

# National Conservation Easements and Cropland

Poster Design and Cartography by: Caroline Sluyter

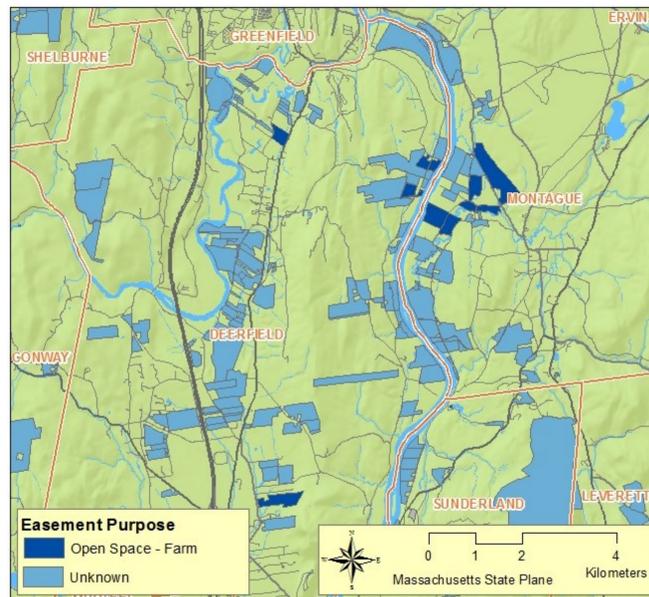
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## Introduction

The National Conservation Easement Database is a relatively new endeavor to put together georeferenced information about land easements all over the country. My project was to look at the NCED data for two towns, Deerfield and Montague, in Western Massachusetts and evaluate the quality and utility of the information provided. By looking at land use data I was able to evaluate how well the NCED had done in identifying cropland-specific easements. In comparing land use over a 20-year period, I measured agricultural land lost to development that could have been protected by land easements, thereby helping to define where land easements might be useful in the future. This exploration involved an examination of the spatial relationships between historical land-use data and conservation easement status.

This topic is extremely important to the future of food security in New England and across the country. The farmland in the Connecticut River Valley, which includes the towns of Deerfield and Montague, produces a large percentage of the agricultural crops grown in New England. The success of our regional food systems depends in large part on the continued use of this land for agricultural purpose.

## National Conservation Easements



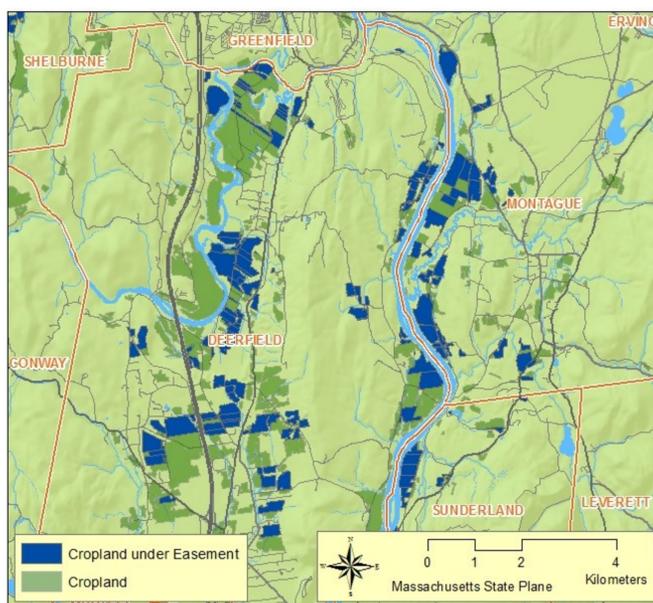
## Methodology

The land-use data for Deerfield and Montague depicts the locations of cropland plots in this part of the Connecticut River Valley in both 1985 and 2005. The NCED data estimates the locations of land easements in this region. The data about easement purpose is incomplete and they list many of the plots as Unknown easements. By combining the land-use data with the easements data I was able to show the spatial relationship between these layers.

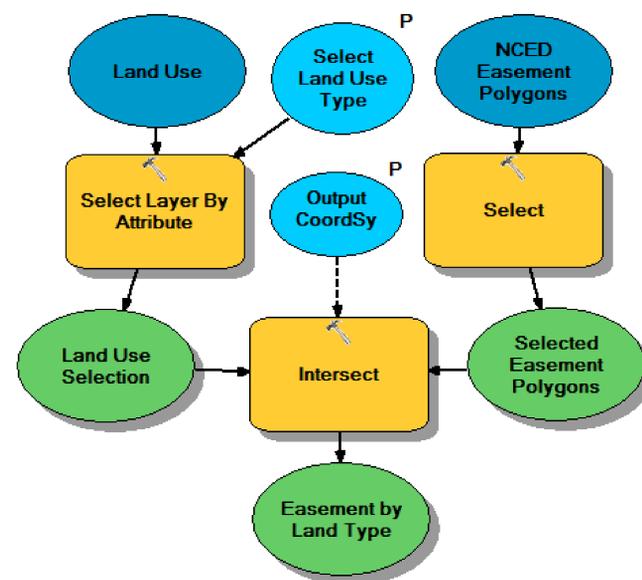
Model 1 used the 'Select Layer By Attribute' tool to select those plots of land categorized as cropland and the 'Select' tool to select all the conservation easements. The 'Intersect' tool identified those polygons that had the cropland attribute and intersected with conservation easement polygons.

Comparing land-use data from 1985 with land-use data from 2005, Model 2 identified all the polygons categorized as cropland for both years. Using the "Intersect" tool I found the land that had been in continuous use as cropland over that 20-year period and then subtracted those polygons from the total 1985 cropland using the "Erase" tool, which left me with the land that had been cropland in 1985 but had been transitioned into other use by 2005, giving me the Former Cropland layer. I used the "Erase" tool again to subtract the continuous cropland from the cropland in 2005 in order to estimate the land that had transitioned into cropland use, giving me the New Cropland layer.

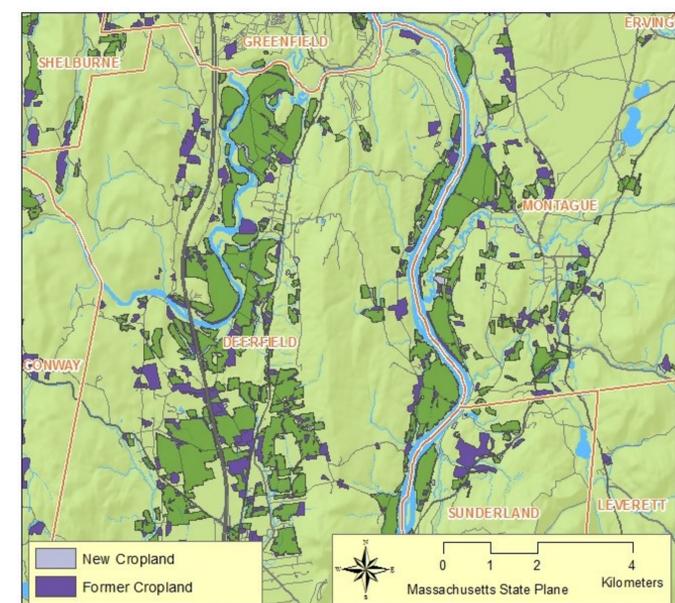
## Cropland Easements



## Model 1



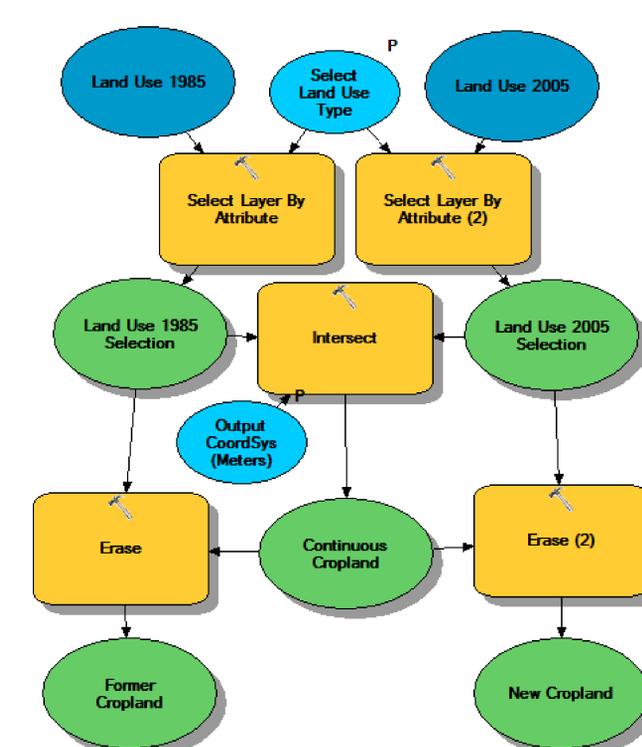
## Cropland Lost and Gained



## Results

Using Model 1, I was able to identify the land plots that are both categorized as cropland and as a land easement. The "Intersect" tool, the primary tool I used to examine the spatial relationships in my first model, achieved the metric I was seeking. It produced an estimate of the general pattern of cropland easement use in this region. My second model produced datalayers from which I was able to calculate an estimate of the total cropland area lost and gained between 1985 and 2005. According to my model, **this region lost 2,351 acres of cropland and gained only 518 acres.**

## Model 2



## Limitations

The NCED data was published in 2011 so it may not include all of the most recent changes in easement status. These data may also contain some errors related to the size and shape of various land parcels. Though not a perfect representation of reality, these data provide important information about the existence of easements and are useful in answering questions about where land easements might be used in the future.

The land use data were collected using digital ortho-imagery with a 0.5 meter resolution. The data were generally categorized using a minimum mapping unit of one square acre. Land use occurring on plots smaller than one acre was lumped into larger mapping units, thereby introducing the modifiable aerial unit problem and potentially blurring some of the real-life distinctions that exist within small land plots. Despite these precision limitations, this dataset suits our investigative purpose well in that it locates for us the cropland plots that are at least an acre in size. In fact, it is the age of the data (10 years) that is more problematic for our purposes. It's possible that there have been numerous land-use transitions in the past 10 years. Ideally, our data would be up-to-date and would reflect easement types without having to model the relationship using two datasets that were not created by the same group or for the same purpose.

## Sources

- Conservation Easement Data, May 2011, National Conservation Easement Database; <http://conservationeasement.us>, accessed March 23, 2015.
- Land Use Data, April 2005, Sanborn Geospatial Solutions; <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html>, accessed March 23, 2015.
- Land Use Data, 1985, University of Massachusetts, Amherst; <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus.html>, accessed May 2, 2015.