

Candidate identification modeling for Massachusetts farmlands preservation

Aaron Dushku, GIS Specialist
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Hot-spots for farmland preservation in Massachusetts

Unprotected farmland on prime farmland soils

version 3 (10/07/09)

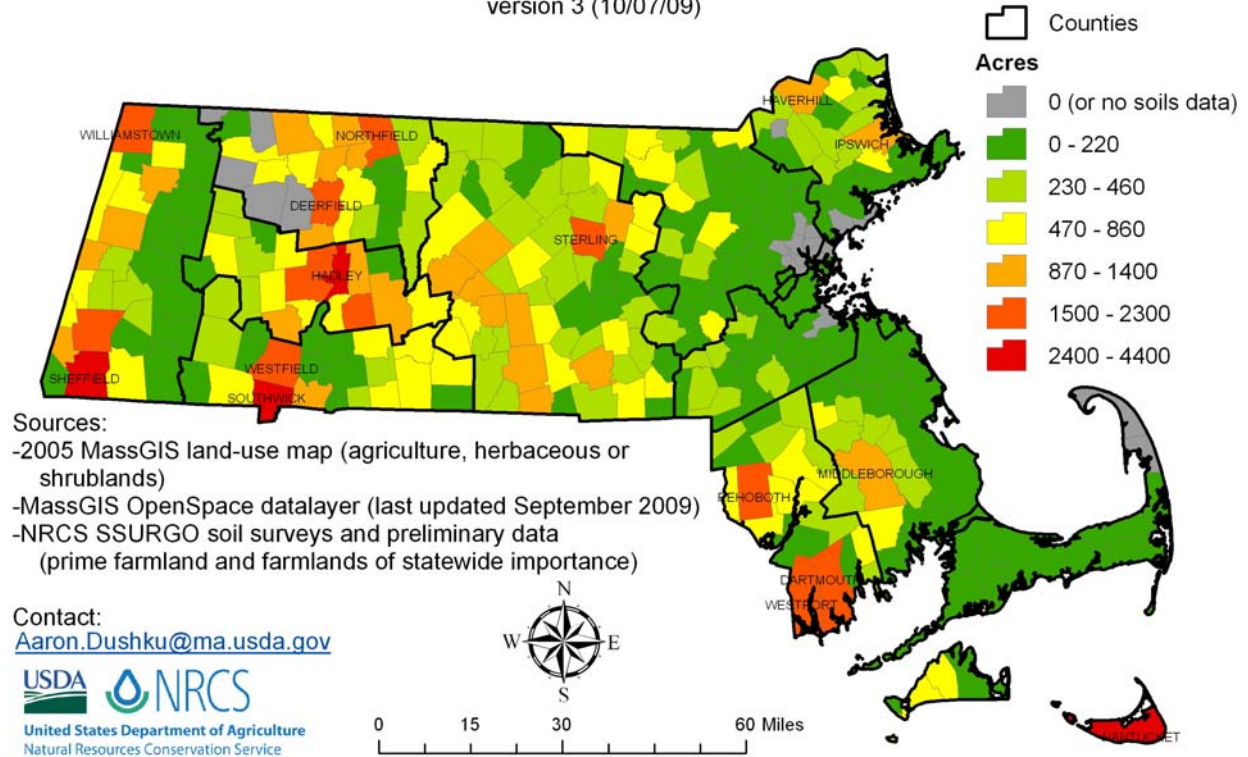


Figure 1. The hotspot map for agricultural preservation in Massachusetts towns. Towns with highest total areas of candidate lands are labeled.

Step 1: Land cover factor

The most detailed and updated land-cover map of Massachusetts is the 2005 MassGIS land-use dataset (<http://www.mass.gov/mgis/lus2005.htm>). A reclassification of this map allowed for the creation of a map of conservation candidate sites based on land cover type alone. The rules applied to the broader categorization of the MassGIS land-cover classes needed for this analysis are illustrated in the table below.



United States Department of Agriculture
Natural Resources Conservation Service

| LU class from 2005 dataset | LUCODE | Acres | Category number | New classification | |
|------------------------------|--------|-----------|-----------------|-----------------------------------------|------------------------------|
| Brushland/Successional | 40 | 33,476 | 1 | Agriculture, shrubs or herbaceous cover | |
| Cranberry Bog | 23 | 24,140 | 1 | Agriculture, shrubs or herbaceous cover | |
| Cropland | 1 | 149,941 | 1 | Agriculture, shrubs or herbaceous cover | |
| Nursery | 36 | 5,989 | 1 | Agriculture, shrubs or herbaceous cover | |
| Orchard | 35 | 8,922 | 1 | Agriculture, shrubs or herbaceous cover | |
| Pasture | 2 | 92,216 | 1 | Agriculture, shrubs or herbaceous cover | sub-total (acres) |
| Forest | 3 | 2,901,528 | 2 | Forest | 314,683 |
| Forested Wetland | 37 | 285,200 | 3 | Wetlands | |
| Non-Forested Wetland | 4 | 165,570 | 3 | Wetlands | |
| Saltwater Sandy Beach | 25 | 50,790 | 3 | Wetlands | sub-total (acres) |
| Saltwater Wetland | 14 | 43,536 | 3 | Wetlands | 545,095 |
| Cemetery | 34 | 13,406 | 4 | Developed or barren lands | |
| Commercial | 15 | 72,055 | 4 | Developed or barren lands | |
| Golf Course | 26 | 31,080 | 4 | Developed or barren lands | |
| High Density Residential | 11 | 120,175 | 4 | Developed or barren lands | |
| Industrial | 16 | 52,960 | 4 | Developed or barren lands | |
| Junkyard | 39 | 2,563 | 4 | Developed or barren lands | |
| Low Density Residential | 13 | 287,314 | 4 | Developed or barren lands | |
| Marina | 29 | 682 | 4 | Developed or barren lands | |
| Medium Density Residential | 12 | 209,656 | 4 | Developed or barren lands | |
| Mining | 5 | 15,183 | 4 | Developed or barren lands | |
| Multi-Family Residential | 10 | 87,089 | 4 | Developed or barren lands | |
| Open Land | 6 | 67,195 | 1 | Developed or barren lands | <-moved here since version 2 |
| Participation Recreation | 7 | 32,929 | 4 | Developed or barren lands | |
| Powerline/Utility | 24 | 28,086 | 4 | Developed or barren lands | |
| Spectator Recreation | 8 | 1,821 | 4 | Developed or barren lands | |
| Transportation | 18 | 55,002 | 4 | Developed or barren lands | |
| Urban Public/Institutional | 31 | 54,882 | 4 | Developed or barren lands | |
| Very Low Density Residential | 38 | 102,183 | 4 | Developed or barren lands | sub-total (acres) |
| Waste Disposal | 19 | 6,496 | 4 | Developed or barren lands | 1,253,931 |

| | | | | |
|------------------------|----|---------|---|---------------------------|
| Transitional | 17 | 13,174 | 4 | Developed or barren lands |
| Water | 20 | 228,792 | 5 | Water |
| Water-Based Recreation | 9 | 1,454 | 5 | Water |

Open areas in the process of being developed from one land use to another (if the future land use is at all uncertain). Formerly identified as "Urban Open".

sub-total (acres)
230,246

DRAFT

Step 2: Soils factor

The NRCS has used soil survey data and the soil data viewer tool to map Prime Farmlands, Farmlands of Statewide Importance and Farmlands of Unique Importance wherever soil survey data are available in the state. This layer was combined and spatially cross-tabulated with the candidates map from Step 1. Categories used in the analysis were a lumping of the original classes as illustrated in the following table.

| SOIL SURVEY DATA | RECLASSIFICATION FOR THE MODEL |
|----------------------------------|--------------------------------|
| All areas are prime farmland | Prime farmlands |
| Farmland of statewide importance | Prime farmlands |
| Farmland of unique importance | Lands not prime for farming |
| Not prime farmland | Lands not prime for farming |

In two counties current and digital soil survey data were not yet available at the time of this analysis. The best-available data were used in these counties. For the purposes of this analysis, in Plymouth County, a preliminary version of the soil survey dataset in development was acquired from the NRCS soil survey team. In Franklin County a printed wall map of prime farmlands that was derived from the 1967 USDA soil survey was digitized. This Franklin County wall map was digitized by the Franklin Regional Council of Governments (FRCOG) and all but five towns were included in the map (Ashfield, Conway, Hawley, Heath and Monroe).

Step 3: Open Spaces factor

Protected and Open Space data were derived from the MassGIS Protected and Recreational Open Space Layer (<http://www.mass.gov/mgis/osp.htm>).

To map management or conservation, this condition was defined by using the OpenSpace polygon attribute PRIM_PURP (Primary Purpose). Codes for this class include, updated in September of 2009.

| CODE | DEFINITION |
|------|--------------------------------------------------|
| R | Recreation (activities are facility based) |
| C | Conservation (activities are non-facility based) |
| B | Recreation and Conservation |
| H | Historical/Cultural |
| A | Agriculture |
| W | Water Supply Protection |
| S | Scenic (official designation only) |
| F | Flood Control |
| Q | Habitat protection |
| U | Site is underwater |
| O | Other (explain) |
| X | Unknown |

Summary

The model that produced the map on page 1 of this report combined data from all of the 3 steps to identify areas with the following characteristics:

- on soil-types with a 'prime farmland' classification,
- with an agricultural land cover in 2005 (not developed or water bodies),
- without any existing management for conservation or recreational activities.

Figure 2 shows the workflow of the model.

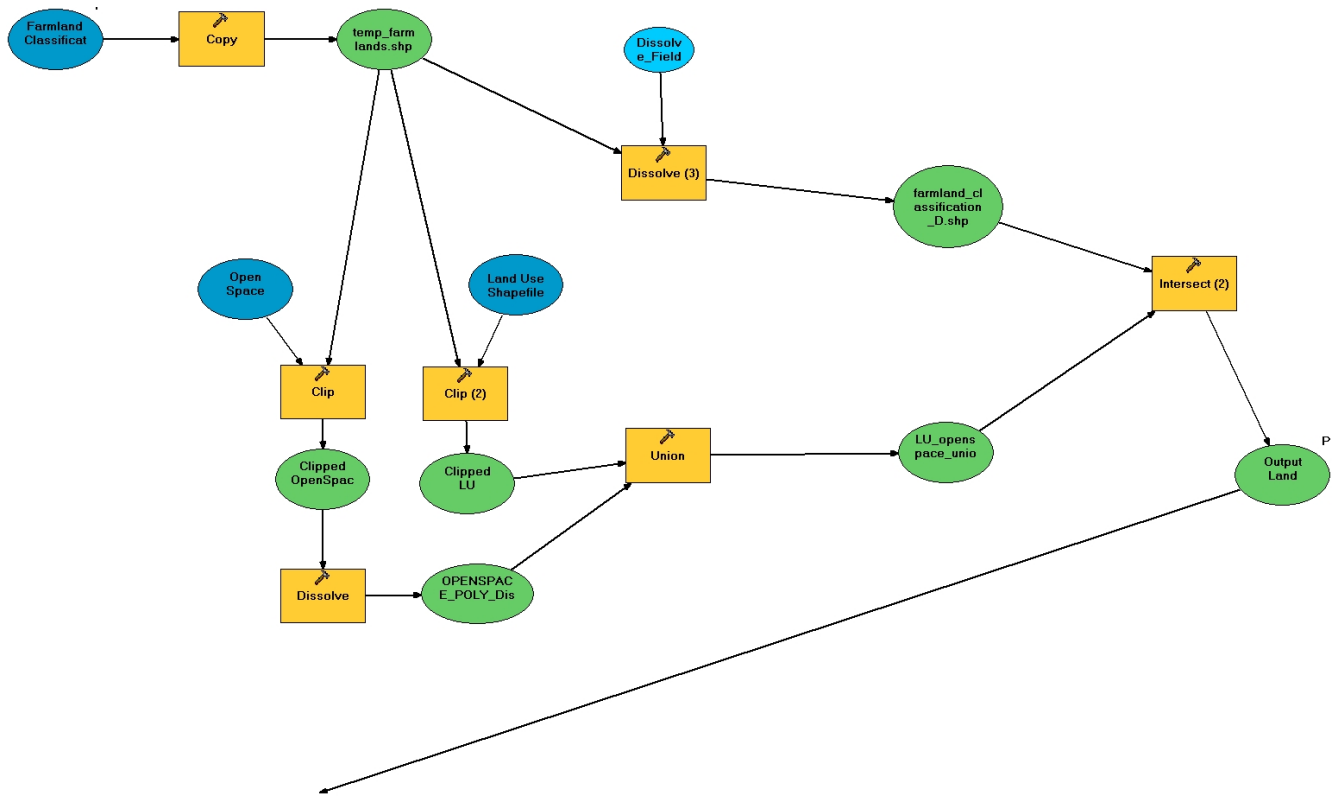


Figure 2. The diagram of model flow. NOTES: (1) the final pieces are removed here due to repetition of multiple commands for attribute table editing; (2) 'Dissolve field' is the farmland classification (Prime farmlands, etc.).

In creating the output shapefile of these 3 criteria, the model concatenates the text descriptions for each class to come out with these categories:

- Other Protected areas on lands not prime for farming
- Other Protected areas on prime farmland
- Protected agriculture/shrub/herbaceous on lands not prime for farming
- Protected agriculture/shrub/herbaceous on prime farmland
- Protected developed/barren on lands not prime for farming
- Protected developed/barren on prime farmland
- Protected forest on lands not prime for farming
- Protected forest on prime farmland
- Protected water body/ice on lands not prime for farming
- Protected water body/ice on prime farmland
- Protected wetland on lands not prime for farming
- Protected wetland on prime farmland
- Unprotected agriculture/shrub/herbaceous on lands not prime for farming
- Unprotected agriculture/shrub/herbaceous on prime farmland
- Unprotected developed/barren on lands not prime for farming
- Unprotected developed/barren on prime farmland
- Unprotected forest on lands not prime for farming
- Unprotected forest on prime farmland
- Unprotected water body/ice on lands not prime for farming
- Unprotected water body/ice on prime farmland
- Unprotected wetland on lands not prime for farming
- Unprotected wetland on prime farmland

The category, 'Unprotected agriculture/shrub/herbaceous on prime farmland' was used to create the page 1 hotspot map. Actual site information was aggregated up to the town-boundary polygons to allow for comparative regional analyses at that level.

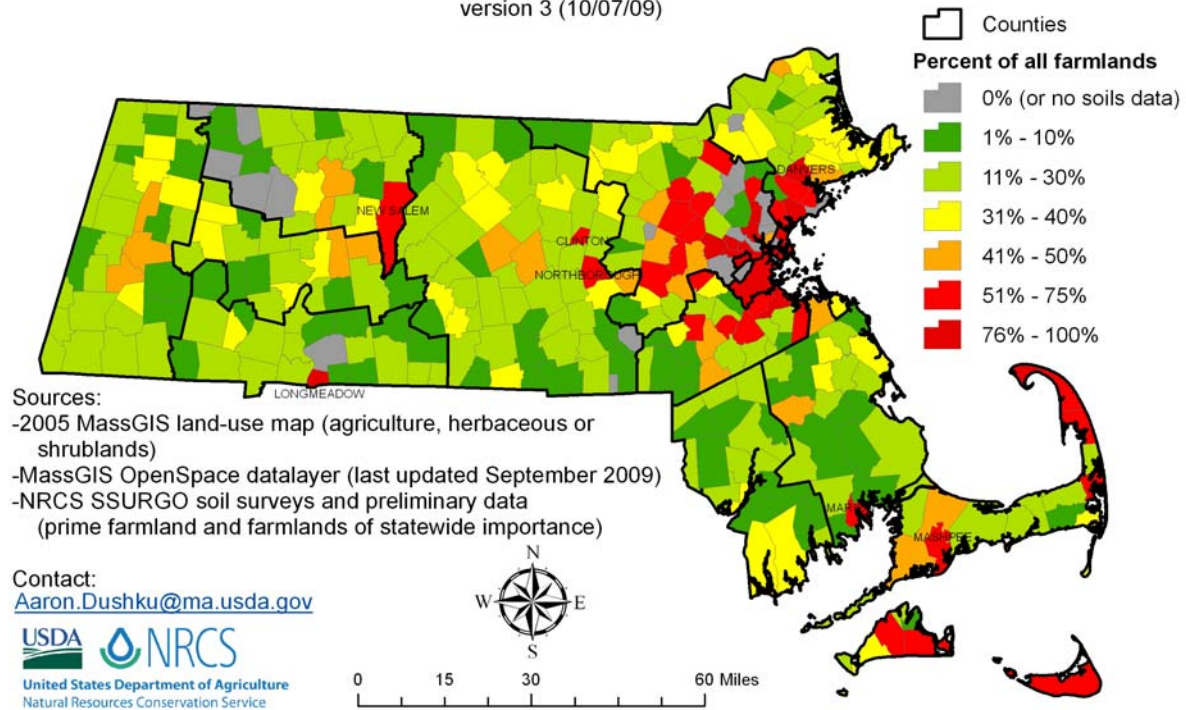
Additional maps were created to all visualization of the resultant data in different manners than the page 1 hotspot map. On the following 3 pages, these are shown alongside one another for comparative purposes:

- Figure 3-4. Percent of town agricultural lands protected vs. percent of prime agricultural lands protected.**
- Figure 5-6. Acres of town agricultural lands protected vs. acres of prime agricultural lands protected.**
- Figure 7-8. Acres of town agricultural lands unprotected vs. acres of prime agricultural lands unprotected.**

Hot-spots for farmland preservation in Massachusetts

Protected farmland on all soil-types

version 3 (10/07/09)



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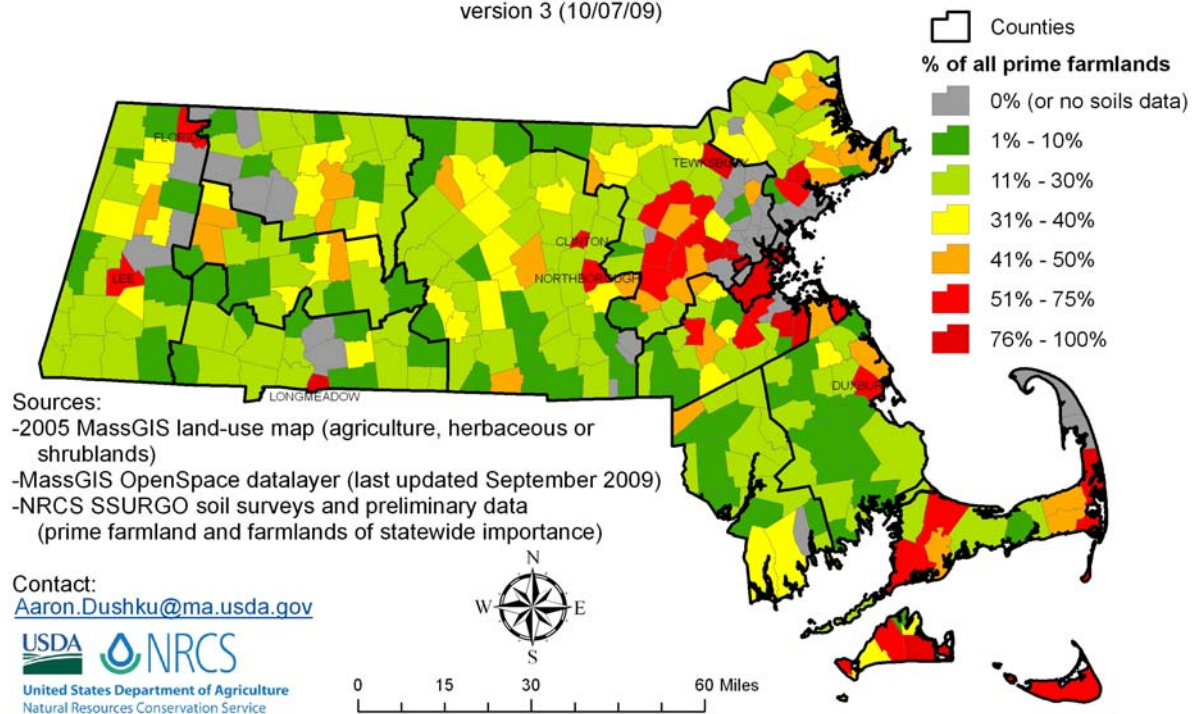
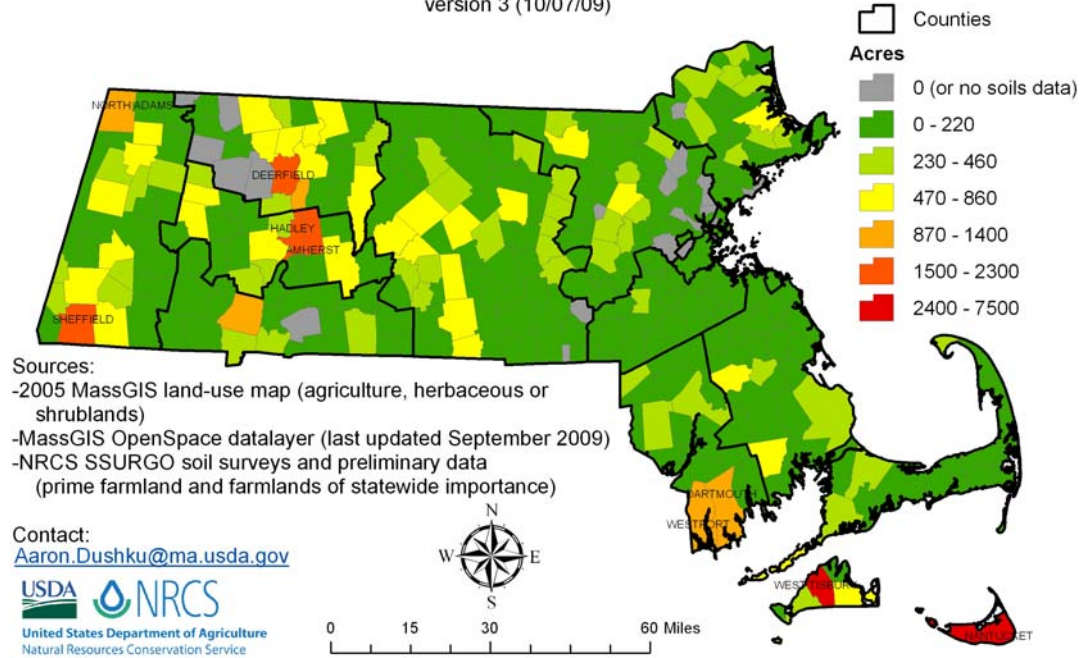


Figure 3-4. Percent of town agricultural lands protected vs. percent of prime agricultural lands protected.

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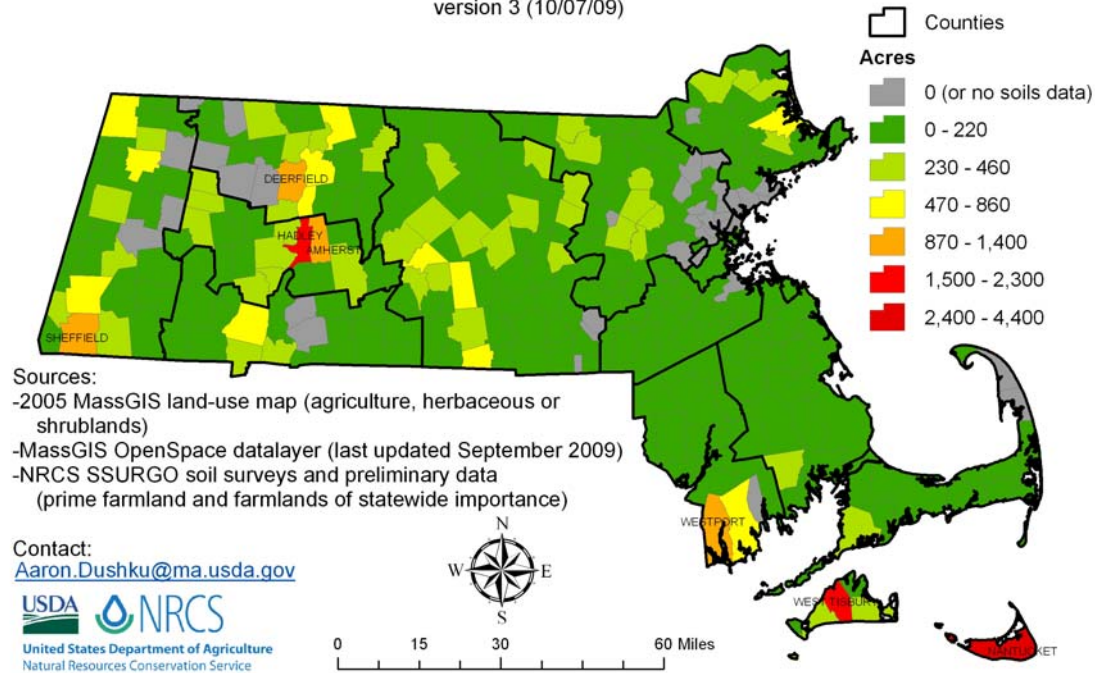
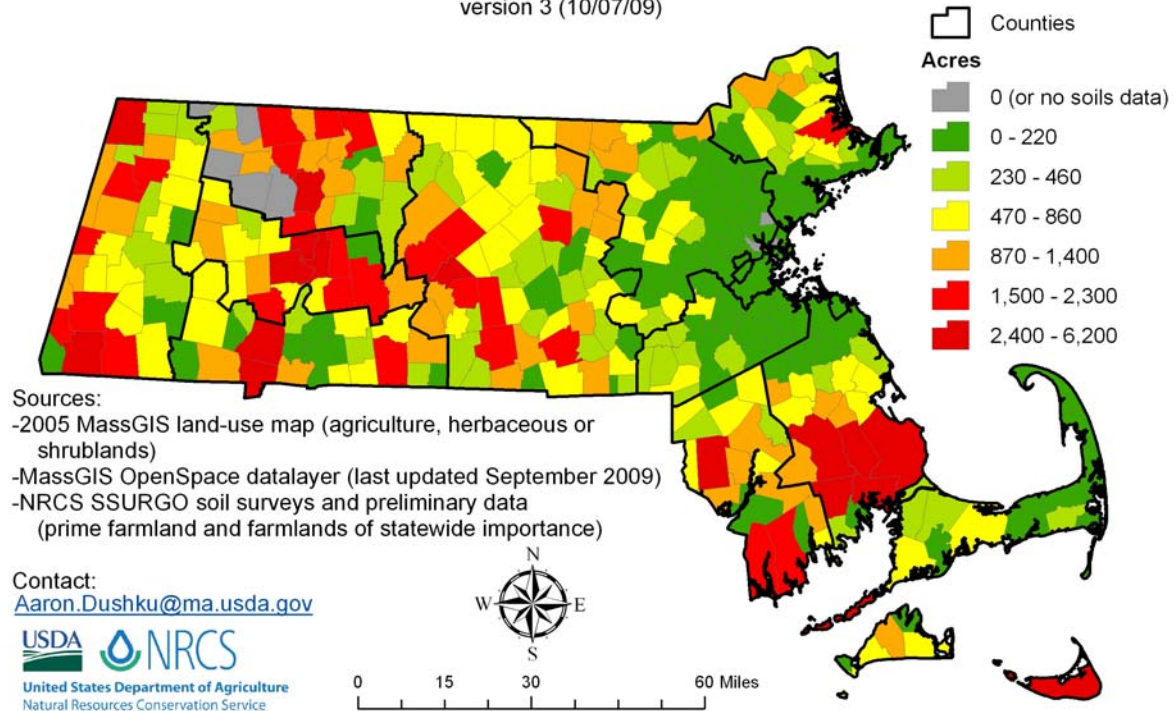


Figure 5-6. Acres of town agricultural lands protected vs. acres of prime agricultural lands protected.

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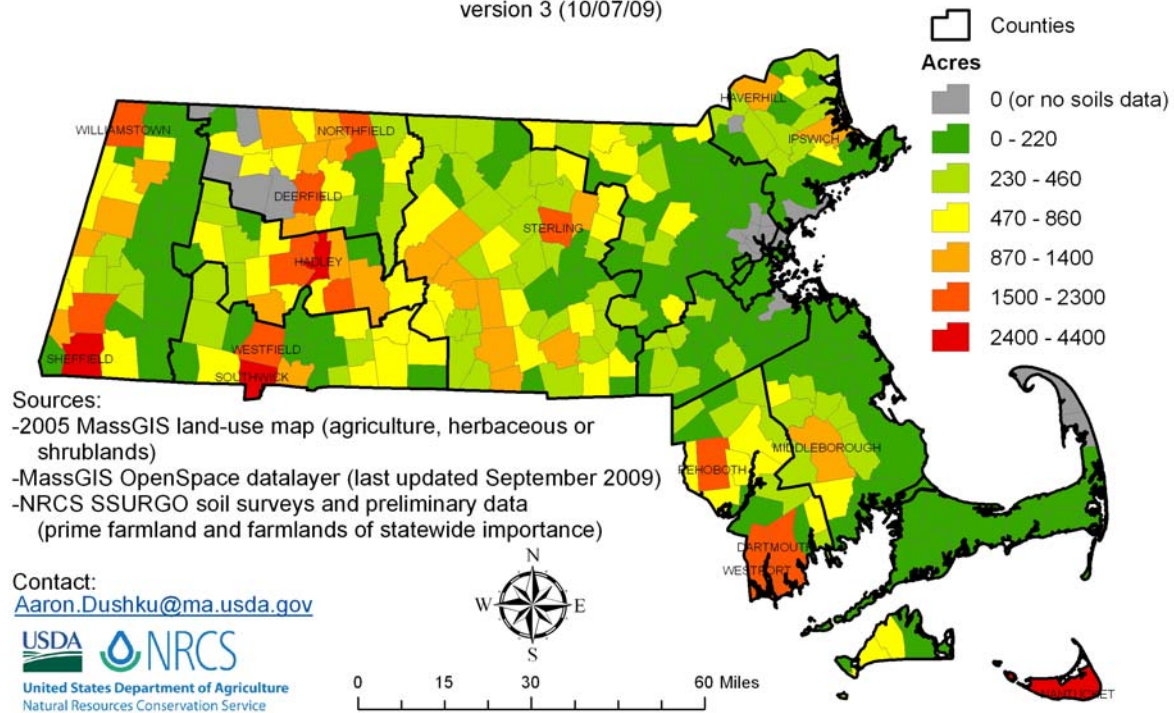


Figure 7-8. Acres of town agricultural lands unprotected vs. acres of prime agricultural lands unprotected.