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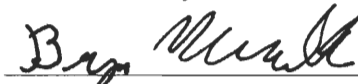
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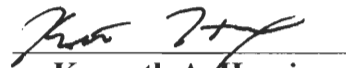
SPECIALIZATION OF INDUSTRY AND ARGICULTRE IN CENTRAL
MASSACHUSETTS FROM 1790 TO 1860

An Interactive Qualifying Project Report
submitted to the Faculty
of the
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

by



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Authorship Page

For this Interactive Qualifying Project Bryan wrote and revised the tutorial for MapInfo and the section on history. He also wrote and revised the oxen, corn, roads, and pastures under the research part of the project. He also worked with MapInfo to create the maps for corn, oxen, roads, pastures, ironworks, cowskeep, tanneries, and shopnear. In addition he wrote the reference section and the title page.

Ken wrote and revised the sections regarding ironworks, cowskeep, tanneries, and shopnear in the research section. He also wrote and revised the *where to go next*, *purpose*, and *literature review*. Ken wrote and revised the section on specialization, as well.

Chris worked with MapInfo to create maps for barns, sawmills, tillage, wheat, and grist. In addition he wrote and revised the sections for barns, sawmills, tillage, wheat, and grist.

Ken and Bryan also did all of the formatting, organizing and printing for this project.

Abstract

This project presents a deeper look into the history of Central Massachusetts during the years between 1801 and 1860. Through the data that has been collected at Old Sturbridge Village, color coded maps were made in MapInfo. These maps were used to visualize what was happening during this time period. After analyzing these maps and reading literature of this time we could see that specialization of the economy could be seen.

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1.0 Purpose

This IQP seeks to develop a better way to graphically display and interpret data that can be used to study historical change in central Massachusetts during the 19th century. The data is obtained from state census collected from 1798 to 1860. This data organized by town, notes such information as improved land, number of crops, types of crop, changes in the type and number of livestock, and number of barns. This data has been entered into the program MapInfo, a program that can generate color-coded graphs illustrating differences between sets of data. This project seeks to produce an accurate look at the landscape and society of the early 19th century.

Our purpose is to help historians understand patterns of change in rural New England as a market-oriented national consumer economy took shape in post Revolutionary America. We can investigate whether the Industrial Revolution caused a specific push towards specialization of crops and industry in the towns included in the census data. We can also better understand the effect of this specialization on the social interactions of the time. For these reasons we have selected several categories to help us understand the changes. By looking at the location and number of instances of certain things we can see if in fact the people of central Massachusetts went through a trend of specialization of goods and services over the time period of the census.

2.0 History

During the 19th century there was a huge transformation in America's economy. The main turning points in that revolution were in transportation and agriculture. New developments in these categories allowed America to run more efficiently and would allow America to expand westward.

The need for better transportation was well apparent before the 19th century. Before the turn of the century, it took close to six weeks to travel with goods from New York to Chicago (Deloria, 293). Once the transportation revolution was under way travel time was down to two days during 1860 for the same route. During 1817 construction began on a canal in Rome, New York, and within a few years almost every state in the original 13 and the new states in the Mid-West had their own canals. The reason that New York got away with the construction of the Erie Canal was that where the canal was built in New York the mountain range was closest to sea level. Since the difference in elevation was only 650 feet an absurd amount of locks would not be needed (Taylor, 33). During the canal boom a major tidewater canal was built in central Massachusetts. This canal, the Blackstone canal, began construction in 1824 and was completed in 1828 (Taylor, 37). The Blackstone canal connected Worcester, Massachusetts with Narragansett Bay in Rhode Island. During the first few years of operation the canal was profitable and met the needs of the economy. Then problems began to arise with the canal, such as too much or too little water, which caused irregular service. Also mill owners sabotaged the canal by diverting the water, and the canal company did not do upkeep on the canal. The canal was destined for doom due to those reasons and the

completion of a railroad from Boston to Worcester in 1835. The Blackstone canal was put out of commission in 1848 (Taylor, 39).

Another improvement in transportation during the turn of the 19th century was the beginning of the railroad system. In 1826 the first line of rails in the New England States was said to have been laid down at Quincy, Mass., 3 miles in length and pulled by horses. (Houk) This railroad was called the Granite Railroad and was used to carry granite. Most of the first railroads were used to transport granite or coal (Taylor, 77,78). The first westward railroad system that was introduced was the Baltimore and Ohio Railroad in 1828 (Deloria, 292). This railroad system led the nation on another boom, which swept across the nation. Railroads provided a faster and more efficient mode of transportation than any other during this time period. The major drawback of the early days of the railroad was that all of the different systems were not uniform. That meant that each different railroad system had a different width of its tracks so that goods could not travel straight from Ohio to New Jersey without changing trains after every new railroad system they hit. The advancement in railroads allowed goods to be shipped across the nation in days instead of months. Railroads were also a more efficient way to transport goods than canals. This is proven since by 1850 there were 1,042 railroads built and only 89 canals in Massachusetts (Taylor, 79). The railroads allowed the nation to expand west.

All of the changes that took place during this time allowed the states of America to specialize. The transportation revolution allowed produce and goods to be shipped across the nation without spoiling. This caused a shift in agriculture away from New England towards what is now the Mid-West. The Mid-West had better land so that it could grow all of America produce. During this shift New England switched from

farming crops to dairy and farm animal growing. This caused many factories to open in New England. One of the most famous developments of this time was the Lowell system, which opened in 1814 (Deloria, 298). The textile mill was located in Waltham, Massachusetts on the Charles River. In this system, which was a model for running and staffing textile factories, Francis Lowell hired young women who would live in the town built around the factory. Also since the mill used a waterwheel for its power, all of the machines in the mill were connected “through a series of cogs and moving belts” (Deloria, 298). This system was the most productive that America had seen to date which caused many others to follow in Lowell’s direction.

Another large change in life during the early 19th century was the role of each family member in New England. Most fathers that used to be farmers for just their families had to become large-scale farmers or take up a skilled job, like a blacksmith. The father had to be a provider for the whole family. Fathers also had claims on their children’s labor, which meant children did as their father said. The young women of the family either had to help out the mother or find a job in a factory to support themselves or their families. “Young women working as domestics or dairymaids also moved in and out of their families, but usually over shorter distances and with less freedom” (Larkin, 15). The young men of the family had to either help the mother or father, or learn a skill so that they could become the head of their future family. Young men worked “in farms or shops in nearby communities... balancing their families’ needs and their own aspirations” (Larkin, 15). Young men also had some independence once in awhile. The only role in the family that barely changed during this time was that of the mother. The mother pretty much maintained her role in the family which meant taking care of the

children or cooking the food. The only new role that the mother took on was that in some cases the mother would have to take on a job in a factory or helping out a skilled person to earn money for her family. All of these new roles, combined, changed the way that a family was run. “Even with their myriad productive activities, American rural households were almost never completely self-sufficient” (Larkin, 36). This meant that families had to trade within their communities. No family during this time had the land, money or time to be self-sufficient. In each community there would be different families that produced different things so that families could trade each other different products.

The final major change during this time was in the development in technology for factories and also the way goods were made. Before factories most goods were made in houses or barns and were produced in very small amounts. These home factories still could not produce enough goods to meet demands and were still at fairly high prices. With the introduction of large scale factories goods were produced in large quantity and also at a cheaper price. One problem with factories was that it cut down the amount of skilled workers. Most factory workers were unskilled, which meant that anyone could do the job. A lot of factories put skilled professionals out of business or forced the skilled workers to work for them at low pay. “In this pressure for market sale, price competition became the determining factor” (Taylor, 251) which meant master craftsman had to reduce wages and let unskilled people work on the less important tasks. Also another problem of factories was that the pay was just enough for most people to live. “American workers were faced with extremely difficult problems of adjustment and even survival” (Taylor, 251). The workers could also not demand money because the owners would just hire someone else who wanted to work. In addition most workers worked 16-18 hours

days, six days a week. These problems created unions for the skilled workmen so that they could get more pay and shorter hours. “Early union movements did not include most workers” (Taylor, 253) only skilled craftsman were allowed in these unions.

As the population increased during this time period so did the need for new jobs. Land was running out in New England and farmers needed more land. Two problems of this time were a “relative land shortage” (Clark, 61) and “that land was unequally distributed” (Clark, 61). This caused farmers to move to industry for jobs. With this move in economy a rise in industry occurred. Since the farms already took up much of the land new business had to search for new land. “Changes in farming and manufacturing were at the heart of a dynamic change in the countryside that took place within the existing social framework” (Clark, 64). These caused certain areas to specialize in either business or farming.

3.0 Literature Review

In order to obtain a knowledge of the information already investigated on the topic of specialization in central Massachusetts around 1860 we consulted several works highlighting this time period.

In Taylor's work on the transportation revolution he talks about the changes that occurred in America around this time period, mainly the creation and improvements of roads and canal. He also talks of the creation of railroads and the affects they had. For the most part this work is focused on America as a whole, but it does allow insight into changes on the micro level.

In Clarks work on the roots of rural capitalism he focuses on the changes in the market place and economic culture of western Massachusetts from 1780 to 1860. This work serves as a tool to give us a specific insight into the economic climate in western Massachusetts, but also allows for a glimpse into the changes occurring in central Massachusetts.

The two works by Jack Larkin serve as a close up look at some of the changes in central Massachusetts, giving us more of an idea of the cultural issues and in some senses the economic issues that were current from 1780 to 1860.

By using these works, a brief historical overview, and the hard census data we input into the MapInfo program we are able to make a hypothesis that a specialization of business and economy took place over the years from 1780 to 1860. The Taylor work allows us to interpolate the national outlook and take a more micro stance focusing on the industry of central Massachusetts, which is outlined in both the Clark and Larkin texts. This not only allows us to look at where in central Massachusetts industries moved and

flourished, but where in the country they moved, and why. We can also use rural data on farmland and barnyard animals to support our reasoning that Massachusetts at this time was moving from a rural self sufficient lifestyle to the highly specialized urban professional society we now see.

4.0 Specialization

The main focus of the research in this project will be to determine if specialization occurred in business and life in the area of central Massachusetts from the years of 1798-1860. There was a trend to move from being self sufficient to allowing several people in a town, or in this case a county, to specialize in a certain jobs and each fill a role. This allows us to see the beginning of our modern society today, where people are professionals and have a facet of society that they fill and fulfill the needs of. This is evident everywhere, and even at WPI, where people have their area of expertise, and they rely on others to supply what they themselves cannot. This aspect of society is also evident in industry, in the form of concurrent engineering, where specialists from several different disciplines get together to create and design something. While the people of the 1800's were not always specifically designing anything, or even engineering for that matter, they were creating and modifying a social system that we all seem to take for granted today, for the most part not even realizing how things would be if we had not specialized our skills and production of goods and crops in the 1800's.

5.0 MapInfo Professional 7.0

Although methods to use MapInfo Professional 7.0 can be found by looking at past IQP's on the same subject, a brief summary is offered here. The reason for this summary is that there is a slight variation on how things were done this year compared to previous years.

The first step in using MapInfo is to install the program on the computer and then to open the program.

The second step in using MapInfo is to get the data that will be used and making sure it is in a format that the MapInfo program can understand. All of the data that we received was in a format that MapInfo can use, except the file that contained the maps of the area. The map file was received as a .e00 and had to be converted over to a .tab file. To do this easy conversion all one has to do is go to Universal Translator. Universal Translator is found under the Tools menu. Next a box will pop up like the box in Figure 1. In the top box with a pull down tab bring up the option of ESRI ArcInfo Export (E00). Then in the box below that select the map file that was received, which can be done by clicking and the box with three periods and then finding the file on the computer that is the map file that was received. Next, in the third box down, select the MapInfo TAB from the pull down tab. Then in the last box select a directory of where the converted data is to be saved. We placed the file under C:\Program Files\MapInfo\Professional\Ut. The box should now look somewhat like the box in Figure 1. Click OK and the file is converted. The only difference could be where the files are located.

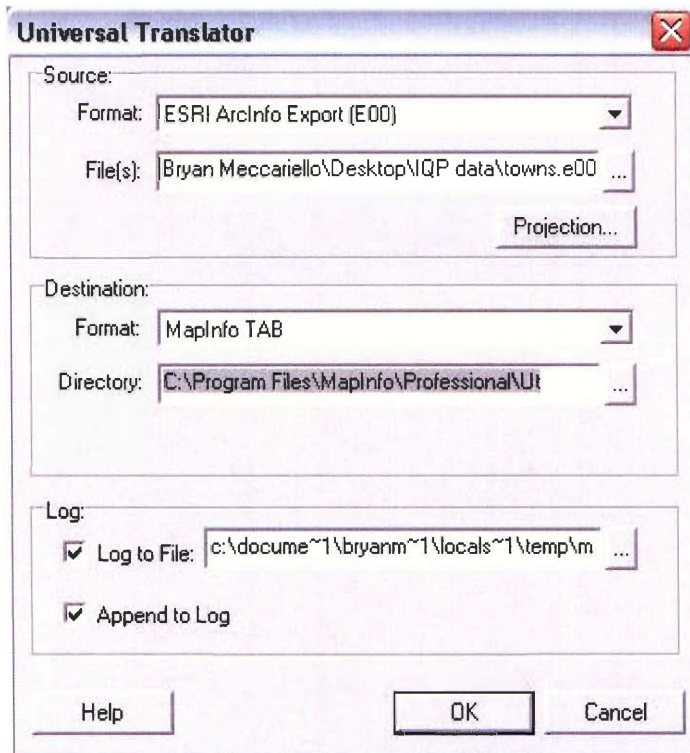


Figure 1: Universal Translator

The next step in making a map in MapInfo is to open all the data files that you will be using to make the maps. Just open all the files that you will use and then minimize them so the windows do not get in the way. Opening the files now is not too important but will come into play later on. After that the map file should be open. The map file is that file that just was converted, but when the conversion was done one file became many files, and we only want to use some of these files. The first of the files that should be opened is the file named TOWNS_poly which is the file that shows the shape of the cities and towns that we are looking at. The next file that should be opened is named TOWNS_NAME_text, which is the file that gives each city and town its name.

Now a map can be made. Select Create Thematic Map which is under Map. A box will then appear like the box in Figure 2.

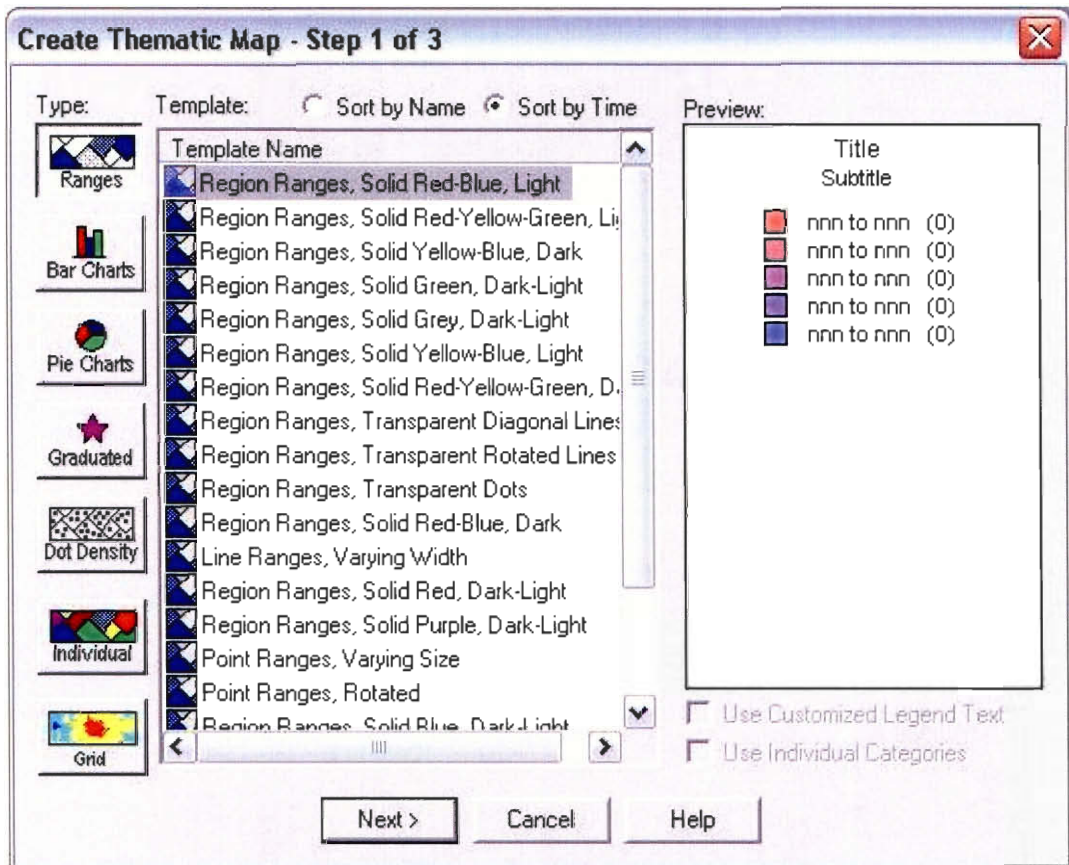


Figure 2: Step 1 to Create a Thematic Map

This first box allows the user to choose the kind of map or chart that is wanted and also the colors or patterns that will show the difference in the data. For our project we choose to sort by name, ranges, and a color that we thought would look good. Then click on Next and another box like Figure 3 will pop up.

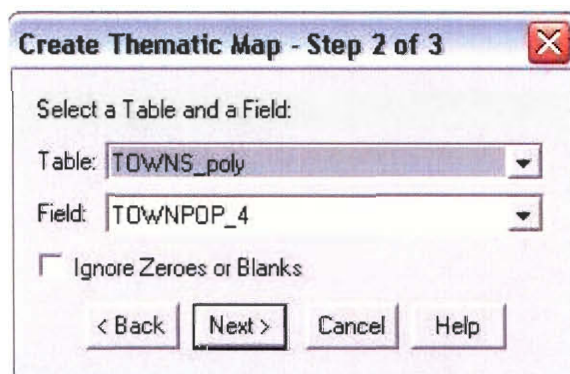


Figure 3: Step 2 to Create a Thematic Map

When the table is asked for select Towns_poly and where it asks for Field select Join. Once joined is picked another box will pop up that looks like Figure 4.

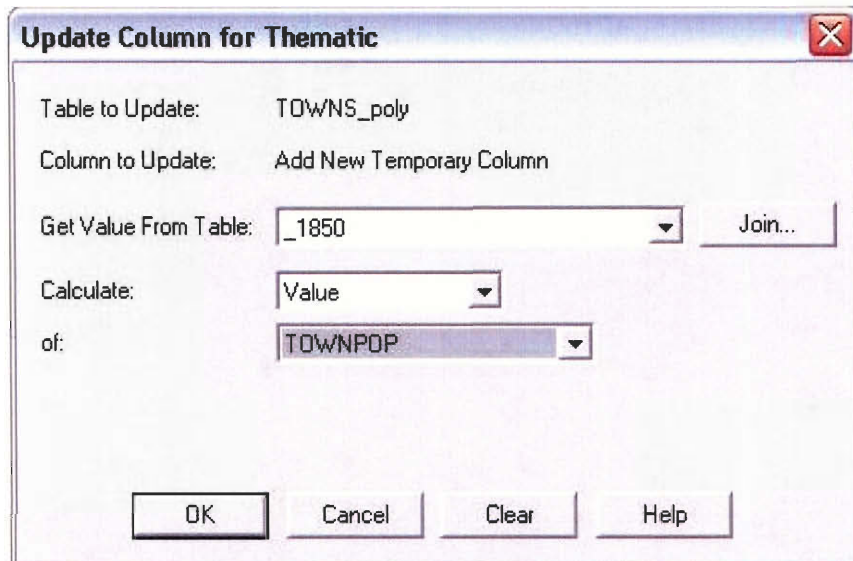


Figure 4: Join Chart Data to Map

Then for Get Value From Table select the date of the data that needs to be looked at. Only the files that were opened before will show up on the pull-down tab. Then click on Join and another box will open that looks like Figure 5.

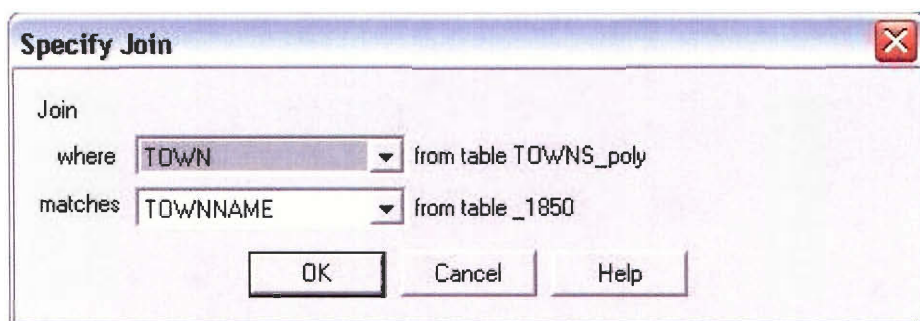


Figure 5: Specify Which Category to Join Together

In the top box where it says where select TOWN and for Matches select TOWNNAME. Then click OK which will bring you back to the box of Figure 4. In the box for Calculate keep the selection of value and in the box for Of pick the data that you

want to look at like TOWNPOP which is the town's population. Click OK again and the box of Figure 3 will pop back up. Then click on Next and a box like Figure 6 will pop up.

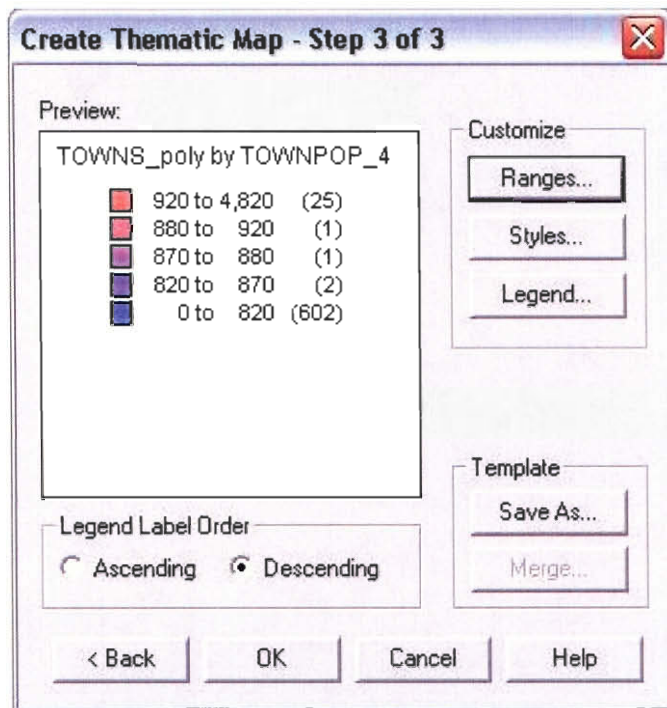


Figure 6: Step 3 to Create a Thematic Map

This box allows the users to set ranges, styles and also how the legend of map looks. Then once the user is satisfied they can click Ok and the map is created.

This next step is used just to print out the maps. First click on the button for New Layout which is located on the top toolbar. A pause over the button will tell you what button you are one. Once this button is clicked on a box like Figure 7 will pop up.

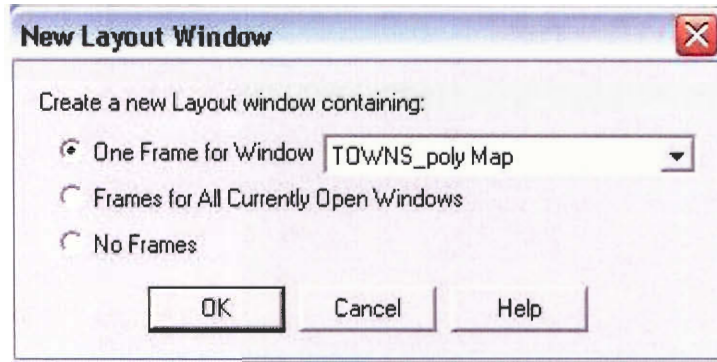


Figure 7: Create Layout for Map and Legend

Choose one frame for window and in the box make sure it says TOWN_NAME_text, TOWN_poly and then click Ok. Now the user can move around or resize the box of the map or legend. Once the user is satisfied on how it looks they can print it out to be looked at carefully. Note only the white background will print in layout so make sure the map and legend are within the white background.

After that, close just the window for the map. The program will then ask you to save, discard or cancel your action. Select Save and save your map anywhere on your computer. Save all of your maps so that you can go back and reference them easily and do not have to redo all your work.

The main problem with using the data that was received was that the name for each subject was not clear on the meaning. But Jack Larkin provided an overview of most of the meanings of the titles in the data. Appendix A provides a listing of the data titles and what they mean.

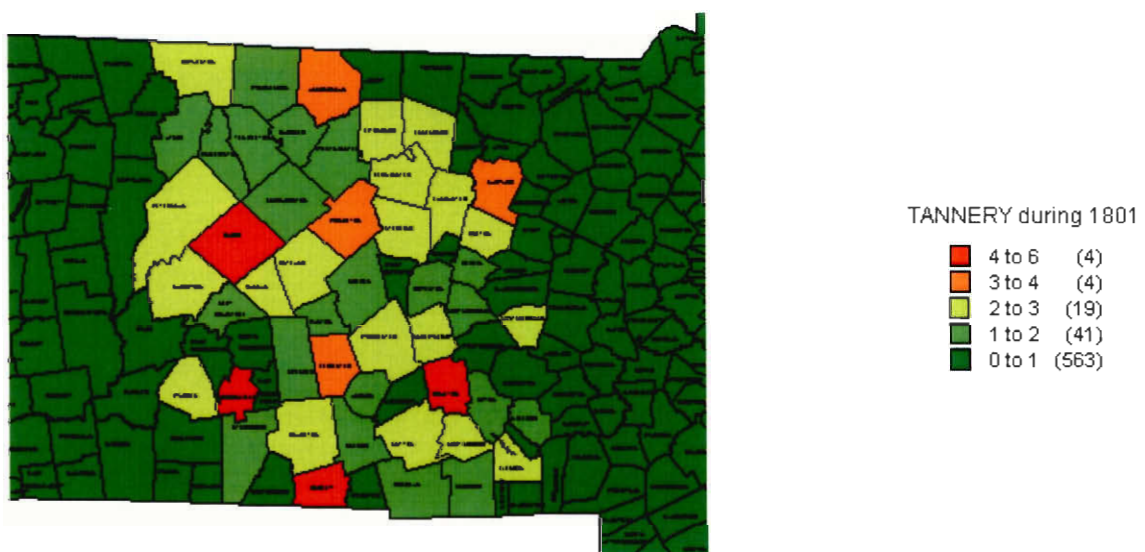
6.0 Research

The following section contains the statistical categories we felt would lend the most information to us when investigation specialization among the towns in central Massachusetts. With information gathered and the maps generated in MapInfo we were able to paint a more accurate picture of the cultural and economic environment of central Massachusetts from 1790 to 1860.

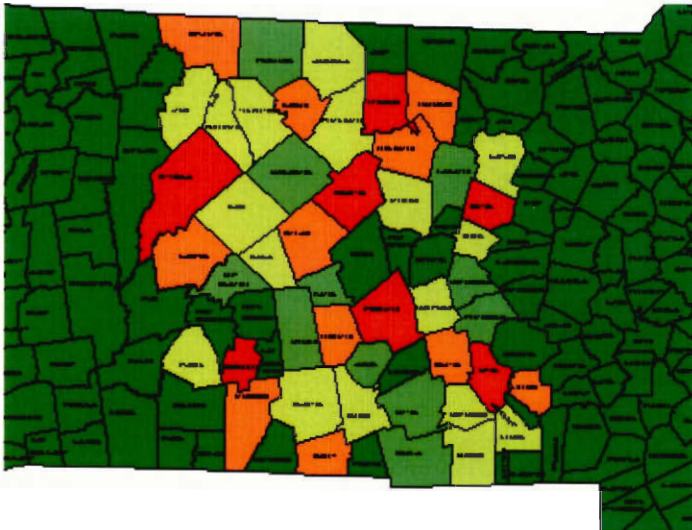
6.1 Tannery

Tanneries in central Massachusetts experienced a sharp decline in numbers over the course of the survey. In the year of 1811 there were a few scattered all over central Massachusetts, with Upton and Bolton having the most, with four and five respectively. The majority of towns had between two and three, there being eleven counties that had this number. Overall in 1811 there were about fifty-four tanneries in central Massachusetts. By 1821 this number had been reduced to thirty-nine. For the most part the numbers fell in the eastern part of the land covered by the survey. Most towns had between two and three, the most being in Gardner which had four. In 1831 there were forty-one tanneries, Barre gained one tannery to lead with four, but for the most part things remained the same. In 1841 the amount fell again to thirty-two tanneries, with there being no more than two in any town. Finally by 1850 the number of tanneries was at sixteen, half of the number operational only nine years earlier. This is the sharpest decline in the amount of tanneries over all of the intervals, dropping sixteen tanneries in nine years, and thirty-eight, total.

What does this all mean? The role of a tannery is to process animal skins (mainly cows) into leathers that are used to make clothes, coverings, shoes and other items used day to day in the life of a farmer. Over time the tanning practices improved, and the tanneries grew in size, making the smaller less productive tanneries useless. This was most evident in the production of shoes, which was the main purpose of the tanneries around 1860. At this time there were only a very few tanneries, but they were presumably highly specialized, producing large amounts of shoes and other items that were needed by the people of central Massachusetts, and for export to other parts of America. In the year 1860 the manufacturing of boots and shoes was the third most profitable industry in the United States. Shoemaking accounted for over seventy-five thousand employees and had a total product value of ninety-one million nine hundred thousand dollars. Men’s clothing was number five, with about one hundred and fifteen thousand employees and a product value of around eighty-one million dollars. Leather production rounded out the top ten with twenty three thousand employees and around sixty-seven million in revenue (Taylor 243).



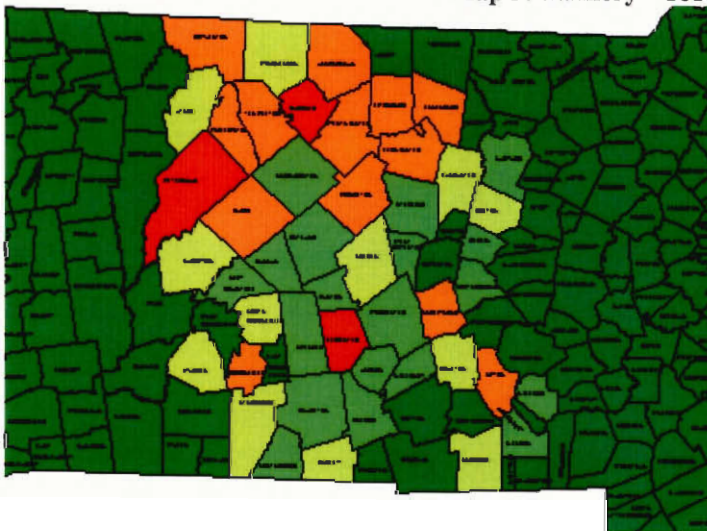
Map 1: Tannery - 1801



Map 2: Tannery - 1811

TANNERY during 1811

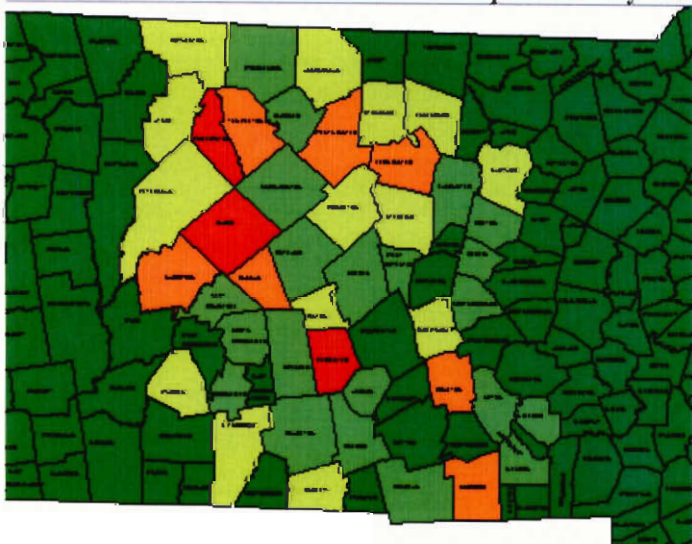
4 to 7	(7)
3 to 4	(11)
2 to 3	(17)
1 to 2	(31)
0 to 1	(565)



Map 3: Tannery - 1821

TANNERY during 1821

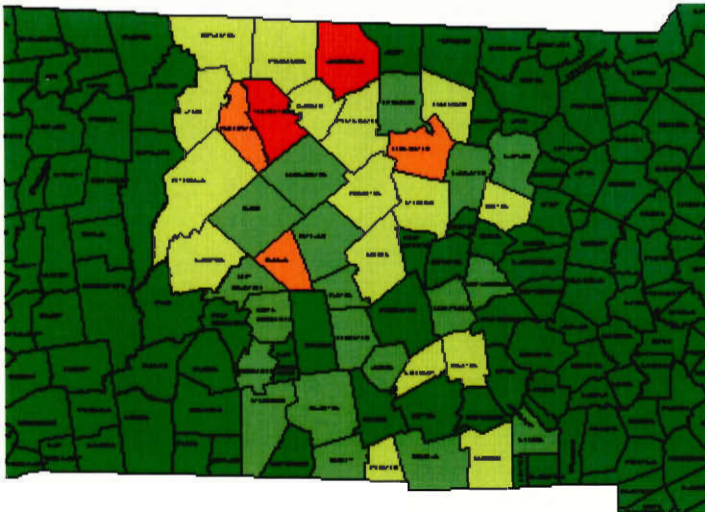
4 to 5	(3)
3 to 4	(13)
2 to 3	(12)
1 to 2	(39)
0 to 1	(564)



Map 4: Tannery - 1831

TANNERY during 1831

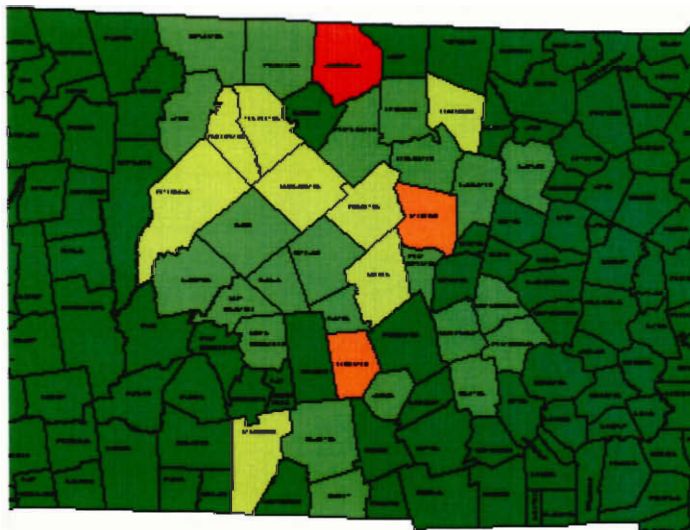
4 to 4	(3)
3 to 4	(7)
2 to 3	(14)
1 to 2	(41)
0 to 1	(566)



TANNERY during 1841

4 to 5	(2)
3 to 4	(3)
2 to 3	(16)
1 to 2	(39)
0 to 1	(571)

Map 5: Tannery - 1841



TANNERY during 1850

5 to 5	(1)
3 to 5	(2)
2 to 3	(8)
1 to 2	(23)
0 to 1	(597)

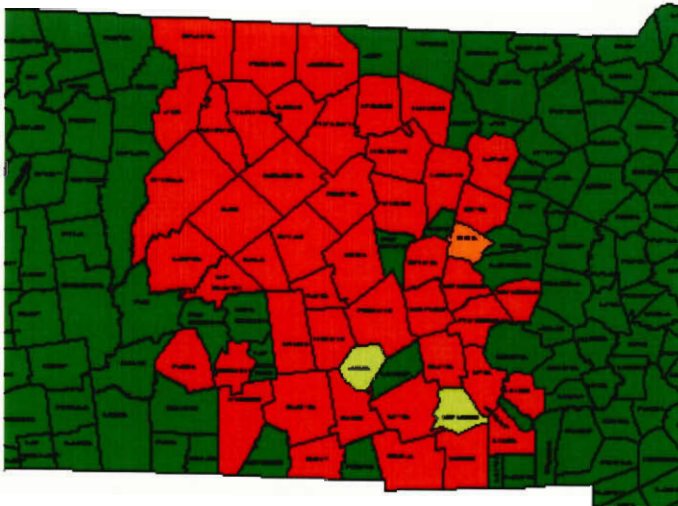
Map 6: Tannery - 1850

6.2 Cowskeep

Cowskeep refers to the number of cows that were in a particular locality at a certain time. Cows were an important part of daily farm life in the early nineteenth century. They were used for dairy purposes, food, clothing, and had a prominent place on many farms in America. In the early 1800's there were a very large amount of cows on every farm. Generally there were two to three thousand cows per town. This number

increased only because there were more people in moving into the area. This number of cows stayed mostly the same until 1841 when there seemed to be a trend to move to a smaller amount of cows. There also seemed to be a smaller number of farms around this time period. By 1850 the trend was to have around one thousand cows in a town, with a max of twenty-seven hundred in Barre.

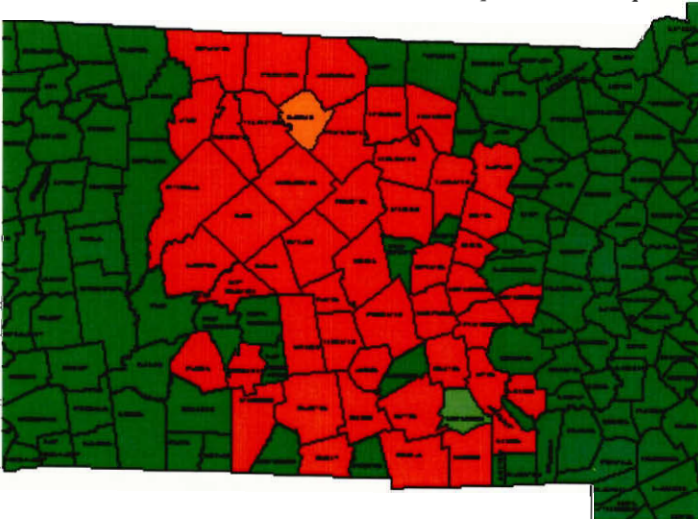
The role of cows on the farm may have changed over time, but more interesting than that is the role of the farm. The roles of the central Massachusetts farm changed due to the improvements in transportation and the residents desire to abandon their rural ways and move to a more “market oriented” society (Clark p.60). Around this time roads and railroads were beginning to cross the nation, connecting the rural and urban centers of the country (Taylor p.15). This connection meant that places that were better suited to dairy farming, or cattle raising would be able to do just that and then ship the product quickly to another part of the country. This had an impact on society because it meant that farmers had to find a new way to make a living, and cows were no longer the main way to make a living. This could also mean that certain towns were more suited to being used solely for the purpose of farming, while others did not prove to be as profitable. This is a further specialization of the industry and social atmosphere of central Massachusetts. In a few towns a majority of the farmers had very small plots of land on which to farm, and only a very small amount had enough land to produce a profitable crop (Clark p.62). Land used for farming was not evenly dispersed among towns.



COWSKEEP during 1801

Red	550 to 3,020	(46)
Orange	520 to 550	(1)
Light Green	390 to 520	(2)
Dark Green	0 to 130	(582)

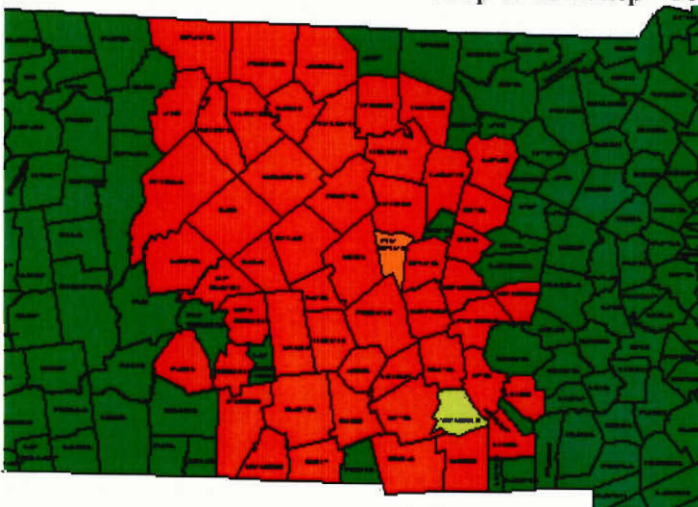
Map 7: Cowskeep - 1801



COWSKEEP during 1811

Red	560 to 2,390	(47)
Orange	520 to 560	(1)
Medium Green	240 to 310	(21)
Dark Green	0 to 240	(562)

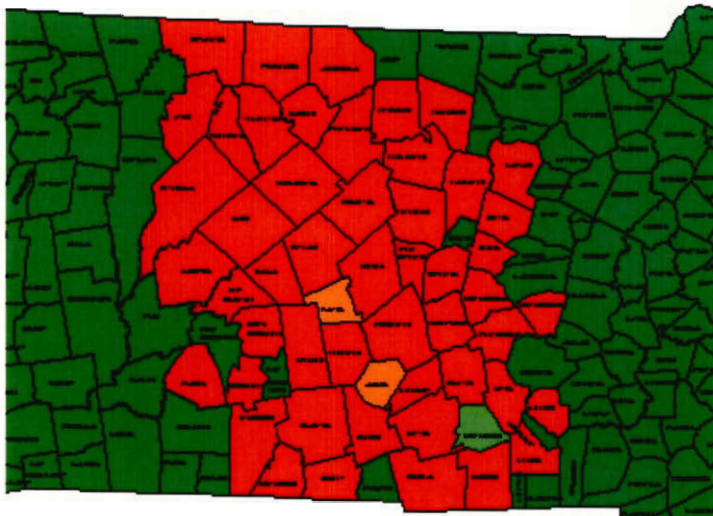
Map 8: Cowskeep - 1811



COWSKEEP during 1821

Red	530 to 1,890	(51)
Orange	480 to 530	(1)
Light Green	410 to 480	(1)
Medium Green	200 to 410	(20)
Dark Green	0 to 200	(558)

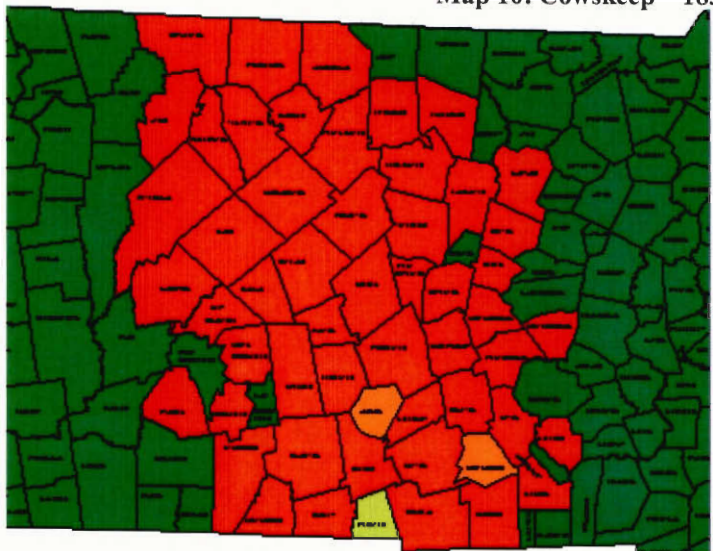
Map 9: Cowskeep - 1821



COWSKEEP during 1831

Red	590 to 2,960	(50)
Orange	530 to 590	(2)
Light Green	490 to 510	(21)
Dark Green	0 to 490	(558)

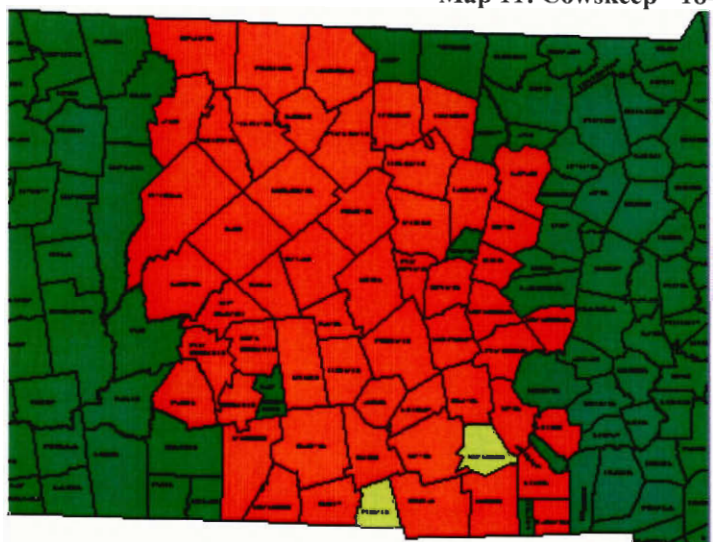
Map 10: Cowskeep - 1831



COWSKEEP during 1841

Red	520 to 2,980	(51)
Orange	390 to 520	(2)
Light Green	380 to 390	(1)
Dark Green	280 to 380	(20)
Very Dark Green	0 to 280	(557)

Map 11: Cowskeep - 1841



COWSKEEP during 1850

Red	500 to 3,000	(74)
Light Green	350 to 470	(2)
Dark Green	0 to 140	(555)

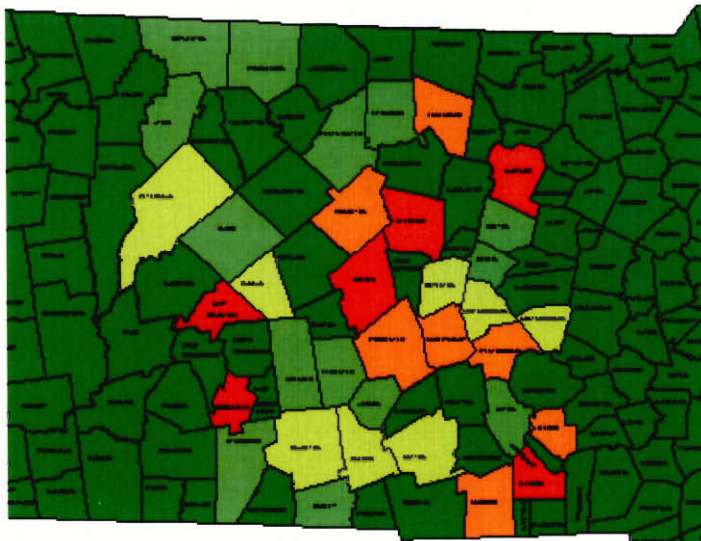
Map 12: Cowskeep - 1850

6.3 Shopnear

Shops are the way that you sell mass produced items, or any items for that matter. In early America most people would go to a local merchant for the items they needed, or barter with a neighbor who grew or made the things they needed. This category is the count of how many dwellings also acted as places of business. This was mainly due to the fact that it was unprofitable for a farmer to allow a merchant to bring his goods to market and in turn sell them and bring the proceeds back. Another option besides this was to travel to market yourself and sell your own goods, this however took time and also took the farmer away from his land. The solution was to create a market in their own home to dispose of excess goods and products and to bring in cash or credit in the process. As time progressed these shop owners were also able to obtain a larger number of goods through transportation and sell them in their own town (Clark p.156).

By 1831 shops increased to a number around a couple hundred and stayed that way until 1850, when they exploded to around one thousand. This is mainly due to the need to sell goods shipped from another part of the county, and the increase in mass produced goods. Knowing that these places were also homes, and that buildings dedicated to simply selling goods and not to be lived in were becoming more prevalent at the time, it seems odd that there would be such a huge number of shops located in homes. This is mostly due to the expansion of the home business. This is a very small form of specialization, meaning that people were no longer doing everything for themselves, but relying on neighbors to do things they needed, and for those neighbors to need things that they did. For example you could be a brewer, and you need to rely on a cooper to make the barrels for you to brew your beer. The cooper relies on you to purchase his barrels,

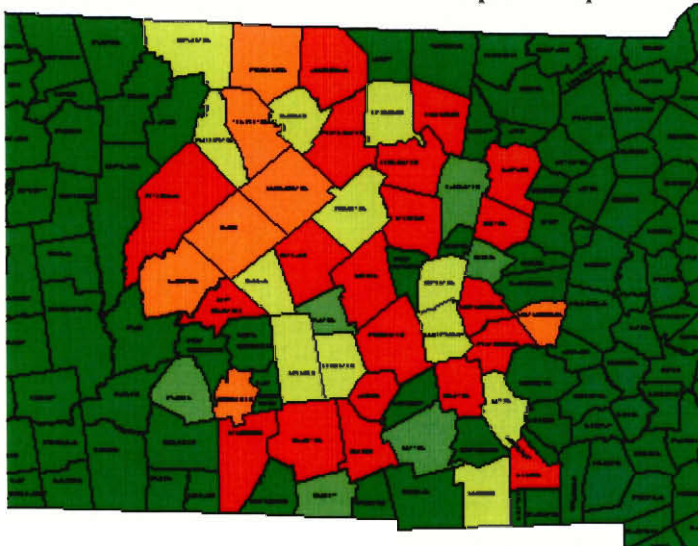
and the brewer relies on the tavern owner to sell his beer. Illustrated by this is the importance of cash in the society of 1860. People were more likely to barter or trade than use cash, meaning you would need to have something another person needed in order to obtain what you needed. Cash was most often used in payment of goods when deals were conducted with strangers (Clark p.69).



SHOPNEAR during 1801

Red	4 to 8	(6)
Orange	3 to 4	(7)
Yellow	2 to 3	(8)
Light Green	1 to 2	(34)
Dark Green	0 to 1	(576)

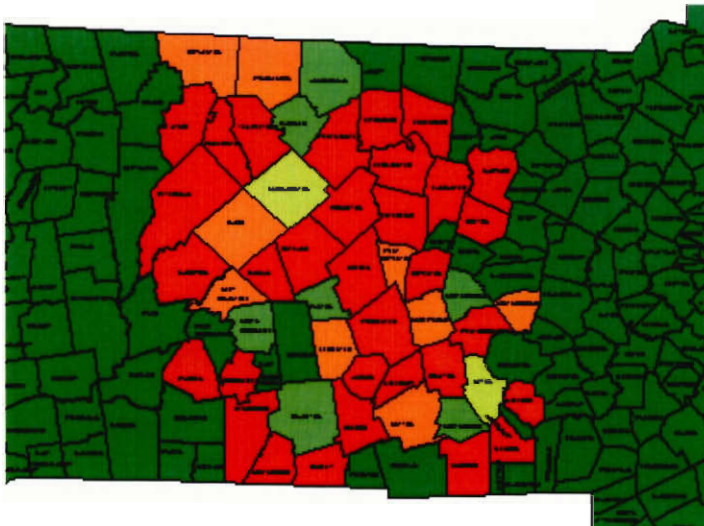
Map 13: Shopnear - 1801



SHOPNEAR during 1811

Red	4 to 40	(20)
Orange	3 to 4	(7)
Yellow	2 to 3	(12)
Light Green	1 to 2	(6)
Dark Green	0 to 1	(586)

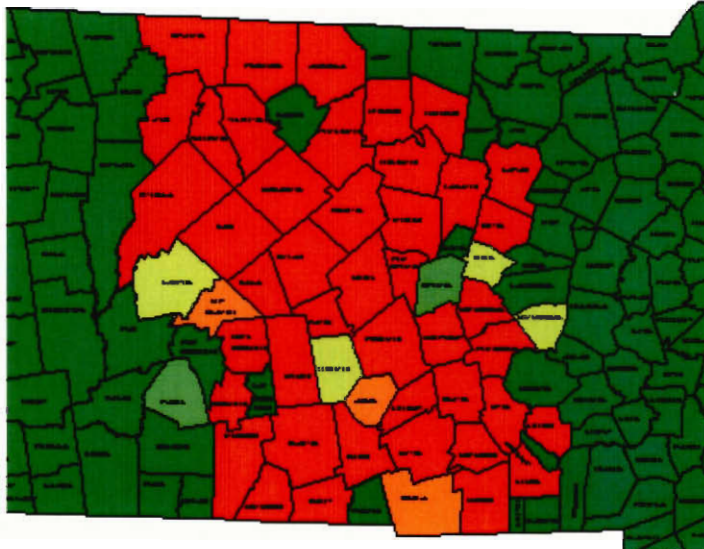
Map 14: Shopnear - 1811



SHOPNEAR during 1821

Red	4 to 30	(32)
Orange	3 to 4	(29)
Yellow	2 to 3	(2)
Light Green	1 to 2	(7)
Dark Green	0 to 1	(561)

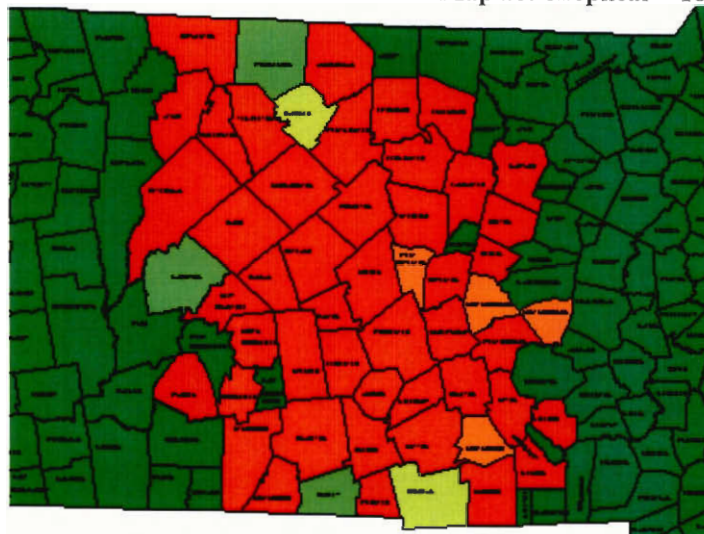
Map 15: Shopnear - 1821



SHOPNEAR during 1831

Red	4 to 34	(43)
Orange	3 to 4	(3)
Yellow	2 to 3	(4)
Light Green	1 to 2	(2)
Dark Green	0 to 1	(579)

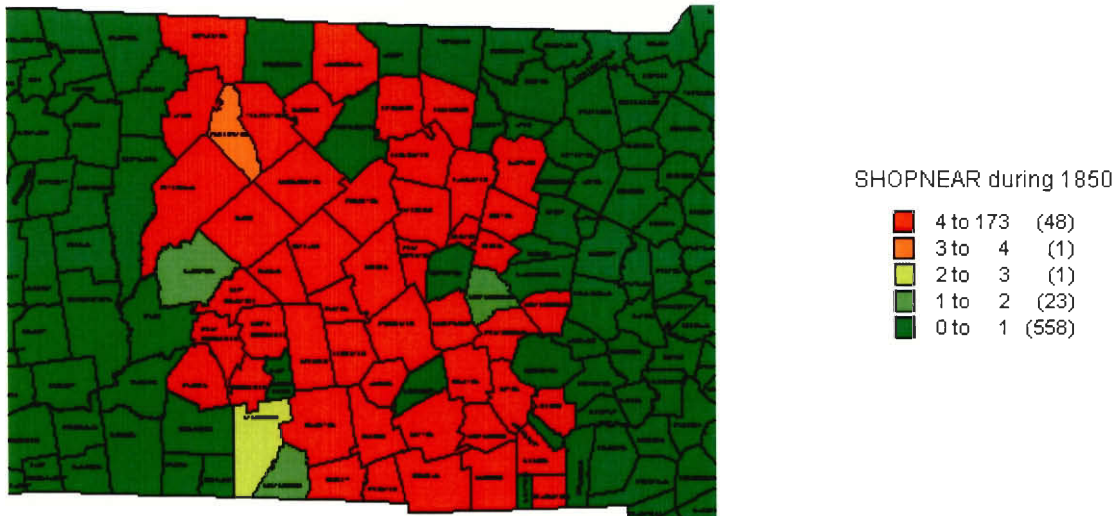
Map 16: Shopnear - 1831



SHOPNEAR during 1841

Red	6 to 52	(65)
Orange	5 to 6	(4)
Yellow	4 to 5	(2)
Light Green	3 to 4	(3)
Dark Green	0 to 3	(557)

Map 17: Shopnear - 1841



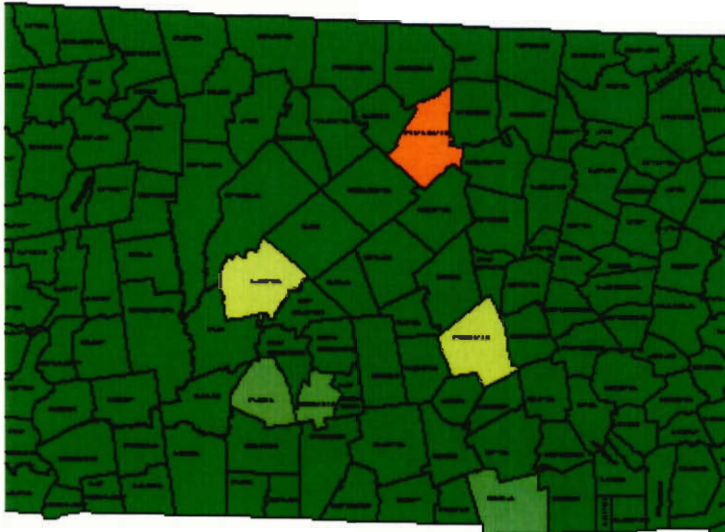
Map 18: Shopnear - 1850

6.4 Ironworks

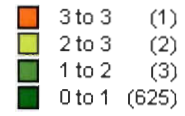
Ironworks refers to large scale factories that produced iron goods and products fabricated out of metal. These people would be the ones that made the horseshoes, nails, brackets, and anything else metal that was used in this time period. As useful as these people are it seems odd that there were only four in central Massachusetts in 1801. This meant that people would have to go a long way to get metal goods, or there was not a large call for an ironworks. This however is not the case. It seems that there were several large scale locations able to produce sufficient amounts of iron goods for the people of central Massachusetts.

Over the time frame of the census the ironworks moved around quite a bit, but always seemed to stay in the same towns. In 1811 there was one in four separate towns spaced evenly across the area of the census. In 1821, there was a decline again, with only three total, one town having two. In 1831 there was an explosion of ironworks, with there being ten in one town and at least three in four other towns. In 1841 there was

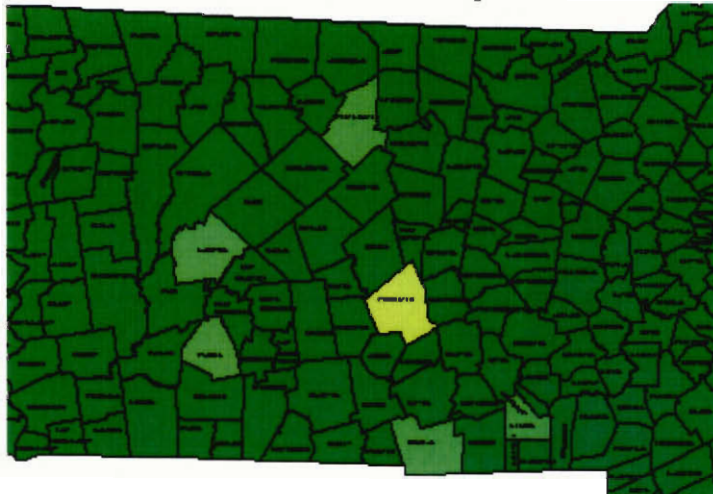
another relocation with the ten reducing to five, and seven towns having between one and three. The strange thing that happens with this data is that in 1850 there are only five iron works in the entire region. This is the same amount that was available in 1811. For some reason in nine years central Massachusetts went from having twenty-four ironworks to only having five. A possible explanation for this is somewhat similar to the tanneries. Places became specialized in what they did, and they did this on a large scale, eliminating the need for a smaller less productive ironworks. It would be easier to obtain mass produced iron goods than to make them yourself. The large ironworks were located in the same towns as the smaller ones were earlier in the time period. The reason for the reduction is that the iron producing center of American moved slightly to the south. In 1860 iron was the sixth ranking industry in America. Ironworking had an employee total of forty-nine thousand, and a total product value of thirty-five and a half million dollars (Taylor p.243). The reason the ironworks seemed to fade away was because they moved to Pennsylvania and other Middle Atlantic states. Around the 1850's, when the central Massachusetts decline began, there was a surge in production in these Middle Atlantic areas. This is great evidence of specialization, while the ironworks moved south, Massachusetts led in cotton, a product the state was more capable of profitably producing (Taylor p.244-245).



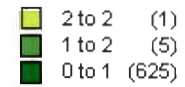
IRONWORKS during 1801



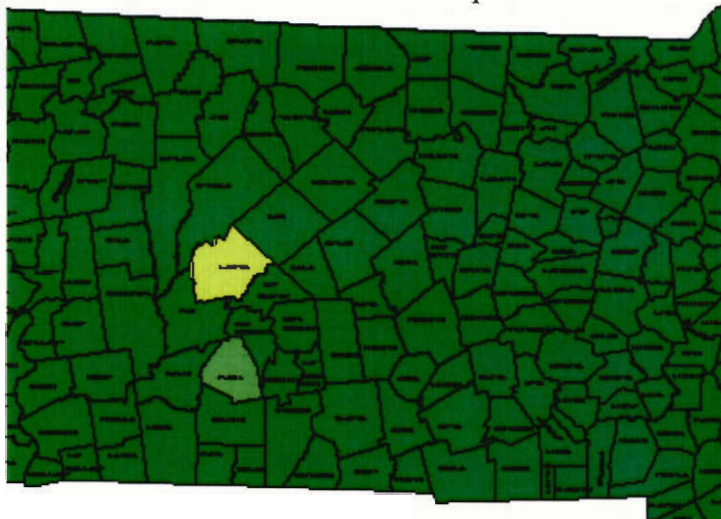
Map 19: Ironworks - 1801



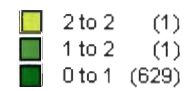
IRONWORKS during 1811



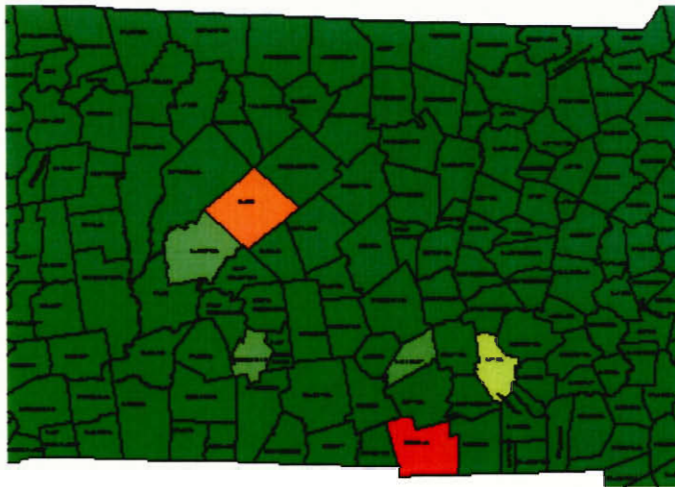
Map 20: Ironworks - 1811



IRONWORKS during 1821



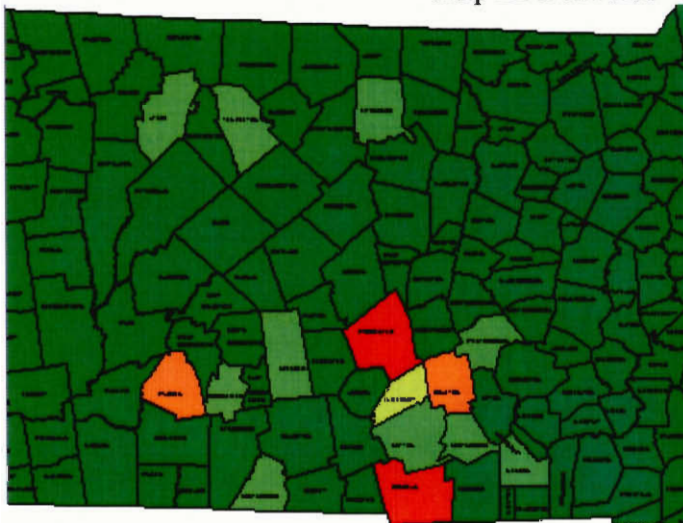
Map 21: Ironworks - 1821



IRONWORKS during 1831

10 to 10	(1)
3 to 10	(1)
2 to 3	(1)
1 to 2	(3)
0 to 1	(625)

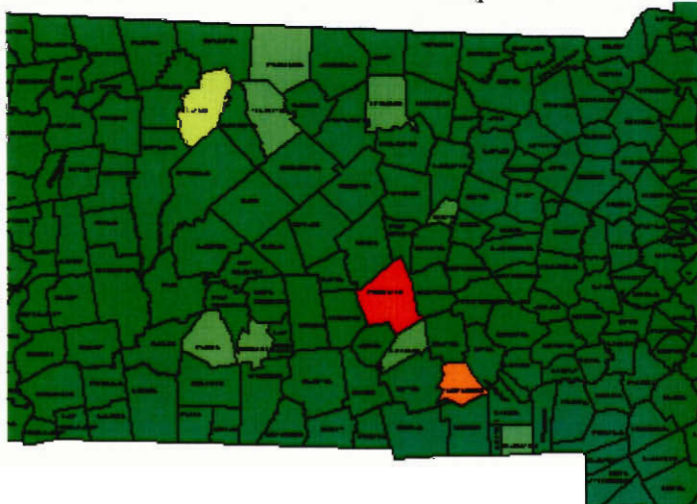
Map 22: Ironworks - 1831



IRONWORKS during 1841

5 to 7	(2)
3 to 5	(2)
2 to 3	(1)
1 to 2	(10)
0 to 1	(616)

Map 23: Ironworks - 1841



IRONWORKS during 1850

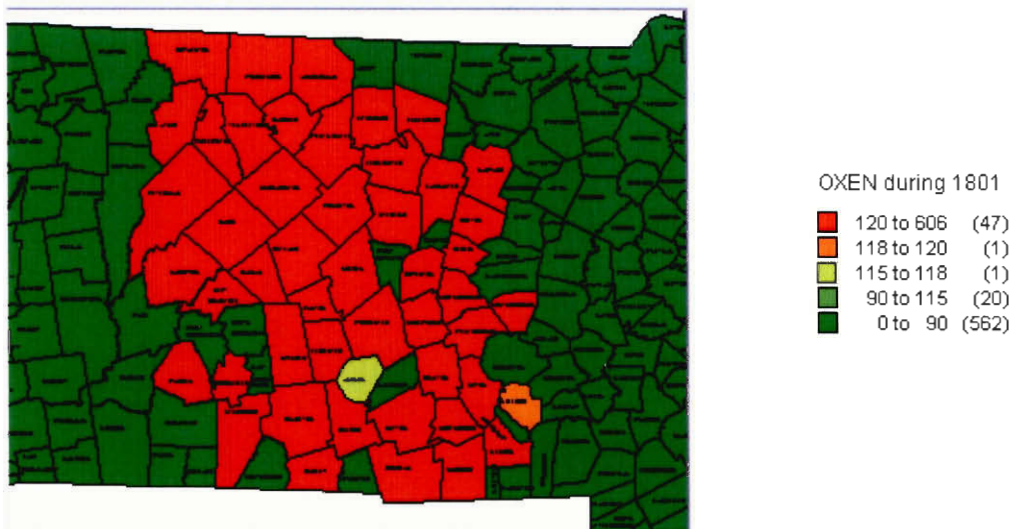
5 to 5	(1)
3 to 5	(1)
2 to 3	(1)
1 to 2	(8)
0 to 1	(620)

Map 24: Ironworks - 1850

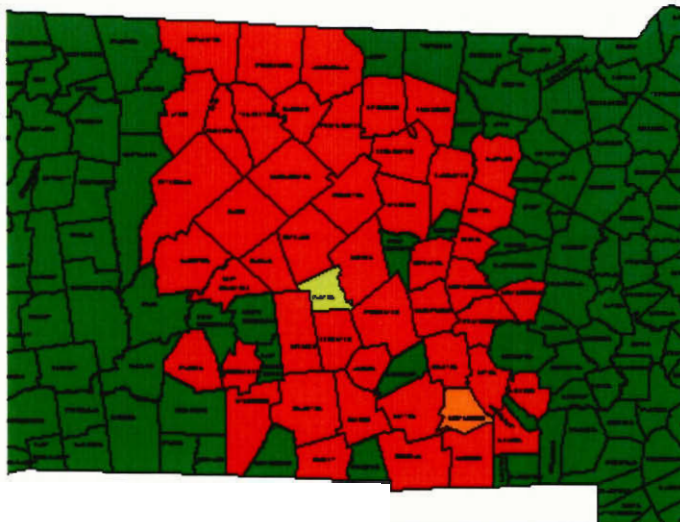
6.5 Oxen

Oxen were used mostly as farm animals. Oxen acted as tractors before the invention of the tractor. They were used to pull the plows or to carry the produce to the market. Oxen were not a source of food for people.

Throughout the time period that we were looking at the number of oxen did not change. We think that this was due because there was still a need for oxen. Although there were many improvements in transportation and industry there was still a need for farm oxen. By looking at different areas of data that showed that there was not a huge decline in agriculture also proved that there was still a large need for farm animals to due labor.



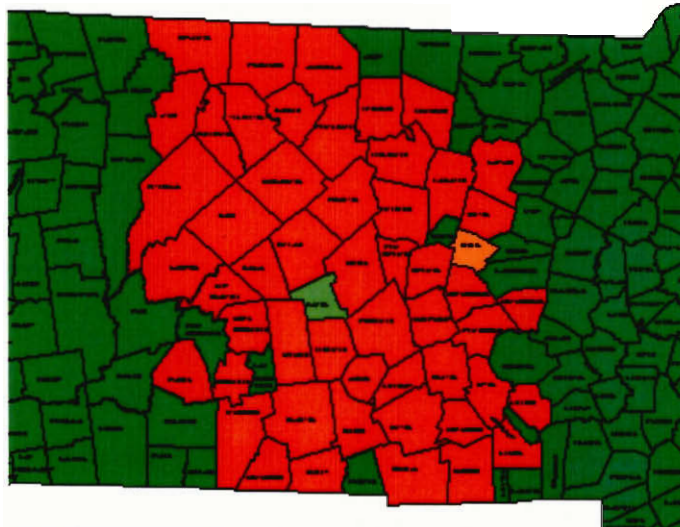
Map 25: Oxen - 1801



OXEN during 1811

111 to 540	(47)
98 to 111	(1)
95 to 98	(1)
75 to 95	(20)
0 to 75	(562)

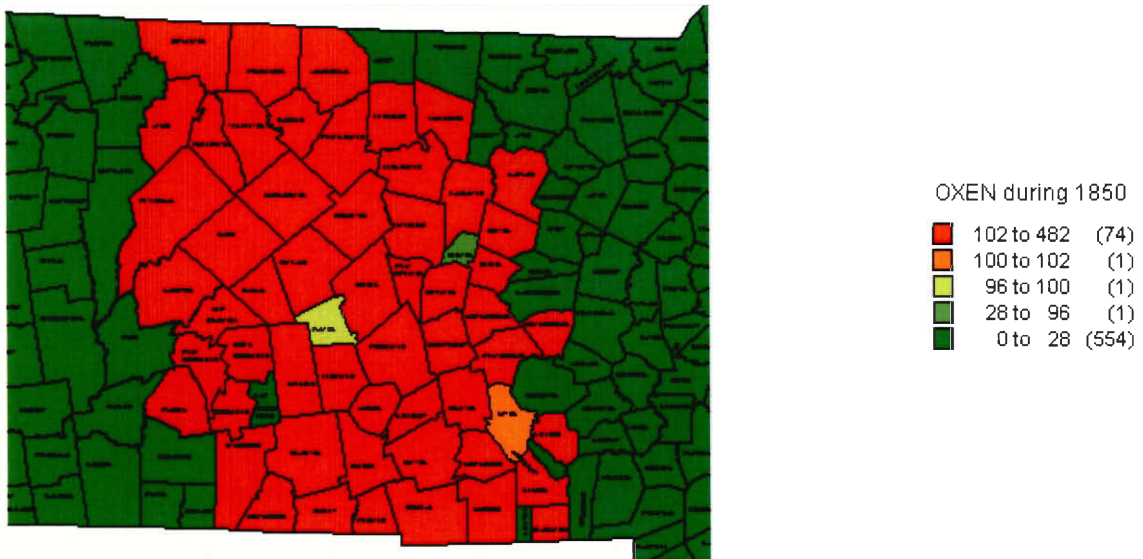
Map 26: Oxen - 1811



OXEN during 1831

132 to 623	(51)
130 to 132	(1)
125 to 130	(20)
123 to 125	(1)
0 to 123	(558)

Map 27: Oxen - 1831



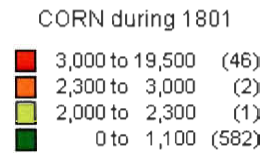
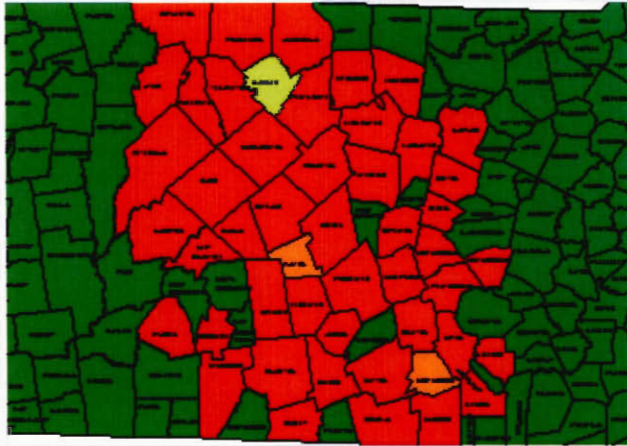
Map 28: Oxen - 1850

6.6 Corn

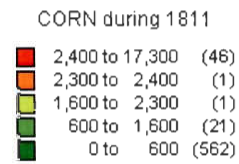
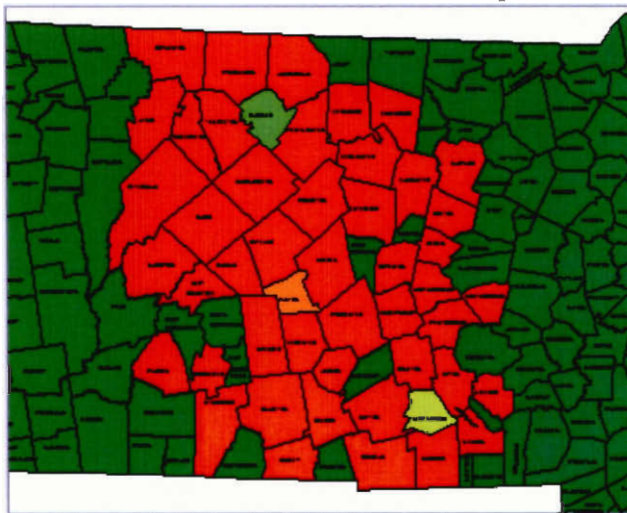
Corn was used as a source of food. Corn was used to feed anything from farm animals to people. Corn also was a source for many jobs. Corn needed to be grown then picked and also sometimes needed to be turned into corn meal.

Out of all of the data that we looked at we noticed that the data of corn was the most erratic. If corn was just looked at beginning and end then a small decrease would be seen, but by looking at each step a trend is seen. It seemed to be that every other decade there would be a larger output of corn than the previous. Which means one of two things, one being that too much corn was produced one decade so on the second decade there was still corn left over from the decade before. The second reason for this was that one decade not enough corn was produced so the decade after more corn had to be produced.

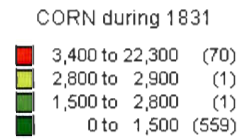
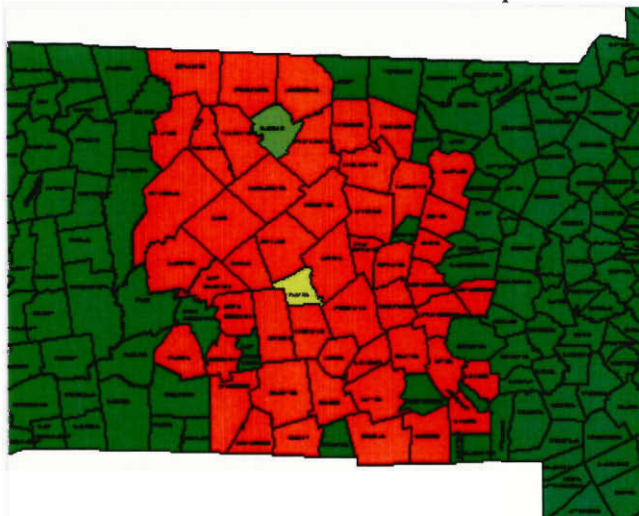
There also seems to be a connection with oxen. The data for corn and oxen follow the same pattern. The more oxen there were the more corn that was produced. This makes sense since oxen were used to farm produce.



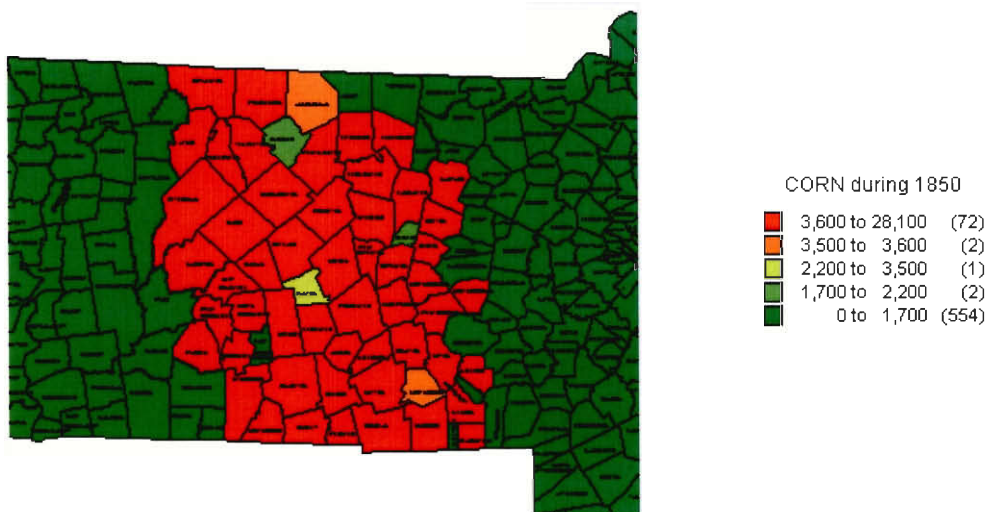
Map 29: Corn - 1801



Map 30: Corn - 1811



Map 31: Corn - 1831

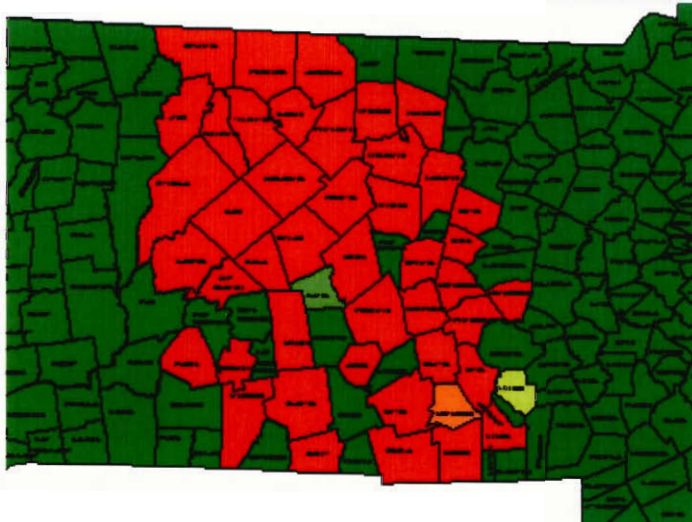


Map 32: Corn - 1850

6.7 Roads

Roads were used, just like they are today, for transportation. During this time people no longer wanted to travel down old trails through the woods so there was a need for roads. In addition roads were made from pavement, stone, or even wood planks back during the beginning of the century.

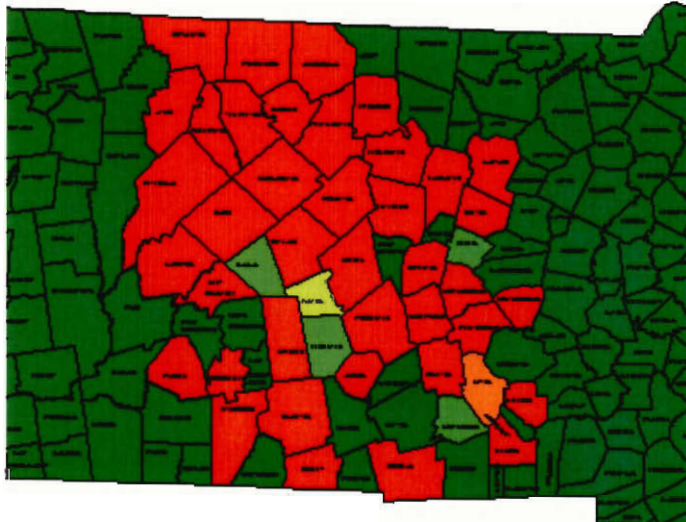
The data for roads showed that there was an increase in roads between 1800-1850 in the following towns; Dudley, Charlton, Spencer, Oxford, Sutton, Grafton, Upton, Uxbridge, Mendon, Barre, Rutland, Holden, Sterling, Boylston, and Athol. This comes as no surprise. This was the time of the transportation revolution and new roads were being built all across America. American governments used government money to build roads to connect major cities and one of those cities was Worcester. The data for roads did not show a huge jump until 1840. This happened because most roads in New England were built at the same time. Once one state started construction another would follow.



Map 33: Roads - 1801

ROADS during 1801

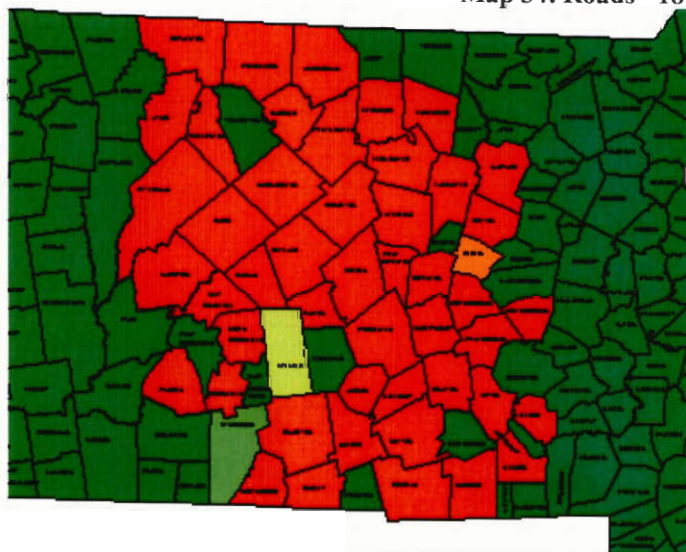
Red	161 to 958	(43)
Orange	157 to 161	(1)
Light Green	150 to 157	(21)
Medium Green	130 to 150	(1)
Dark Green	0 to 130	(565)



Map 34: Roads - 1811

ROADS during 1811

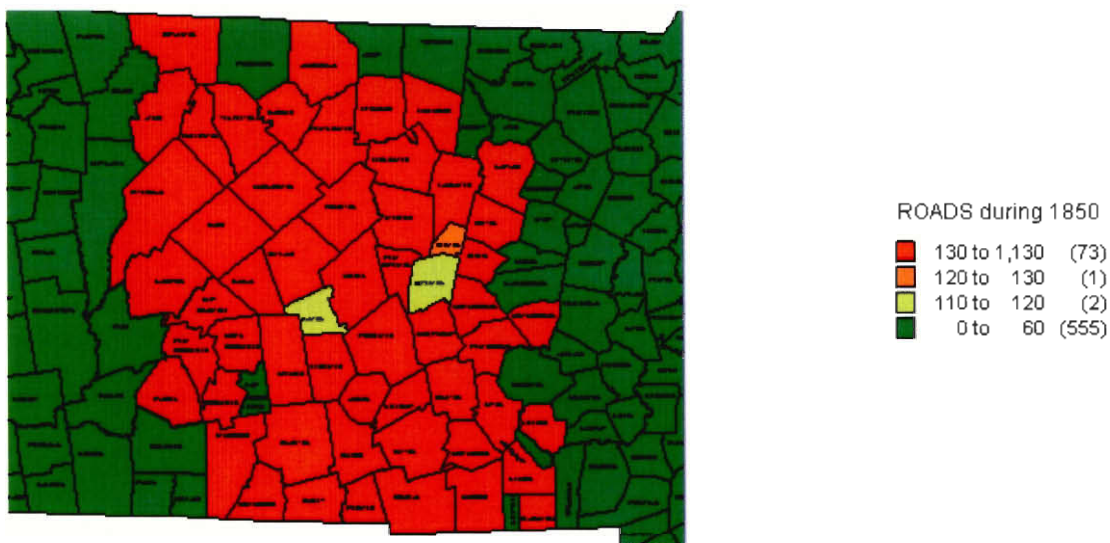
Red	160 to 1,000	(39)
Orange	150 to 160	(21)
Light Green	140 to 150	(1)
Medium Green	100 to 140	(4)
Dark Green	0 to 100	(566)



Map 35: Roads - 1831

ROADS during 1831

Red	144 to 750	(67)
Orange	137 to 144	(1)
Light Green	94 to 137	(1)
Medium Green	35 to 94	(1)
Dark Green	0 to 35	(561)



Map 36: Roads - 1850

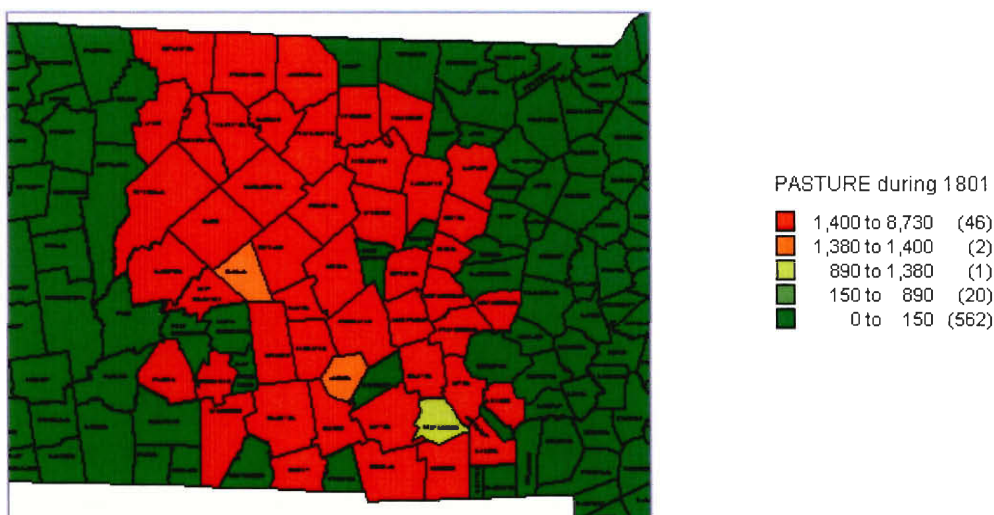
6.8 Pasture

Pastures were used as grazing areas. Farm animals would graze these pastures, ranging in size, to feed and live unless they were put to work. Animals like horses, cows, or oxen would be a familiar sight in a pasture. When not in a pasture oxen would be in the farm field or hauling produce and cows would be getting milked or being turned in to food

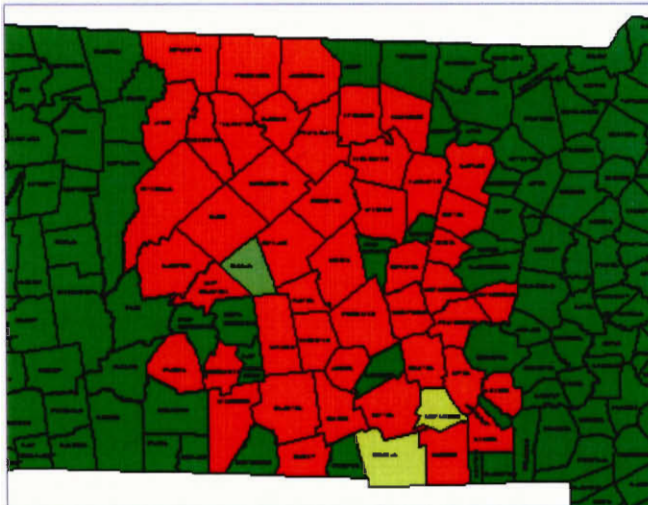
The data of pastures shows a small increase over time. This makes sense after reading Jack Larkin's article. Larkin stated, "two-thirds of the Central Massachusetts landscape was cultivated and open" (Larkin, 13). One reason was that farmers cleared new land so that they could expand their farms. Also another reason could be that old pastures could not handle the amount of animals that it could so new pasture had to be used. This means that if a pasture used to have fifty animals on it after a couple of years there would only be enough grass for twenty five animals to graze and the other twenty five would have to be brought to a new pasture. One connection that could be made is

with oxen is that the number of oxen did not show a change during this time which would mean that they would need a place to graze along with all of the other animals. With no change in oxen pastures could not get smaller since there was still a demand.

After reviewing the maps of the subjects of corn, roads, pastures, and oxen a certain pattern of what was in certain towns was apparent. The main centers for these subjects were Dudley, Charlton, Spencer, Oxford, Sutton, Grafton, Upton, Uxbridge, Mendon, Barre, Rutland, Holden, Sterling, Boylston, and Athol. These towns seemed to have a large role in agriculture in Central Massachusetts. Roads would seem to not go along with agriculture but after some thought it is clearly seen that there is a need from the farmers. Farmers need roads to move their goods from place to place. Before roads farmers would have to travel down old trails that were dangerous and could cause farmers to lose some of their crops. With the new roads traveling became easy and was no longer a case to worry about. The results from data show that different areas are centers for different things. This may mean that the towns above concentrated on agriculture while other towns surrounding focused on other things such as industry.



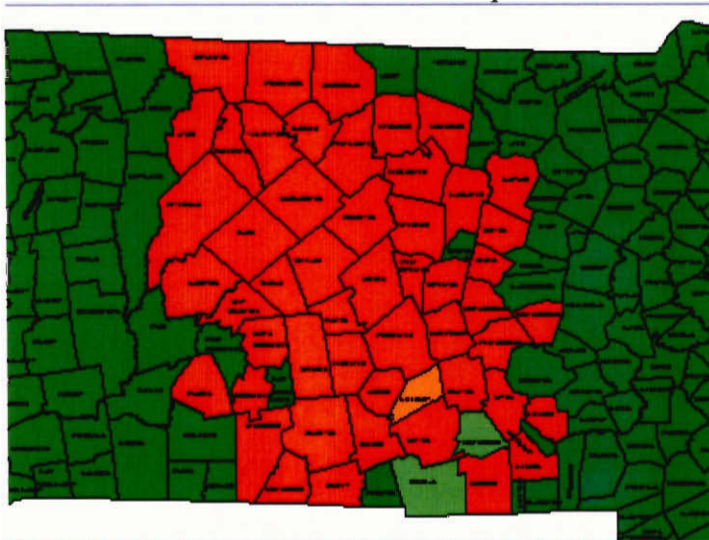
Map 37: Pasture - 1801



PASTURE during 1811

Red	1,900 to 10,800	(46)
Light Green	1,300 to 1,600	(2)
Medium Green	300 to 1,300	(21)
Dark Green	0 to 300	(562)

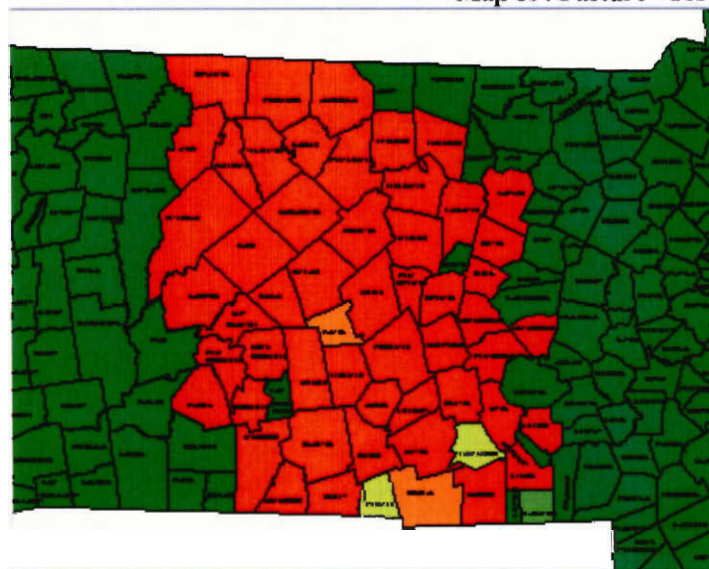
Map 38: Pasture - 1811



PASTURE during 1831

Red	2,700 to 12,000	(50)
Orange	2,300 to 2,700	(1)
Medium Green	2,000 to 2,100	(22)
Dark Green	0 to 2,000	(558)

Map 39: Pasture - 1831



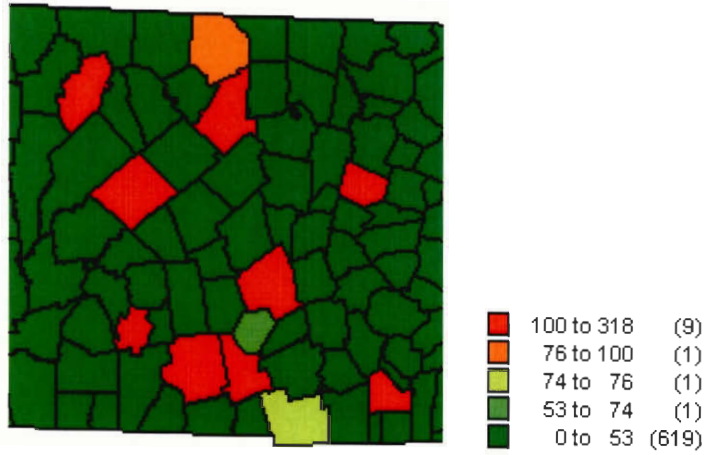
PASTURE during 1850

Red	2,600 to 13,100	(51)
Orange	2,500 to 2,600	(2)
Light Green	2,300 to 2,500	(2)
Medium Green	800 to 2,300	(21)
Dark Green	0 to 800	(555)

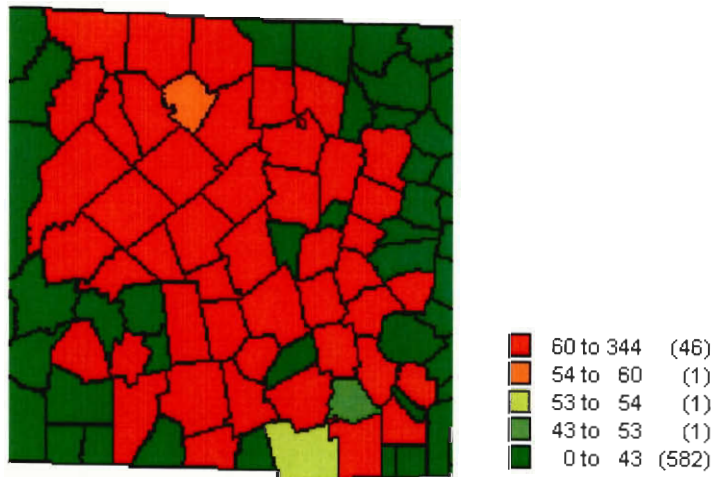
Map 40: Pasture - 1850

6.9 Barns

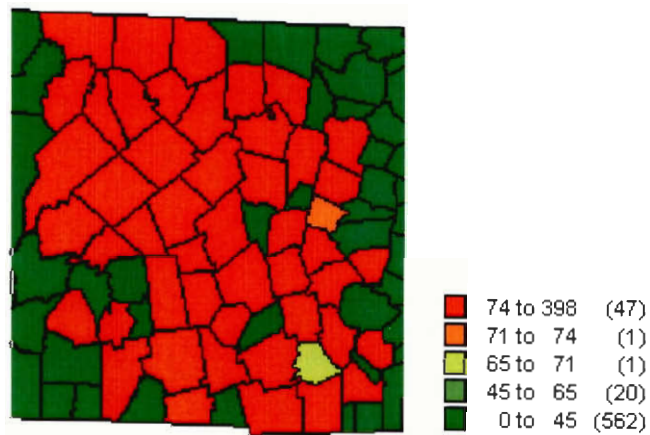
The barn was an important building in 19th century New England. Barns were used as a place to keep livestock, tools, and harvested crops. Due to the barn's importance to the functionality of the New England farm, it is worth while to see how the number of barns changes over time during the first half of the 19th century in central Massachusetts. The first two years examined were 1781 and 1791. During the ten year interval the number of barns increased greatly in central Massachusetts. In 1781 the majority of towns had less than 53 barns. In 1791 the average number of barns per town was between 70 to 300 barns. There are several possible reasons for these changes. The first is simply existing farms adding more barns because of an increase in size of the farm and a need for more space to house live stock, tools, and other goods. The other reason could be the starting of new farms on previously unused land. The new farmers could have come from several sources. The most likely would be the sons of the farmers moving out to start their own farms, which was common practice during the time period. The second source would be new farmers moving to the area and starting up a farm. During the next ten years not much changes overall in the region some towns see an increase of a couple of barns but the distribution through out the region is constant. The same pattern reoccurs for the rest of the investigated time period. Through the period there is a slow climb in the number of barns per town but the rate is the same for all towns so there is no change in distribution in the area.



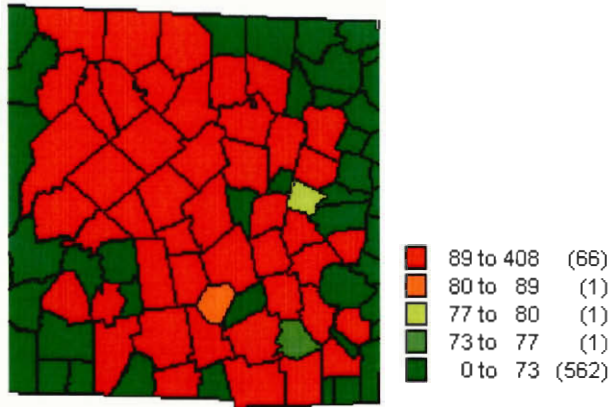
Map 41: Barns - 1781



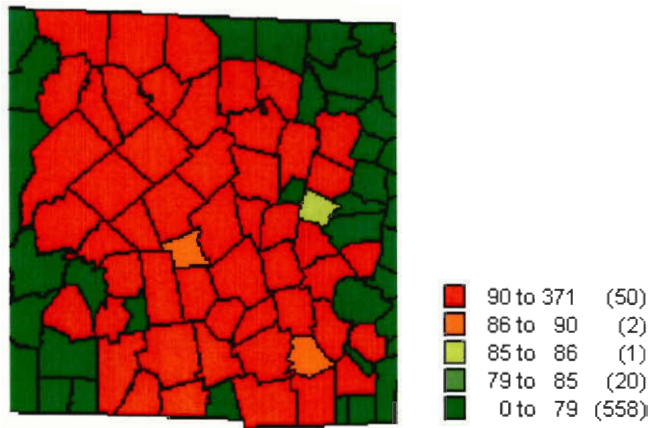
Map 42: Barns - 1791



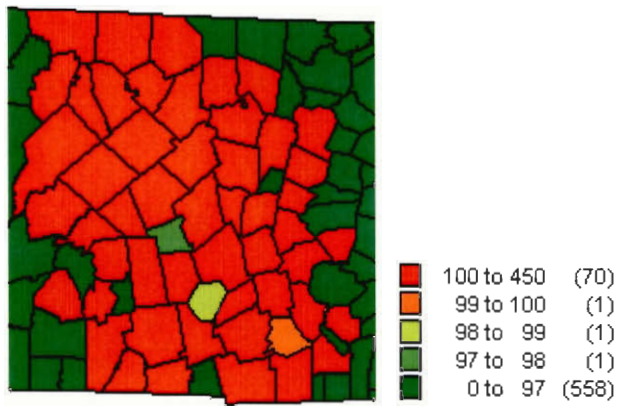
Map 43: Barns - 1801



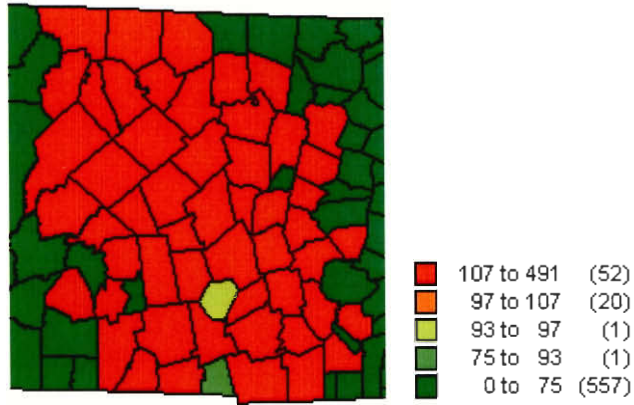
Map 44: Barns - 1811



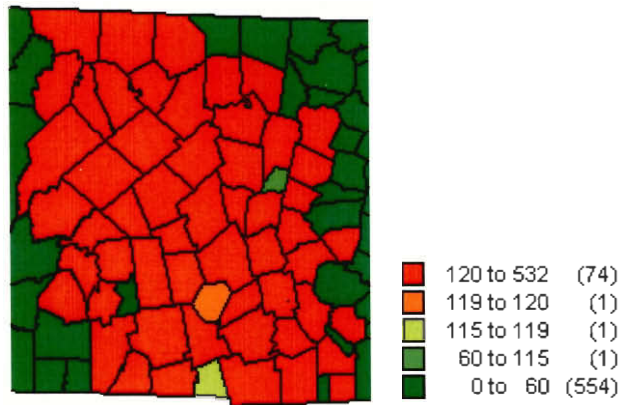
Map 45: Barns - 1821



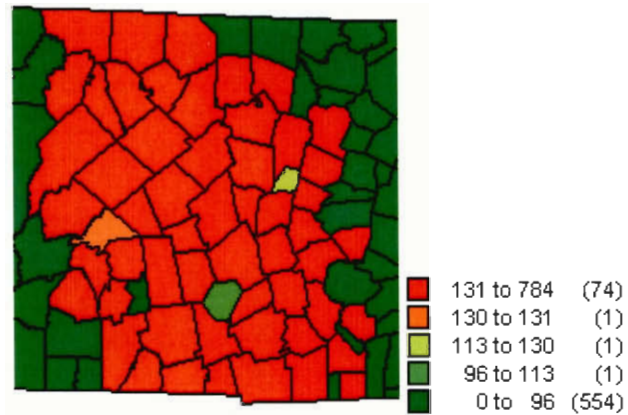
Map 46: Barns - 1831



Map 47: Barns - 1841



Map 48: Barns - 1850



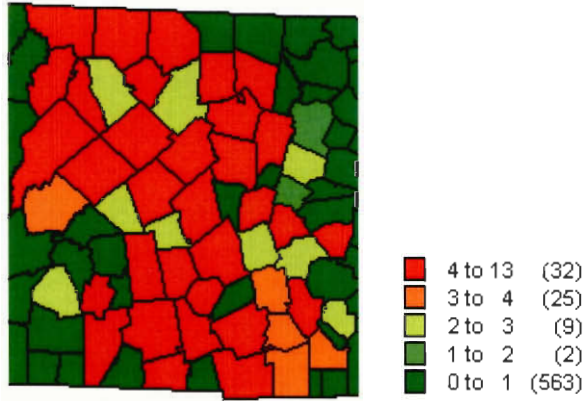
Map 49: Barns - 1860

6.10 Sawmills

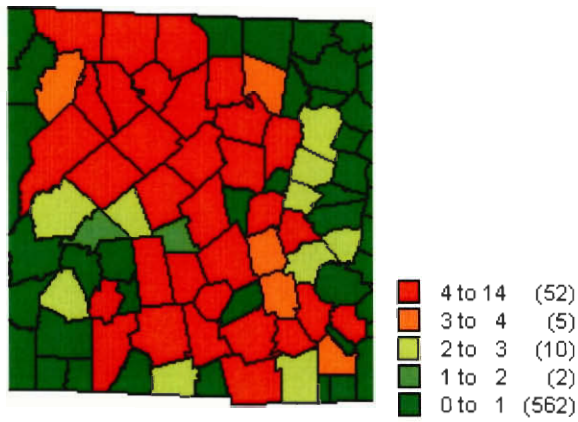
The sawmill was also an important structure in New England during the 19th century. The sawmills examined were powered by water. Sawmills were necessary to

process the wood from the forest that were cut down to make room for farm land and the towns. At the sawmill trees could be turned into building supplies to construct homes, barns, shops, and any other structures needed by the towns.

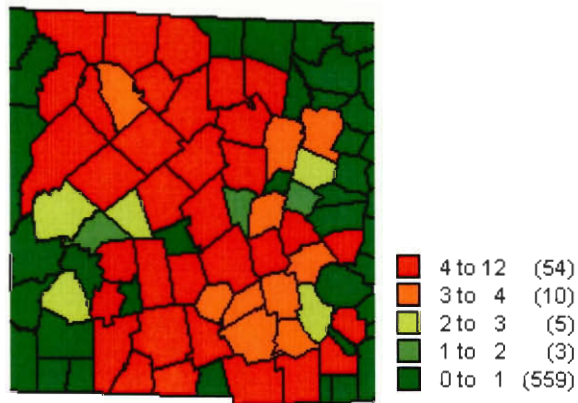
In 1801 about half of the towns in central Massachusetts have between 4 and 13 sawmills. The majority of the other towns have 3 or 4 sawmills, with a few remaining towns having 1 or 2. The maximum number of sawmills per town does almost double over the 60 year period examined, increasing to a maximum value of 23 sawmills per town in 1841. After 1841 the maximum value drops slightly coming back to a maximum number of 17 in 1860. Also with the increasing maximum number of sawmills per town more towns start to have higher number of sawmills. In 1801 only 32 of the 76 towns in the region having four or more sawmills. The number of towns with more than four sawmills steadily increase till 1841, with the maximum number being 63 towns. The maximum holds steady over the next nine years till 1850 and then drops slightly in the next ten years to 61 towns with more than four sawmills per town in 1860. The increasing number of sawmills could indicate that forest were being cleared in the towns where there were large concentrations of sawmills. The clearing of forest to make room for farms and shops would create a lot of timber that would need to be processed in to usable lumber. The lumber produced could then be used to build barns, shops, dwellings, and other required structures. The decreasing number of sawmills in 1860 could indicate that the amount of timber needing to be processed was decreasing. The decreased demand for lumber could possibly be due to most of the land having been cleared or that clearing was continuing at a slower pace than earlier.



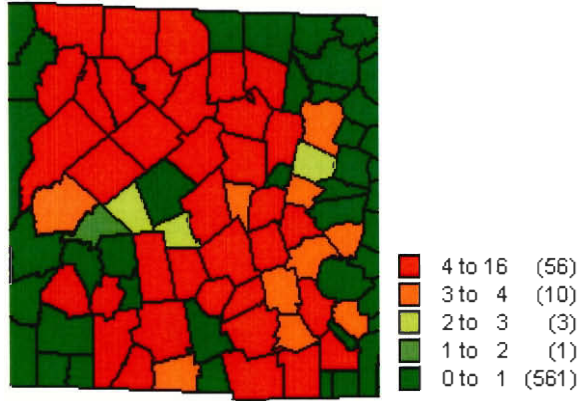
Map 50: Sawmills - 1801



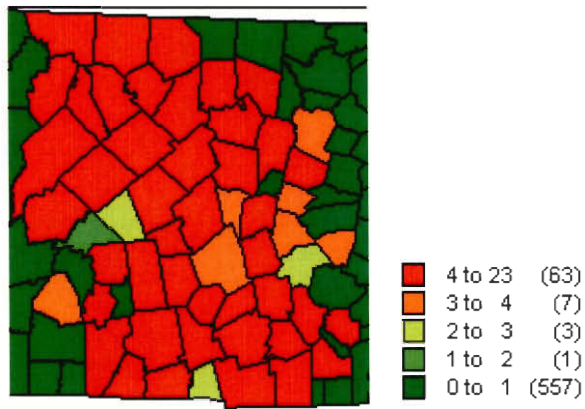
Map 51: Sawmills - 1811



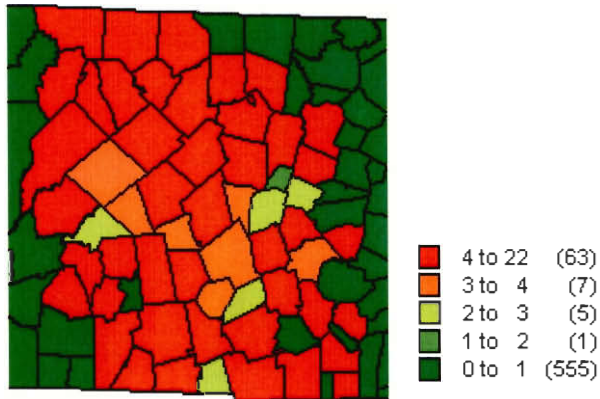
Map 52: Sawmills - 1821



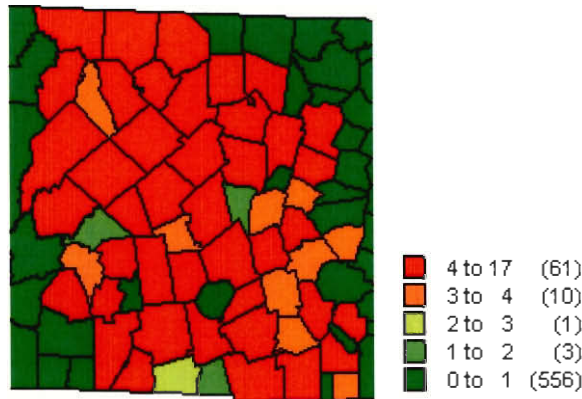
Map 53: Sawmills - 1831



Map 54: Sawmills - 1841



Map 55: Sawmills - 1850

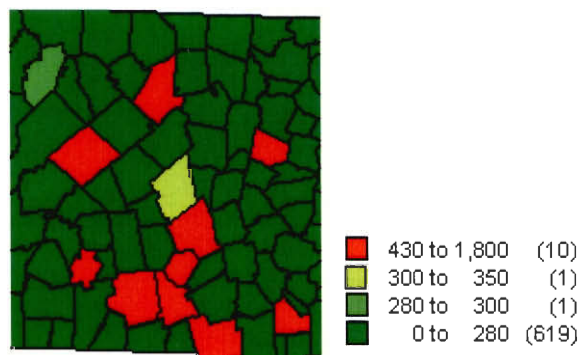


Map 56: Sawmills - 1860

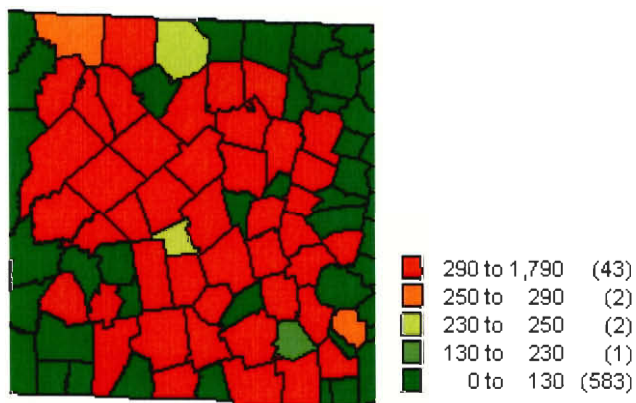
6.11 Tillage

Tillage is the amount of land set aside for the growing of crops. In New England these were wheat, corn, rye, oats, barley, and hops. The number of acres set aside for the growth of crops increases dramatically from 1781 to 1860. In 1781 only a ten towns had more than 430 acres set aside for crops, with the largest acreage being 1,800 acres. Most of the towns had less than 280 acres set aside for growing crops. In 1791 forty three towns have over 300 acres set aside for crop growth. The maximum acreage was 1,790 acres. For 1801, the number of towns with acreages over 300 increased to 46. The maximum acreage also increases to 1,920 acres. In 1811 the number of towns with over 300 acres does not increase but the maximum acreage does increase slightly to 1,990 acres. By 1821 the majority of the region has set aside more than 370 acres per town for farming. The number of towns with acreages greater than 370 rises to 70. The maximum acreage set aside decreases slightly to 1,960 acres. In 1831 most of the towns remain at

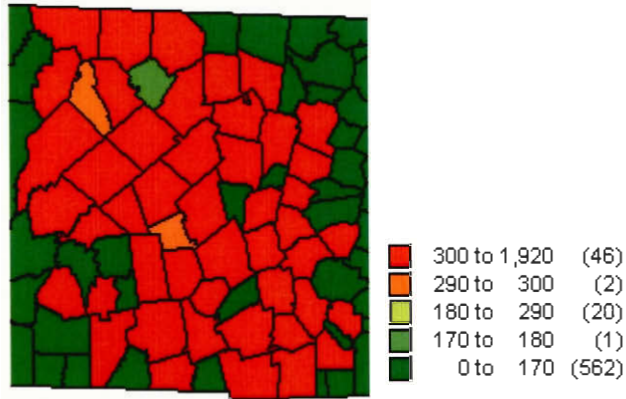
the same levels of tillage as in the previous ten years. The maximum number of acres does decrease slightly again to 1,930 acres. Again in 1841 the number of towns with over 370 acres of tillage does not change but the maximum number of acres does increase back to 1,990 acres. In 1850 74 towns have more than 350 acres of tillage set aside. The 5 towns that did not have as many acres set aside are the towns with smaller areas' than the other towns. No increase in the number of towns with over 350 acres of tillage. A large increase does occur however in the maximum number of acres set aside for tillage to 2,970 acres. By 1860 most of the towns seem to have maximized the amount of land to be used for tillage. This meant that the land available needed to be shared between the various crops grown in the area.



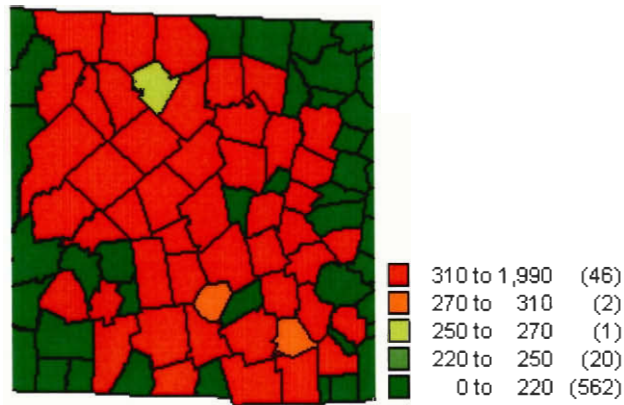
Map 57: Tillage - 1781



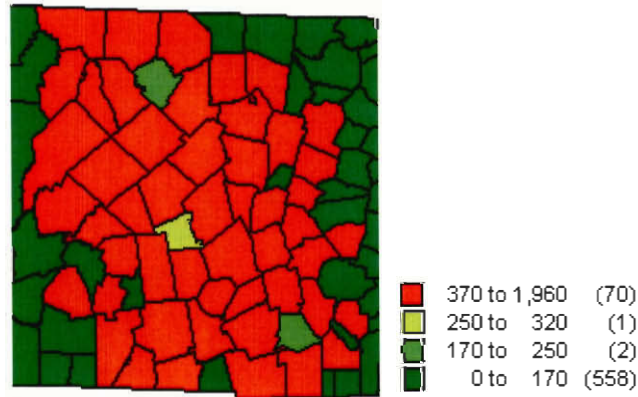
Map 58: Tillage - 1791



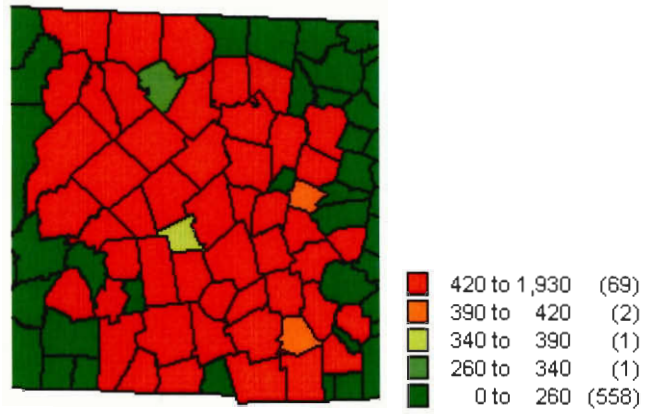
Map 59 Tillage - 1801



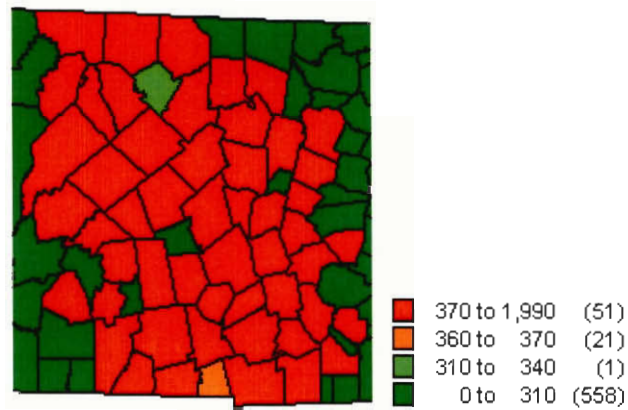
Map 60: Tillage - 1811



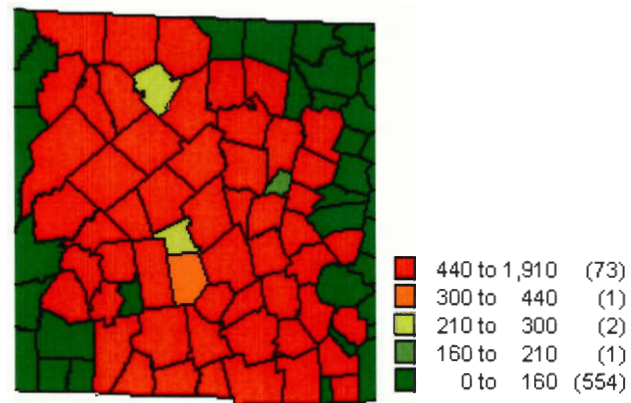
Map 61: Tillage - 1821



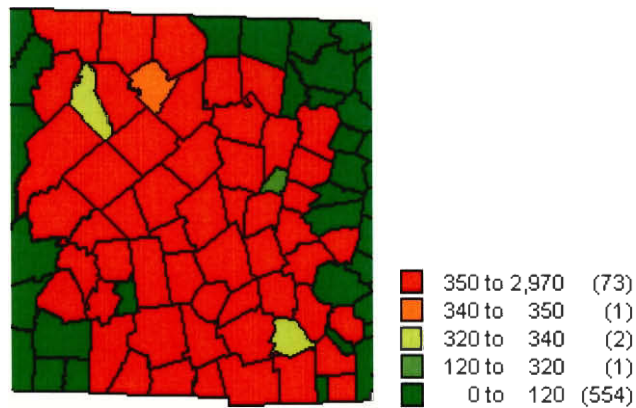
Map 62: Tillage - 1831



Map 63: Tillage - 1841



Map 64: Tillage - 1850



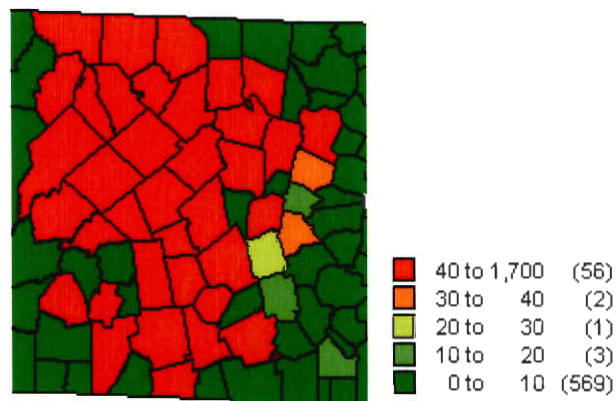
Map 65: Tillage - 1860

The increase in tillage over the half century examined also shows a slow process of specialization for the region. The fact that land was dedicated to the growth of crops shows that the area is becoming specialized in agriculture. The land could have instead been used for shops or factories, but due to the region's specialization the land was instead used for farming.

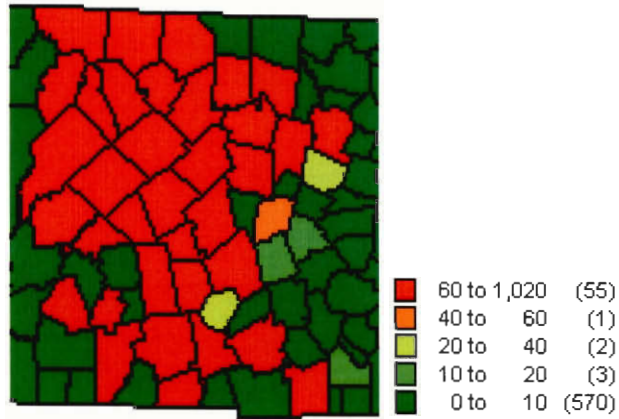
6.12 Wheat

Wheat was one of the important crops grown in New England. The primary use of wheat was for making food. As such wheat is a crop that was essential to providing for the population. The data for Central Massachusetts shows an interesting trend. For the first forty years examined the number of bushels produced in each town steadily decreases, then in the last ten year period the number of bushels per town increases significantly. In 1801 the number of bushels produced per town ranged from ten bushels to 1,700 bushels for some towns. The majority of the towns produced between 40 to 1,700 bushels in 1801. In 1811 the same number of town produced over 40 bushels but the maximum number of bushels produced dropped to 1,020. 1821 saw a similar drop in

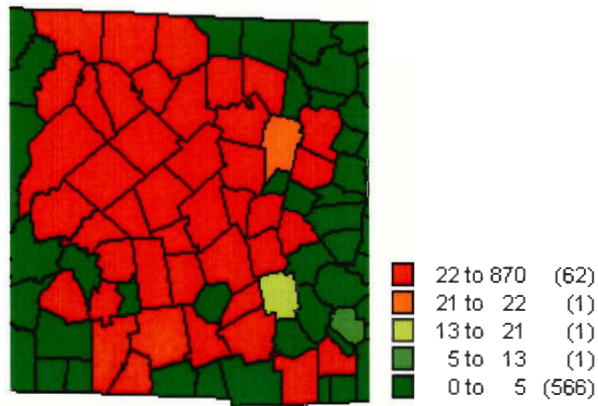
the maximum number of bushels grown dropping to 870. The production of wheat for the majority of the towns dropped to producing over 22 bushels. Another drop occurred in 1831. The Majority of towns only produce 12 bushels during the year. The maximum number of bushels again dropped to 339 bushels. Half of the towns in the region only produced up to 2 bushels during the year. The production of wheat increases dramatically in 1841. The majority of the towns produce over 50 bushels, which is better than the first year examined. The maximum number of bushels produced rise to 2,520 bushels. The decrease in production of wheat in the middle of the time period examined could be explained by several causes. The first reason the production of wheat dropped could be that the growing seasons for the year of the census might have been unfavorable for growth of wheat. Another reason could be that emphasis was placed on growing one of the other crops grown in New England during the year of the census. The category for wheat is not retained for the 1850 and 1860 censuses so a more thorough look into what is happening can't be determined.



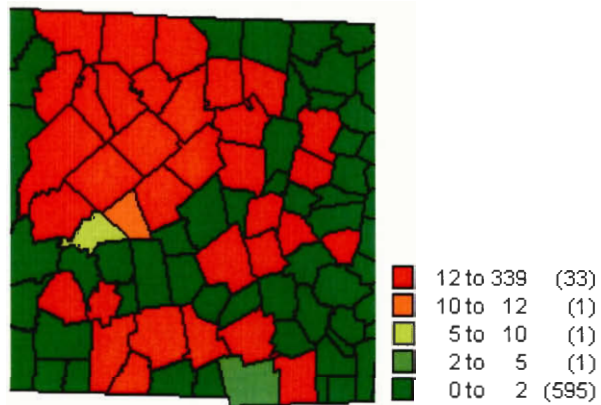
Map 66: Wheat - 1801



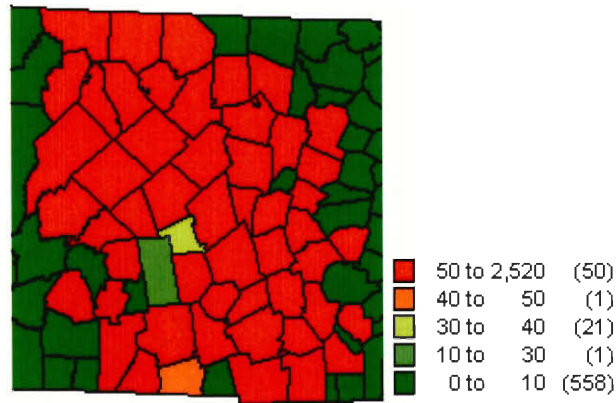
Map 67: Wheat - 1811



Map 68: Wheat - 1821



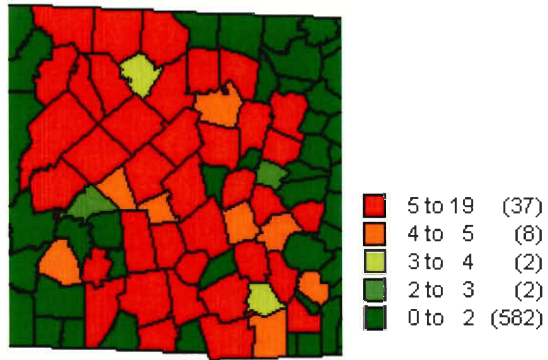
Map 69: Wheat - 1831



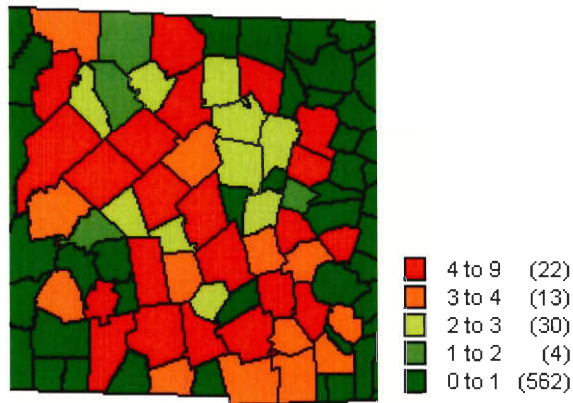
Map 70: Wheat - 1841

6.13 Grist

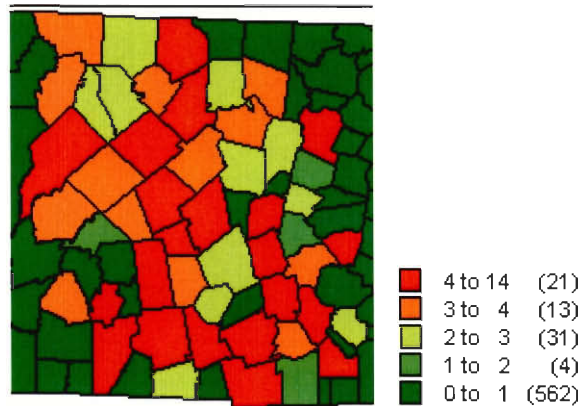
Grist Mills were used to process the several crops grown in New England. Such crops are corn, wheat, and rye. Grist mills were used to grind the crops down into a powder to be used in baking. The number of grist mills in the region decreases during the time period examined. In 1791 most of the towns in the region have more than 4 grist mills per town. The maximum number of grist mills per town is 19. The number of grist per town steadily drops over the next 70 years. The maximum number of grist per town eventually stabilizes at 7. However the majority of the towns by the end of the time period have only 2 to 3 grist per town. The decreasing numbers could be caused by several factors. The demand for grain processing could be decreasing, though this does not seem likely since the production of wheat is increasing towards the end of the time period examined. Another possibility is that the remaining mills are larger than those in 1791 and can handle more grain. The third reason for the decrease is that the crops are being sent away to be processed and not processed in the region. The improvements in the transportation system during the time period would allow grain to be transported elsewhere before it spoiled.



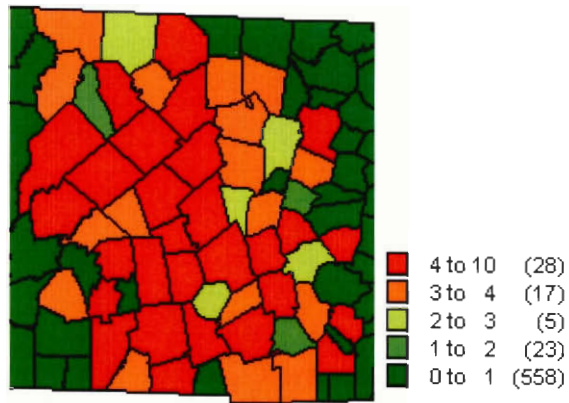
Map 71: Grist - 1791



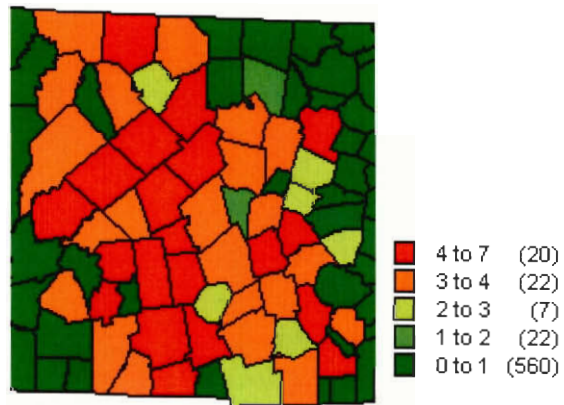
Map 72: Grist - 1801



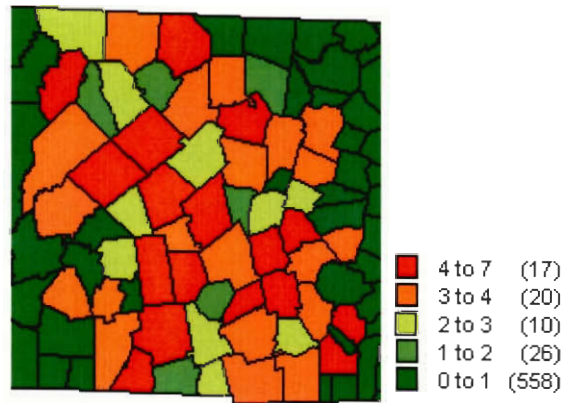
Map 73: Grist - 1811



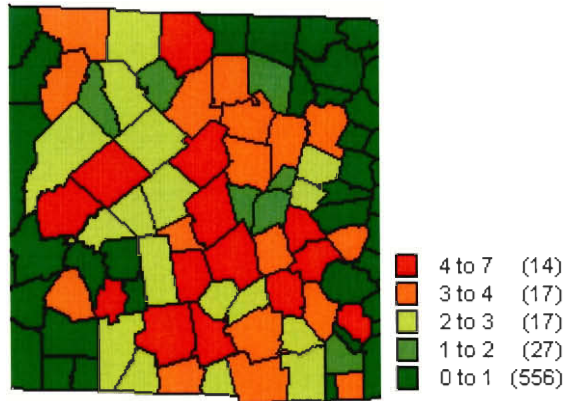
Map 74: Grist - 1821



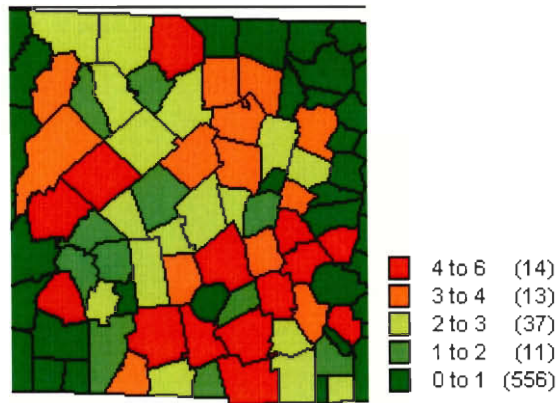
Map 75: Grist - 1831



Map 76: Grist - 1841



Map 77: Grist - 1850



Map 78: Grist - 1860

7.0 Where to go next

This section will be devoted to suggestions as to where the project and associated information could be taken by future project teams, or by any organization receiving the data organized by this or any future project. Some of these projects may require the use of other programs besides MapInfo, and may involve a more in-depth look at the data, possibly expanding on the information provided by the census.

One of the first projects could be to compare more specific data in MapInfo. For instance, the use of specific types of structures such as barns, renovated barns, residential buildings, and possibly commercial buildings could be compared. To achieve this, more research regarding the uses of structures will have to be done. Finding out how many commercial as opposed to residential buildings were constructed over the time period could give some interesting information about how the changes in transportation and manufacturing affected the use of structures. This information could also give some insight on the speed with which people left the country and headed into the cities, on the family level more so than on the individual person level. This information will be particularly interesting because it can show just how many varied structures were used for certain purposes, and could even help to explain the urbanization of some rural areas.

The final thing that could be achieved in a future IQP is to find a practical application for the data collected and graphed in MapInfo. As of now, the data is simply compiled in one file and used to make graphs about small aspects of society. In the future, this information could possibly be placed into a search based program, or even displayed on a web site allowing others to use the maps and graphs generated by this information for other projects or scholarly purposes. The data could be presented to visitors to Old Sturbridge Village in the form of maps and quick bits of data on a small screen at certain points in the village. This information can further instill the lessons taught by the village, and give visitors an interesting pictorial representation of the information presented.

8.0 References

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9.0 Appendices

APPENDIX A: Explanation of Data Categories for the MapInfo Program

9.1 APPENDIX A

townname - abbreviated version of town name
townpop - town population from nearest census
dwelling - number of houses in community
barns - number of barns in community
distill - number of distilleries
tannery - number of establishments
grist - number of waterpowered gristmills (grain grinding mills for wheat, corn, etc.)
carding - number of waterpowered wool carding mills (a process that prepares wool for spinning)
fulling - number of water powered wool fulling mills (a process that finishes up already woven cloth)
sawmill - number of water powered sawmills
cottonf - number of water powered cotton factories
cottons - number of spindles in the factories
cottonl - number of power looms in the factories
woolenf - number of water powered woolen factories
woolens - number of spindles in the factories
woolenl - number of power looms (for weaving woolen cloth) in the factories
tillage - acres of land used for grain crops
wheat - bushels produced
rye - bushels produced
oats - bushels produced
corn - bushels produced
barley - bushels produced
hops - bushels produced
oxen - number in each town
uplandmo - acres of land used for upland hay (i.e. hay grown on well-drained land)
uplandha - tons of upland hay grown
freshmow - acres of land used for meadow hay (i.e. hay grown in wetlands)
freshhay - tons of meadow (wetlands) hay grown
pasture - acres of land used for grazing cattle and sheep
tothay - total tons of hay all kinds
hayland - total acres used for hay, all kinds
ahay - tons of hay, all kinds, per acre (productivity)
aup - tons of upland hay per acre(productivity)
pup - percent of all hay grown that is upland hay
afresh - tons of fresh meadow hay per acre (productivity)
timp - total improved land (all agricultural uses except woodlot, forest)
tunimp - total unimproved land (unused, water, forested
totland - total area of town
punimp - percent of land unimproved
percimp = percent of land improved
bread - Bread grain - Rye and Wheat
pbread - Bread grain as % of all grain

ptillage - Tillage land as % of all land

phay - Hayland as % of all land

ppasture - Pasture as % of all land

capbread - Bread grain per person

popdwell - People per dwelling