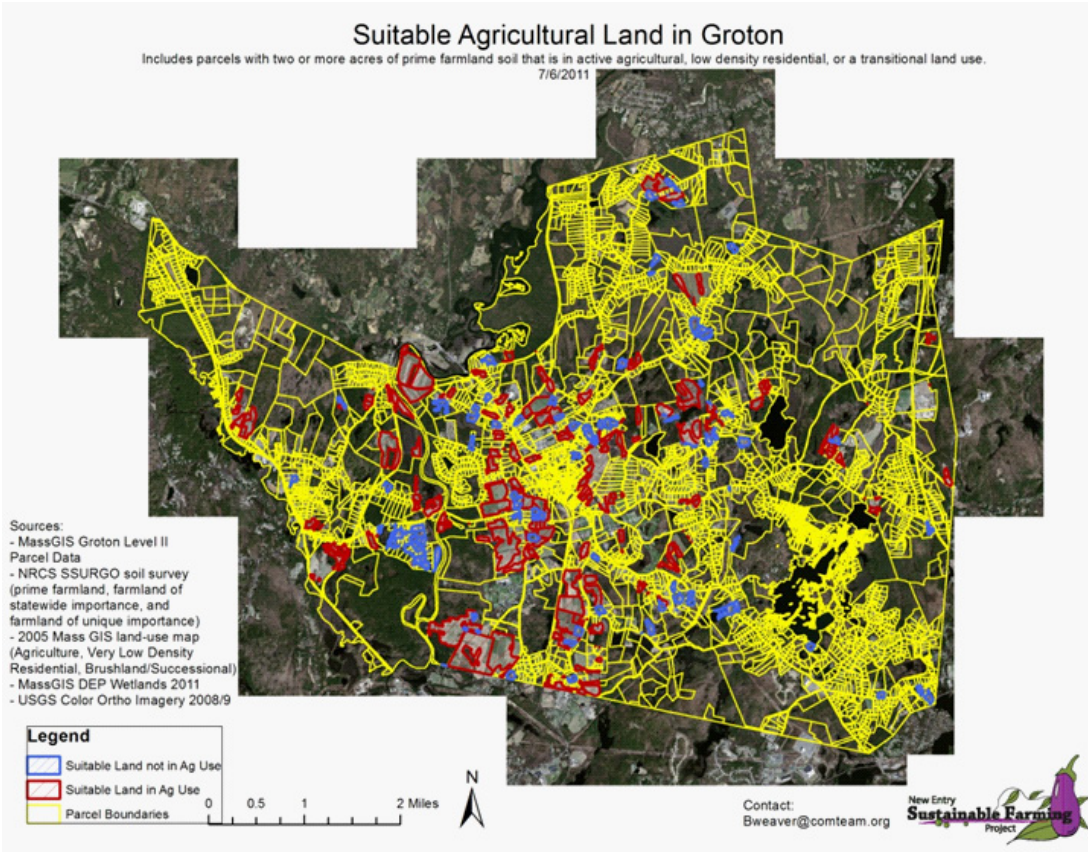
f. Export your selected management units to a new shape file. These are your suitable management units, and the parcels that may be of interest to farmers. You can then export the database of information to excel for further analysis.

10) If you decided to analyze agricultural uses and other uses separately, then you will now repeat steps 6-9, using new names for your suitable land use shape, management units, and suitable management units.



The image above shows the town of Groton, MA. The yellow lines designate parcel boundaries and the red hashed lines designate all the suitable management units (see step 9f).

This image shows the town of Groton, MA. The yellow lines designate the parcel boundaries. The red hashed lines designate the suitable management units that are already in agricultural use and the blue hashed lines represent the suitable management units that are categorized as land uses other than agriculture (low-density residential, brushland, successional, etc). This map would be the result of doing the analysis according to step #10.



We'd like to hear from you!
For questions, comments, or help with your community's farmland mapping project, please contact:

Noelle Fogg
Farmland Matching Service Coordinator
New Entry Sustainable Farming Project
978-654-6745
nfogg@commteam.org

New Entry Sustainable Farming Project
155 Merrimack Street, 3rd floor
Lowell, MA 01852
www.nesfp.org

Working with new farmers
to build strong businesses,
expertise in the field, and
a resilient food system.