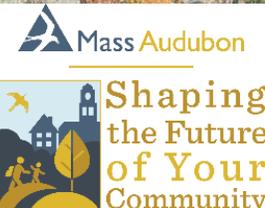


MAPPING TOOLS FOR A MORE RESILIENT FUTURE:

New England Landscape Futures Scenarios

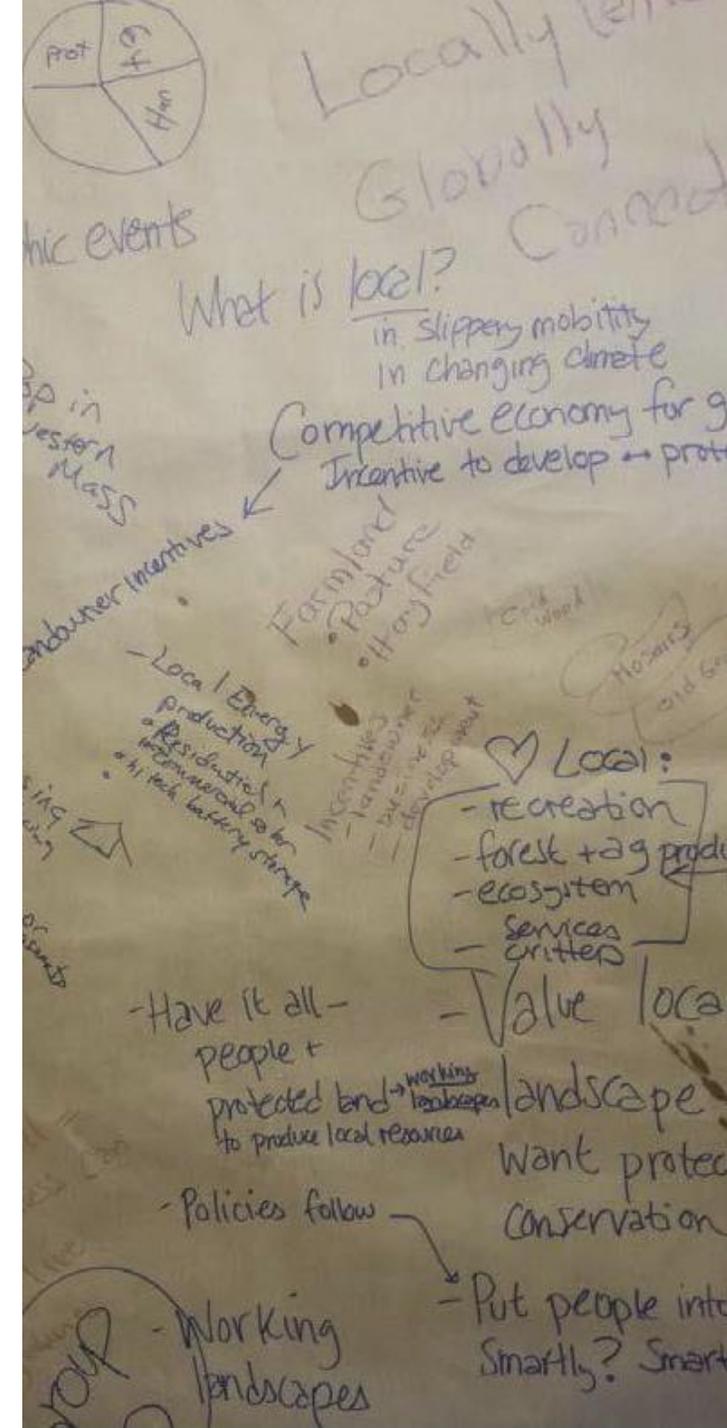
Lucy Lee, Harvard Forest
E. Heidi Ricci, Mass Audubon



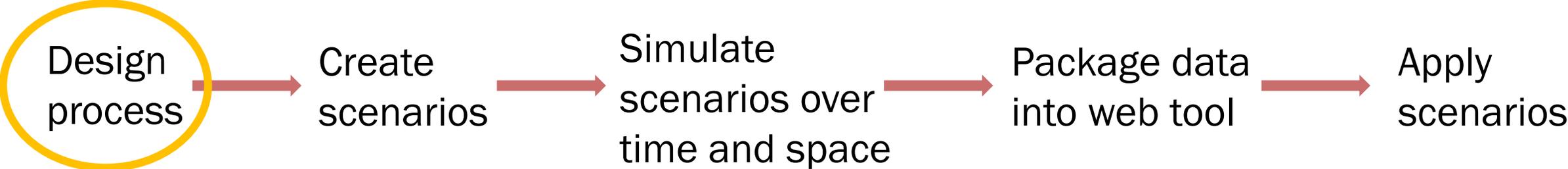
Presentation Overview

- Introduce the New England Landscape Futures Project
 - Stakeholder-driven scenario development
 - Results
- Demonstrate the New England Landscape Futures (NELF) Explorer
- Provide examples of applications
 - Using the NELF Explorer
 - Using the land-use data
- Share contact information for follow-up

Goal: Provide diverse examples of how the NELF project can be useful for land trusts, including yours!



NELF Approach = Stakeholder Engagement



E N G A G E

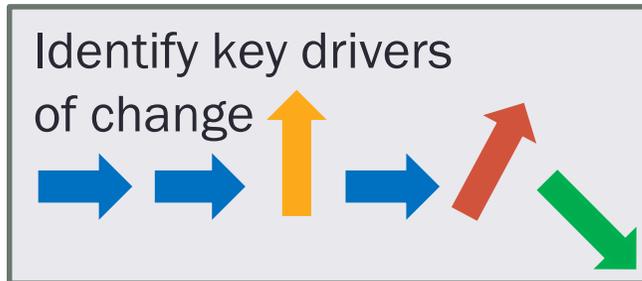


Scenario-building process

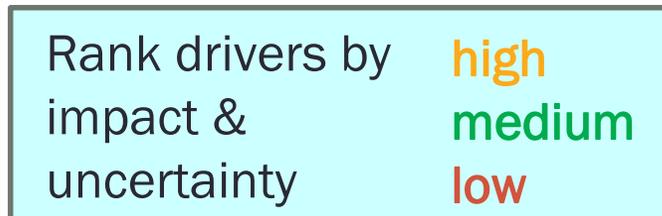
(1)



(2)



(3)



(4)



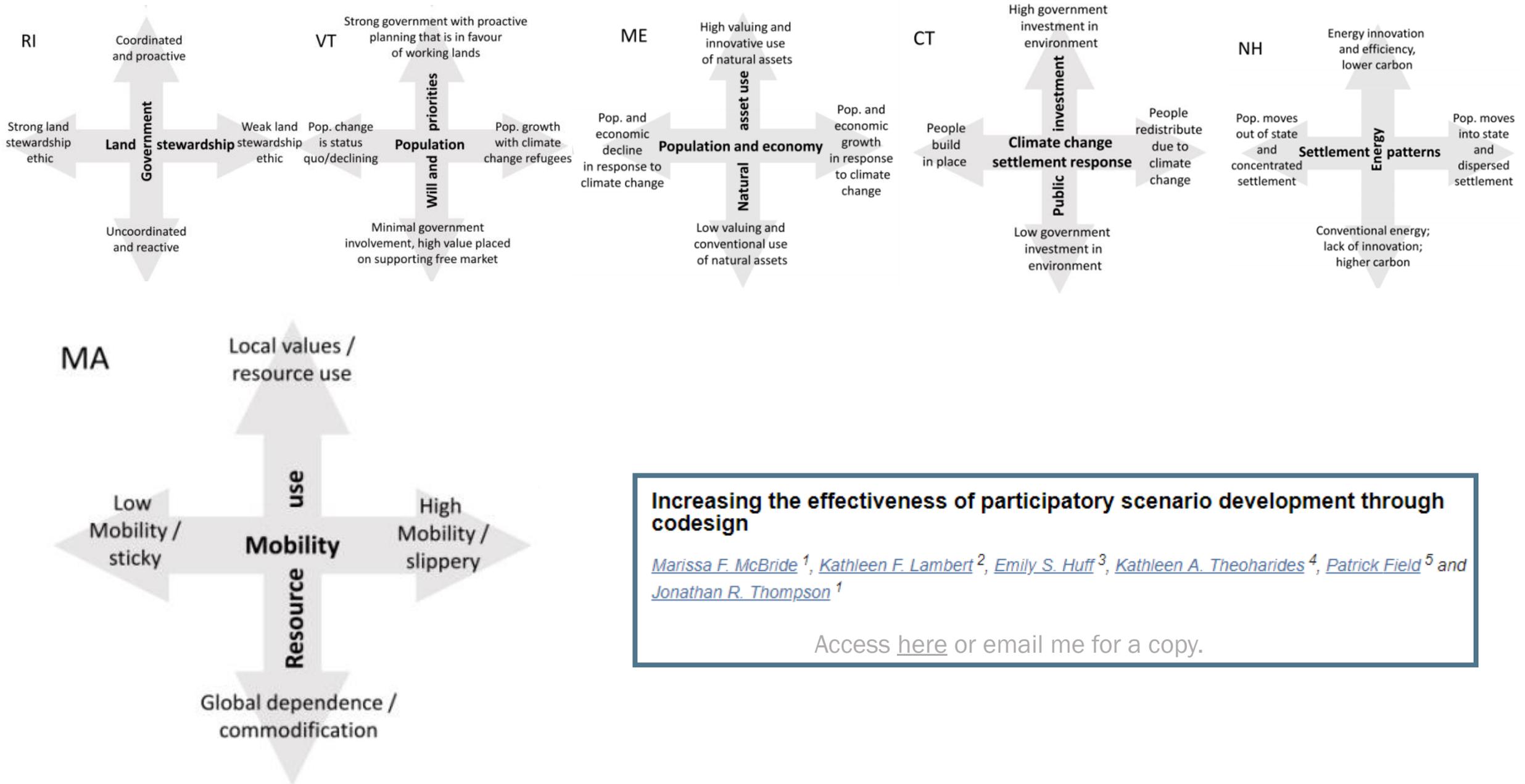
(5)



(6)



Land use	How Much?	Where?	What kind?	Why?
Forest to Development 	In 50 years on average, about 2000 acres/year is lost from forest to development.	Most (75%) of forest conversion is adjacent to existing community centers, roads, networks & lakes. More development in southern counties.	Mostly residential, mostly small lot development with some rural 2-acre lot development in southern Maine	The conversion is a result of the high influx of in-migration related to the desirability of the environment as a place to live and recreate and need for housing, some seasonal homes, about a 30% increase in population
Forest to Agriculture 	Slight increase in agriculture – 450 new farms in 50 years, 1-2% increase in land area	Near other small agriculture as well as near population centers	Small-scale farms; row crops	Continued interest in local farms & foods
Timber Harvesting 	Reduced timber harvesting in southern part of state; potential increase in northern areas; resulting in approx. 500,000 acres/year	Mostly northern Maine, slightly reduced in southern areas	Same conventional practices	Corporate forestland owners remain predominant in Maine's north woods; small woodlot owners feel pressure to cut & sell for development
Conservation 	The total amount of conservation land each year stays about the same or increase slightly (though one respondent said "decrease")	Out from population centers; fewer large tracts to protect; smaller parcels protected; new models of conservation emerge to target fast-growing areas; southern Maine & western Maine	Trails, waterfront access (small parcels out from population centers) in southern Maine Target climate change – fewer larger projects have this focus and they are in northern Maine	Continued support for land conservation locally; more experience to protect land Reduced willingness of northern corporate landowners to sell easements; where there is conservation there is a focus on more train connectors through state/towns for people to use



Increasing the effectiveness of participatory scenario development through codesign

*Marissa F. McBride*¹, *Kathleen F. Lambert*², *Emily S. Huff*³, *Kathleen A. Theoharides*⁴, *Patrick Field*⁵ and *Jonathan R. Thompson*¹

Access [here](#) or email me for a copy.



CONNECTED COMMUNITIES

Connected Communities

- Localized world economy
- High innovation
- Renewable energy
- Proactive government planning
- Ecosystem services highly valued
- Stable population
- Smart growth works
- Infrastructure investments serve local needs



YANKEE COSMOPOLITAN

Yankee Cosmopolitan

- Globalized world economy
- High innovation
- Renewable energy
- Proactive government planning
- Some ecosystem services highly valued
- High immigration
- Smart growth becomes sprawl, especially in the south
- Infrastructure investments serve global needs

LOCAL

SOCIO-ECONOMIC

CONNECTEDNESS

GLOBAL

Go It Alone

- Localized world economy
- Low innovation
- Convenient, high-cost energy
- Low government planning
- Low value of ecosystem services
- Stable population
- Limited but sprawling development
 - Decay in infrastructure
 - Reduced mobility



GO IT ALONE

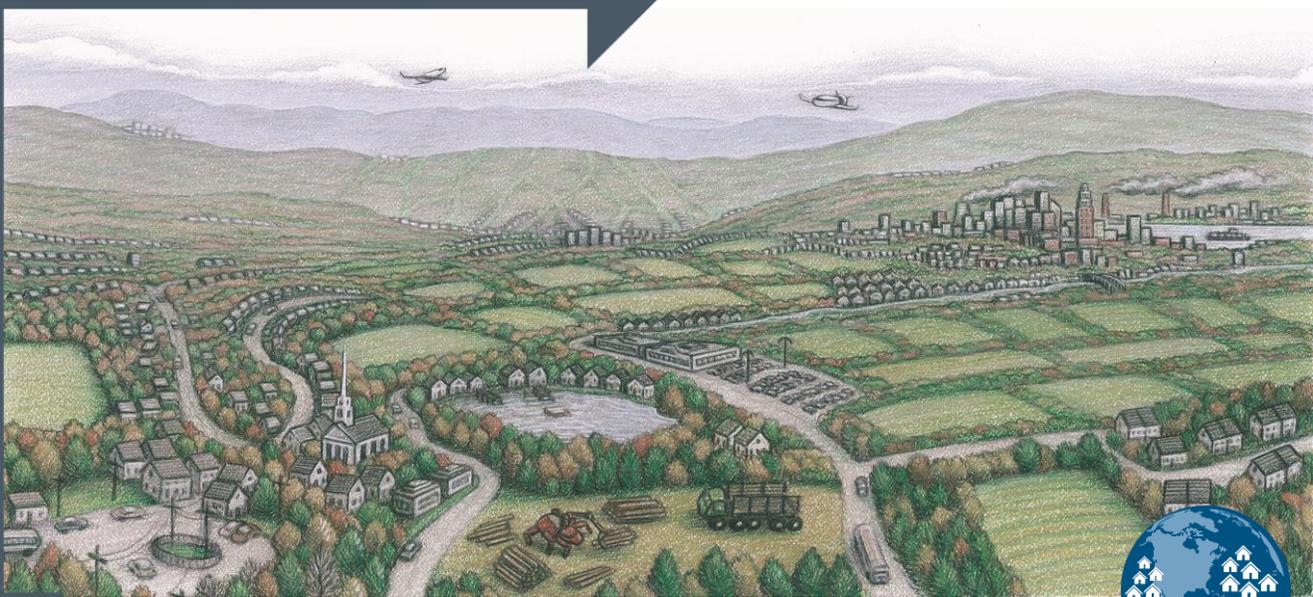
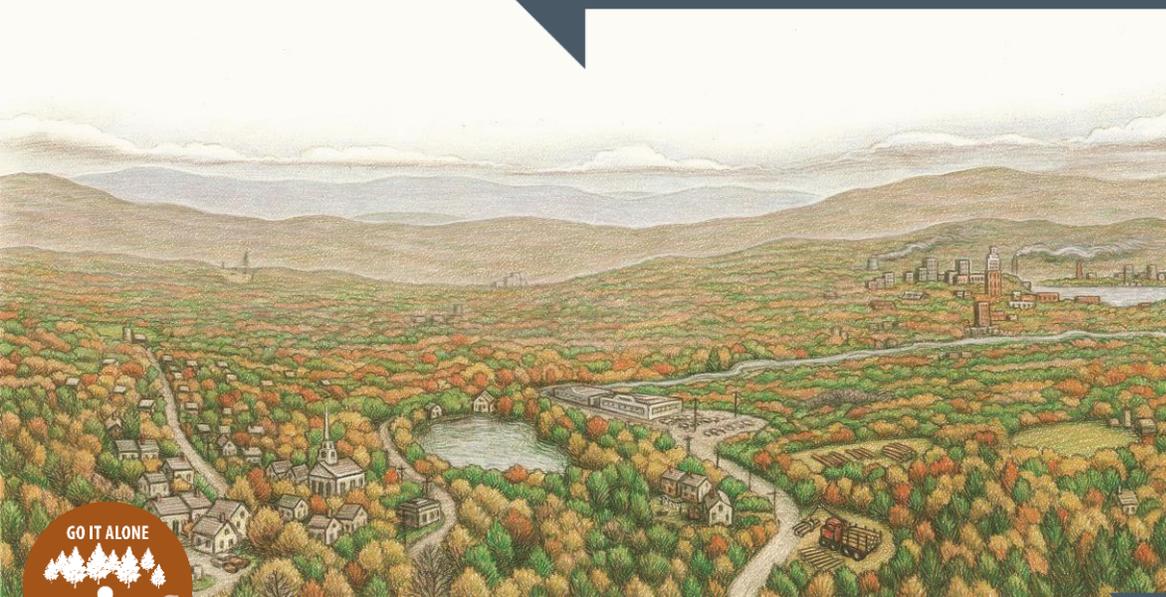
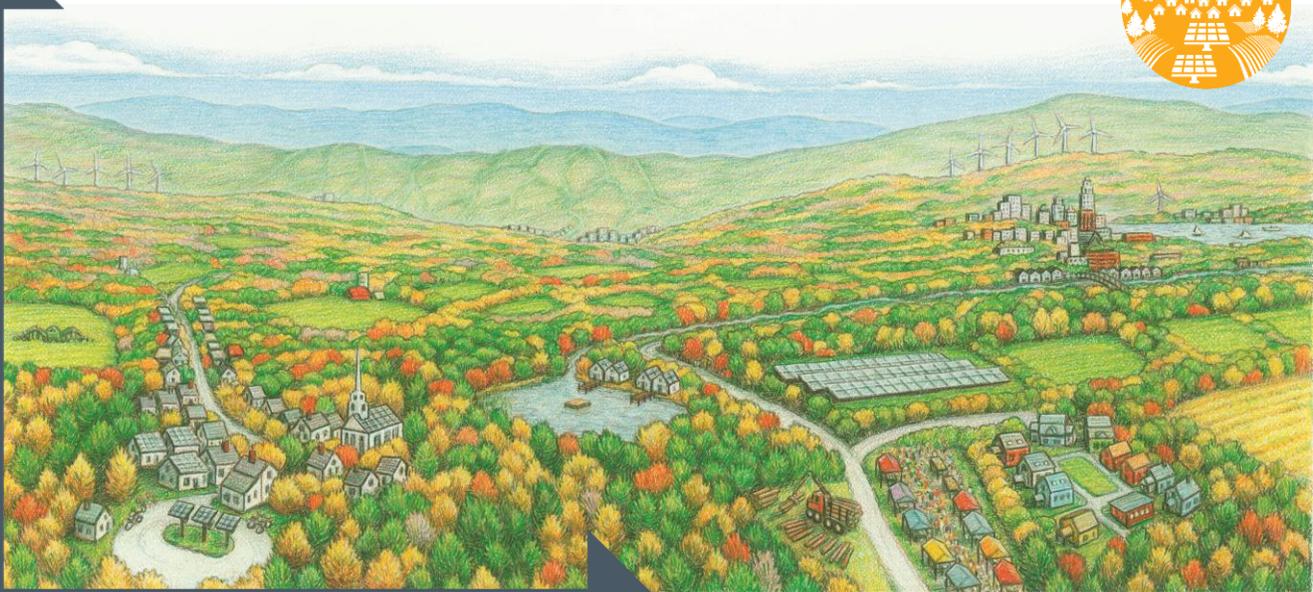
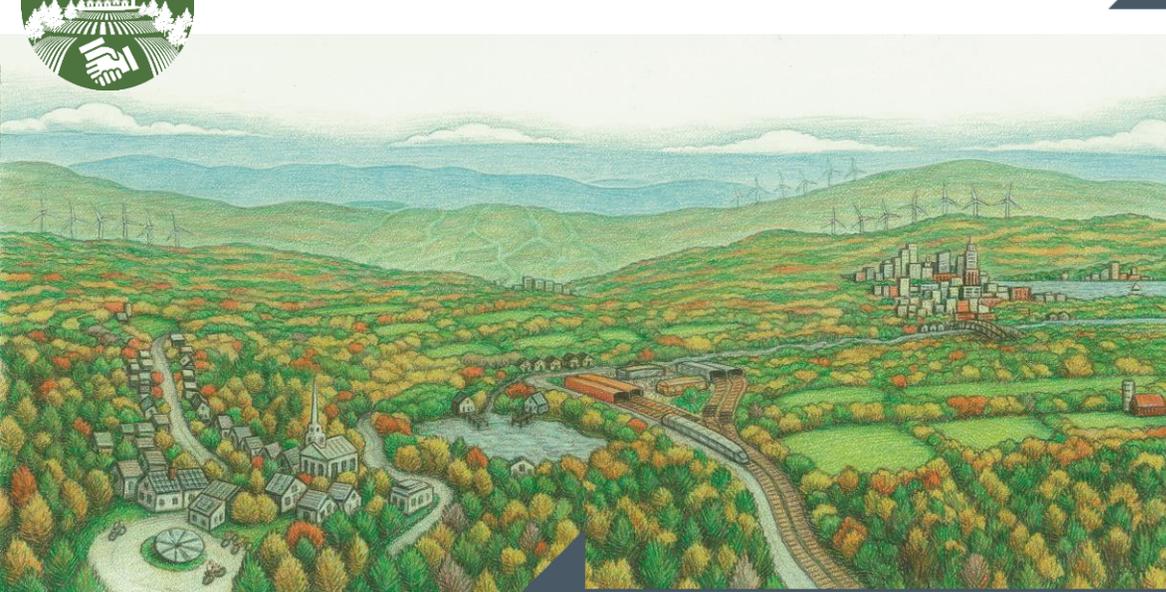
Growing Global

- Globalized world economy
- Low innovation
- Convenient cheap energy
- Low government planning
- Low value of ecosystem services
- High immigration
- Rapid sprawling development
- Investment in conventional infrastructure

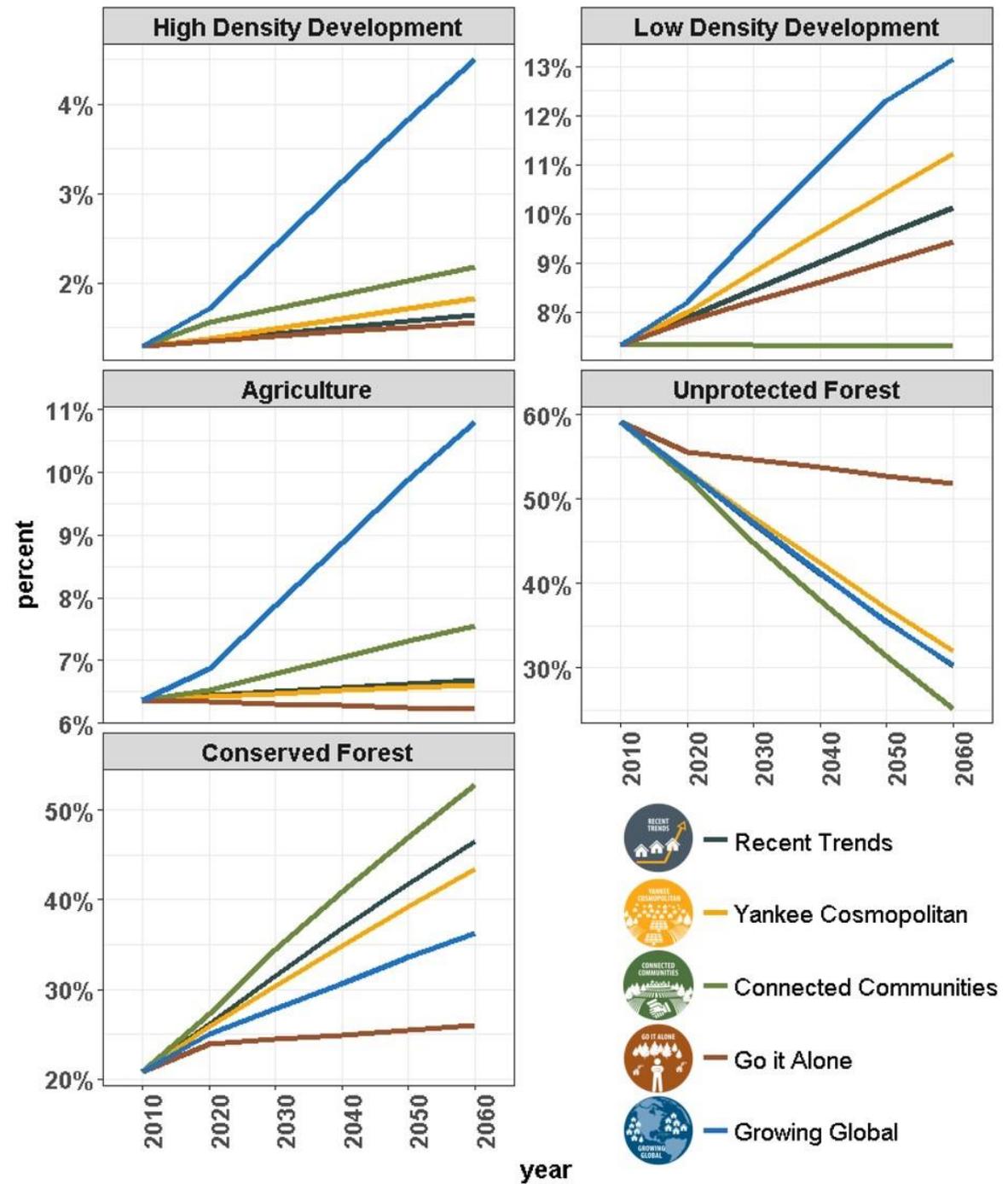
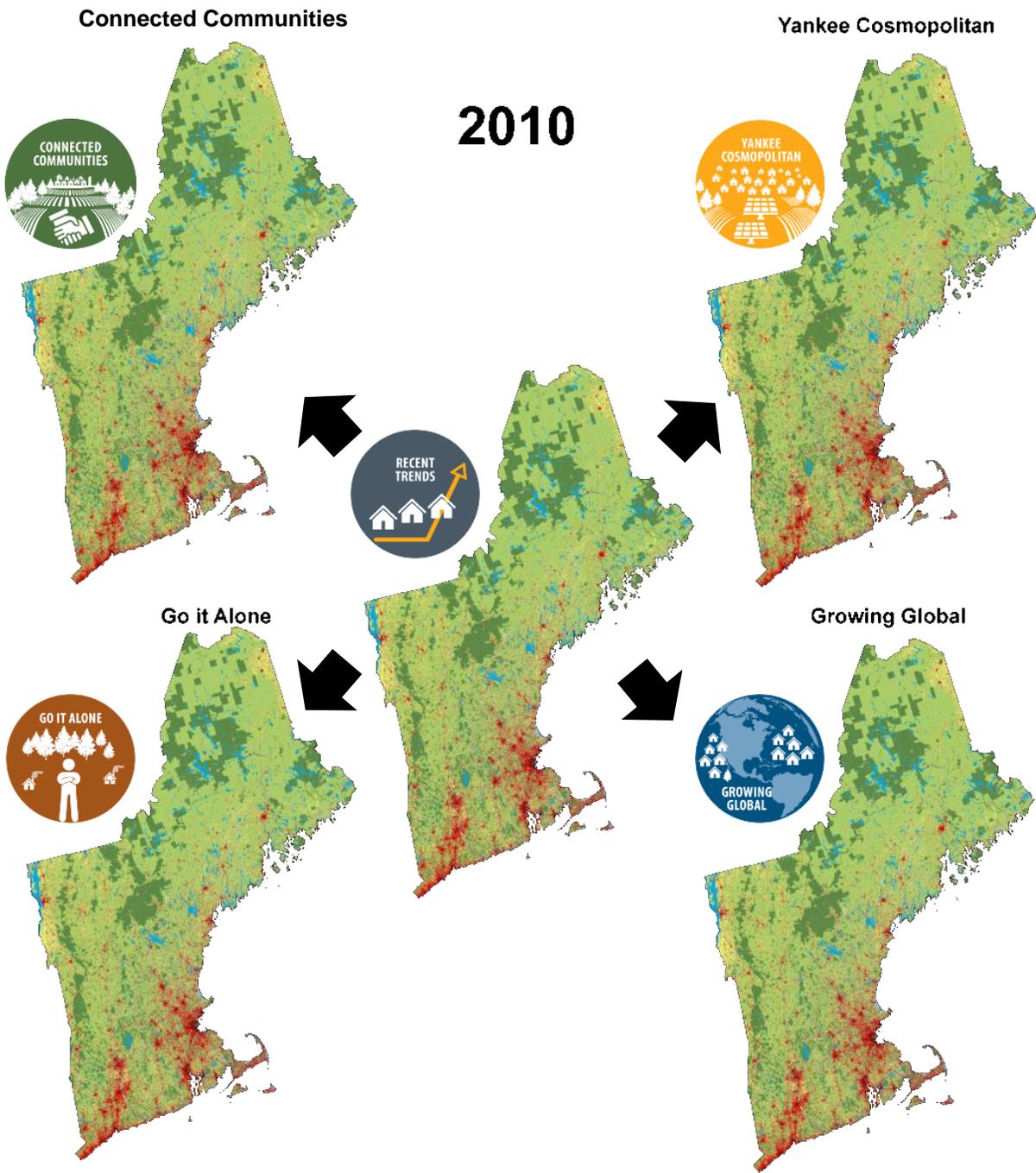


GROWING GLOBAL

LOW



Illustrations by Rick Powell

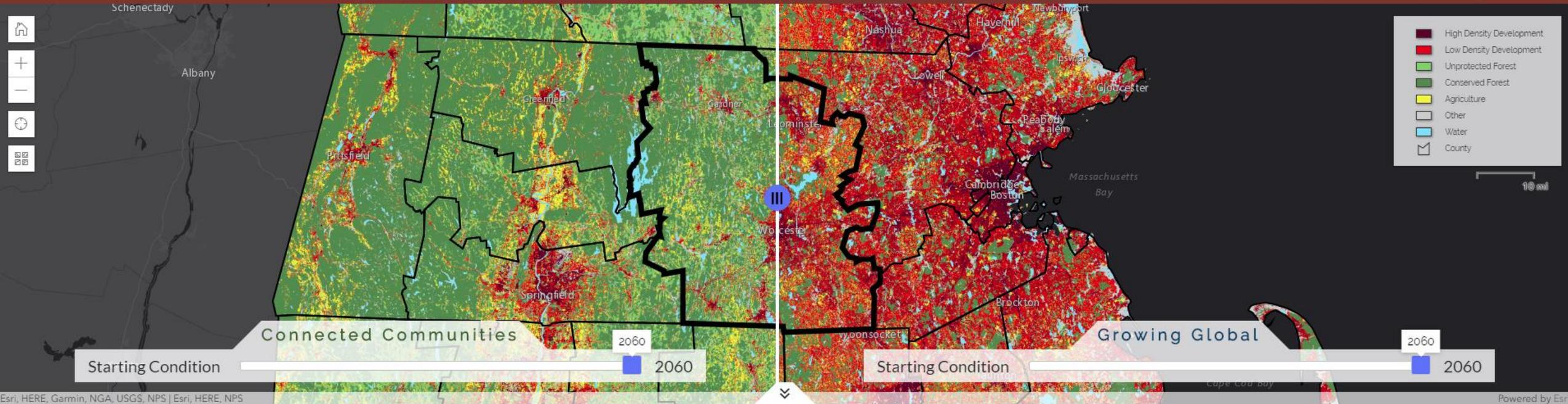


NELF Explorer Demo!

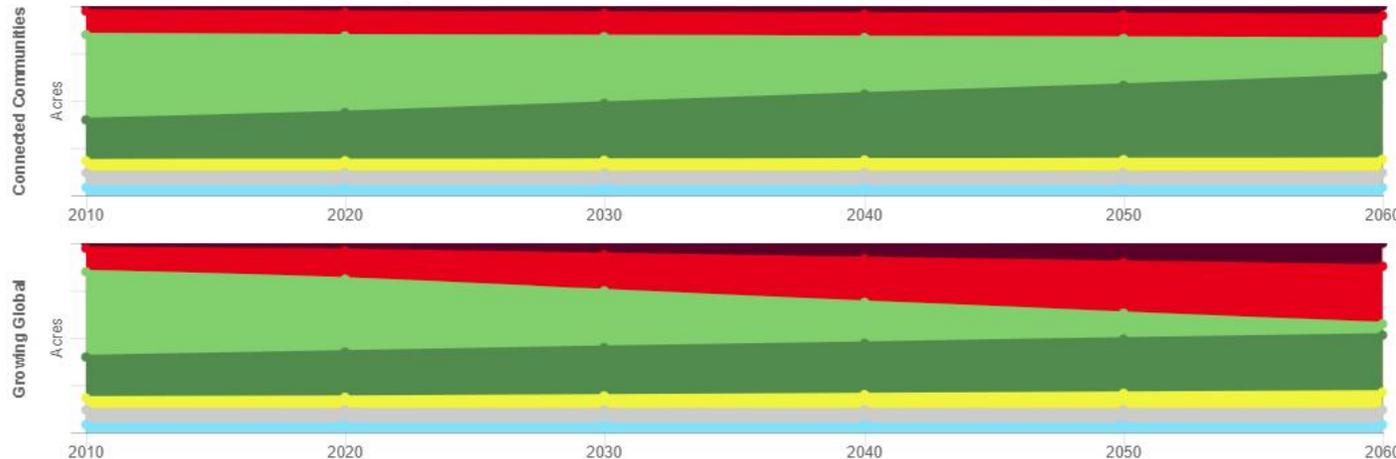
Send feedback!
Open Story Map!

Start Over

NELF Explorer About the Future Scenarios Change Scenarios Explore Areas



Land uses over time for Worcester County, MA



Impacts on within Worcester County, MA

Conserved forest land decreases

Connected Communities: 5,064 acres | Growing Global: 1,122 acres
Conserved forest land in current flood zones within Worcester County, MA **decreases** by 2060 in the Growing Global scenario compared to the Connected Communities scenario.

Developed land increases

Connected Communities: 478 acres | Growing Global: 6,283 acres
Developed land in current flood zones within Worcester County, MA **increases** by 2060 in the Growing Global scenario compared to the Connected Communities scenario.

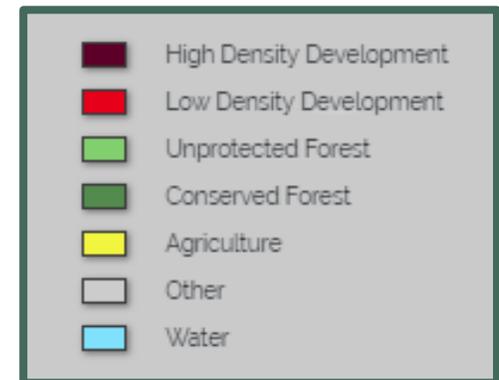
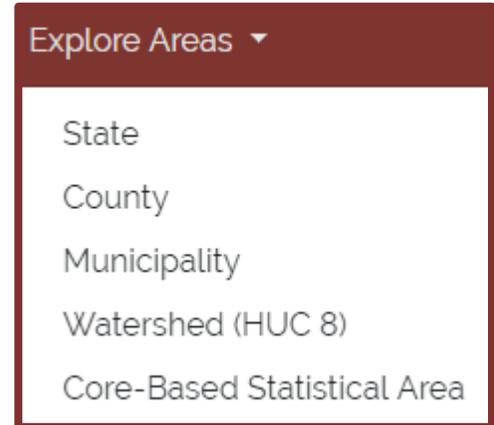
About Flood Zones:

Flood zones are defined as Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas. Special Flood Hazard Areas have the highest flood risk because they will be affected by 100-year floods, which are large flood events that occur approximately once every 100 years.

Statistics for Grant Writing

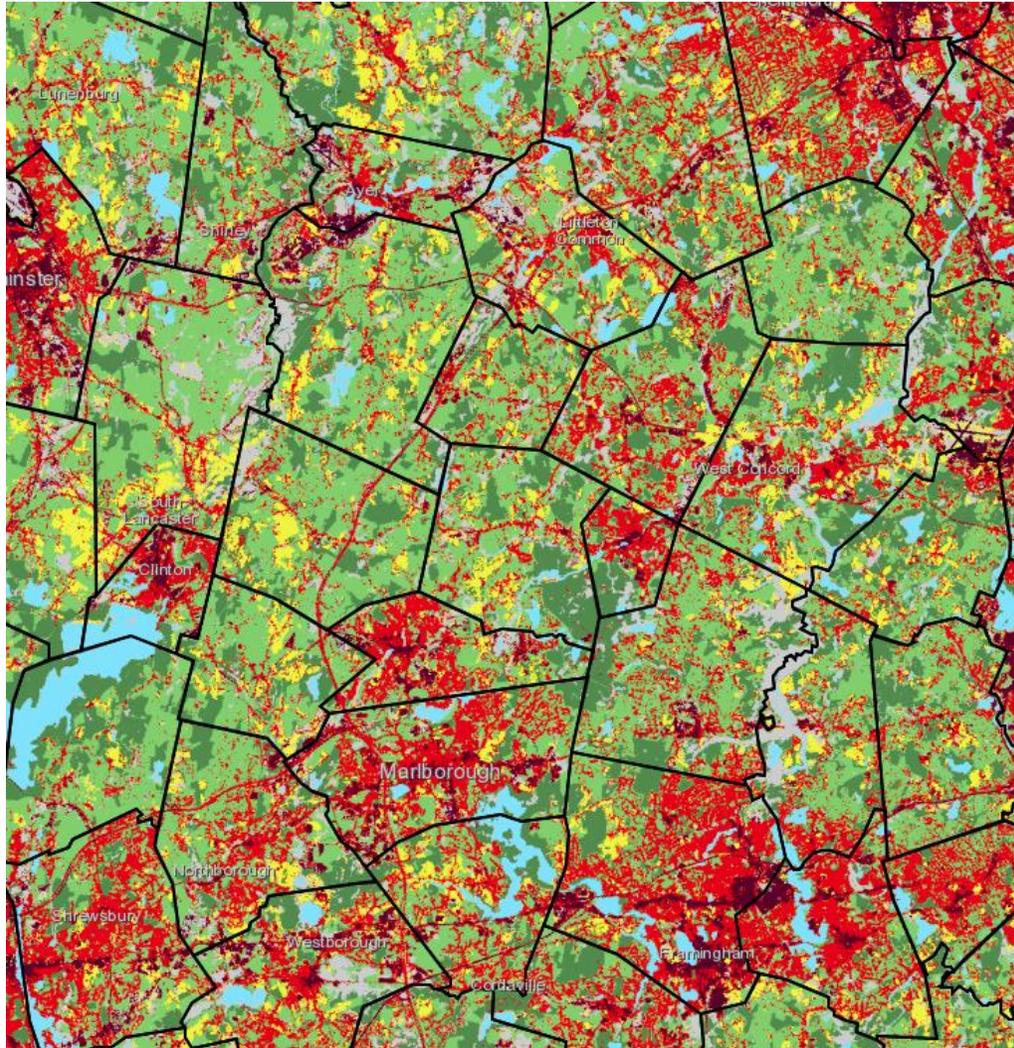
- Generate useful descriptive statistics about your area to show why you need the money
- Utilize the **Recent Trends** scenario
 - **2010**: good landcover map of approx. current conditions
 - **2030, 2040, 2050, 2060**: likely future conditions given land-use trends from 1990-2010

“Holden is currently **72% forest** and just more than half of that is protected. It is likely given recent land-use trends **13% of Holden’s existing forests will be lost** in the next 40 years (by 2060). This grant will enable us to purchase X acres for permanent protection...”

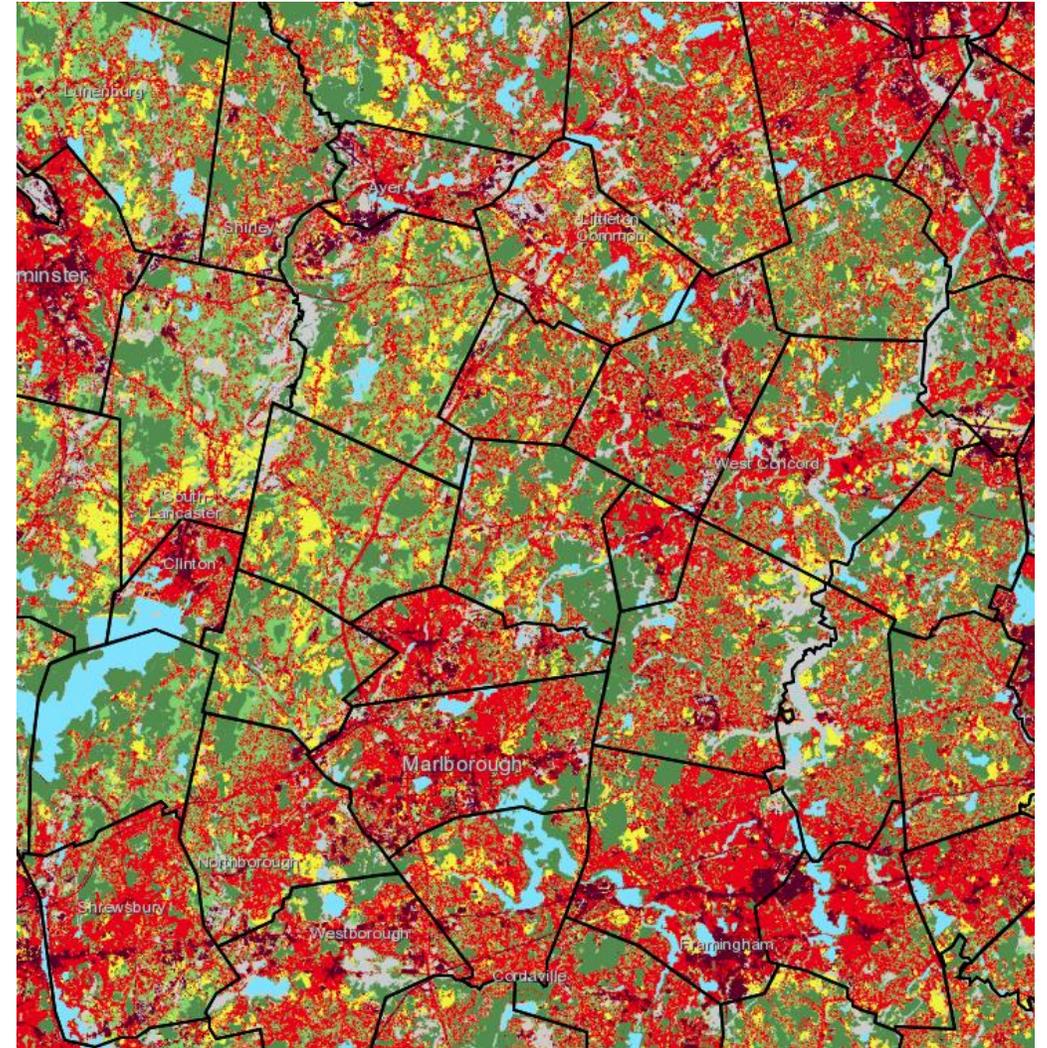


Donor outreach and fundraising

Service Area: Sudbury Valley Trustees



Recent Trends 2010



Recent Trends 2060

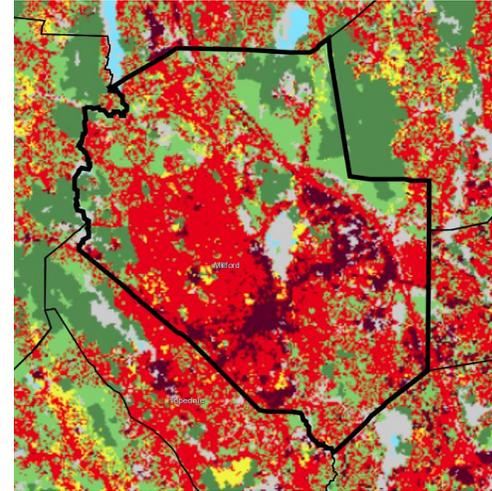
Applications cont.

- Explore smart growth influences by comparing CC to other scenarios
- Identify most likely places to be developed
 - Do they include your priority conservation lands?
- Conversation starters
 - Municipal / regional decision makers
 - Landowners and citizens

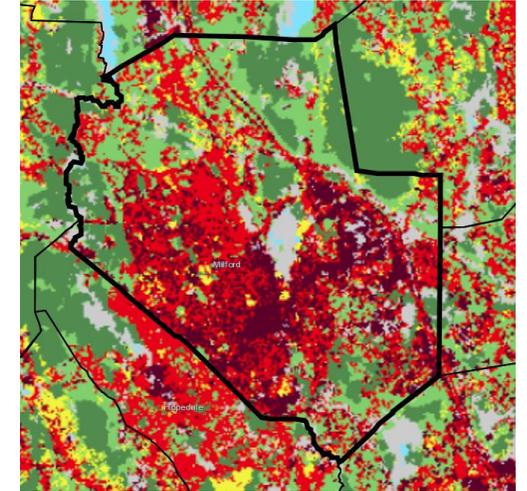


MILFORD

Recent Trends 2060



Connected Communities 2060



Impacts on within Milford

Conserved forest land increases

Recent Trends: 24 acres | Connected Communities: 116 acres

Conserved forest land in current flood zones within Milford **increases** by 2060 in the Connected Communities scenario compared to the Recent Trends scenario.

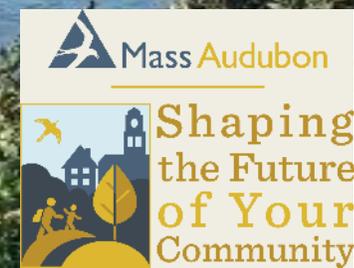
Developed land decreases

Recent Trends: 56 acres | Connected Communities: 20 acres

Developed land in current flood zones within Milford **decreases** by 2060 in the Connected Communities scenario compared to the Recent Trends scenario.

Mapping Tools for a More Resilient Future

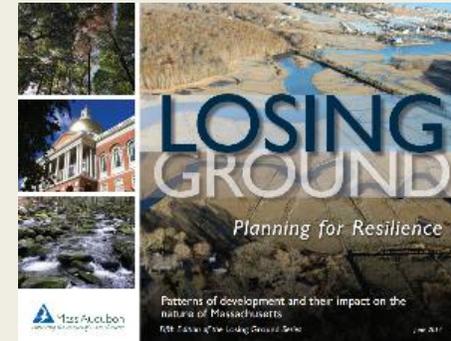
Massachusetts Land Conservation Conference
Worcester Technical High School
March 23, 2019



Shaping The Future of Your Community Program

Created in 2009 to implement Losing Ground recommendations

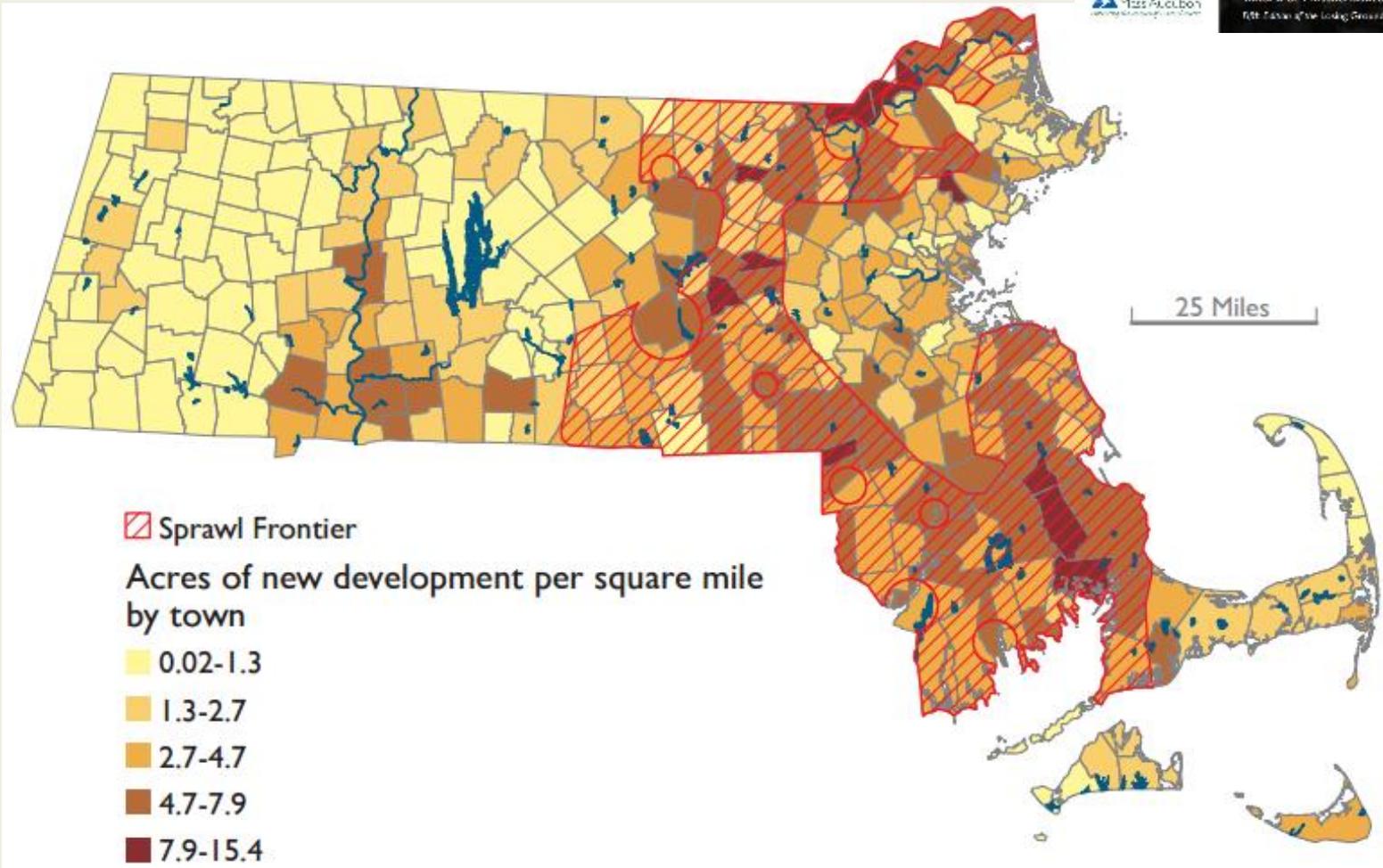
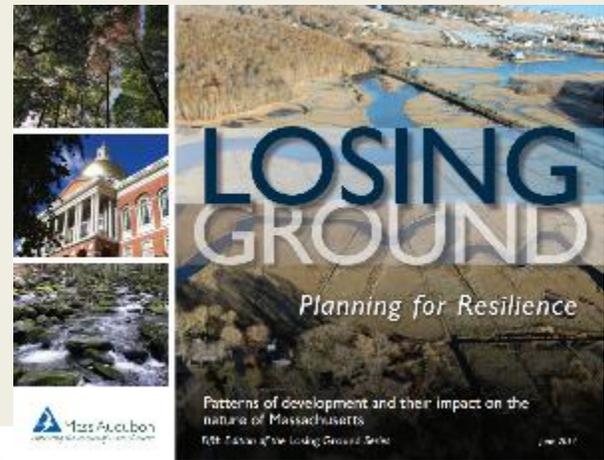
Assists communities chart a more **sustainable future** through customized community workshops and direct assistance



Shaping
the Future
of Your
Community

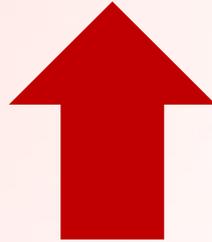
What's the problem?

Development is sprawling



Our climate is already changing

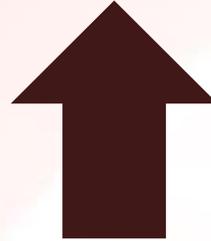
Temperature:



2.9°F

Since 1895

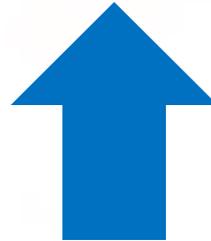
Growing Season:



11 Days

Since 1950

Sea Level Rise:



11 inches

Since 1922

Strong Storms:

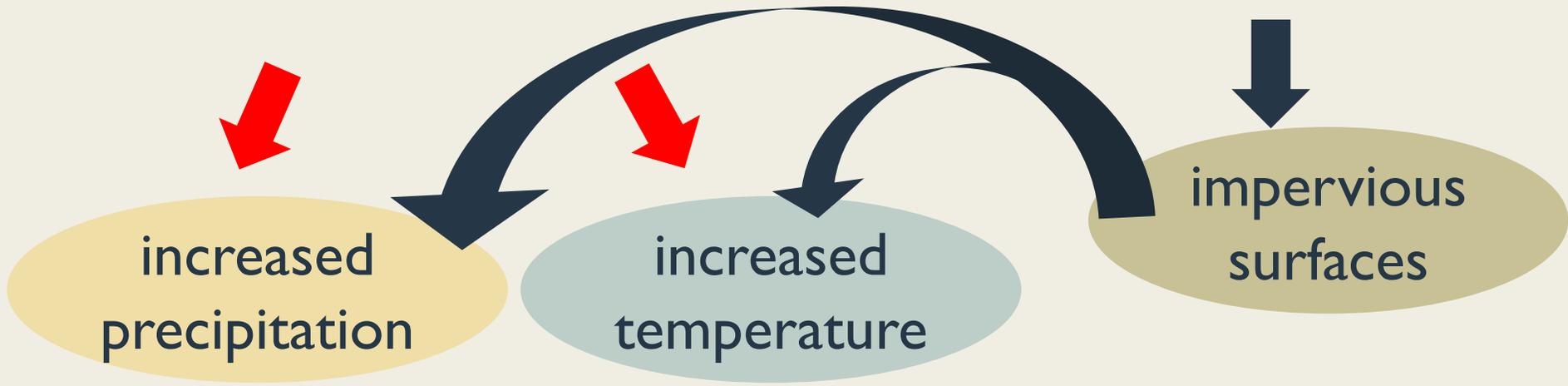


55%

Since 1958

Climate change

Sprawling Development



stormwater & WQ issues

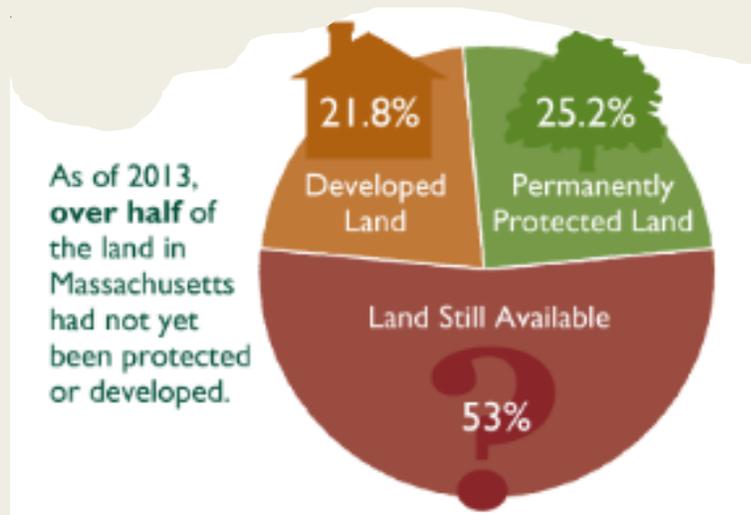
flooding & infrastructure damage

heat-related illnesses

fish and aquatic life impacts



Losing Ground



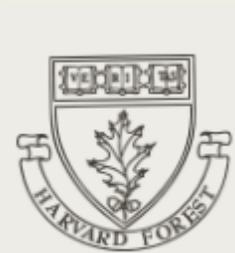
Planning for the Future

54% of the remaining unprotected land is of **high conservation value.**
(BioMap 2)

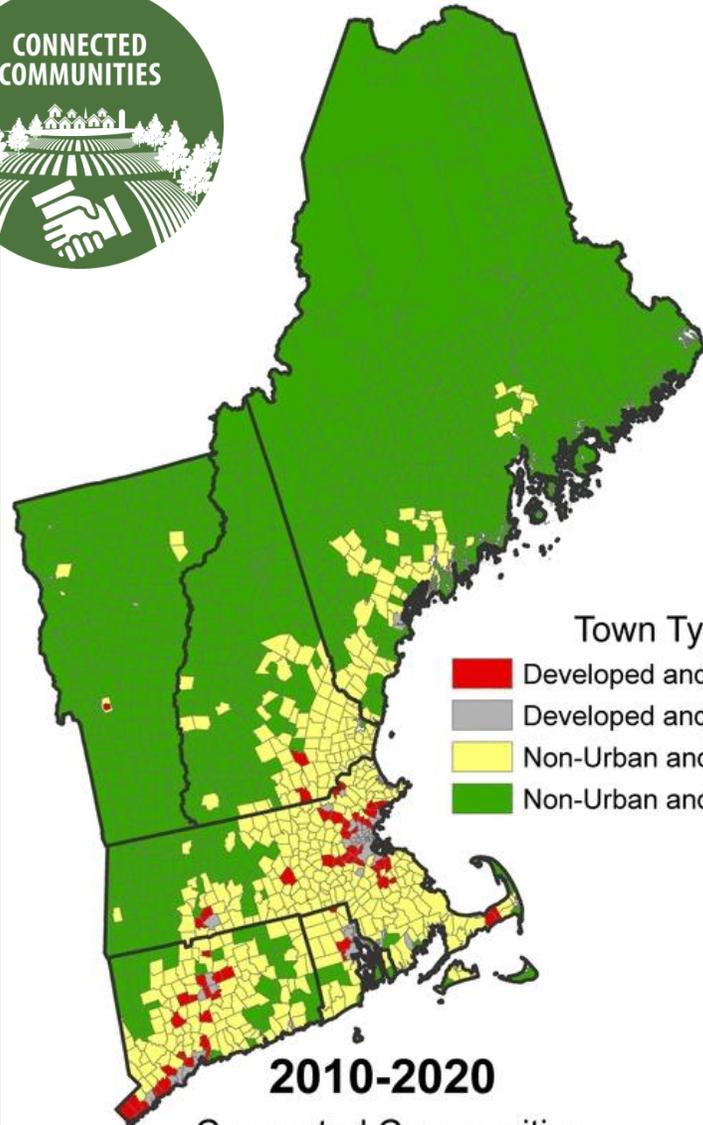
As development pressures increase, we can plan our land use for both a **strong economy** and a **safe, healthy environment.**

New England Landscape Futures Explorer

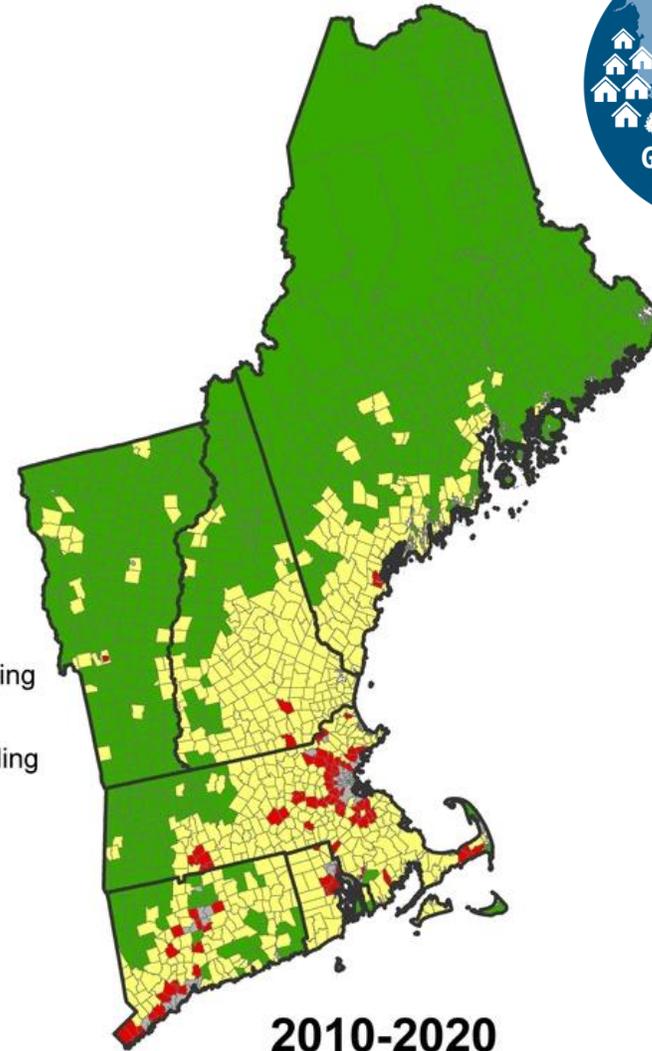
newenglandlandscapes.org



Sprawl



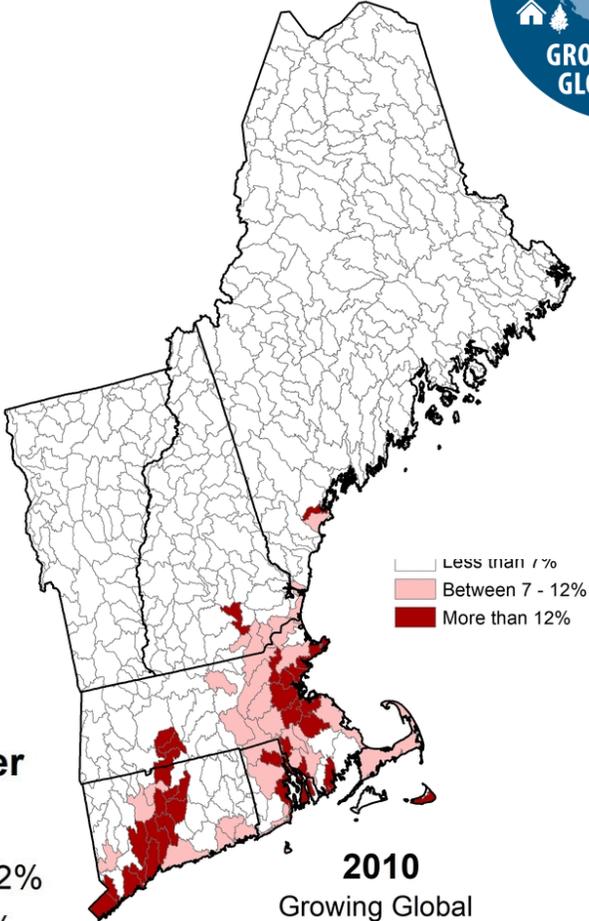
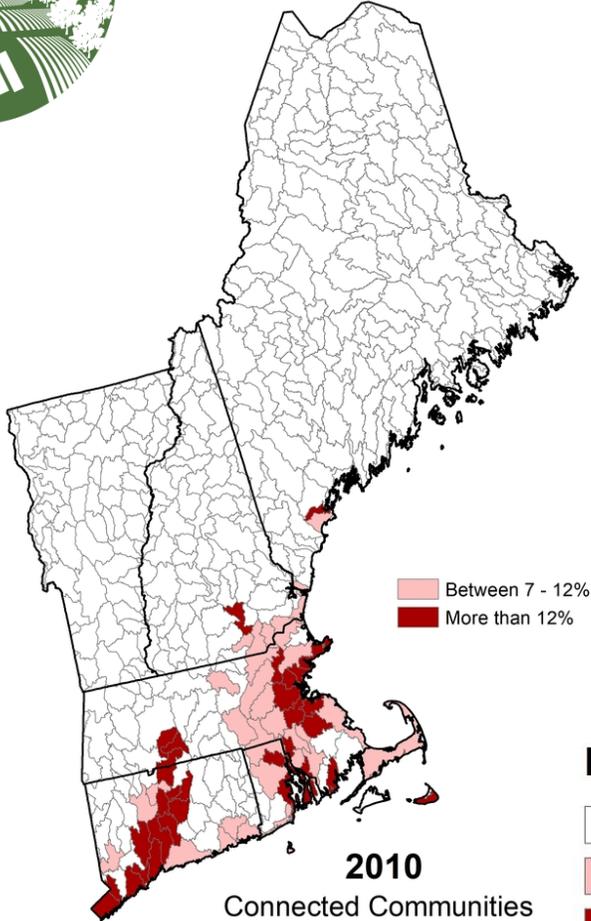
2010-2020
Connected Communities



2010-2020
Growing Global

- Town Type
- Developed and Sprawling
 - Developed and not Sprawling
 - Non-Urban and Sprawling
 - Non-Urban and not Sprawling

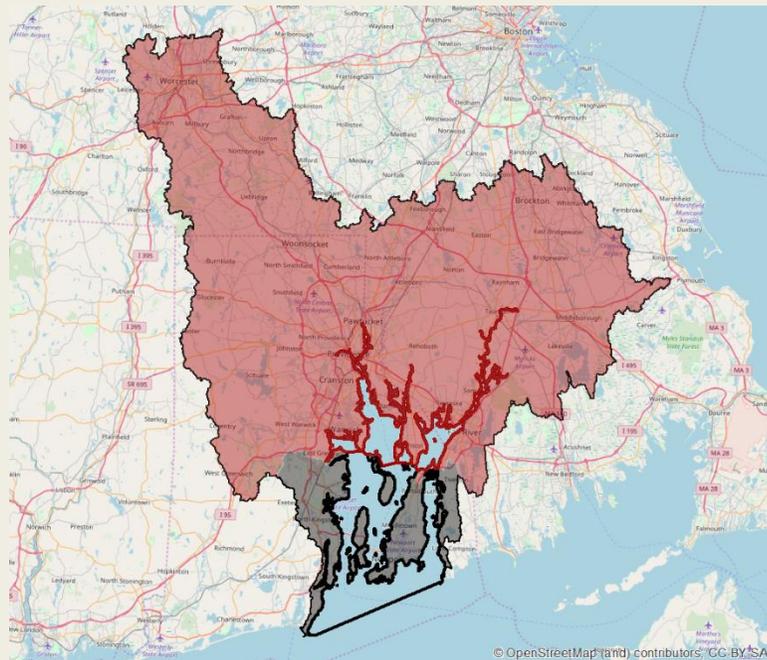
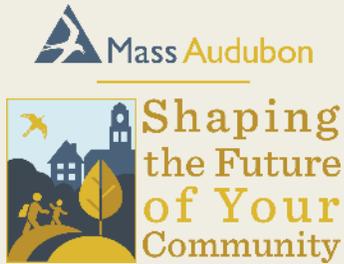
Impervious Surfaces



Impervious Cover

- Less than 7%
- Between 7 - 12%
- More than 12%

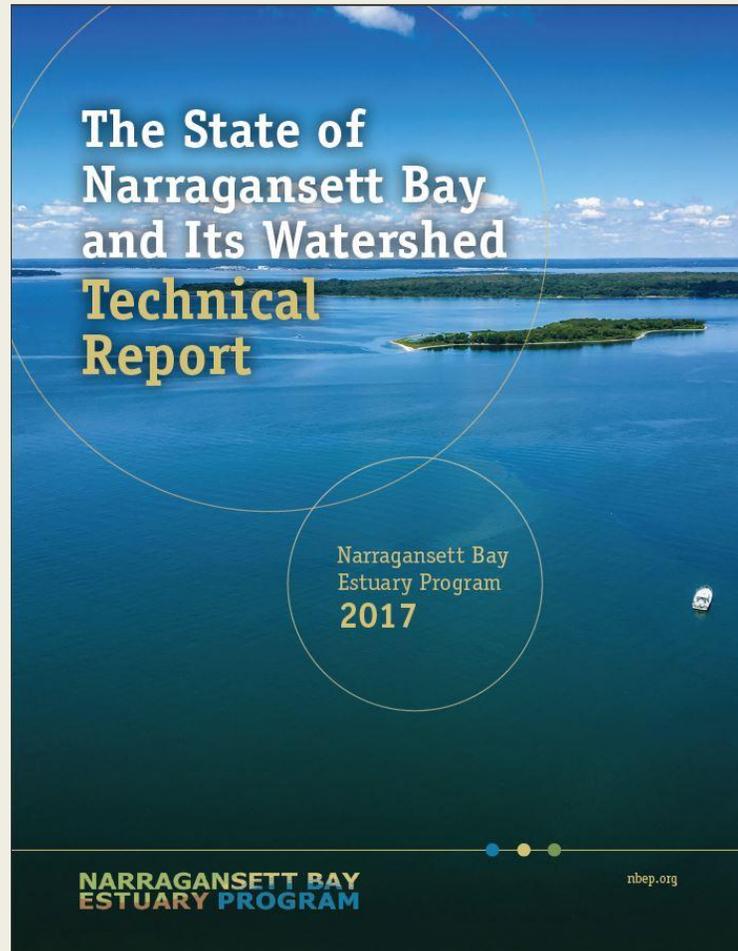
Integrating Ecosystem Services Values in the Narragansett Bay Watershed



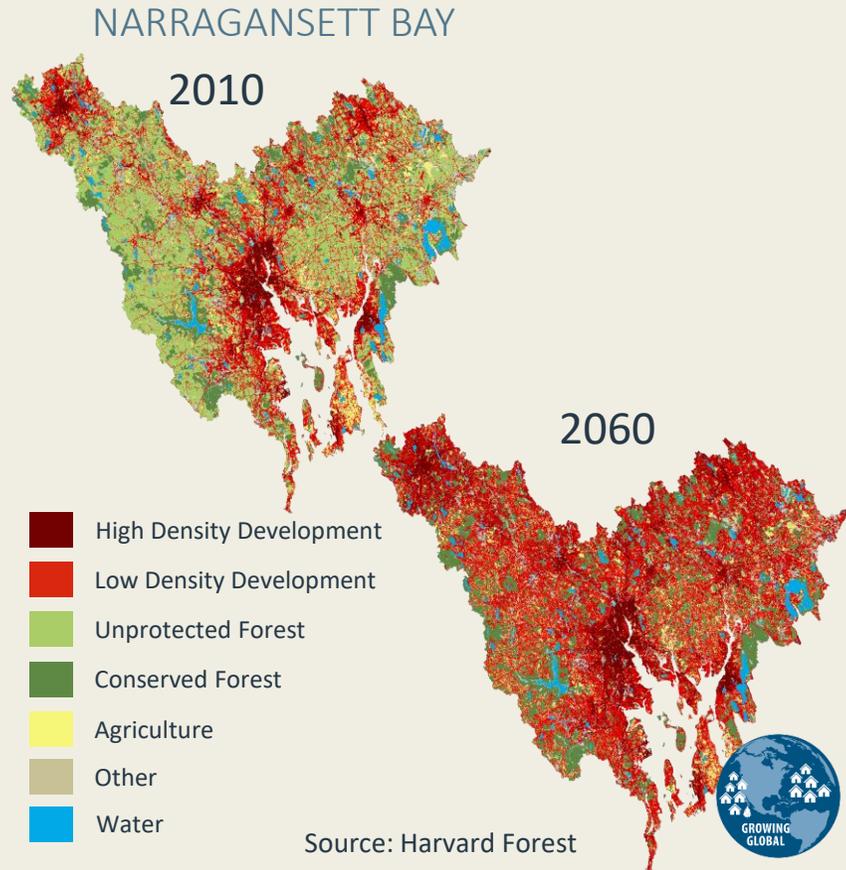
This project was funded under Assistance Agreement No. SE - 00A00252 awarded by the U.S. Environmental Protection Agency (EPA).

massaudubon.org/naturesvalue

Status and Trends in the Narragansett Bay Watershed – And Possible Futures



Harvard Forest Scenarios



2060 scenarios	Urban	Forest	Ag
Connected Communities	34%	46%	8%
Growing Global	57%	22%	9%
Go It Alone	39%	42%	7%
Recent Trends	41%	40%	7%
Yankee Cosmopolitan	50%	32%	6%
Current (2010)	31%	50%	7%

OUR CONSERVATION WORK

Wildlife Research & Conservation

Land Conservation

Ecological Management

Education & Community Outreach

Climate Change

Advocacy

Advocacy News & Events

Priority Legislation

Protecting Land & Wildlife

Ocean Management

Climate Change

Version 2.0 just released - Mapping and Prioritizing Parcels for Resilience Project



Mass Audubon, in partnership with The Nature Conservancy and LandVest, developed [Mapping and Prioritizing Parcels for Resilience \(MAPPR\)](#) to allow Massachusetts conservationists to rapidly identify specific parcels that, if protected, could contribute the most to achieving land protection goals.



Resources

[MAPPR Tool 2.0](#)

[Resources](#)

Review bylaws and regulations to encourage nature-based solutions

Factors	Conventional	Better	Best	Community's Zoning	Community's Subdivision Rules & Regulations	Community's Site Plan Review	Community's Stormwater/LID Bylaw/Regulations
GOAL 1: PROTECT NATURAL RESOURCES AND OPEN SPACE							
Soils managed for revegetation	Not addressed	Limitations on removal from site, and/or requirements for stabilization and revegetation	Prohibit removal of topsoil from site. Require rototilling and other prep of soils compacted during construction	<i>(Not applicable)</i>			
Limit clearing, lawn size, require retention or planting of native vegetation/naturalized areas	Not addressed or general qualitative statement not tied to other design standards	Encourage minimization of clearing/ grubbing	Require minimization of clearing/grubbing with specific standards				
Require native vegetation and trees	Require or recommend invasives	Not addressed, or mixture of required plantings of native and nonnative	Require at least 75% native plantings				
GOAL 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL							
Lot size	Required minimum lot sizes	OSRD/NRPZ preferred. Special permit with incentives to utilize	Flexible with OSRD/NRPZ by right, preferred option		<i>(Not applicable)</i>	<i>(Not applicable)</i>	<i>(Not applicable)</i>

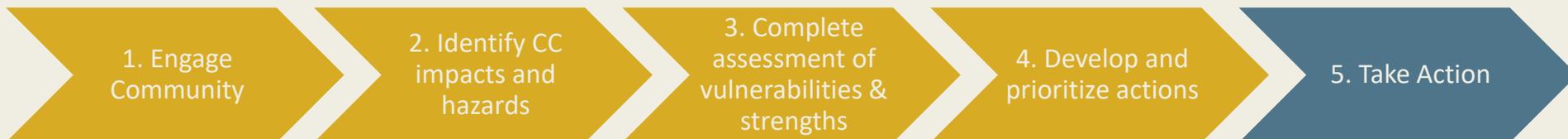
www.massaudubon.org/lidcost

Also available on the MVP website with a how-to webinar

Municipal Vulnerability Preparedness (MVP)



State and local partnership to build resiliency to climate change

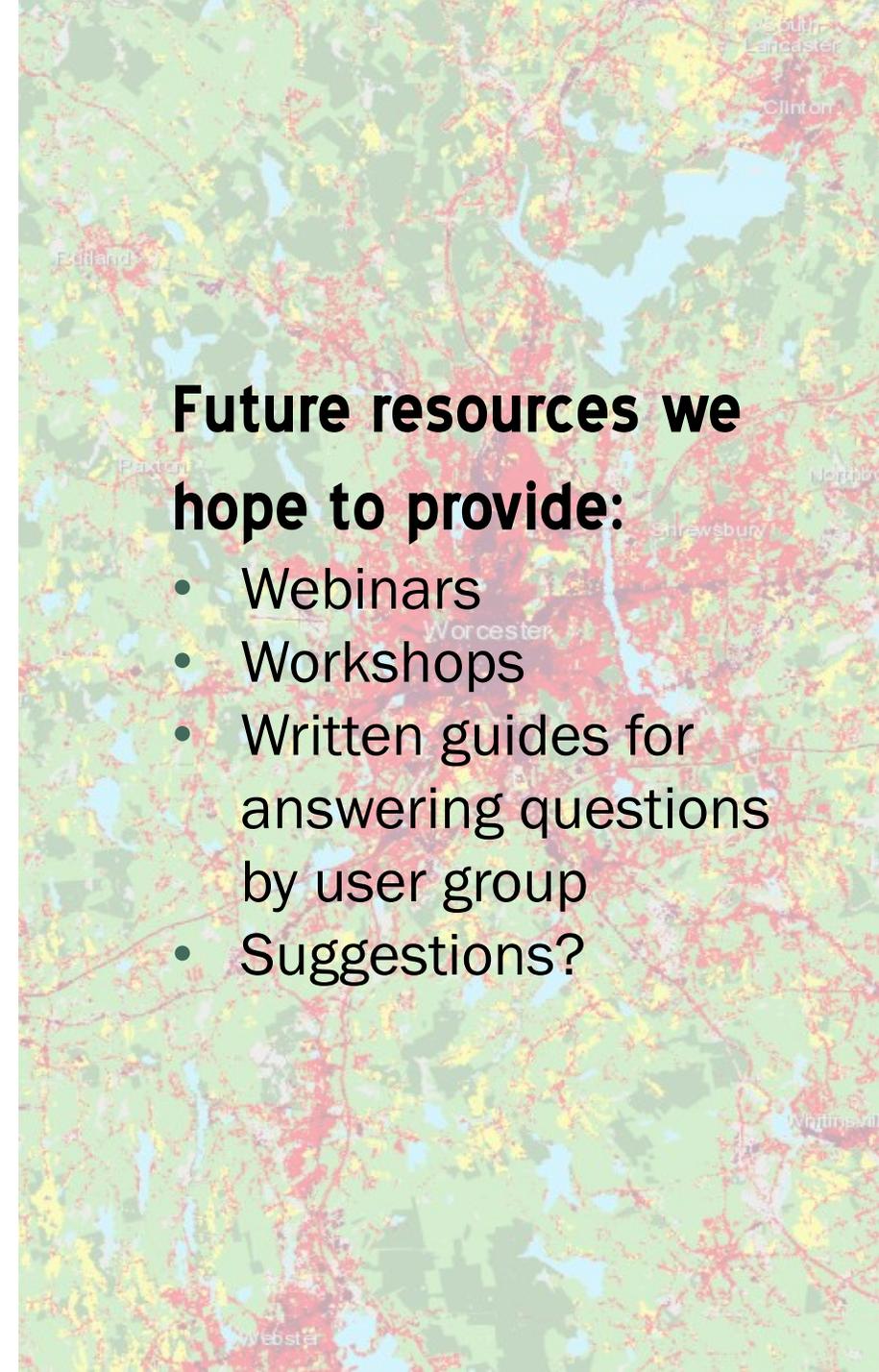


Summary of Applications

- Getting \$\$\$
 - Grant writing
 - Donor outreach
- Conversation starter with stakeholders
 - Landowners, citizens
 - Municipal leaders
- Conservation planning
 - Identify most-likely places to be developed
 - Explore impacts of smart growth
- Custom analyses to support your particular initiatives
 - Use our landcover maps with other datasets that you already use

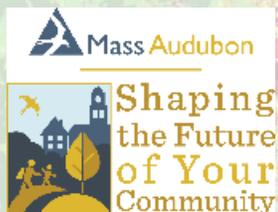
Future resources we hope to provide:

- Webinars
- Workshops
- Written guides for answering questions by user group
- Suggestions?



newenglandlandscapes.org

Thank you!



www.massaudubon.org/shapingthefuture

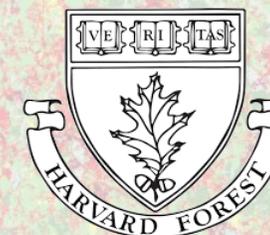
E. Heidi Ricci

hricci@massaudubon.org

Lucy Lee

lucylee@fas.harvard.edu

www.newenglandlandscapes.org



Connect with us!

[newenglandscenarios](#)

listserv for sharing news, events, supporting materials

[Wildlands & Woodlands e-news](#)

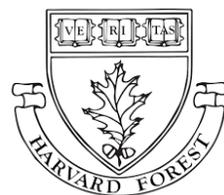
supporting materials, events

lucylee@fas.harvard.edu

Voices from the Land requests, help with anything NELF!

[Download data:](#)

New England Landscape Futures group on DataBasin

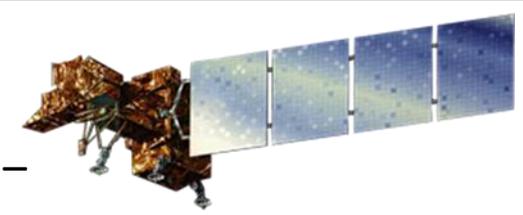


“Recent Trends” is based on historic rates & patterns from 1990 - 2010

Data Sources

Landcover Data

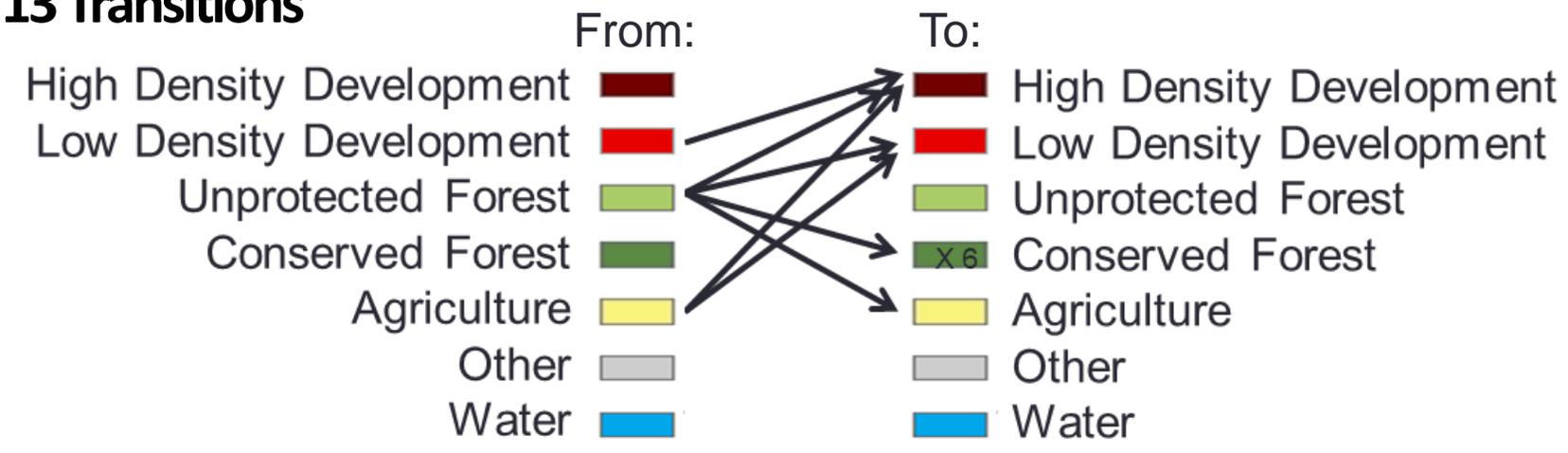
- Continuous Change Detection and Classification (CCDC) – Olofsson et al. 2016 - 30m classified pixels.
- National Land Cover Database (NLCD) - 30m classified pixels.



Protected Open Space

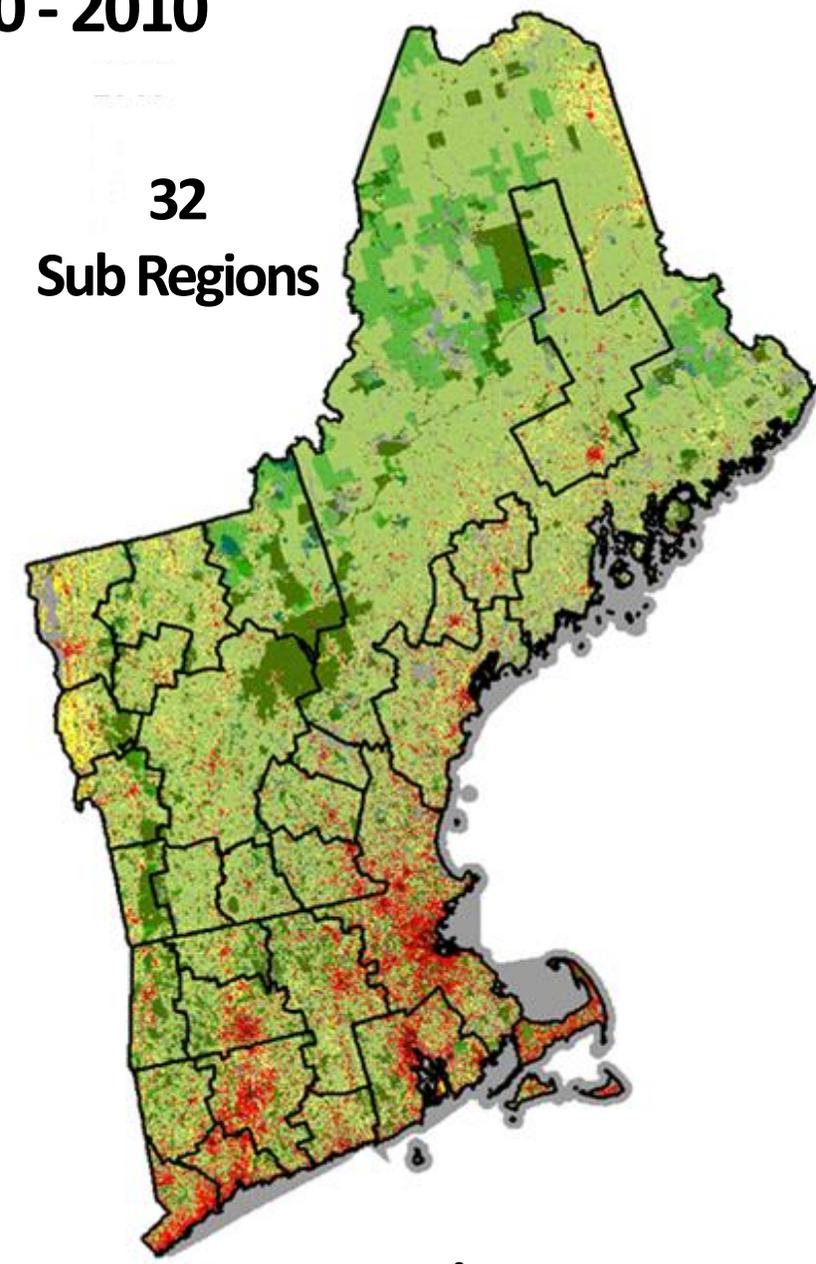
- TNC Secured Areas, NCED, PAD-US, State GIS, Land trusts, etc.

13 Transitions



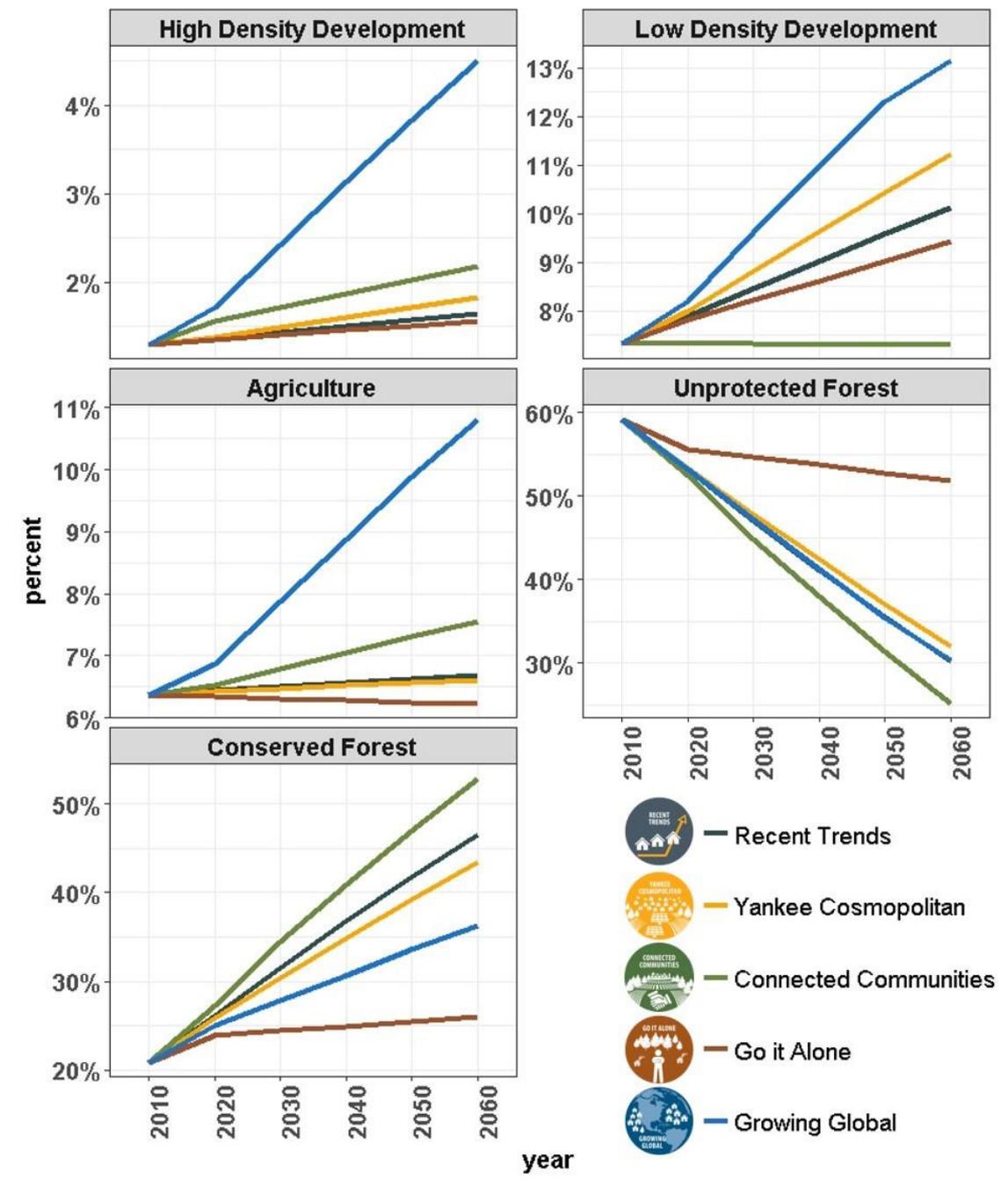
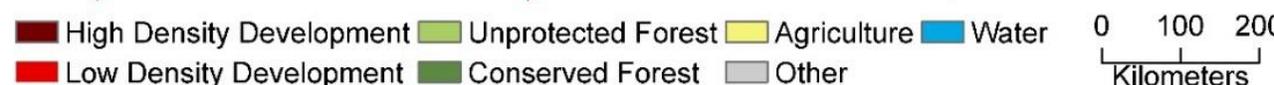
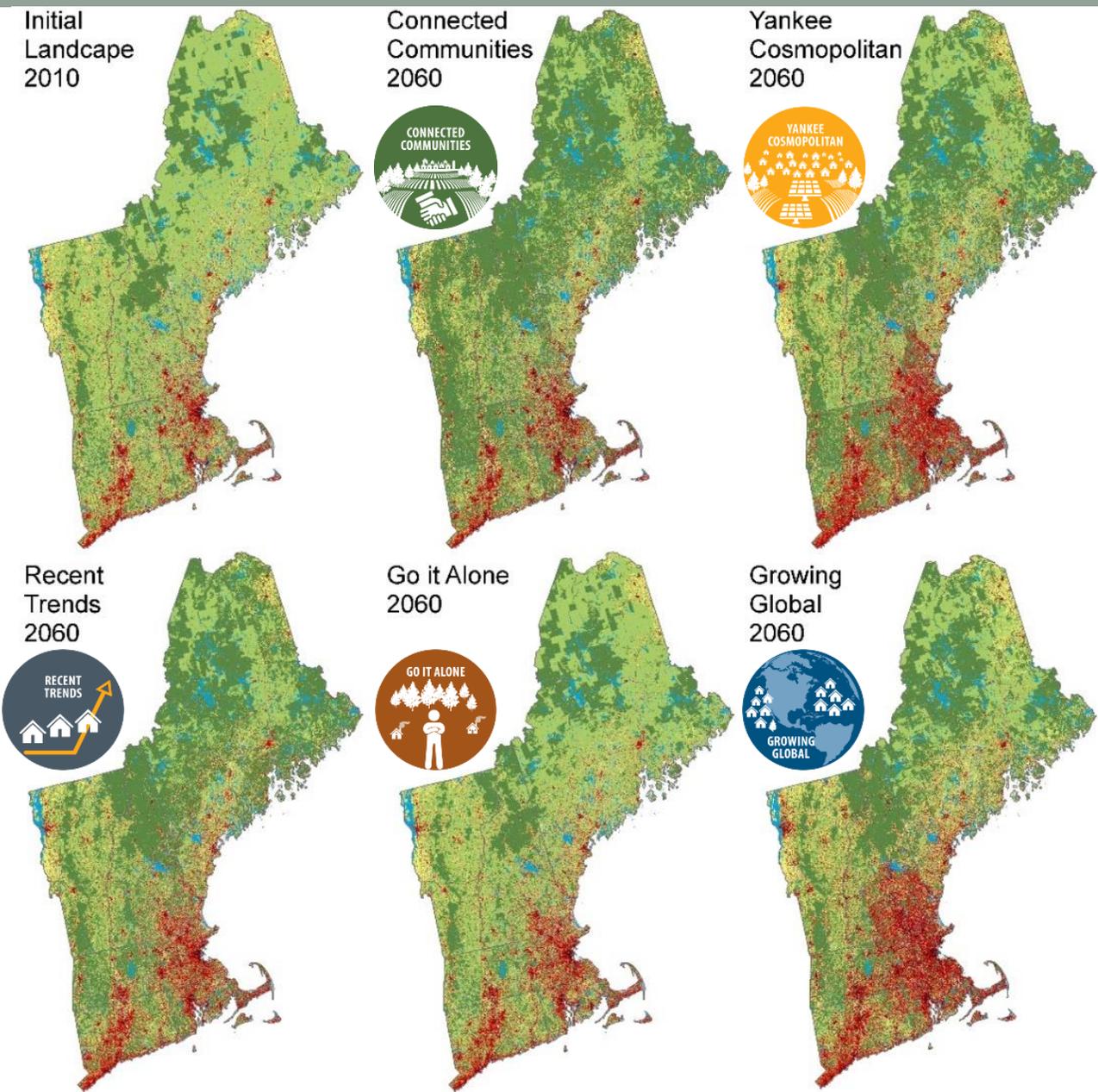
7 Driver Variables

- Distance to Cities
- Distance to Development
- Ownership
- Population Density
- Distance to Roads
- Slope
- Wetlands/Non-wetlands

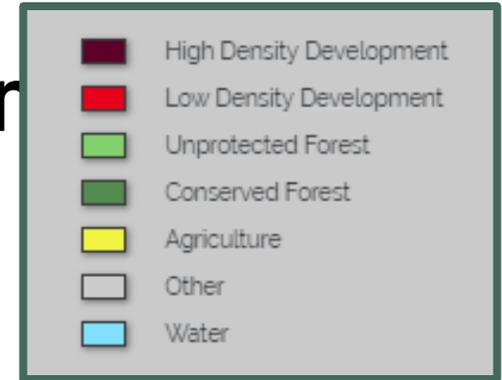


32
Sub Regions

5 ten year time steps
from 2010-2060



Landcover acreages for Holden, MA under Recent Trends scenario



	2010	2060
High density dev.	344	360
Low density dev.	3082	5264
Unprotected forest	7816	4291
Conserved forest	9123	10402
Agriculture	975	1025
Other	1414	1414
Water	710	710

	2010	2060
Total forest	16939	14693
Total developed	3426	5624
Total area	23464	23466
% forest	72	62
% forest conserved	54	71
% developed	14	24

% forest lost 2010-2060 = $(16939 - 14693) / 16969 * 100 = 13\%$