



North County Land Trust's

Creating Connections:

Mapping Conservation Priorities in

North Central Massachusetts

Workshop

January 28, 2020

MRPC

Leominster, MA



Contents

Stakeholder Knowledge and Thematic Values	4
Thematic Value Maps	5-7
Weighted Parcel Map- Analysis	8
Weighted Parcel Map	9
Weighted Scoring Matrix	10
Top Scoring Parcels- Maps	11-13
Using the Interactive Map Tools	14

We envision a future that connects our communities through conservation - where physical, ecological, recreational and economic interconnections are embraced - enriching the unique character of each community.

-North County Land Trust (NCLT), Strategic Conservation Plan Vision Statement

Thank you to our generous grantors and sponsors for this workshop.

- Community Foundation of North Central Massachusetts
- Beim Foundation
- Montachusett Regional Planning Commission



North County Land Trust
325 Lindell Ave
Leominster, MA 01453
978.466.3900

Introduction

North County Land Trust (NCLT) is a regional non-profit land conservation organization firmly rooted in north central Massachusetts. NCLT serves eleven towns and three small cities, with a focus on providing access to natural spaces for all communities within its diverse region. Conservation land trusts, like NCLT, facilitate the permanent protection of parcels owned by other organizations, municipalities and private landowners, make direct purchases of land for conservation and oversee conservation areas that are open to the public. In total, NCLT has protected 647.5 acres through direct purchase, conserved 383 acres through conservation restrictions and facilitated the permanent protection of 3,294 additional acres both independently and through conservation partnerships.

Conservation work of this nature requires collaboration between many different partners. NCLT has always partnered with municipalities, state agencies and other land trusts since its founding in 1992. Conservation partnerships across the region today work to expand upon conserved areas in order to build a network of ecologically intact conservation areas. NCLT's Strategic Conservation Plan is an effort to develop a prioritization system using the most recent data from the state **and local stakeholder knowledge**. The Conway School report identified and ranked unprotected parcels of ecological integrity across our region. We hope our stakeholders will find this information useful and that this process will instigate the formation of successful partnerships and land conservation projects.

The WHY?

Shaping Our Future Through Strategic Land Conservation

Massachusetts is at a turning point in land use. Research out of Harvard Forest in Petersham shows that our remaining forests' futures will be shaped by impacts associated with climate change and, to a much greater extent, development. A 2017 Harvard study concluded **conversion of forest land for development is the biggest near-term threat to the region** ¹. While climate change will slowly alter the health and types of trees that grow here, conversion will eliminate our forests and farmland altogether. The most recent data shows **New England loses about 65 acres of forest and farmland per day to development** ². Most of that development (74%) is from suburban residential construction. High-density development and the energy sector make up the remainder. Harvard Forest's Wildland and Woodlands report links the protection of forests and farms directly to advancing livable urban to rural communities ³.

North Central Massachusetts is rich in natural resources and has a unique mix of urban, suburban, and rural areas. It is also on the frontline for development pressure (Fig. 1) As housing prices in the Boston area continue to rise and congestion worsens, populations look to our region for relief and are finding affordable homes and excellent quality of life. In addition, we face a future that will include pressure from climate change refugees from within the US and globally ⁴. In fact Worcester County, including the communities of Fitchburg and Leominster, absorbed significant numbers of elderly, children, and families from Puerto Rico after hurricane Maria devastated the island ⁵.

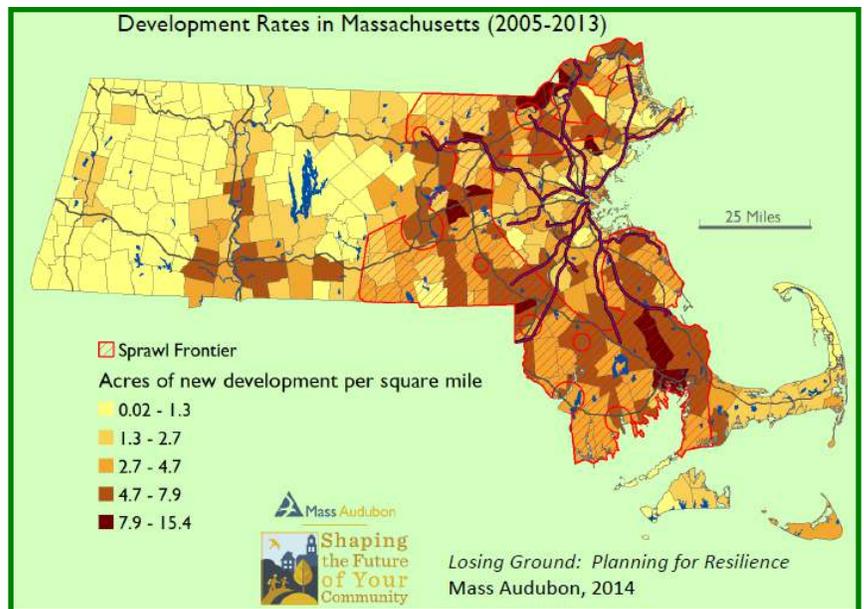


Fig. 1. Acres of New Development per Town from 2005-2013, from Mass Audubon's *Losing Ground* report

NCLT's Creating Connections Workshop

The quality of life that draws people to want to re-settle in north central Massachusetts is closely linked to our nature e.g. beautiful landscapes, outdoor recreation opportunities, clean air, and ample clean drinking water, etc. Developers, many of whom are not local, purchase forest land and farms on speculation oftentimes with little thought to what impacts their profit-seeking projects will have locally.

Development is necessary and desirable for our local economy and an expanding population. However, as the pressure to grow increases, local communities need to identify and protect those natural resources that are the most important and direct building toward areas with lower conservation value.

If we are not proactive about advocating for smart growth and low-impact development, we risk losing the only thing that's not replaceable: our undeveloped land. In addition to these quality of life aspects, it is widely known that conserved land is a low-cost, natural asset in confronting challenges like climate change and supporting local, resource-based economies.

But which land is the most important to protect? How can we use our natural resources to build and sustain our local economies? What can be done for land protection in and among communities with the limited resources available?

Beginning in Fall 2018, NCLT began answering that for ourselves. Our two well-attended public stakeholder meetings and countless individual meetings with local land trusts, Conservation Commissioners, local and state government officials, Open Space Committee members, and other conservation organization representatives helped identify the priority natural resources and perceived threats for each community and organization. These connections and conversations have led us in a direction we might not have originally orientated ourselves before this process began.

Stakeholder Knowledge and Thematic Values – Gathered from Your Input.

At our stakeholder meetings, participants identified four values, landscape connectivity, trail connectivity, farmland and water resources as those that best represent the highest thematic conservation priorities within the region.

NCLT stakeholders' thematic values form the parameters for the models developed for this project to analyze resources within the NCLT service area.



For the mapping component, we contracted with The Conway School in Northampton, MA to work on the geospatial analysis with the intent of discovering "focus areas" within our region where there is a confluence of factors making certain areas a higher priority for land conservation work. Their work was completed in April 2019.

This workshop is intended to bring the data back to our stakeholders for review. The interactive weighted parcel map has compiled the thematic values stated in the stakeholder meetings. Looking at this analysis will highlight areas that might have been overlooked, reframe existing priorities, illuminate collaboration opportunities, and spur conversations that will help us all further our own objectives.

Introduction to Analysis

The Conway School translated stakeholder values into conservation mapping tools that can help identify which parcels should have priority for conservation specific to our region. This GIS-generated analysis moves from maps based on a single theme in the Mapping Thematic Values section, to the Weighted Parcel Map section. The Weighted Parcel Map combines the datasets used in Mapping Thematic Values into a single scoring system that allows map users to rank and score the entire service area based on defined values.

The Conway School analysis concludes with a breakdown of:

- the top-scoring parcels within the service area (pg. 11)
- within each town (pg. 12), and
- the largest parcels within each town (pg. 13)

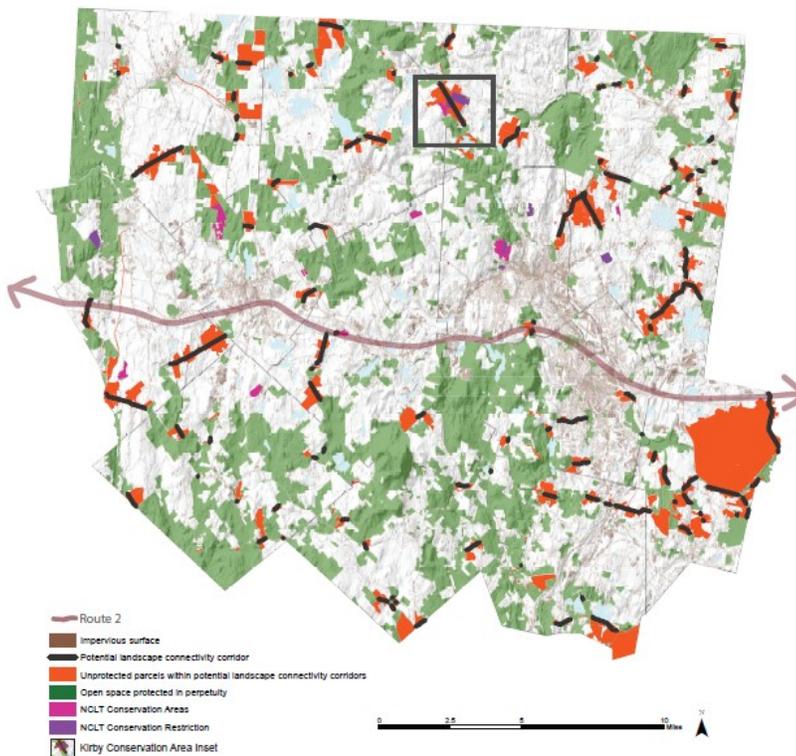
as identified by the Weighted Parcel Map, demonstrating just a few of the analyses possible using these tools.

Mapping Values with GIS Analysis

On-the-ground knowledge about parcels from stakeholders helps ensure that a given parcel is significant at the local level, and worthy of a community's conservation resources. This local knowledge can be bolstered with large-scale data that contextualizes parcels within broad-scale patterns of significant areas at the regional scale. By mapping the values identified by stakeholders as important for conservation using GIS, a number of landscape patterns emerge.

In addition to the stakeholder identified values of landscape connectivity, trail connectivity, water resources, and farmland, the values of "ecological integrity" and "climate resilience" were added to the GIS analyses. These additional values are important indicators of regional ecological intactness, and the land capacity for climate resilience in the future.

Thematic Value Maps



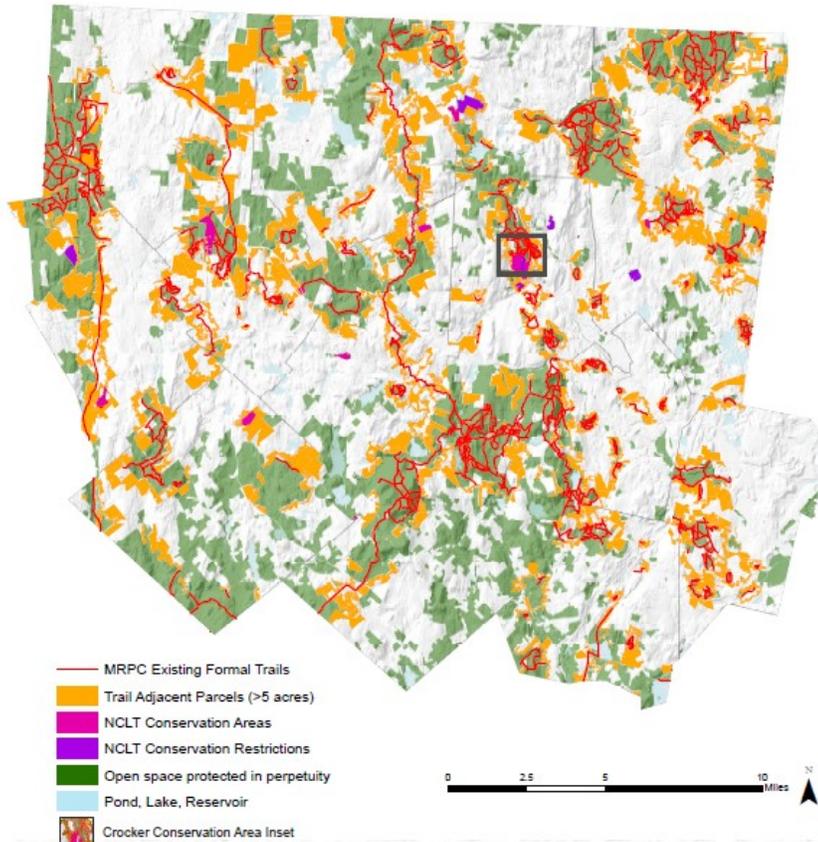
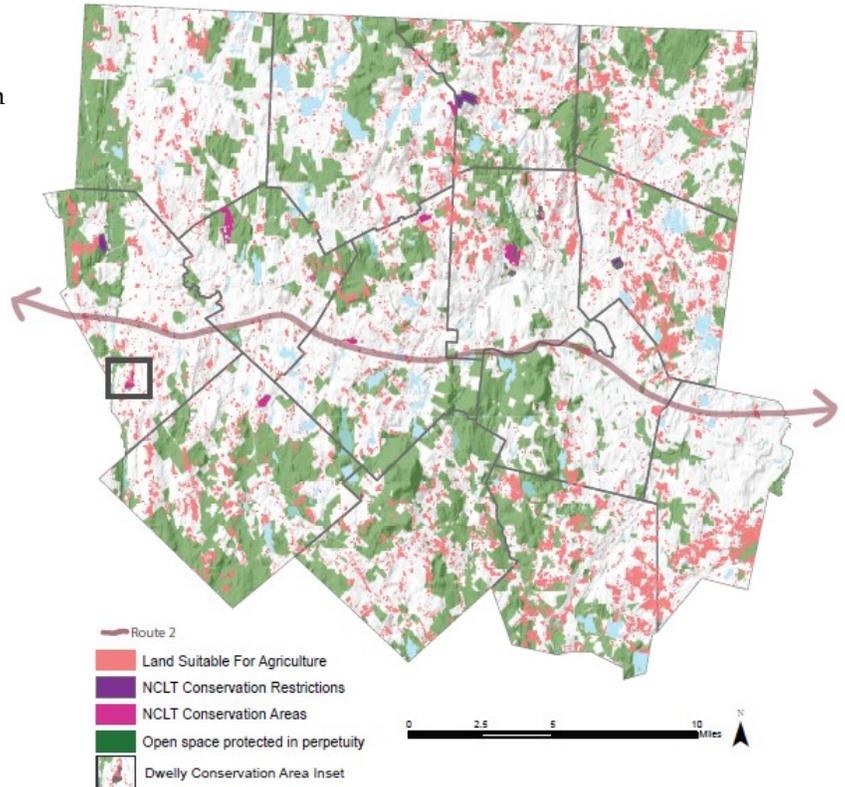
Landscape Connectivity

Massachusetts Office of Geographic Information (MassGIS):
Protected and Recreational Open Space (2019)
Standardized "Level 3" Assessors' Parcels (2019)
NHESP BioMap2 (2010)
MassDEP Hydrography (1:25,000) (2017)
Impervious Surface (2005)
Shaded Relief (1:5,000) (2005)
UMass Designing Sustainable Landscapes:
Conductance (2017)

Thematic Value Maps, cont.

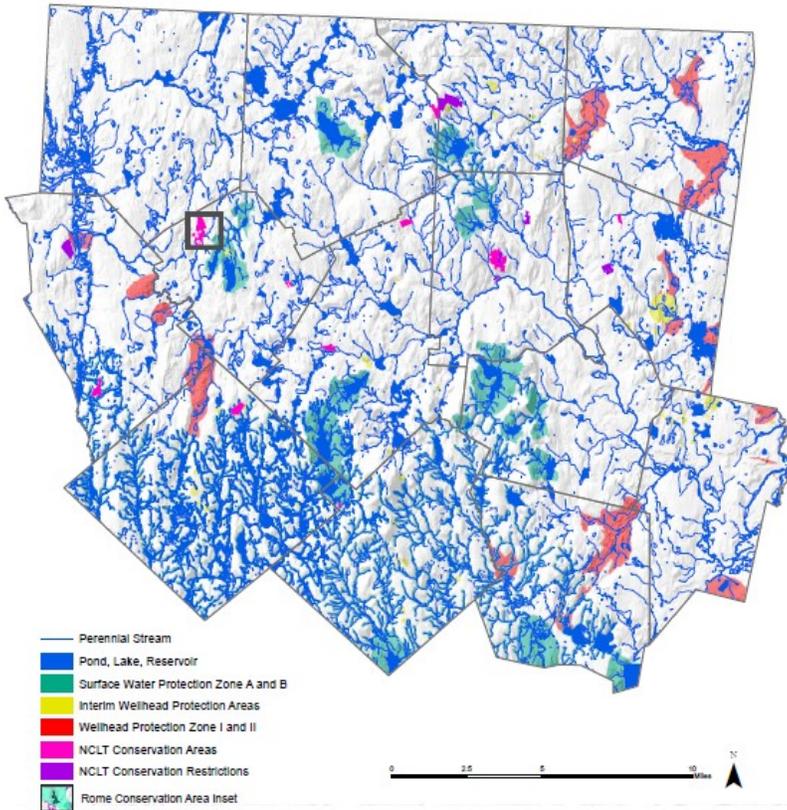
Farmlands

- Massachusetts Office of Geographic Information (MassGIS):
- Protected and Recreational Open Space (2019)
- MassDEP Wetlands (2005)
- Land Use (2005)
- NRCS SSURGO-Certified Soils (2012)
- MassDEP Hydrography (1:25,000) (2017)
- Shaded Relief (1:5,000) (2005)



Trail Connectivity

- Massachusetts Office of Geographic Information (MassGIS):
- Protected and Recreational Open Space (2019)
- Standardized "Level 3" Assessors' Parcels (2019)
- MassDEP Hydrography (1:25,000) (2017)
- Shaded Relief (1:5,000) (2005)
- Montachusset Regional Planning Commission: "Existing Formal Trails"

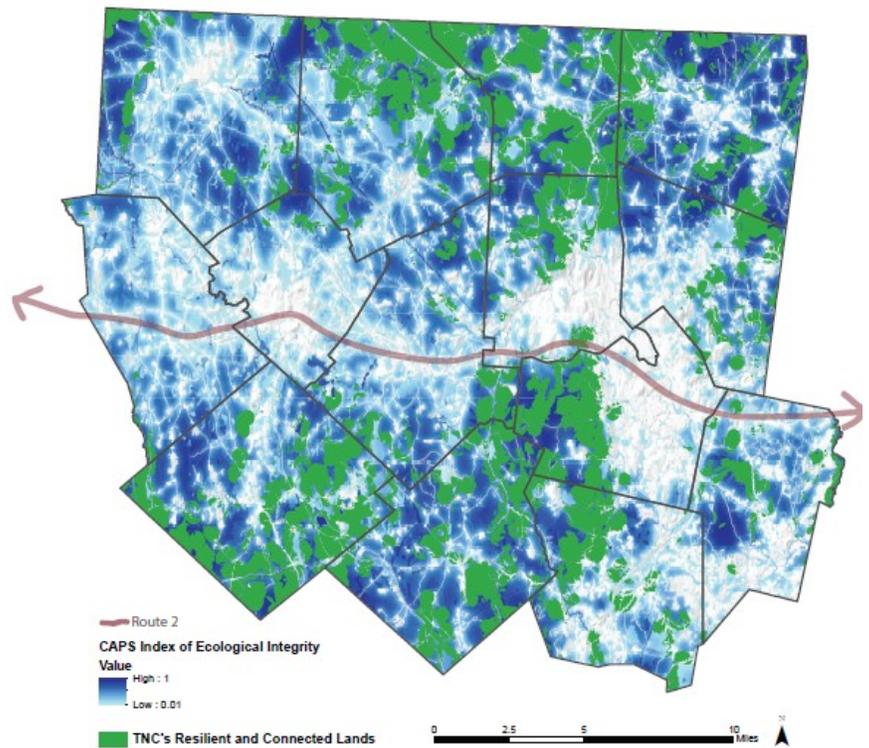


Water Resources

Massachusetts Office of Geographic Information (MassGIS):
 MassDEP Hydrography (1:25,000) (2017)
 MassDEP Wellhead Protection Areas (Zone II, Zone I, IWPA) (2019)
 Surface Water Supply Protection Areas (ZONE A, B, C) (2017)
 Shaded Relief (1:5,000) (2005)

Ecological Integrity and Resilient and Connected Lands

Massachusetts Office of Geographic Information (MassGIS):
 Shaded Relief (1:5,000) (2005)
 UMass Designing Sustainable Landscapes:
 Index of Ecological Integrity (2011)
 The Nature Conservancy:
 Resilient and Connected Lands: 6 Classes (2016)



Ecological Integrity and Climate Resilience

Conservation Value of Individual Parcels

In order to map these values and make parcel assessments based on them, criteria for each value is defined. Criteria are further split into indicators, which informed what GIS data layers are used, modified, or combined to represent the value in question as accurately as possible.

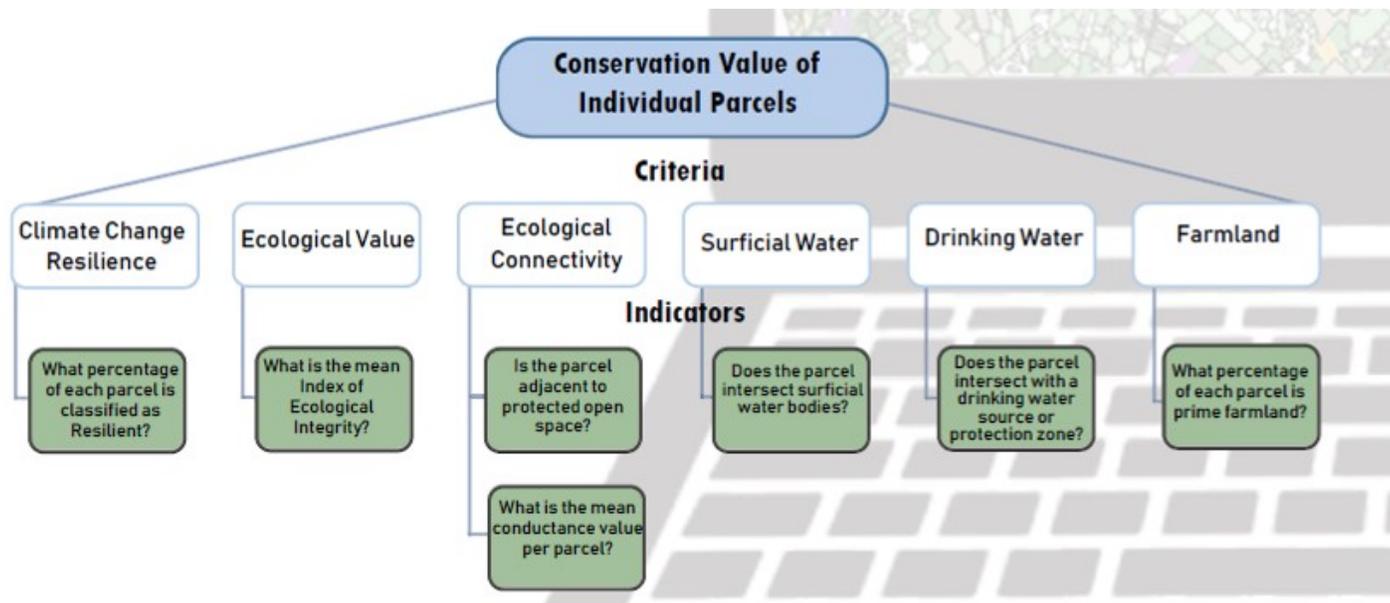


Fig. 3- Flow chart illustrating the method for scoring individual parcels. Values were first broken down into criteria, and these criteria were assessed based on indicators.

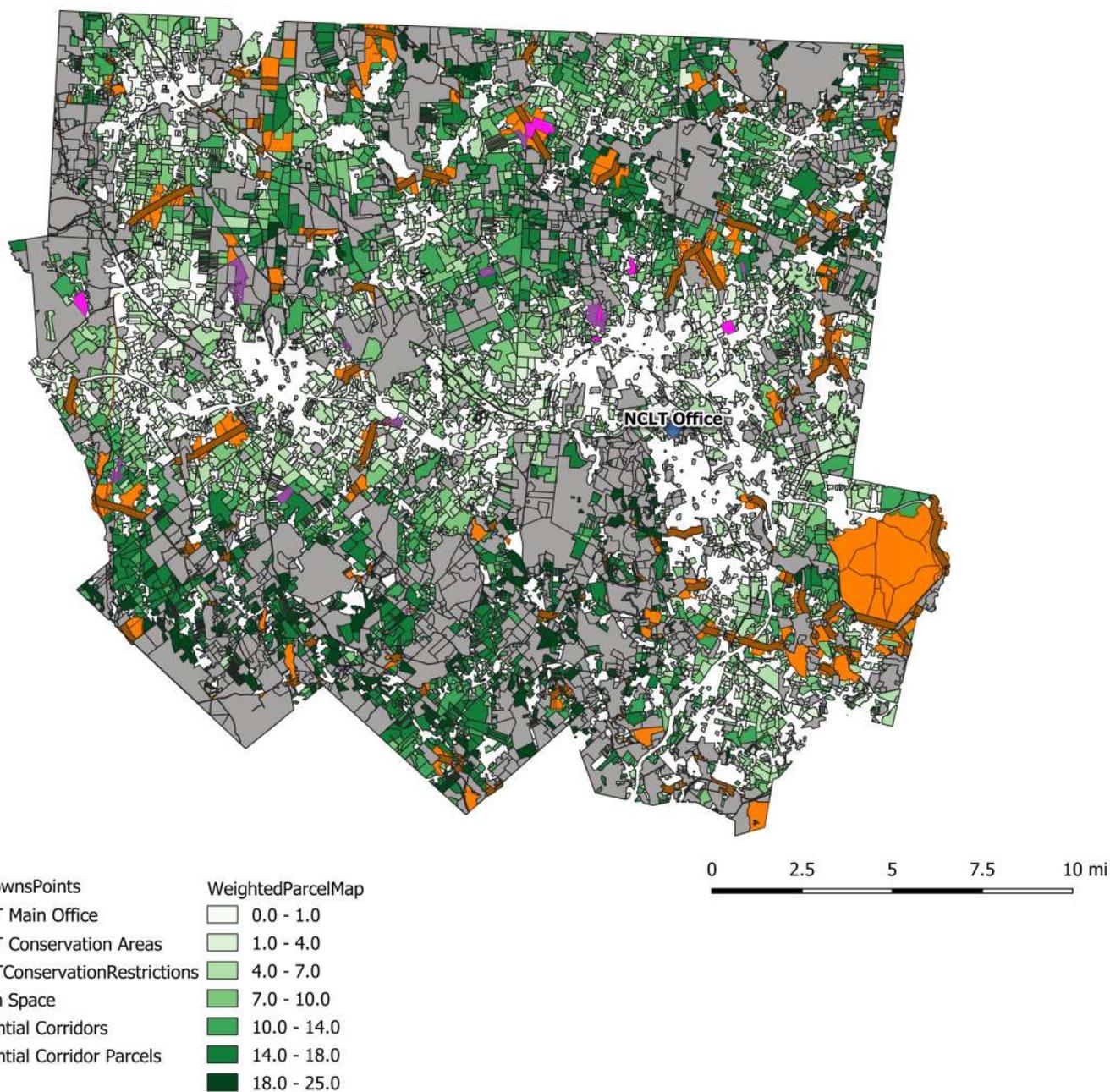
Weighted Parcel Map

The Thematic Value maps in this report identify specific parcels of conservation interest based on their thematic value eg. **Connectivity** or **Farmland**. The weighted parcel map assigns a conservation value to each parcel in the service area.

In the weighted parcel map overlap is the primary factor in scoring parcels for conservation value. If several criteria overlap in a parcel that parcel score increases. Parcels with the darkest green score the highest.

In this analysis, overlap is the primary factor in scoring parcels for conservation value. If several criteria overlap within a parcel, that parcel's conservation score increases.

The darkest green areas appear in the southwest and northeast sections of the service area. These areas have a lower population density and have been less fragmented by development. Any area in white is composed of either parcels smaller than five acres or lakes that have no distinct owner. The largest white space clusters in the weighted parcel map are centered around Leominster, Fitchburg, Gardner, Winchendon, and Sterling. Greater populations in these towns have increased the amount of subdivisions and decreased the average parcel size. As a general trend, these areas are also more developed and fragmented, and parcels within and near urban cores have lower aggregated conservation scores.



Weighted Scoring Matrix

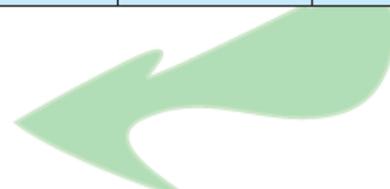
Behind the shade of green is a total score. Using a GIS statistic tool, the mapping program took the scores for each indicator within a parcel (i.e. ecological integrity, climate resilience, farmland, etc.) then added them together to determine a "total score" per parcel. It is important to note that parcel prioritization can be modified with the inclusion or exclusion of certain indicators.

The figure below shows how each indicator was scored on an individual parcel basis. It is important to recognize that a low ranking parcel might be significant and high ranking in one category but not in the others, affecting the total score. This is why the tool is a good first look at the overall parcel significance but full analysis should include other considerations.

Weighted Scoring Matrix

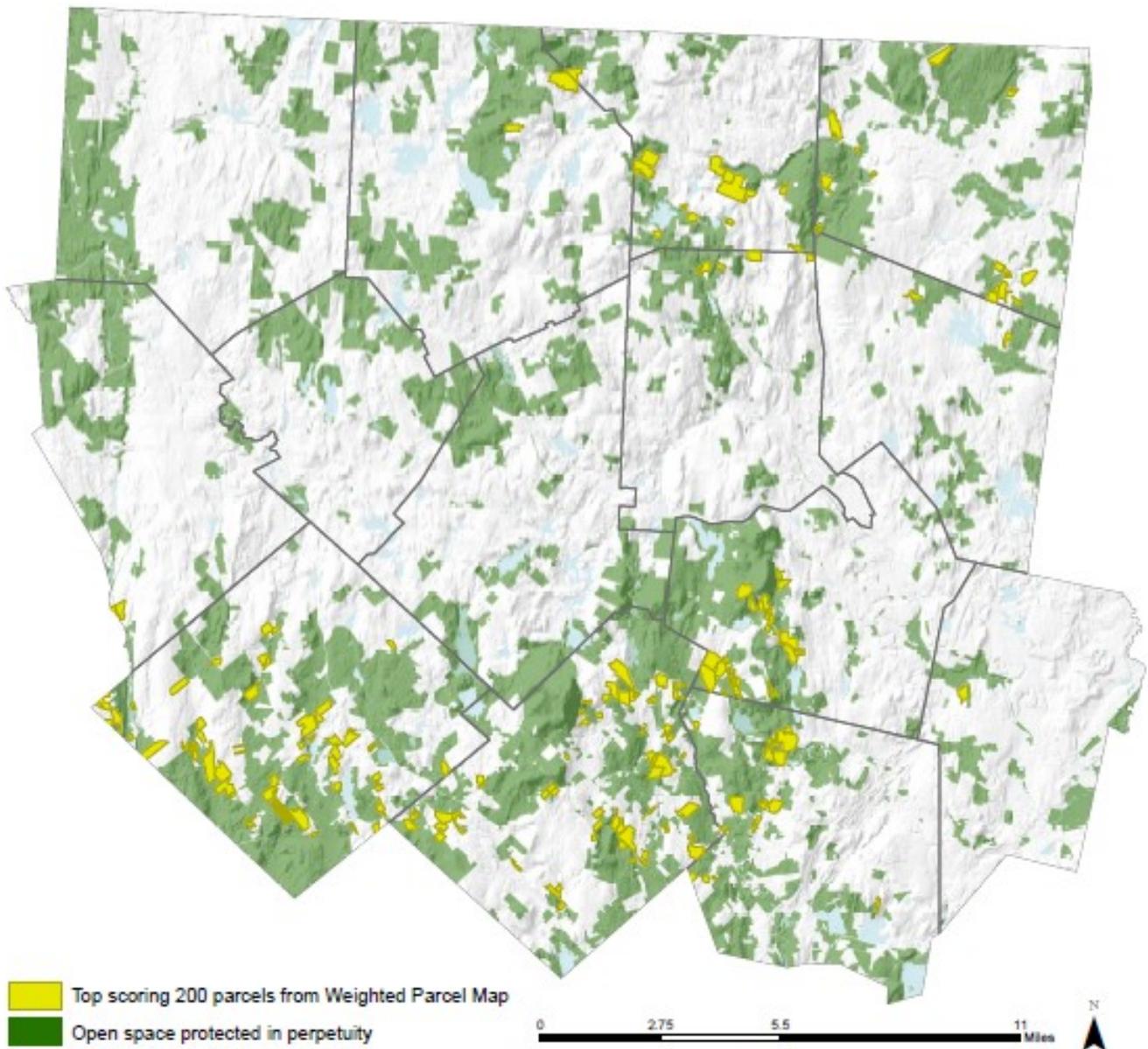
Criteria	Indicators	Indicator Overlap With Parcel	Score
Ecological Value	Index for Ecological Integrity (CAPS)	0	0
		very low	1
Connectivity	Contiguous to Open Space preserved in perpetuity	medium	3
		highest	5
		No	0
Climate Change Resilience	Conductance (ecological permeability)	Yes	3
		0	0
		very low	1
Farmlands	The Nature Conservancy's Resilient and Connected Landscapes	medium	3
		highest	5
		0%	0
Water Resources	Agricultural Land (using Tuft's Data Lab process for identifying prime agricultural lands)	0-50%	3
		50-100%	5
		0%	0
		1-33%	1
Water Resources	Drinking Water (Surficial drinking water protection, Zones A and B; groundwater protection, Zones I and II; and IWPA's)	33-66%	3
		66-100%	5
		Does not intersect with feature	0
Water Resources	Surface Water (Wetlands, Perennial Streams, Lakes, Ponds, Reservoirs)	Intersects with feature	3
		Does not intersect with feature	0
		Intersects with feature	3

Total Score Per Parcel

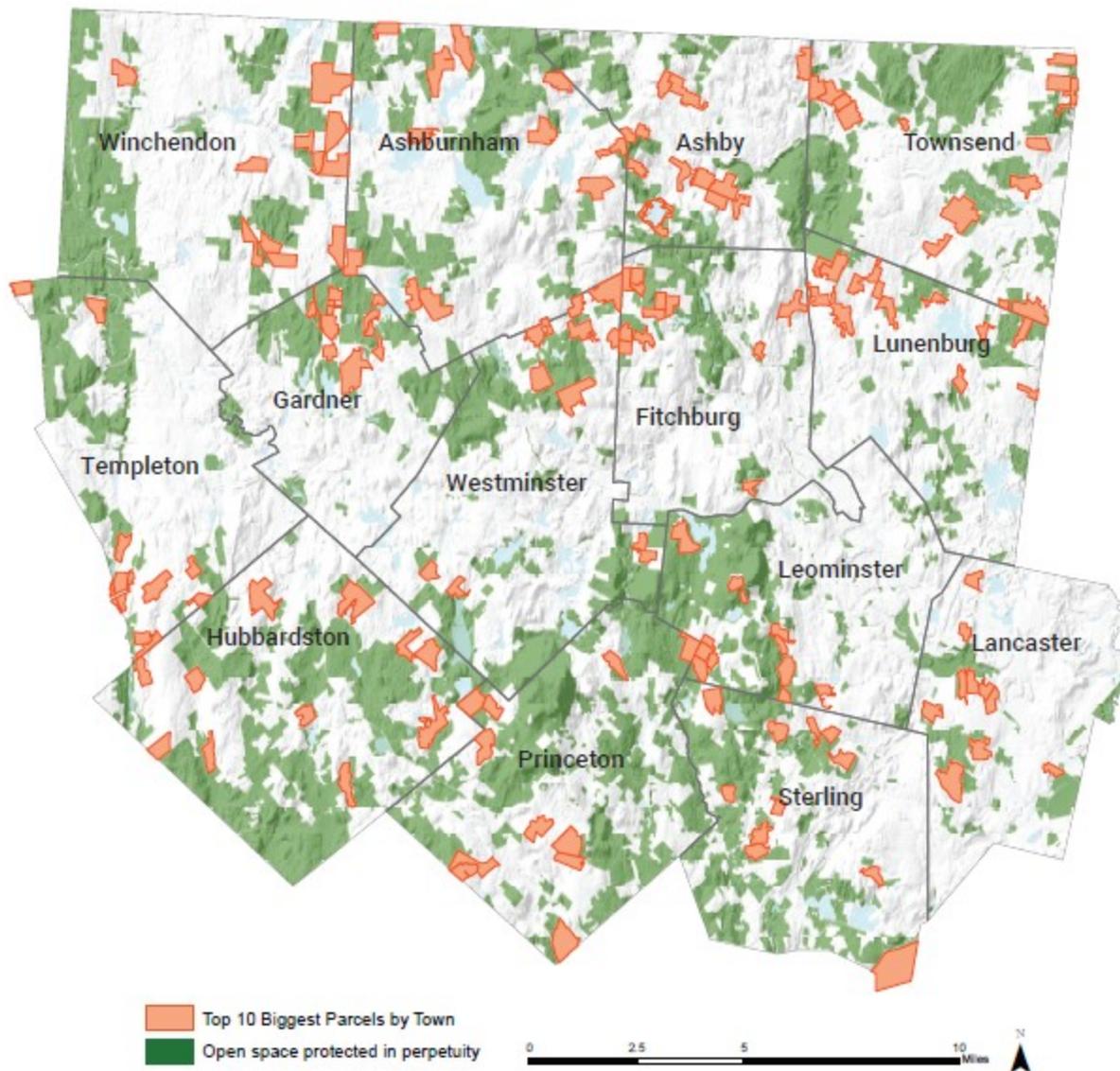


The analysis resulted in the highlighted extraction of high ranking parcels filtered through three different parameters: the Top 200 Scoring Parcels in the Region, Top 10 Scoring Parcels in each Town and the Ten Largest Parcels in each Town.

Top 200 Scoring Parcels in the Region

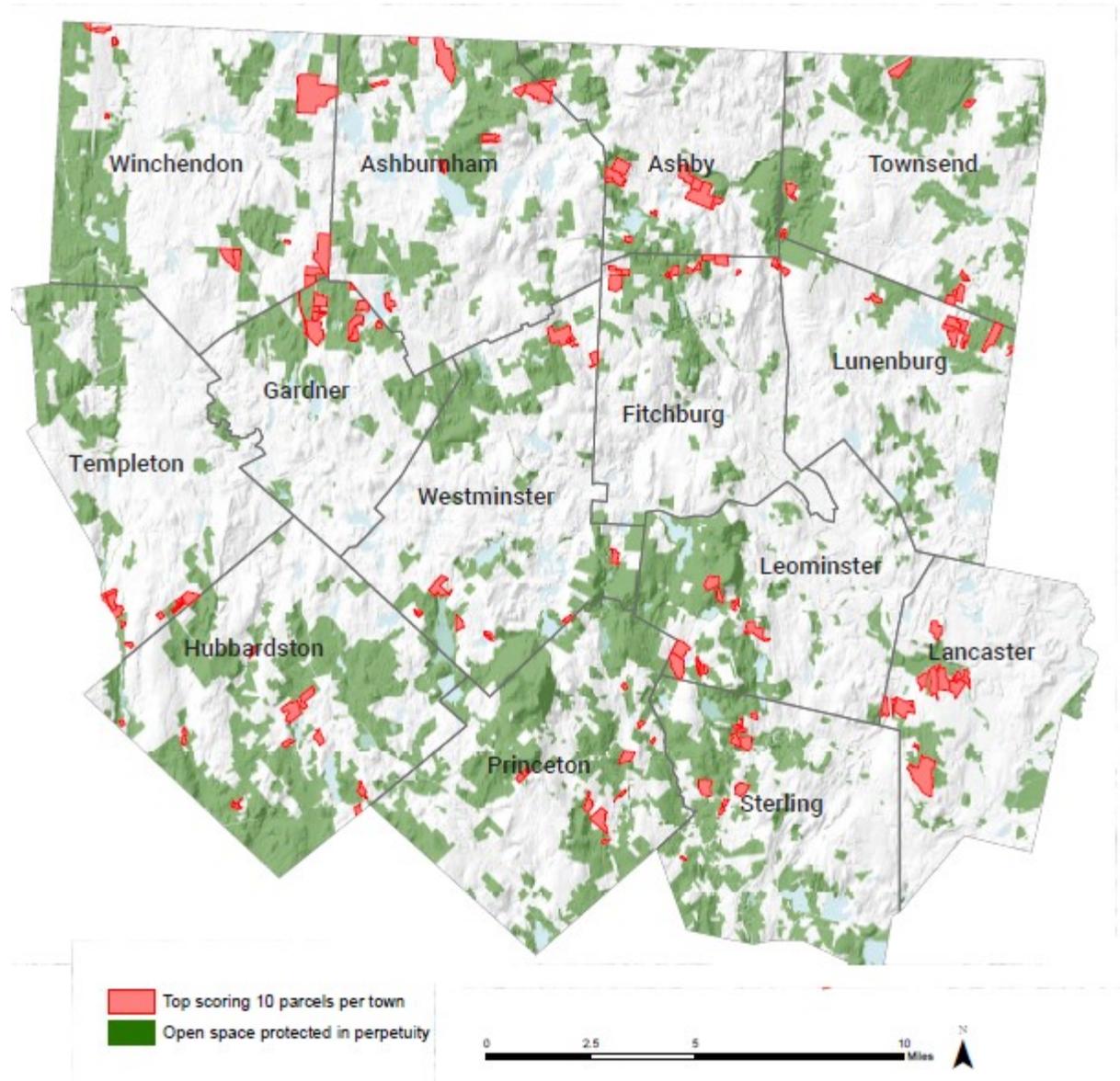


Top 10 Largest Parcels Per Town



Top 10 Largest Parcels Per Town: This dataset may become helpful if NCLT decides parcel size is a high priority. This map illustrates the ten largest parcels per town regardless of score. NCLT staff can use this dataset to identify which of the largest parcels within this list contain values and resources of interest, and target these parcels for conservation. These parcels make up 16,469 acres, with an average parcel size of 111 acres. This analysis excluded the single parcel that makes up Devens South Post in Lancaster, as the parcel was an outlier at 4,696 acres in size.

Top 10 Highest Scoring Parcels Per Town



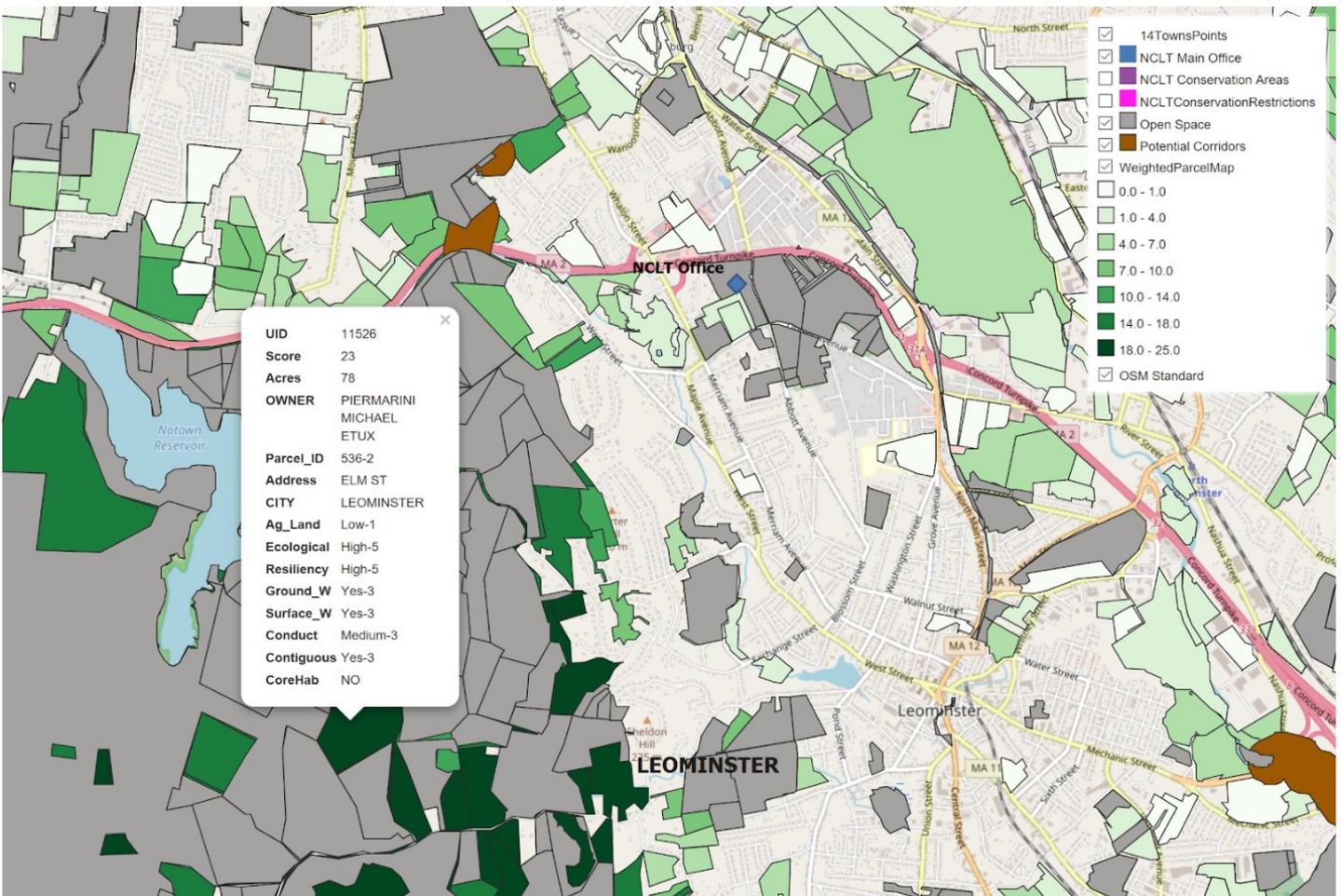
Top 10 Highest Scoring Parcels Per Town: To consider all municipalities equally, this map applies an alternative approach by identifying the top 10 highest scoring parcels within each town. Targeted outreach to these landowners may increase the likelihood of landowner interest, as residents of different towns have varying degrees of interest in conservation. By looking at the top parcels in each town, NCLT can serve as a resource for towns and town-level land trusts.

Using the Weighted Parcel Maps

There are two different user interfaces to view and reference the weighted parcel map. The Interactive Weighted Parcel Map is in a file format that uses a browser (Internet Explorer, Google Chrome, Safari, or Firefox, for example), but does not require internet access for its functioning. The file is provided in a folder which includes the browser interface itself, along with several additional folders which encode the data. (If you do not have the Weighted Parcel Map folder, contact NCLT for access.) Once in the Weighted Parcel Map Folder, double-click the Weighted Parcel Map file to open it in your browser. Additionally, you can access the maps from our Creating Connectivity Report in an interactive web format by following this link: <https://arcg.is/LyH9K>

Weighted Parcel Maps are an easy-to-use tool for conservation groups to quickly assess the conservation value of any ranked parcel within the service area. Parcels that are smaller than 5 acres or lakes that have no distinct owner are shown in white on the map and not as individual parcels.

The Map was developed using complex criteria and robust data, but should not replace other means of parcel assessment. Instead, it should complement additional mapping data and as on-the-ground analysis.



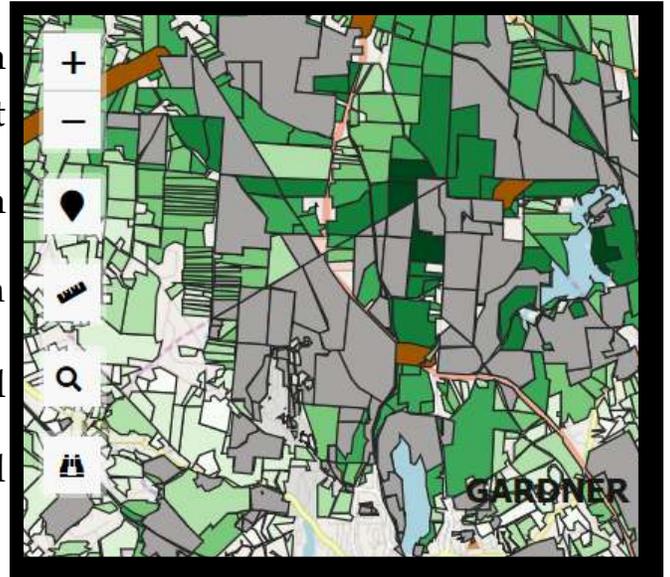
Weighted Parcel Map Interface: Screenshot of the Weighted Parcel Map with illustrated tool functions, which include zoom in/out, zoom to user location, measurement of distance or area, address search, and Parcel ID search.

The functionality of the Weighted Parcel Map includes:

- scrolling to zoom,
- searching by either a location or Parcel ID,
- zooming to the user's location, and
- toggling on and off individual layers.

Tool Bar Features

- Zoom In
- Zoom Out
- Zoom to Your Location
- Measure a Distance or Area
- Street Address Search Tool
- Parcel ID Search Tool



Upon clicking any Weighted parcel, an attribute table appears with the fields, each of which is described below. Features located in the top left corner of the window include zooming to parcels, user location, a measurement tool, zooming based on address, and zooming based on Parcel ID.

Fields :	Description
UID	An unique ID associated with each individual parcel. This allows the computer to recognize and associate distinct information for each parcel.
Score	This is the cumulative score of the parcel derived from the weighted scoring analysis
Owner	The registered owner of the parcel
Address	Parcel address
City	City in which parcel is located
Ag_Land	The percentage of the parcel identified as agriculturally significant (ranges from "None-0" to "High-5")
Ecological	This is a metric of average Index of Ecological Integrity using the UMass CAPS data layer (ranges from "None-0" to "High-5").
Resiliency	This is a score based on the percentage of a parcel's overlap with TNC's Resilient and Connected Lands layer. Parcels with a "Low-1" score still have resilience value.
Conduct	This a mean value assigned to each parcel based on its ecological conductivity or permeability (ranges from "None-0" to "High-5").
Contiguous	Parcels contiguous to Open Space are assigned three points ("Yes-3") and zero points if they are not contiguous ("No-0").
Drink_W	Parcels that fall within a groundwater AND/OR surficial drinking water protection zone are given three points and labeled "Yes-3". Parcels not intersecting a ground and/or surficial drinking water source are given zero points and labeled "No-0".
Surface_W	Parcels that are intersected by a wetland or perennial stream, or that are within 50 feet of a surficial waterbody are given three points and labeled "Yes-3". Parcels not intersecting a water feature are labeled "No-0" and are given zero points.
CoreHab	A "Yes/No" designation was made for parcels that overlap with BioMap2 Core areas. These areas are not given an additional score, to prevent double weighting with the Index of Ecological Integrity dataset, a dataset used to identify BioMap2 Core Habitat areas.

Where do we go from here?

- Connect with Landowners- Make sure they are aware of ALL of their options, including conservation
- Advocate for Smart Growth policy adoption and enforcement of existing by-laws
- Look for partnerships and creative financing arrangements
- More detailed analysis of River Greenways and corridors identified by Conway (e.g. trails and connectivity corridors)
- **Consider a different approach to our Rt 2 corridor and EJ Neighborhoods**
- *Meet quarterly as a group or form a regional "conservation alliance"?*
What are your suggestions?



Ultimate Goal: Identify and protect land that is most important and direct building toward areas with lower conservation value.

Thank you for connecting with us today!

Notes, ideas, thoughts...

NCLT's Creating Connections Workshop

NOTES:

1. Foster, David et. al. Wildlands and Woodlands, Farmland and Communities: Broadening the Vision for New England. 2017 Report. Harvard University Press.
2. Foster, David et. al. Wildlands and Woodlands, Farmland and Communities: Broadening the Vision for New England. 2017 Report. Harvard University Press.
3. Foster, David et. al. Wildlands and Woodlands, Farmland and Communities: Broadening the Vision for New England. 2017 Report. Harvard University Press.
4. Hauer, Mathew E. May 2017. Migration induced by sea-level rise could reshape the US population landscape. Nature Climate Change, Vol. 7. Department of Geography, University of Georgia. www.nature.com/natureclimatechange
5. Meléndez, Edwin, Hinojosa, Jennifer, and Roman, Nashia. Issued March 2018. Puerto Rican Post -Maria Relocation By States. Research Brief. Center for Puerto Rican Studies, Hunter College, CUNY. centropr.hunter.cuny.edu



North County Land Trust
325 Lindell Ave
Leominster, MA 01453
978.466.3900