Landscapes

Improving Conservation Practice

in the

Northeast Megaregion

A Report by **Regional Plan Association** and **America 2050**

February 2012

Regional Plan Association is America's oldest and most distinguished independent urban research and advocacy group. RPA prepares long range plans and policies to guide the growth and development of the New York- New Jersey-Connecticut metropolitan region. RPA also provides leadership on national infrastructure, sustainability, and competitiveness concerns. RPA enjoys broad support from the region's and nation's business, philanthropic, civic, and planning communities. In its Third Regional Plan, Regional Plan Association identified a dozen region-shaping landscapes and estuaries where conservation could set a green boundary to suburban expansion and improve the quality life for our existing cities and suburbs.

www.rpa.org
4 Irving Place, 7th floor
New York, NY 10003
212.253.2727

America 2050 is a national planning initiative to develop a framework for America's future development in face of rapid population growth, demographic change and infrastructure needs in the 21st century. A major focus of America 2050 is the emergence of megaregions - large networks of metropolitan areas, where most of the population growth by mid-century will take place – and how to organize governance, infrastructure, and land use planning at this new urban scale. A project of the independent Regional Plan Association, America 2050 is working to shape and support the new federal High-Speed Intercity Passenger Rail Program because of high-speed rail's potential realize the economic promise of megaregions and act as a transformative investment for America's future growth.

www.America2050.org
4 Irving Place, Suite 711-S
New York, NY 10003
T: 212-253-5795

Contents

Index of Figures

Photo: Ken Sturm / U.S. Fish and Wildlife Service

Overview & Summary

1

Buying land isn't enough. Building parks won't get it done. Restoring forests and wetlands by themselves is not an answer. Successful conservation requires a comprehensive, regional approach.

Landscape conservation means looking beyond property boundaries and political jurisdictions. A holistic perspective is vital for managing watersheds and habitats and addressing long-term issues such as climate change. With funding scarce, it's also crucial to build partnerships that can set mutual priorities, share resources and collaborate effectively. As the population grows and development expands, conservation needs to help shape – and not simply react to – decisions about land use and urban infrastructure.

This is especially true for complex geographies like the 13-state Northeast megaregion. This densely developed area – stretching from Maine to West Virginia – is now home to about 72 million people. Its cities, suburbs and rural areas are expected to add an additional 15 million people by the year 2040. Where these people are housed, and how their transportation and energy needs are met, will dictate whether the region's wildlife, drinking water and other resources, farms and forests, and outdoor recreational opportunities are truly lasting.

Landscape conservation initiatives can bring together the diverse interests critical for conservation success in the Northeast and elsewhere. These publicly or privately led efforts, which range from thousands to millions of acres, help focus partners on their shared interest in protecting landscapes and landscape processes. Such collaboration can enable the conservation community to align protection and management of individual properties while providing a platform for engaging non-traditional partners in their work.

To understand the promise and potential of landscape conservation, Regional Plan Association and America 2050, RPA's national-planning program, have conducted an in-depth analysis of landscape conservation in the Northeast megaregion, inventorying and characterizing existing landscape conservation initiatives and assessing how their diverse efforts relate to issues such as protecting habitats and water resources; assuring recreational opportunities; and managing agriculture and forestry resources. This was accomplished in part through the creation of an interactive website, www.rpa.org/northeastlandscapes, that allowed the public to post and view information about the initiatives.

This report offers a summary of the work landscape conservation initiatives are doing in the Northeast megaregion. Specific examples on how landscape practitioners are carrying out their work are highlighted throughout the document. To our knowledge, this inventory represents the first time that such a comprehensive assessment has been conducted.

The survey was used to identify the major challenges facing landscape conservation, including urban growth and land-use change, investments in transportation, water and energy infrastructure, climate change and limited funding for conservation and management. A build-out model of the 13 states in the region was created as a means of assessing where land-use change – by far the most critical issue facing these initiatives – will likely occur. Maps and analyses of infrastructure investments, energy resources and climate change similarly help paint a mega-regional-scale picture of challenges and opportunities.

Our goal in presenting this information is to further the practice of landscape scale conservation. There is little published information on the science and management of landscapes. Nor is there an overall strategy for coordination and innovation. This report is aimed at the land conservation community and in particular the growing network of those professionals engaged in landscape conservation practice. It is intended to generate discussion on how to better support these largely local efforts, increase their capacity, and leverage their whole system perspective to help shape federal and state policies.

In particular, that conversation should start by considering how to improve the practice of landscape conservation by:

- Addressing issues related to governance, such as the appropriate role of landscape assessment and management plans and building effective strategies for collaborating with partners, especially non-traditional stakeholders;
- Ensuring adequate funding and making the most efficient use of the money that is available. This includes understanding how landscape initiatives can access or benefit from investments in transportation, water, and energy and identifying the opportunities and barriers to sharing services and management responsibilities; and
- Developing the right set of tools, from better communications and marketing to quantifying ecosystem services to implementing regional land-use plans.

On the Ground: **Landscapes**

Making Conservation Work

Finding new resources for conservation is an urgent concern, given recent cuts in federal, state, and local spending. By working together across boundaries and agency responsibilities, landscape initiatives are making a compelling case for increased conservation funding and best practices that more effectively allocate available dollars.

Initiatives like the Piedmont Environmental Council have found successful strategies for leveraging infrastructure spending for sustainable development. Where marketing and tourism campaigns can help to sustain the cultural, scenic, and historic character of a region, National Heritage Areas like the one for the Blackstone River region have been created through partnerships between local communities and the National Park Service. The New Jersey Highlands Water Protection and Planning Council is employing ecosystem services produced by protected forests to keep water quality safe for people living in northern New Jersey. Private initiatives like Staying Connected and regional commissions like the Albany Pine Bush Preserve have developed robust land management techniques and spatial planning metrics to identify natural areas of special quality that are worth protecting.

"On the Ground" examples are included throughout the report to show how landscape initiatives are successfully implementing their missions and developing best practices in this emerging field.

Photo: Ken Sturm / U.S. Fish and Wildlife Service

Landscapes

2

Across the United States, conservationists are banding together and leveraging local actions to protect and manage natural resources at the landscape scale. Practitioners are developing conservation strategies across jurisdictions and thinking about ecological and watershed processes systematically. As communities across the country are faced with increasingly complex and interconnected challenges, the landscape conservation approach is proving the right tool at the right time.

Specifically, landscape conservation initiatives:

1. Understand that managing wildlife, water, recreation, and forestry and agricultural production depends on managing landscape and other systems processes, whether it's a migratory corridor, a watershed, or a rural economy;

2. Work across political and property boundaries, agency jurisdictions, and political interests, bringing together different players that must work together on these complex problems; and

3. Make conservation more effective and create stewardship efficiencies by helping organizations prioritize actions, build partnerships, and share services.

Perhaps most significantly, landscape conservation can elevate concerns about natural resources management into the broader policy framework of land use and urban infrastructure.

This is especially important for lands and waters in and around the nation's eleven megaregions. Networks of metropolitan areas – like the Boston - Washington corridor in the Northeast – will see most of the nation's population and economic growth in the 21st century. Megaregions are a new scale of geography that reflect the interlocking economic systems, shared natural resources and ecosystems, and common transportation systems linking population centers. These increasingly crowded places demand that conservation and development work together as part of a better overall land use strategy.

Over the next generation, the 13-state Northeast megaregion from West Virginia to Maine is expected to grow by 20%, adding about 15 million residents. Population growth – and the related choices about settlement patterns, how to supply energy, and support needed infrastructure – will place increased pressure on natural resources. But efforts to protect water, habitat, and other natural resources are all-too-often divorced from local and regional land use decision making, as well as investments in transportation, water, and energy infrastructure.

Climate change adds urgency to the situation. Reducing CO_2 emissions and sequestering carbon in soils and vegetation will require coordinated, broad-scale actions. Adapting to higher temperatures, increased precipitation, and periods of drought will require resilient natural systems and management schemes. Likewise, funding constraints make priority setting and cooperative partnerships essential.

Landscape conservation practitioners can work across lines that otherwise serve as barriers, pulling in key stakeholders and utilizing a broad array of tools to accomplish their missions. Such strategies can elevate the significance of local actions. Land and easement acquisition, municipal land use plans, and management agreements with property owners are all more effective when they are supportive of broader ecological and cultural goals.

Landscape practitioners have established networks with common goals, providing a framework for cooperation on important issues. They have developed contractual partnerships to share services, allocate funding, and ensure best management practices across jurisdictions. In some cases, new institutions have been established under federal or state law that authorize special funding or even establish planning and regulatory rules to protect important natural resources within a distinct geographic boundary.

The promise of landscape conservation to address 21st century conservation concerns has been increasingly recognized by elected officials and public agencies. Landscape conservation is featured in President Obama's America's Great Outdoors initiative and the U.S. Fish and Wildlife Service's Landscape Conservation Cooperatives, National Parks Service's Second Century Commission Report, the U.S. Department of Agriculture's All Lands policy, and the Forest Service's Open Space Conservation Strategy and Stewardship Project.

What Are Landscapes?

For conservation professionals, the term "landscape" refers to much more than scenery, the qualities at the heart of a standard dictionary definition. It is an approach informed by the growing science of landscape ecology, which integrates natural and social sciences to examine how biological and cultural systems function within a specific geographic boundary.

The Nature Conservancy defines landscapes as "...places with a recognizable unifying ecological feature (like a bay, watershed, or mountain range) that include parks, human communities, and working lands and waters all within an area large enough to maintain resilience over time, sustain key ecological processes and services, and allow for movement of organisms within and through the landscape. Whole systems are identified by human perception as well as biology."[1]

At the state level, the Northeast Association of Fish and Wildlife Agencies has brought together state agencies to collaborate on landscape research while Pennsylvania's Conservation Landscape Initiatives have brought together state and local partners for collaboration in community revitalization.

What Are Landscape Conservation Initiatives?

Landscape conservation initiatives are focused efforts by organizations to partner with others to protect resources and landscape-scale processes across borders, generally to protect habitat, water, agricultural and forest production, and cultural and recreational resources.

Landscape conservation initiatives are generally characterized as:

- Multi-jurisdictional;
- Having multiple objectives and / or outcomes;
- Deploying conservation tools at a relevant geographic scale and time horizon;
- Geographically contiguous;
- Accountable to an entity or oganization;
- Making progress toward measurable outcomes.

These efforts can be institutions created under federal or state statutes, or voluntary networks of organizations with common goals. The Lincoln Institute of Land Policy has published two reports recently that provide further examples and definitions of landscape conservation. These reports provide overviews of various experiments in landscape conservation (*Working Across Boundaries: People, Nature, and Regions*[2]) as well as recommendations for a national policy agenda (*Large Landscape Conservation: A Strategic Framework for Policy and Action*[3]).

Of course, the concept of landscape conservation is not a new one. The United States (and other nations) have a long history of taking significant measures to protect landscape resources. Here in the Northeast these include the Adirondack Park in New York and the Pinelands of New Jersey. National examples include Lake Tahoe in California and the Columbia River Gorge in Washington and Oregon. A history of these efforts is discussed in the America 2050 and Regional Plan Association's 2007 publication: *A Land and Resources Conservation Agenda for the United States*.

Conservation Faces Landscape Scale Challenges

Landscape initiatives can help meet great conservation challenges, matching the response to the scale at which they occur and the issues they encompass. By providing a framework for advocacy, investment, and management, landscape conservation can make for better public and private decisions about resource management, land use, infrastructure investment, climate adaptation and mitigation, and capital and operating funding.

Addressing Whole Systems

When natural processes clean the air, filter and cool the water, protect against natural disasters, and make crops and other plants thrive, the ecosystem is providing the people and communities with valuable services. These benefits provide an effective and efficient way of meeting community needs. Landscape conservation offers a tool to protect, restore, and enhance the green infrastructure from which ecosystem benefits derive.

Wildlife habitat, drinking and other water resources, outdoor recreation from hiking to hunting, and agricultural and forestry production all function at the landscape scale, rarely conforming to the property line or to jurisdictional boundaries. By recognizing these whole systems in their goals and strategies, conservationists increase their likelihood of success.

The benefits of the landscape approach have been recognized by a variety of federal and state programs for protecting the habitat, water, recreational, and working farms and forests of the Northeast. For example, the Pennsylvania Comprehensive Wildlife Conservation Strategy highlights the importance of protecting contiguous, high-quality forest habitat "...where forest-dependent species may reproduce at high rates, creating a large population surplus on a yearly basis... forest species occupying highly fragmented forests, especially those in an agricultural or developed landscape, may have lower reproductive rates as a result of the effects of predators and nest parasites. Area-sensitive species may not occupy these patches at all".[4] The USDA Forest Service has noted how "a watershed protection forest provides services like filtering air and water, reducing floods and erosion, sustaining stream flows and aquatic species, ensuring watershed stability and resilience, and absorbing rain and refilling groundwater aquifers. Maintaining these watershed services is essential".[5]

Managing Land Use Change

There are approximately 19 million urban acres in the 13-state Northeast megaregion. The build out model constructed for this study suggests that there will be approximately 22 million urban acres by 2040. The location and the environmental performance of these three million acres of new homes, businesses, and roads will have much to say about their impact – both positive and negative - on natural and recreational resources.

Compared to other megaregions, the pace of land use change in the Northeast is not extraordinary. About 100,000 acres will be converted for urban uses each year over the next three decades. But this change is not spread evenly. It is concentrated in a few key counties. Moreover, development in the wrong place – a wildlife migration corridor, a pristine stream, the viewshed from a remote trail – can have a disproportionate impact on important resources.

In the Northeast, land use decisions are generally made by local municipalities. All too often, conservationists have not focused enough on land use planning, particularly at a scale beyond the individual property or development proposal. Landscape conservation initiatives can help align local, regional and mega-regional policies and decisions: helping concentrate new housing and jobs in existing centers, designing subdivisions to protect sensitive resources, building open space connections between protected parklands, or creating public open spaces to add quality of life in urban areas. The collaborative nature of efforts can also be a vehicle for advancing economic development efforts in rural areas that are losing population and vitality. By combining conservation action with investments in tourism and working farms and forests, conservation initiatives can foster sustainable rural economies.

Leveraging Infrastructure Investments

The infrastructure that delivers energy, treats wastewater, and ensures our mobility is critical to the success of the Northeast's economy. Federal, state, and local agencies are investing billions of dollars as demand for new infrastructure continues to grow and current infrastructure ages and needs repair.

Landscape conservation initiatives can help direct investments by identifying sensitive resources that the siting of infrastructure may harm. Landscapes conservation can also be a part of growth management strategy, helping establish greenbelts around urban and suburban centers that can ensure that infrastructure dollars are spent wisely. They provide an efficient, regional framework for mitigation of necessary projects.

But leveraging these important investments to yield conservation benefits also represents a significant opportunity to increase investments in conservation. Between 1998 and 2005, local, state, and federal spending for capital projects to improve transportation and water management in the nation averaged $149 billion and $49 billion per year, respectively.[6] During the same time period, local, state, and federal appropriations for conservation averaged only about $2.4 billion per year.[7] Protected landscapes constitute a green infrastructure that can often effectively deliver vital ecosystem services such as clean drinking water and stormwater management. Landscape conservation strategies offer the scale required for establishing viable markets for such services and they allow the use of transportation and water resource funds to pay for them.

Mitigating and Adapting to a Changing Climate

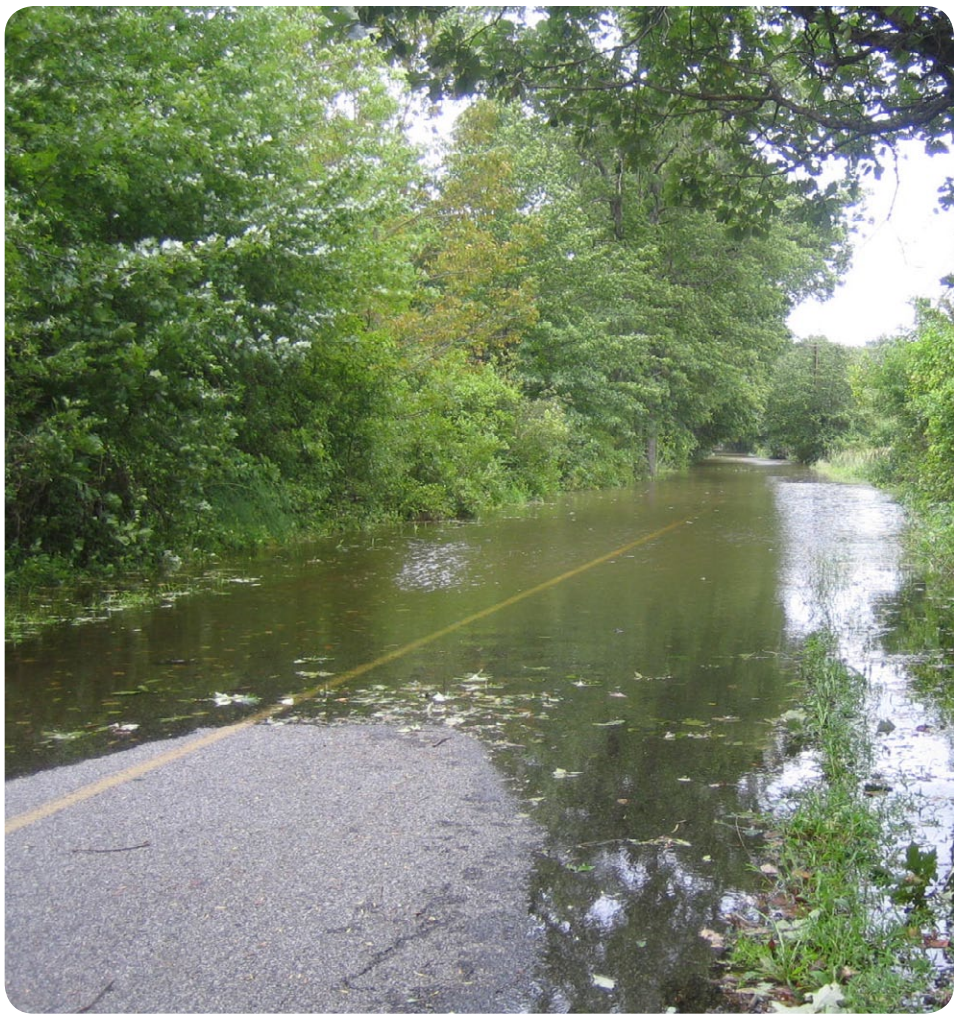
Landscape conservation can mitigate the emissions of greenhouse gasses that contribute to climate change by sequestering carbon in forests and soils. In the Northeast, landscape conservation initiatives can be an important vehicle for coordinating sequestration efforts given the persistent threat of subdivision for the region's remaining large, unfragmented forest tracts. Initiatives can play a role in reducing vehicle miles traveled by encouraging higher density mixed use development. Landscape conservation is also an important tool in adapting to the effects of climate change, allowing room for coastal and riverine floods, protecting the headwaters that supply baseflow to small streams during periods of drought, and providing continental-scale corridors for species migration.

For example, nearly six million acres of land in the 13-state Northeast megaregion – an area equal to the size of the state of New Hampshire - are at risk from inundation by floods currently anticipated to occur once in every 100 years.[8] But by mid-century, the rate of return for 100 year rain events will increase by about 20% and the sea will rise between 5 – 29 inches.[9] These changes make creating spaces for riverine and coastal floodwater and protecting wetlands and forests in headwater areas ever more important.

Securing Needed Funding

Whether it's capital for land acquisition or the year-to-year operational dollars needed to run an organization or manage property, there is never enough funding to meet conservation needs. Landscape conservation can leverage capital funds from water, transportation and energy sources for conservation purposes. Landscape conservation can also help by providing a framework for efficient and effective marketing, acquisition, and management. Landscape conservation initiatives can help set priorities, ensuring that scarce resources protect the most important lands and waters, allowing individual members to use public and private resources at a level unavailable to any one individual member. The partnerships inherent in landscape-scale efforts help ensure close coordination between adjoining land trusts, or between federal, state, and local partners. Landscape efforts can also provide for shared services, such as joint marketing to promote tourism or management agreements that enable cooperative use of equipment and staff resources across jurisdictions. By recognizing the multiple objectives of large landscapes conservation, initiatives can attract more partners from the world of regional economic development entities, marketers of agricultural and forest products, tourism coalitions, state transportation boards, and county and regional planning directors.

Such efficiency is crucial, especially in a challenging economy. Given the challenges facing state and federal conservation programs like the Land and Water Conservation Fund and the State Wildlife Grants, it is critical that the conservation community ensure that acquisitions are strategic and management costs minimized. Moreover, landscape conservation initiatives can be an important means of engaging partners, like the hospitality industry, in advocacy efforts.



Flooded road at Great Swamp National Wildlife Refuge in New Jersey.
Photo: U.S. Fish and Wildlife Service

America's Great Outdoors Program

"Conserving large landscapes requires collaboration among landowners; tribes; local, state, and federal governments; conservation groups; agriculture and forestry groups; and other stakeholders. Such 'locally grown' landscape partnerships are springing up in regions across the nation and are increasingly vital to 21st entury conservation. AGO can help foster and catalyze these vibrant, community-level efforts to conserve and connect the nation's landscapes and watersheds to benefit both present and future generations." AGO initiatives include the EPA's Urban Waters Federal Partnership, the BLM's National Landscape Conservation System, and the NPS's Climate Response Strategy.

For more information, see http://americasgreatoutdoors.gov/report/

Forest Service Open Space Strategy

"Our vision for the 21st century is an interconnected network of open space across the landscape that supports healthy ecosystems and a high quality of life for Americans. Private and public open spaces will complement each other across the landscape to provide ecosystem services, wildlife habitat, recreation opportunities, and sustainable products."

For more information, see http://www.fs.fed.us/openspace/OS_Strategy_final_web.pdf

NPS Second Century Commission

"Parks will be key elements in a network of connected ecological systems and historical sites, and public and private lands and waters that are linked together across the nation and the continent. Lived-in landscapes will be an integral part of these great corridors of conservation."

For more information, see http://www.npca.org/commission/pdf/Commission_Report.PDF

Landscape Conservation Cooperatives

"[This] national geographic framework will provide a continental platform upon which the [Fish and Wildlife] Service can work with state and other partners to connect project- and site-specific efforts to larger biological goals and outcomes. By providing visual context for conservation at 'landscape' scales– the entire range of a priority species or suite of species–the framework helps ensure that resource managers have the information and decision-making tools they need to conserve fish, wildlife, plants and their habitats in the most efficient and effective way possible."

For more information, see http://www.fws.gov/science/shc/nationalgeographicframework.html

Northeast Megaregion

3

Just as cities and suburbs blur to form metropolitan areas, the expansion of these urbanized areas has created even larger places: megaregions. Most of the nation's rapid population growth, and an even larger share of its economic expansion, is expected to occur in one of eleven emerging megaregions. Interlocking economies, shared natural resources and cultural identify, and common transportation systems link these population centers together.

Complex urban development patterns and high demand for land and resources pose particular challenges for conservation in the thirteen state Northeast megaregion. The Northeast is a densely developed economic powerhouse, producing 20% of the nation's gross domestic product and housing 18% of the population on only 2% of the nation's land area.

This dense urban fabric places extraordinary burdens on natural resources in the Northeast. Competing demand for lands and water, large volumes of wastewater and other pollution, expensive and complicated real estate, heavy recreation demand on existing parks, and resource systems fragmented by roads and urban development are common challenges to conservationists and wildlife managers. At the same time, continued growth in low density settlement patterns places increasing pressure on some open spaces while declining populations and changing rural economies are posing economic hardships in other areas.

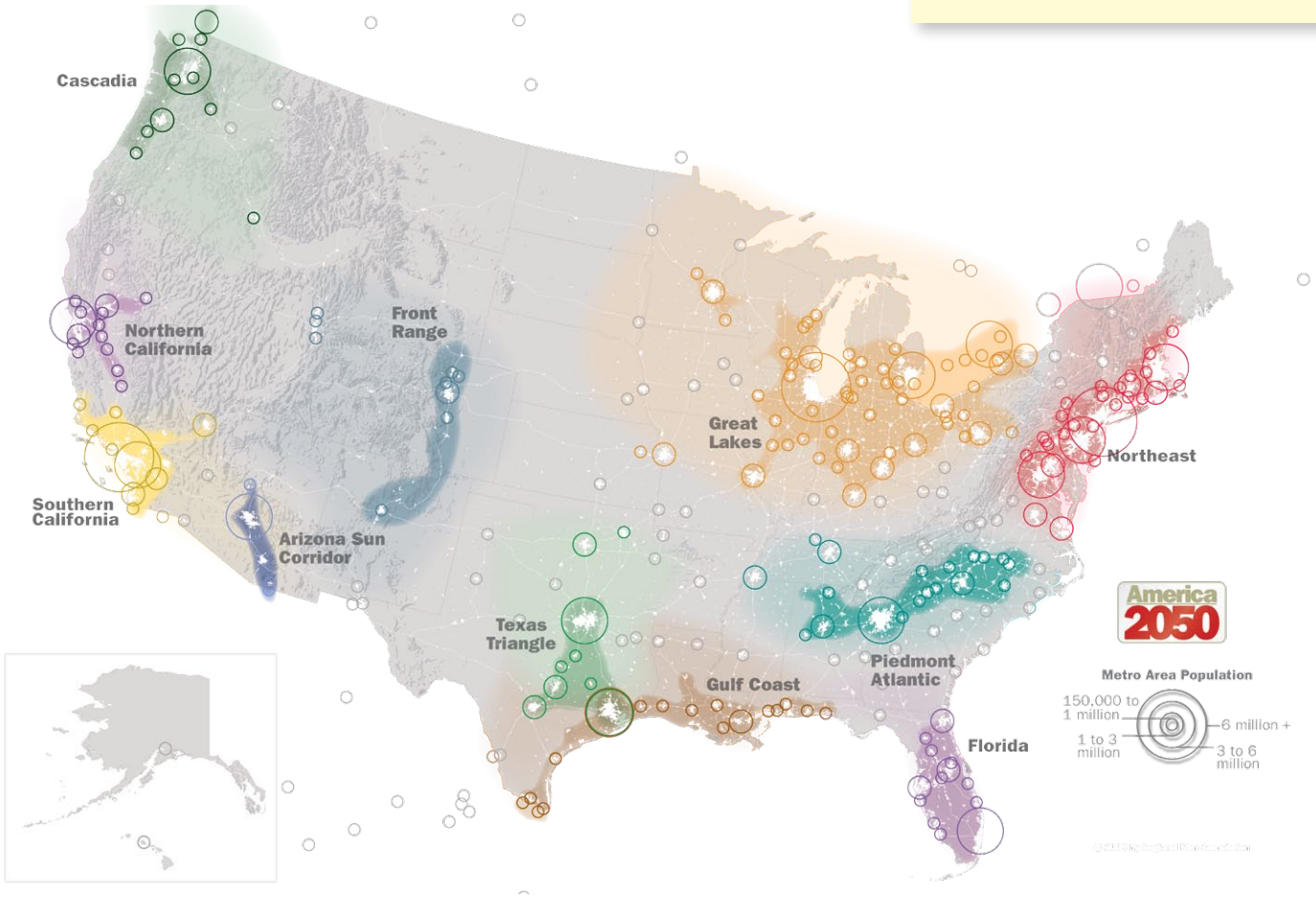
Megaregions

Megaregions are large network of metropolitan regions, each covering thousands of square miles and located in every part of the country.

The megaregions of the United States are defined by layers of relationships that together define a common interest; this common interest, in turn, forms the basis for policy decisions. The five major categories of relationships that define megaregions are:

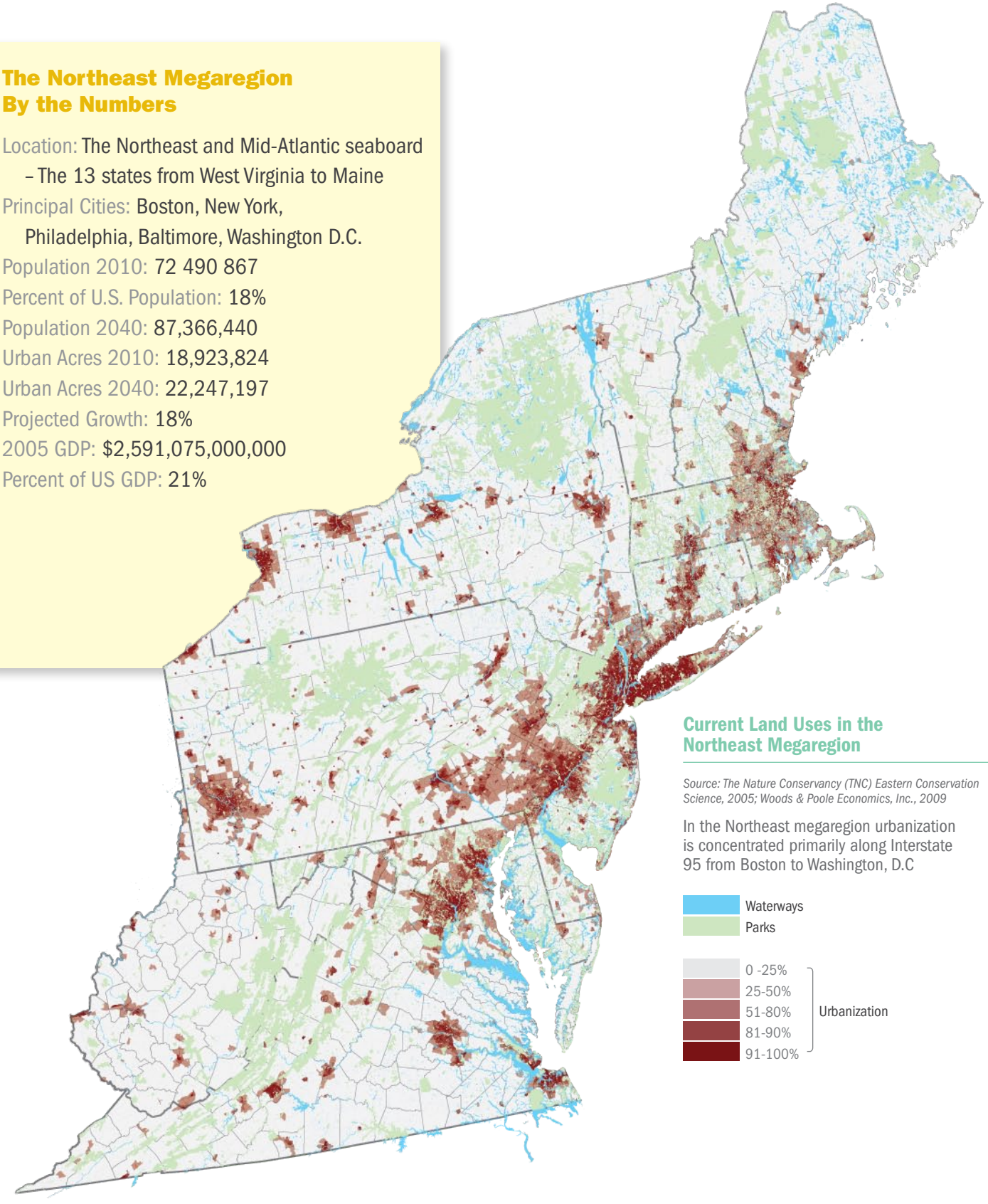
- Environmental systems and topography;
- Infrastructure systems;
- Economic linkages;
- Settlement patterns and land use; and
- Shared culture and history.

For more information, see http://www.america2050.org/2007/09/new-report-highlights-planning.html



The Northeast Megaregion By the Numbers

Location: The Northeast and Mid-Atlantic seaboard – The 13 states from West Virginia to Maine
Principal Cities: Boston, New York, Philadelphia, Baltimore, Washington D.C.
Population 2010: 72 490 867
Percent of U.S. Population: 18%
Population 2040: 87,366,440
Urban Acres 2010: 18,923,824
Urban Acres 2040: 22,247,197
Projected Growth: 18%
2005 GDP: $2,591,075,000,000
Percent of US GDP: 21%



Current Land Uses in the Northeast Megaregion

Source: The Nature Conservancy (TNC) Eastern Conservation Science, 2005; Woods & Poole Economics, Inc., 2009

In the Northeast megaregion urbanization is concentrated primarily along Interstate 95 from Boston to Washington, D.C

Waterways
Parks

0 -25%
25-50%
51-80%
81-90%
91-100%
Urbanization

Initiatives

4

To understand how landscape initiatives are addressing conservation challenges in the Northeast megaregion. America 2050 and RPA have compiled an inventory of more than 165 landscape initiatives in the thirteen states from Maine to West Virginia. Initiatives are tracked based on a number of attributes, including their goals and objectives, the tools they use to achieve them, and the partners they engage in building support for their work. Together, the initiatives in the inventory offer a portrait of the major trends for landscape conservation in the region.

Inventory Criteria and Methodology

The landscape initiatives in America 2050 and RPA's inventory are characterized by a comprehensive set of 16 criteria:

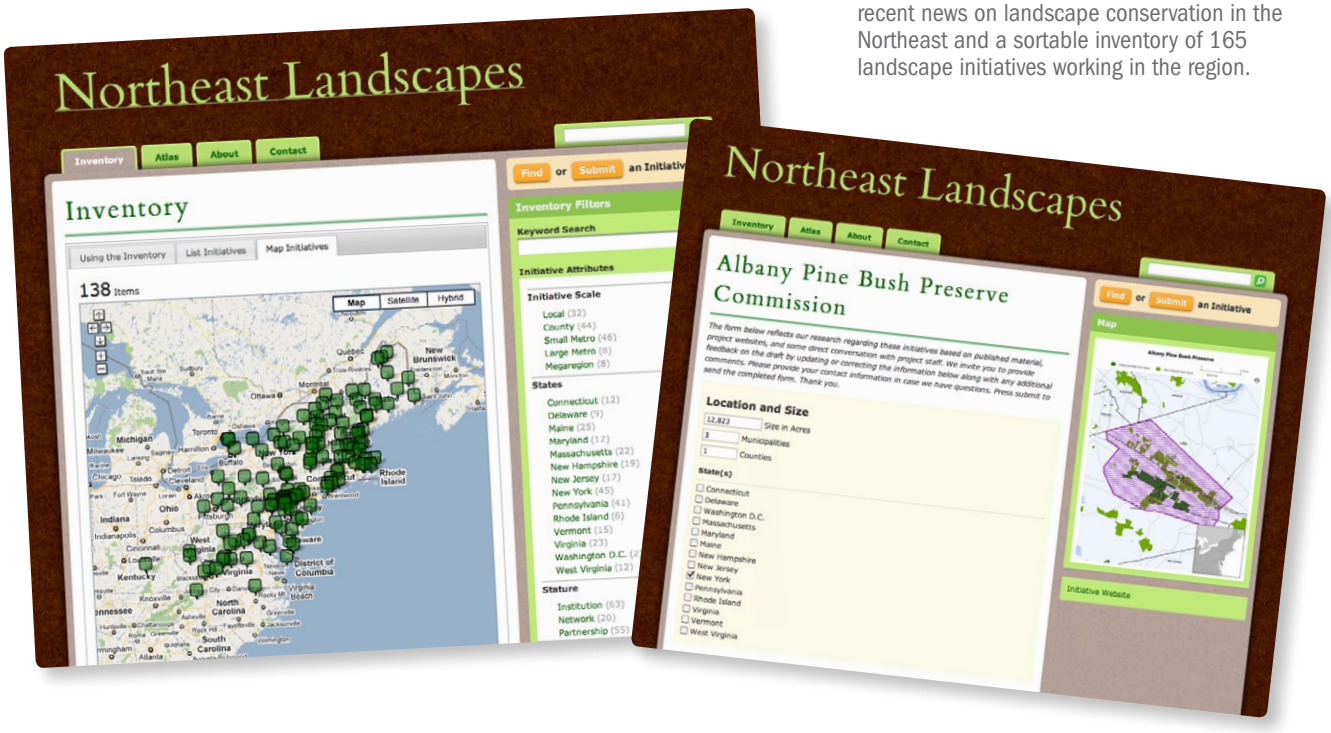
1. Size in Acres
2. Scale
3. Number of Municipalities in Service Area
4. Number of Counties
5. Number of States
6. Values
7. Threats
8. Objectives
9. Tools
10. Partnerships
11. Governance / Stature
12. Lead Institution
13. Adopted / Required Management Plan?
14. Year Established
15. Number of Staff
16. Level of Federal Engagement

Information was collected through published information and initiative websites. In some cases interviews with staff or others familiar with the initiatives were conducted. Draft information was then made available for review to the staff at the initiatives and an advisory committee established by RPA and America 2050. Finally, the information was posted on a website, and the public was invited to review the inventory and propose new initiatives or make corrections. For some criteria, such as staff size and year established, data was not available for all 165 initiatives. To be sure, the inventory is a snapshot in time, and by its nature will never be complete. The information collected at the time of publication was used to identify and highlight the important opportunities and challenges facing landscape conservation initiatives.

America 2050 and RPA's Northeast Landscapes Website

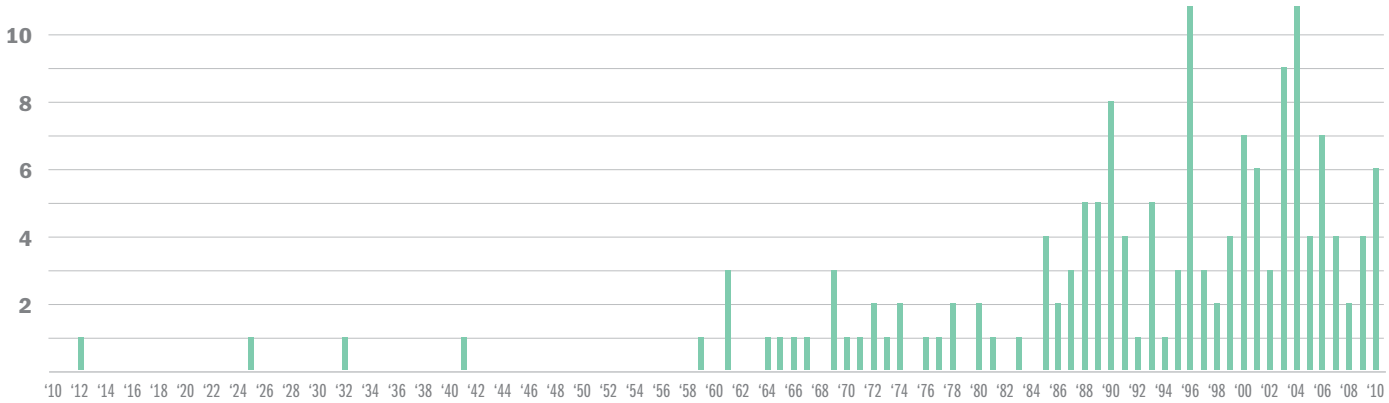
www.rpa.org/northeastlandscapes

The Northeast Landscapes website features recent news on landscape conservation in the Northeast and a sortable inventory of 165 landscape initiatives working in the region.



Inventory Trends

Year Established for Northeast Landscape Initiatives



Age

Landscape conservation in the Northeast megaregion is a movement that is young and growing. While some initiatives date back to the turn of the 20th century, over 40% were founded in since 2000; 80% since 1985. This growth is likely due to a combination of several factors, including implementation of new federal authorities, such as the National Heritage Areas and Estuary Programs, the rise of land trusts and other non-profit conservation organizations, and the growing understanding of landscape ecology and watershed processes.

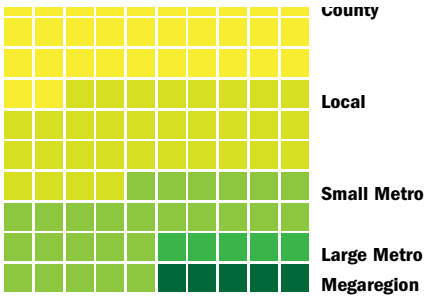
Staff

Landscape conservation initiatives are relatively small scale enterprises, even given the broad territory they cover. More than half have fewer than five employees, 80% have less than 15. It is the partnerships between groups that allow landscape conservation initiatives to achieve their goals.

Scale

Close to 60% of the initiatives operate at a scale that can readily engage individual towns and counties. More than 25% of the initiatives are less than 200,000 acres in size. The more local nature of the territories that the initiatives encompass may reflect the need to engage land owners and local government, the primary players in land use decisions. It may also reflect the geographic and cultural diversity of Northeastern landscapes, and the desire of initiatives to organize around recognizable territory. For initiatives concerned about megaregional or metropolitan scale forces, working with the many smaller initiatives within their borders may be an effective way of delivering their services and agenda.

Operating Scale for Northeast Landscape Initiatives



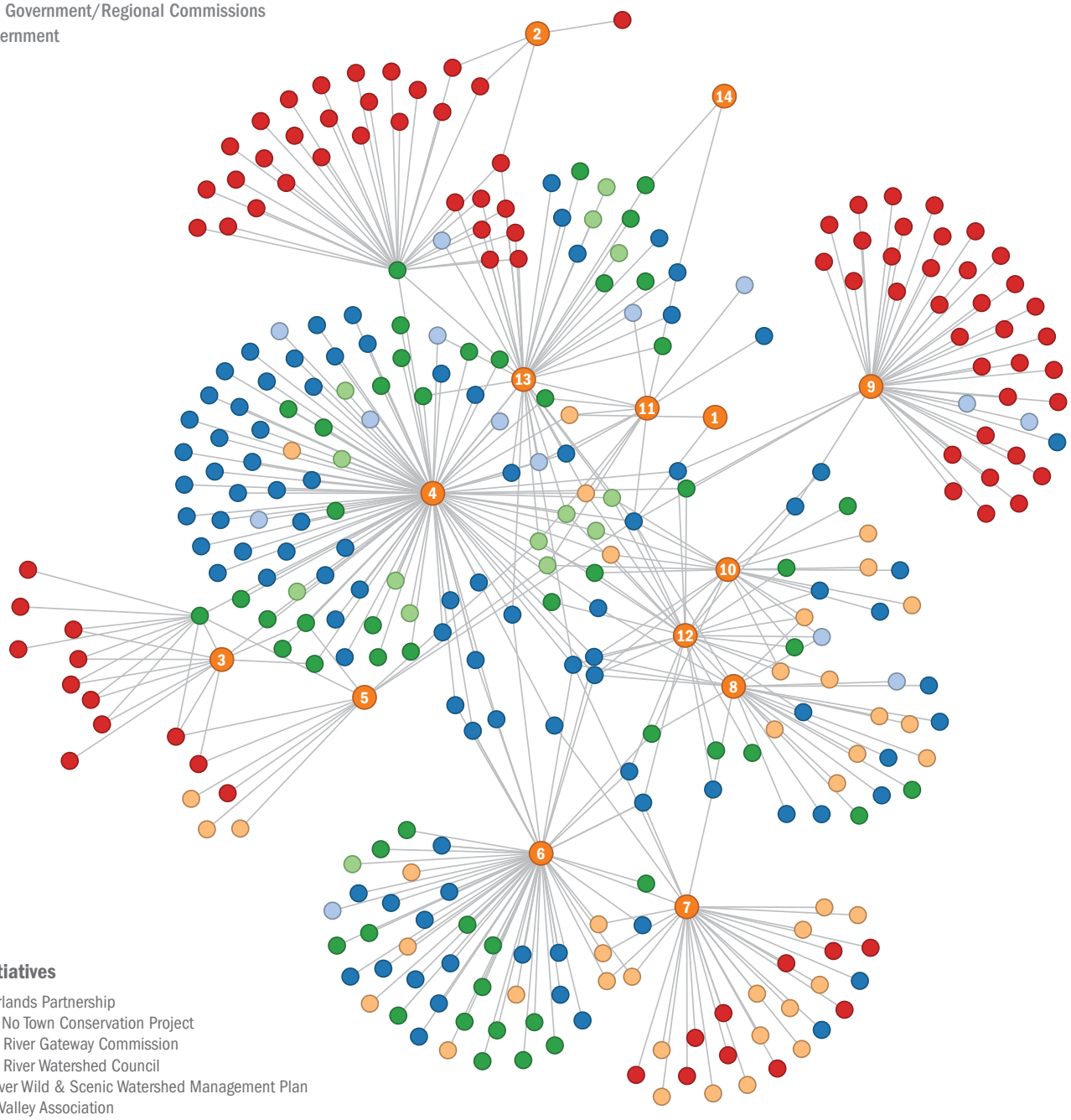
Partnerships

While non-profit organizations are often responsible for leading an initiative, success is dependent on a dense network of partners working towards common goals and objectives. The typical initiative involves three sectors of society: non-profit civic organizations; universities; and local, state or federal government. While not often playing a leadership role in landscape initiatives, federal agencies are an important part of the mix; over 53% of the initiatives note that federal agencies helped to found their efforts, provide funding, or offer technical assistance.

The Conservation Network in the Connecticut River Valley

In the Connecticut River Valley, federal, state, and civic initiatives work with each other as well as with local government and academic institutions.

- Landscape Initiatives
- Towns
- NGOs
- Local/State Government/Regional Commissions
- Federal Government
- Universities
- Land Trusts



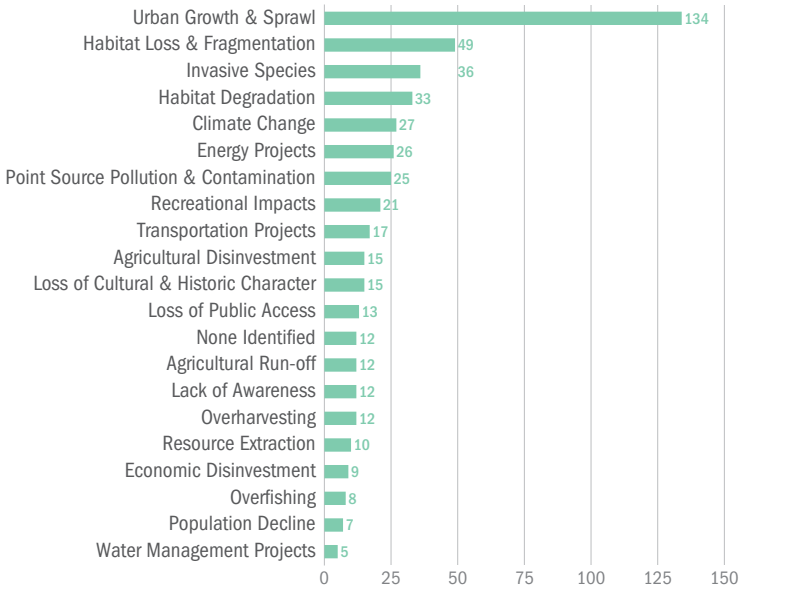
Landscape Initiatives

1 Atlas Timberlands Partnership
2 Chateaugay No Town Conservation Project
3 Connecticut River Gateway Commission
4 Connecticut River Watershed Council
5 Eightmile River Wild & Scenic Watershed Management Plan
6 Housatonic Valley Association
7 Litchfield Hills Greenprint Collaborative
8 MassConn Sustainable Forest Partnership
9 Monadnock Community Conservation Partnership
10 North Quabbin Regional Landscape Partnership
11 Orange County Headwaters Project
12 Quabbin to Cardigan Partnership
13 White River Partnership
14 Worcesters-to-Kingdom Linkage Conservation Project

Threats

In the Northeast megaregion, decisions about land use are the most important factor in considering how to protect natural resources across landscapes. The vast majority of landscape initiatives - more than 80% - cite urban growth and related sprawl as a threat to the multiple resources they seek to protect. Other threats are the result of changes in land use, including habitat loss and fragmentation and the loss of cultural and historic character. In the Delaware River Basin, like most of the Northeast, urban growth is cited by nearly all of the initiatives in the region, representing a common issue that helps to unify the conservation organizations in the region.

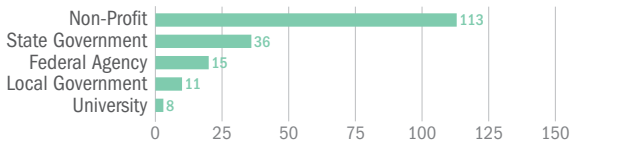
Common Threats to Landscape Conservation



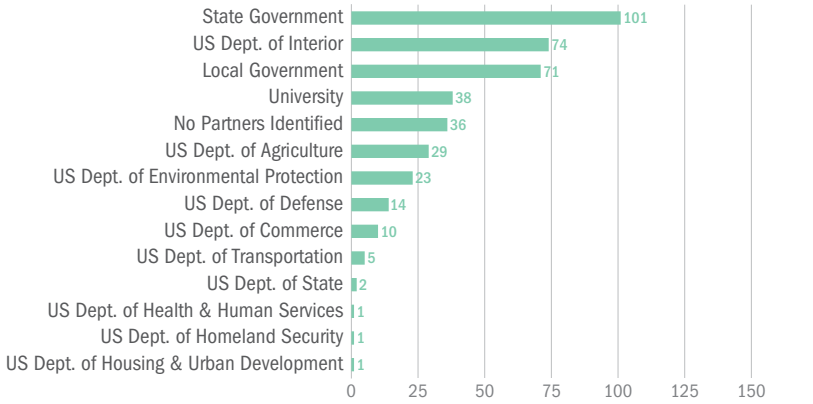
Leadership

Of the 165 landscape initiatives identified in the inventory, over 68% are led by non-profit organizations. This is not surprising in many respects: these private civic organizations are able to cross jurisdictional boundaries, seek diverse sources of funding, and bring together stakeholders from several sectors. Of the 53 public sector driven initiatives, most are led by state governments, while only 9% are led by federal agencies.

Lead Partner in Initiatives by Sector



Conservation Partners for Landscape Initiatives



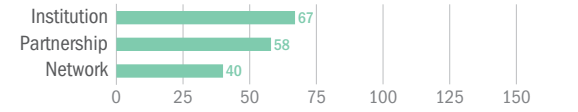
Stature

The inventory classifies initiatives based on three increasing levels of formality:

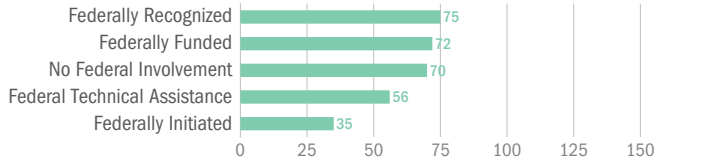
- **Networks** where members work collaboratively with each other on a voluntary basis;
- **Partnerships** governed by a legal contract between the parties; or
- **Institutions** that exist in federal or state law.

More than 60% of the initiatives are guided by legislation or formal contracts. Most instutions are less than 200,000 acres in size.

Governance



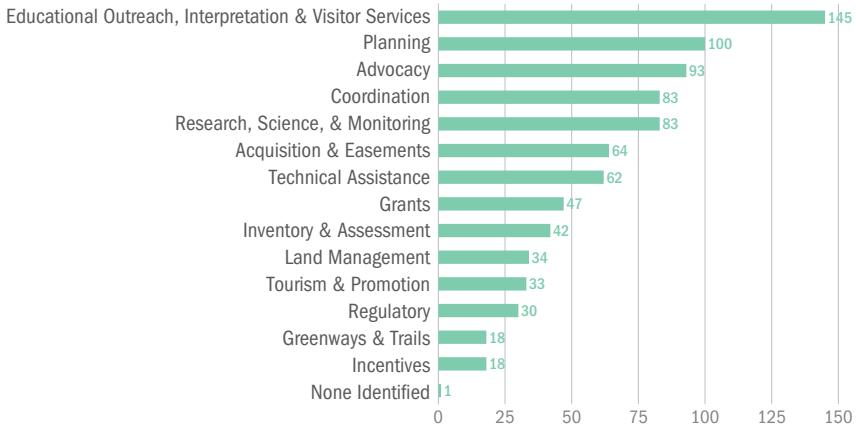
Federal Involvement



Tools

While land acquisition and management is often the most direct (and costly) means of achieving conservation goals, only about 40% of the landscape conservation initiatives directly acquire land and easements to meet their objectives. Very few (about 21%) manage conservation holdings.

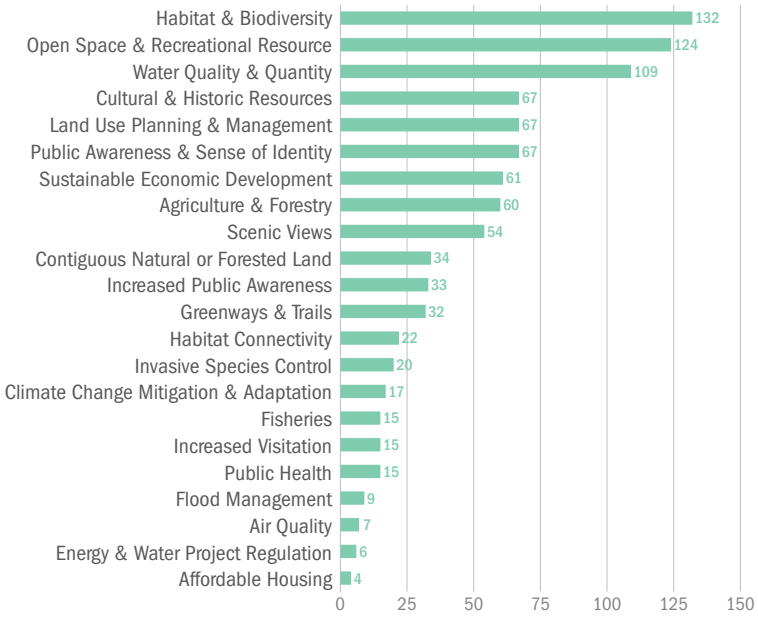
Common Conservation Tools Employed by Landscape Initiatives



Objectives

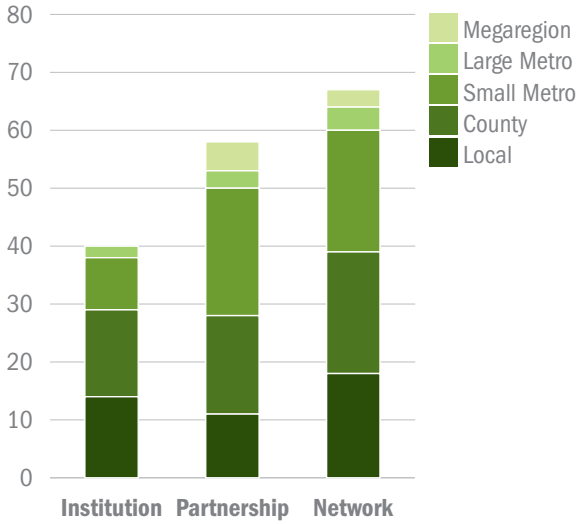
Most landscape initiatives recognize the importance of multiple resources within their territory. Initiatives listed an average of six objectives that they were actively addressing. The objectives most often cited by practitioners are “Habitat & Biodiversity”; “Open Space & Recreational Resources,” and “Water Quality & Quantity”.

Common Objectives for Landscape Initiatives



Distribution of Northeast Landscape Initiatives by Organizational Stature and Scale

The vast majority of initiatives operate in a territory where less than 20% of the land base is protected by local, state, or federal government. As a result, the initiatives employ a broad range of tools, including education, planning, and technical assistance to achieve their landscape conservation goals.

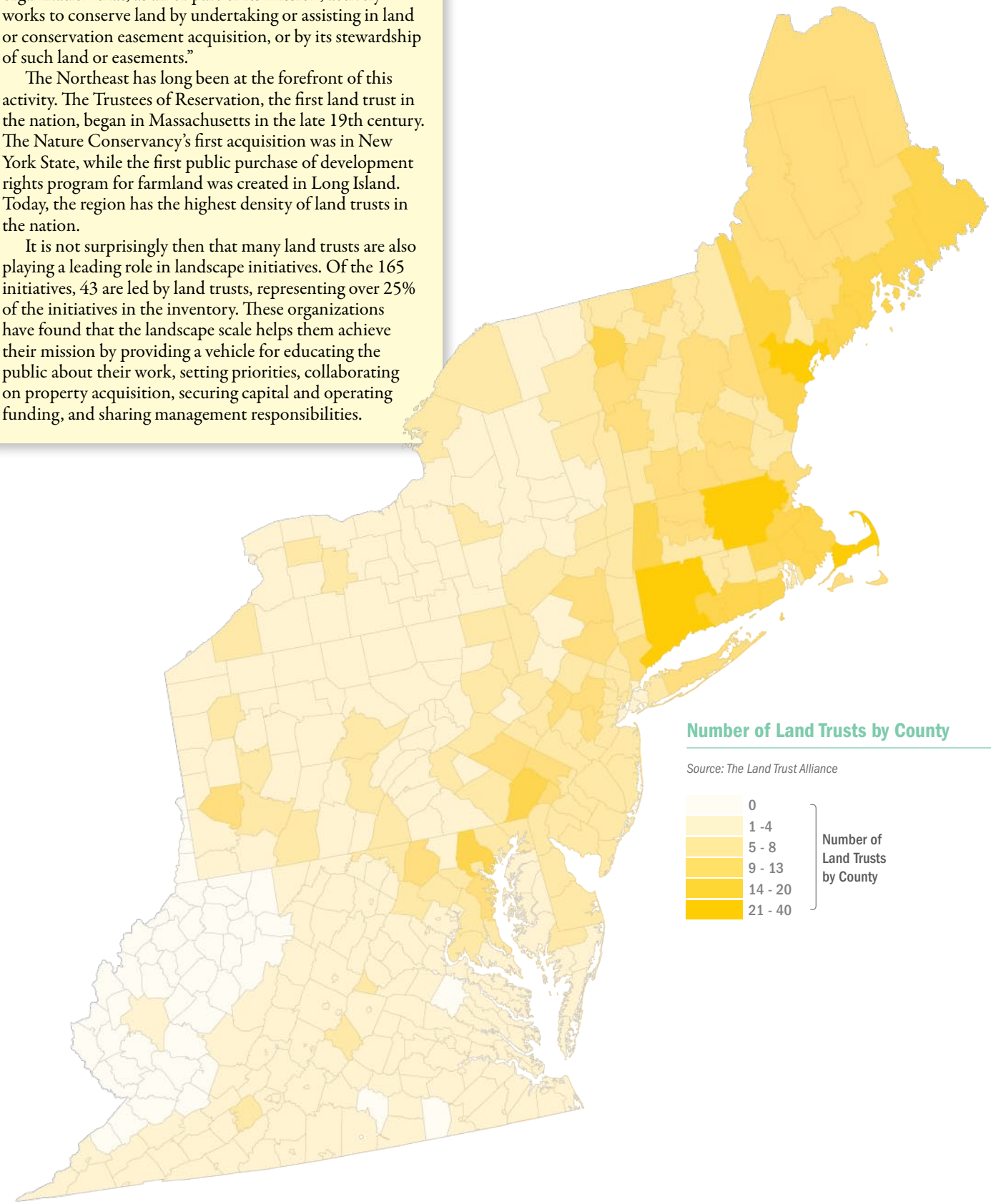


Land Trusts in Landscape Conservation

The Land Trust Alliance defines a land trust as "a nonprofit organization that, as all or part of its mission, actively works to conserve land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements."

The Northeast has long been at the forefront of this activity. The Trustees of Reservation, the first land trust in the nation, began in Massachusetts in the late 19th century. The Nature Conservancy's first acquisition was in New York State, while the first public purchase of development rights program for farmland was created in Long Island. Today, the region has the highest density of land trusts in the nation.

It is not surprisingly then that many land trusts are also playing a leading role in landscape initiatives. Of the 165 initiatives, 43 are led by land trusts, representing over 25% of the initiatives in the inventory. These organizations have found that the landscape scale helps them achieve their mission by providing a vehicle for educating the public about their work, setting priorities, collaborating on property acquisition, securing capital and operating funding, and sharing management responsibilities.

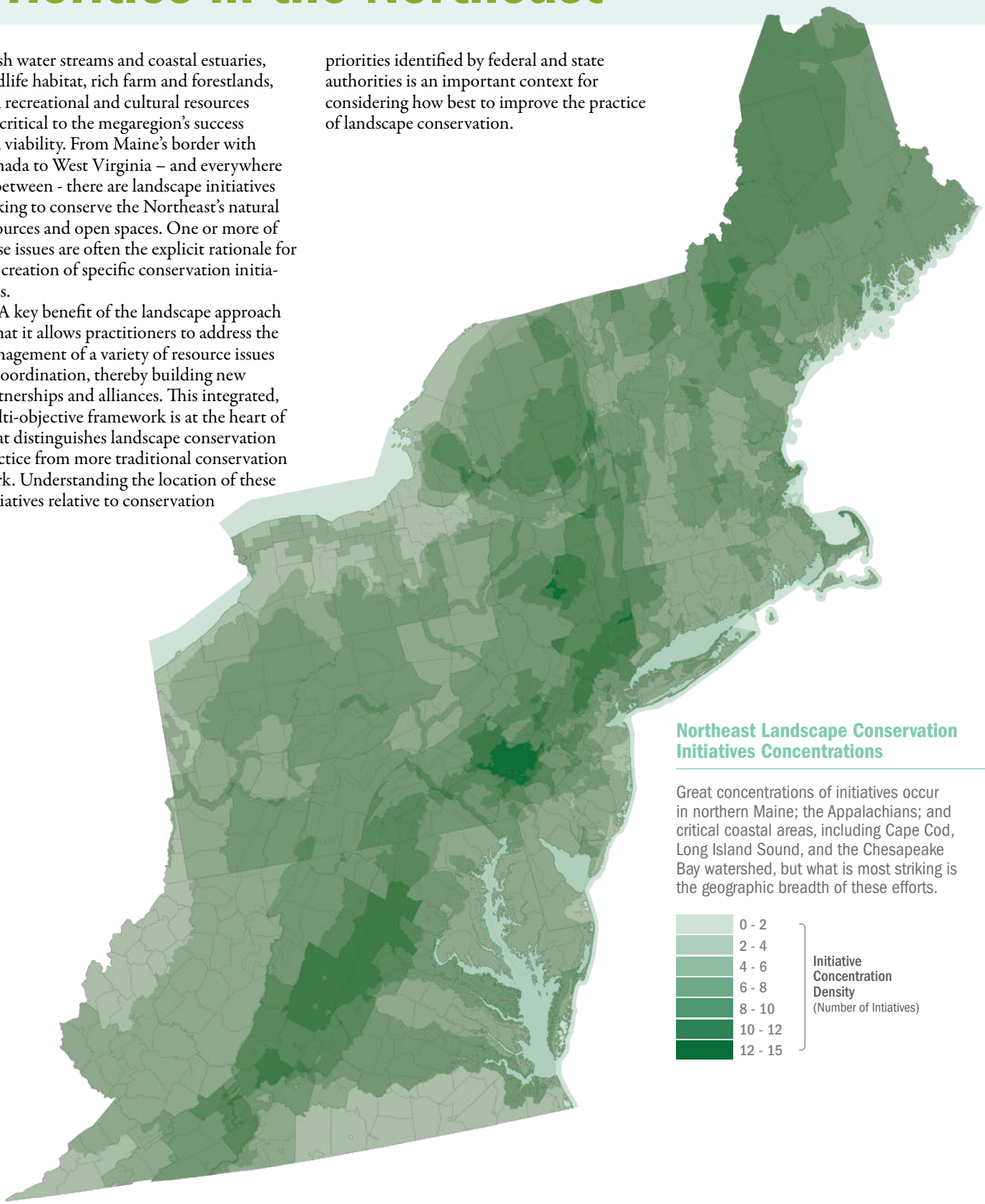


Meeting Conservation Priorities in the Northeast

5

Fresh water streams and coastal estuaries, wildlife habitat, rich farm and forestlands, and recreational and cultural resources are critical to the megaregion's success and viability. From Maine's border with Canada to West Virginia – and everywhere in between - there are landscape initiatives seeking to conserve the Northeast's natural resources and open spaces. One or more of these issues are often the explicit rationale for the creation of specific conservation initiatives.

A key benefit of the landscape approach is that it allows practitioners to address the management of a variety of resource issues in coordination, thereby building new partnerships and alliances. This integrated, multi-objective framework is at the heart of what distinguishes landscape conservation practice from more traditional conservation work. Understanding the location of these initiatives relative to conservation priorities identified by federal and state authorities is an important context for considering how best to improve the practice of landscape conservation.



Northeast Landscape Conservation Initiatives Concentrations

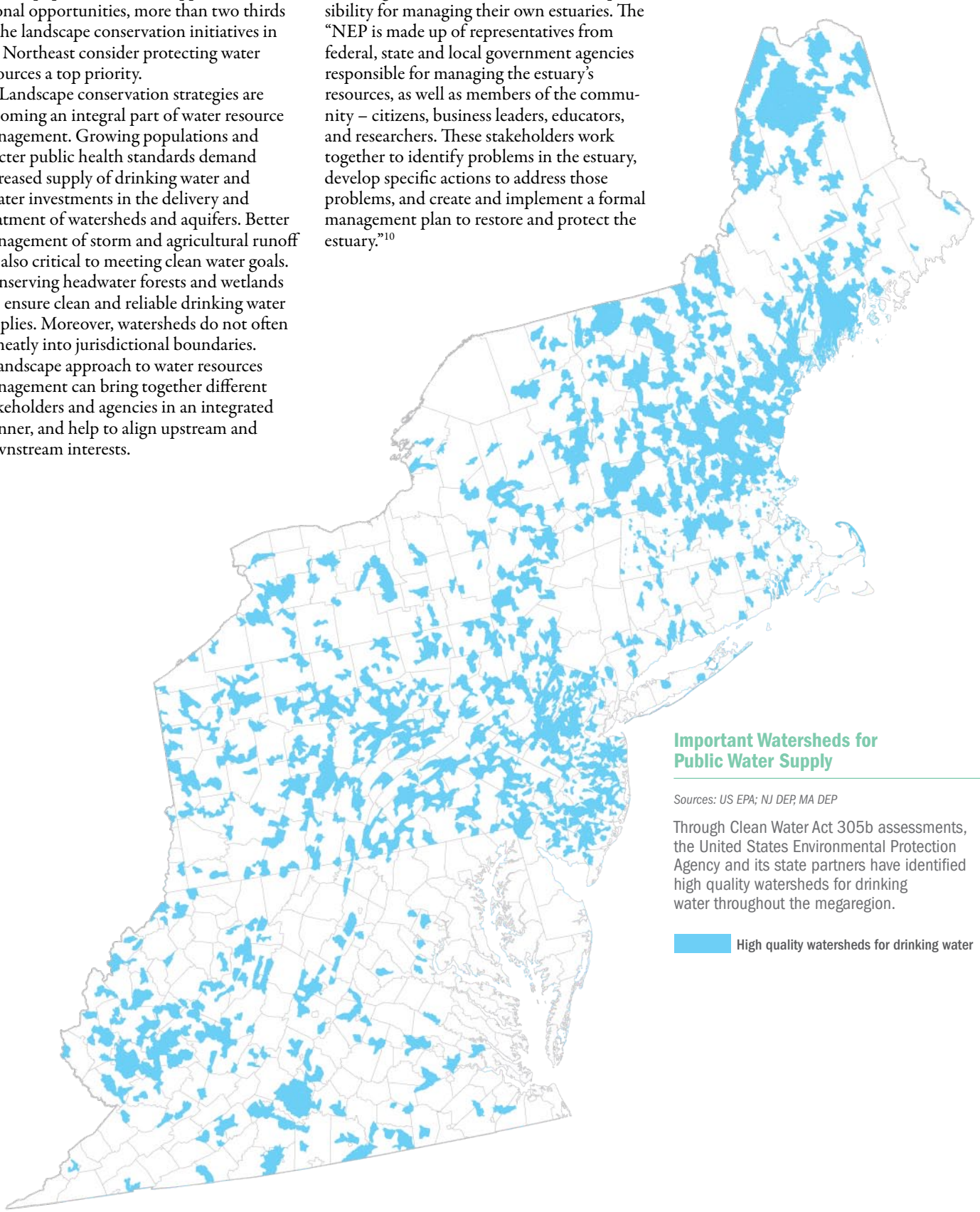
Great concentrations of initiatives occur in northern Maine; the Appalachians; and critical coastal areas, including Cape Cod, Long Island Sound, and the Chesapeake Bay watershed, but what is most striking is the geographic breadth of these efforts.

Water

Whether it's to protect human health, sustain wildlife populations, or to support recreational opportunities, more than two thirds of the landscape conservation initiatives in the Northeast consider protecting water resources a top priority.

Landscape conservation strategies are becoming an integral part of water resource management. Growing populations and stricter public health standards demand increased supply of drinking water and greater investments in the delivery and treatment of watersheds and aquifers. Better management of storm and agricultural runoff are also critical to meeting clean water goals. Conserving headwater forests and wetlands can ensure clean and reliable drinking water supplies. Moreover, watersheds do not often fit neatly into jurisdictional boundaries. A landscape approach to water resources management can bring together different stakeholders and agencies in an integrated manner, and help to align upstream and downstream interests.

The EPA has had significant successes curbing point and non-point source pollution through its National Estuary Program. The National Estuary Program is designed to encourage local communities to take responsibility for managing their own estuaries. The "NEP is made up of representatives from federal, state and local government agencies responsible for managing the estuary's resources, as well as members of the community – citizens, business leaders, educators, and researchers. These stakeholders work together to identify problems in the estuary, develop specific actions to address those problems, and create and implement a formal management plan to restore and protect the estuary."[10]



Important Watersheds for Public Water Supply

Sources: US EPA; NJ DEP, MA DEP

Through Clean Water Act 305b assessments, the United States Environmental Protection Agency and its state partners have identified high quality watersheds for drinking water throughout the megaregion.

High quality watersheds for drinking water

Kayakers paddle near a marsh at the Eastern Shore of Virginia National Wildlife Refuge. Photo: Chesapeake Bay Program

On the Ground: **Water Quality**

New Jersey Highlands Water Protection and Planning Council

The New Jersey Highlands Water Protection and Planning Council was established to oversee the management of the New Jersey Highlands region in the northwestern part of the state. Located at the edge of heavily populated northern New Jersey, the quality and quantity of source water in the Highlands is threatened by urban development that further disrupts the functioning of natural processes.

The Highlands Council approved a broad-reaching Regional Master Plan (RMP) to preserve critical core areas, guide growth through better land use and site planning, and restore impaired ecological systems. The Highlands Council achieves its water quality goals through a mix of scientific assessment and planning, zoning regulation, and restoration projects. Watershed-based plans set water conservation needs in a broader regional context, allowing officials to determine priorities for spending on water infrastructure and restoration. Developing Watershed Restoration Plans is also beneficial because they are what make projects eligible for state and federal funding.

Watershed plans in the Highlands are based on three basic concepts: maintaining stream buffers, encouraging low-impact development and clustering, and implementing source controls instead of expensive end-of-the pipe infrastructure solutions.

On the Ground: **Water Quality**

Chesapeake Bay Program

The Chesapeake Bay is known for its superlatives: It is the largest estuary in the United States and some people say that it produces the best seafood in the country, but the bay was also the first identified marine dead zone and it was the first estuary targeted by Congress for restoration and protection following growing awareness of its severely polluted condition. By the early 1970s, the bay's health had deteriorated from excess nutrient pollution. Runoff from farms located on the bay's eastern shore and runoff from development and impervious surfaces on the western shore were killing wildlife living near its banks and aquatic life living in its waters.

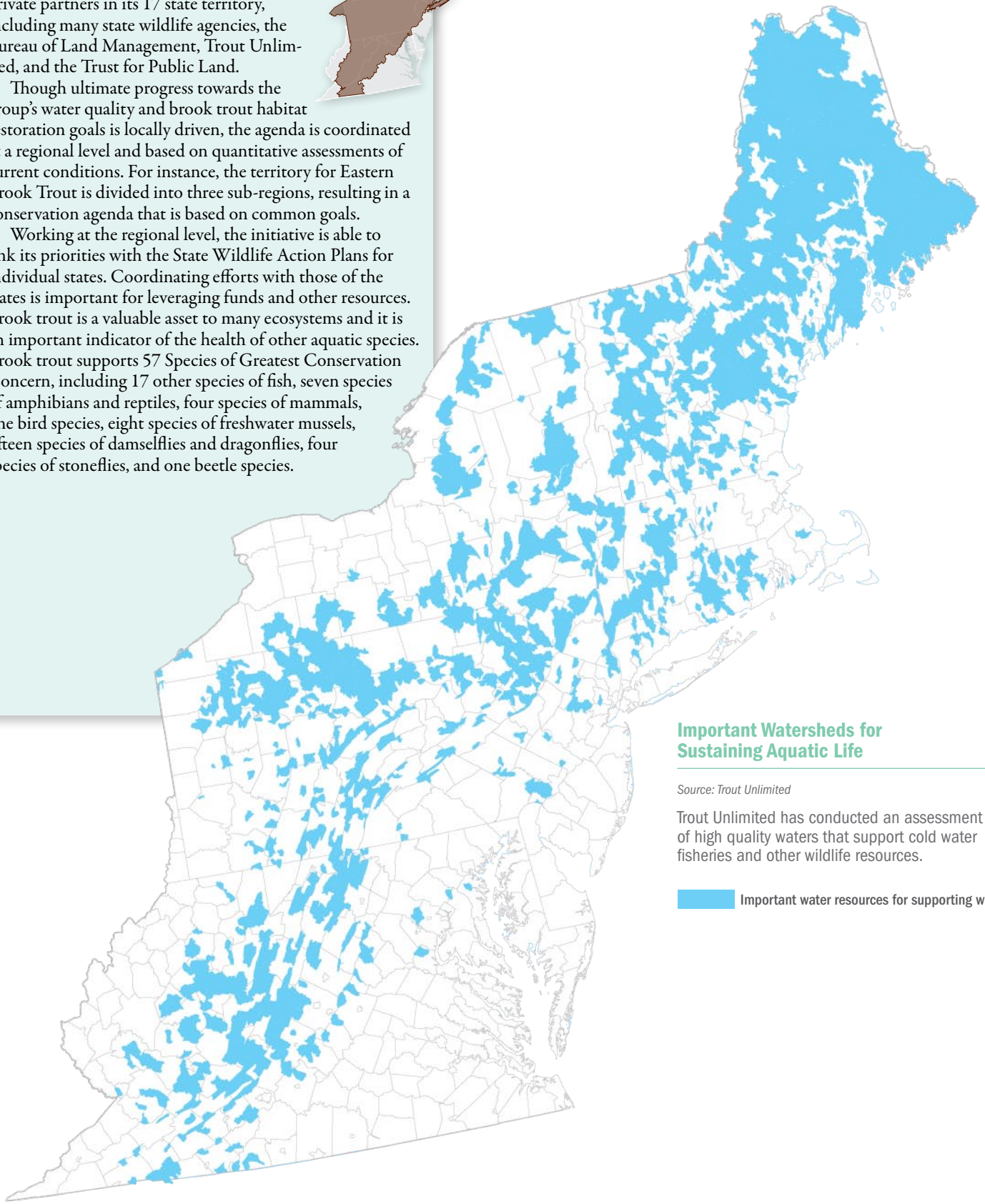
Restoration of the Chesapeake is guided by a simple, one-page document – the 1983 Chesapeake Bay Agreement. The agreement requires that the federal government (through the EPA) and the states of Maryland, Pennsylvania, Virginia, and Washington, D.C., coordinate their efforts to protect the bay. In 2000, the agreement was expanded to include New York and Delaware and it set new benchmarks for improving water quality. The agreement focuses on introducing more shellfish to filter water in the bay, limiting invasive species, restoring aquatic habitat, controlling runoff, improving the health of tributary watersheds, and increasing the footprint of existing wetland and forest areas, as well as a host of other related conservation efforts aimed at curbing development and improving agricultural practices.

Eastern Brook Trout Joint Venture

The Eastern Brook Trout Joint Venture is a Fish Habitat Partnership made up of public and private partners in its 17 state territory, including many state wildlife agencies, the Bureau of Land Management, Trout Unlimited, and the Trust for Public Land.

Though ultimate progress towards the group's water quality and brook trout habitat restoration goals is locally driven, the agenda is coordinated at a regional level and based on quantitative assessments of current conditions. For instance, the territory for Eastern Brook Trout is divided into three sub-regions, resulting in a conservation agenda that is based on common goals.

Working at the regional level, the initiative is able to link its priorities with the State Wildlife Action Plans for individual states. Coordinating efforts with those of the states is important for leveraging funds and other resources. Brook trout is a valuable asset to many ecosystems and it is an important indicator of the health of other aquatic species. Brook trout supports 57 Species of Greatest Conservation Concern, including 17 other species of fish, seven species of amphibians and reptiles, four species of mammals, one bird species, eight species of freshwater mussels, fifteen species of damselflies and dragonflies, four species of stoneflies, and one beetle species.



Important Watersheds for Sustaining Aquatic Life

Source: Trout Unlimited

Trout Unlimited has conducted an assessment of high quality waters that support cold water fisheries and other wildlife resources.

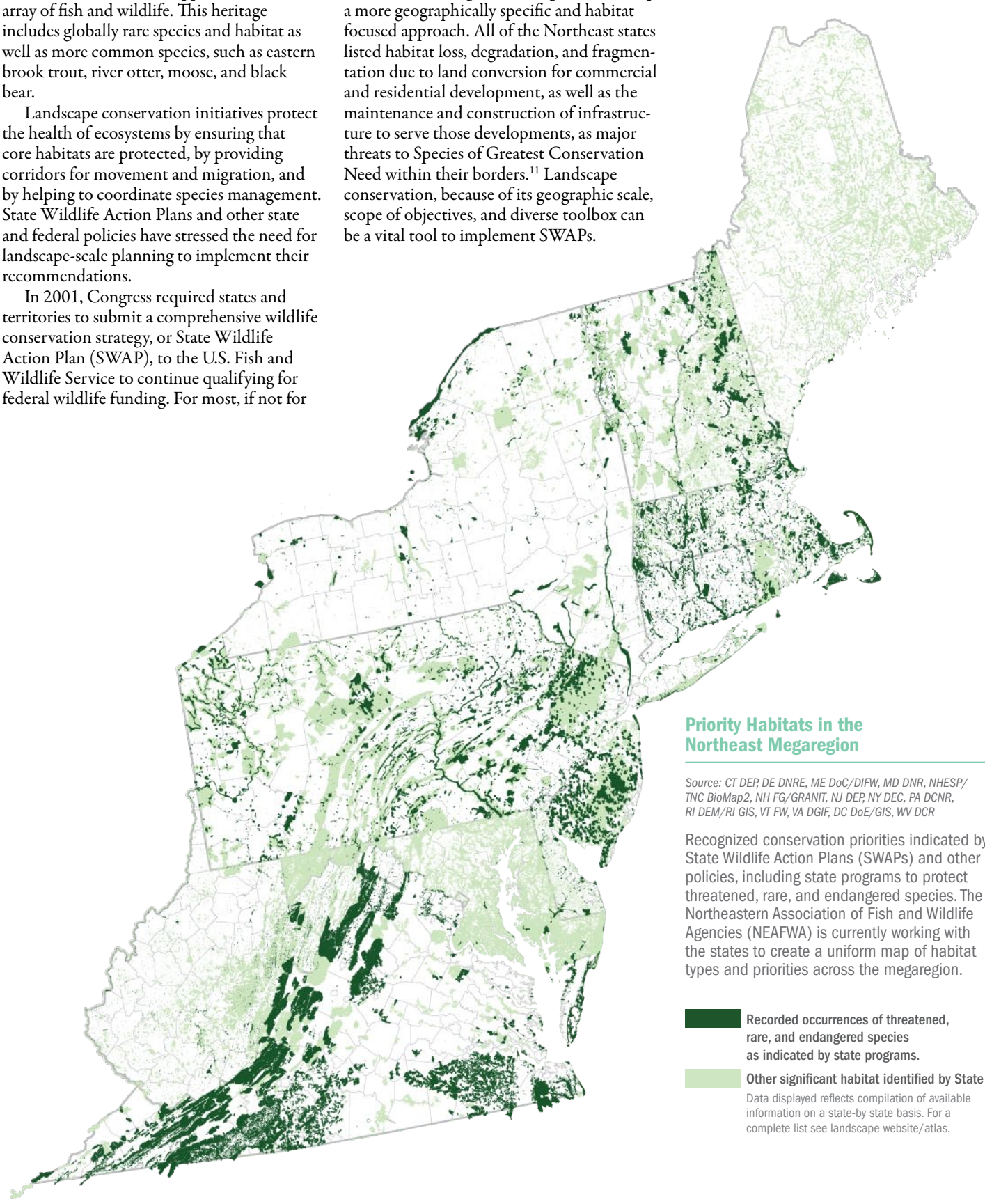
Important water resources for supporting wildlife

Habitat

Despite its large human population, the Northeast continues to support a diverse array of fish and wildlife. This heritage includes globally rare species and habitat as well as more common species, such as eastern brook trout, river otter, moose, and black bear.

Landscape conservation initiatives protect the health of ecosystems by ensuring that core habitats are protected, by providing corridors for movement and migration, and by helping to coordinate species management. State Wildlife Action Plans and other state and federal policies have stressed the need for landscape-scale planning to implement their recommendations.

In 2001, Congress required states and territories to submit a comprehensive wildlife conservation strategy, or State Wildlife Action Plan (SWAP), to the U.S. Fish and Wildlife Service to continue qualifying for federal wildlife funding. For most, if not for all states in the Northeast, these plans were the first statewide, comprehensive plan for conservation of game and nongame species and their habitats. SWAPs were specifically meant to encourage wildlife agencies to adopt a more geographically specific and habitat focused approach. All of the Northeast states listed habitat loss, degradation, and fragmentation due to land conversion for commercial and residential development, as well as the maintenance and construction of infrastructure to serve those developments, as major threats to Species of Greatest Conservation Need within their borders.[11] Landscape conservation, because of its geographic scale, scope of objectives, and diverse toolbox can be a vital tool to implement SWAPs.



Priority Habitats in the Northeast Megaregion

Source: CT DEP, DE DNRE, ME DoC/DIFW, MD DNR, NHESP/ TNC BioMap2, NH FG/GRANIT, NJ DEP, NY DEC, PA DCNR, RI DEM/RI GIS, VT FW, VA DGIF, DC DoE/GIS, WV DCR

Recognized conservation priorities indicated by State Wildlife Action Plans (SWAPs) and other policies, including state programs to protect threatened, rare, and endangered species. The Northeastern Association of Fish and Wildlife Agencies (NEAFWA) is currently working with the states to create a uniform map of habitat types and priorities across the megaregion.

Recorded occurrences of threatened, rare, and endangered species as indicated by state programs.

Other significant habitat identified by State

Data displayed reflects compilation of available information on a state-by state basis. For a complete list see landscape website/atlas.

On the Ground: **Habitat**

Albany Pine Bush Preserve Commission

The Albany Pine Bush is the remnant of a barren that used to stretch across northeast New York from Glenn Falls to Newburgh. Bisected by interstate highways, shopping malls, industrial parks, and residential development, the Albany Pine Bush is down to 20% of its original size.

In 1988, the New York State Legislature created the Albany Pine Bush Preserve Commission to protect and expand this unique habitat. The commission's 2002 management plan recommended protecting a minimum of 4,600 acres of priority contiguous habitat in order to maintain the health of the ecosystem. The commission identified 61 large undeveloped areas within its service area and assigned a ranking to each one based on four criteria: ability to support pitch-pine and scrub oak, ability to link existing habitats in the preserve, ability to buffer the preserve from existing developed areas, and ability to support significant cultural and environmental resources. Each property was then ranked and organized into one of three categories: full protection, partial protection, or maintenance as open space. More than 3,100 acres has been protected to date through this ongoing work.

Northeast Regional Conservation Needs Grant Program

The Wildlife Management Institute has created the Regional Conservation Needs Grant Program to supplement the work initiated by Northeastern states to develop State Wildlife Action Plans. In particular, the intention of RCN grants are to leverage the funding and administrative capacity at the state level into landscape-scale collaborations that produce regional benefits. The RCN grants encourage conserving land and water habitat at the landscape scale as a way to protect wildlife threatened by endangerment.

Easern Brook Trout. Photo: U.S. Fish and Wildlife Service

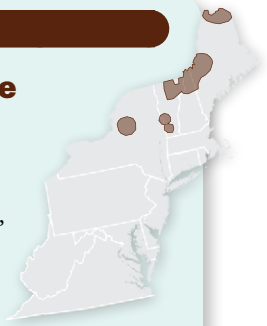
On the Ground: **Habitat**

Raritan Piedmont Wildlife Habitat Partnership

Central New Jersey will be built out by 2040. Urban sprawl and development from both Philadelphia and New York City are significant threats to farming, water quality, and habitat in this part of the state. The Raritan Piedmont Wildlife Habitat Partnership has a three-pronged approach to conservation in the Central Piedmont Plains region of New Jersey. Working with local and state government, several non-profits joined together to adapt New Jersey's State Wildlife Action Plan to the unique demands of the area, resulting in regionally tailored grassland, forestry, and riparian conservation plans. The partnership also uses fee simple acquisition of strategic properties and performs ecological restoration projects on important habitat in order to protect the integrity of the Central Piedmont Plains region.

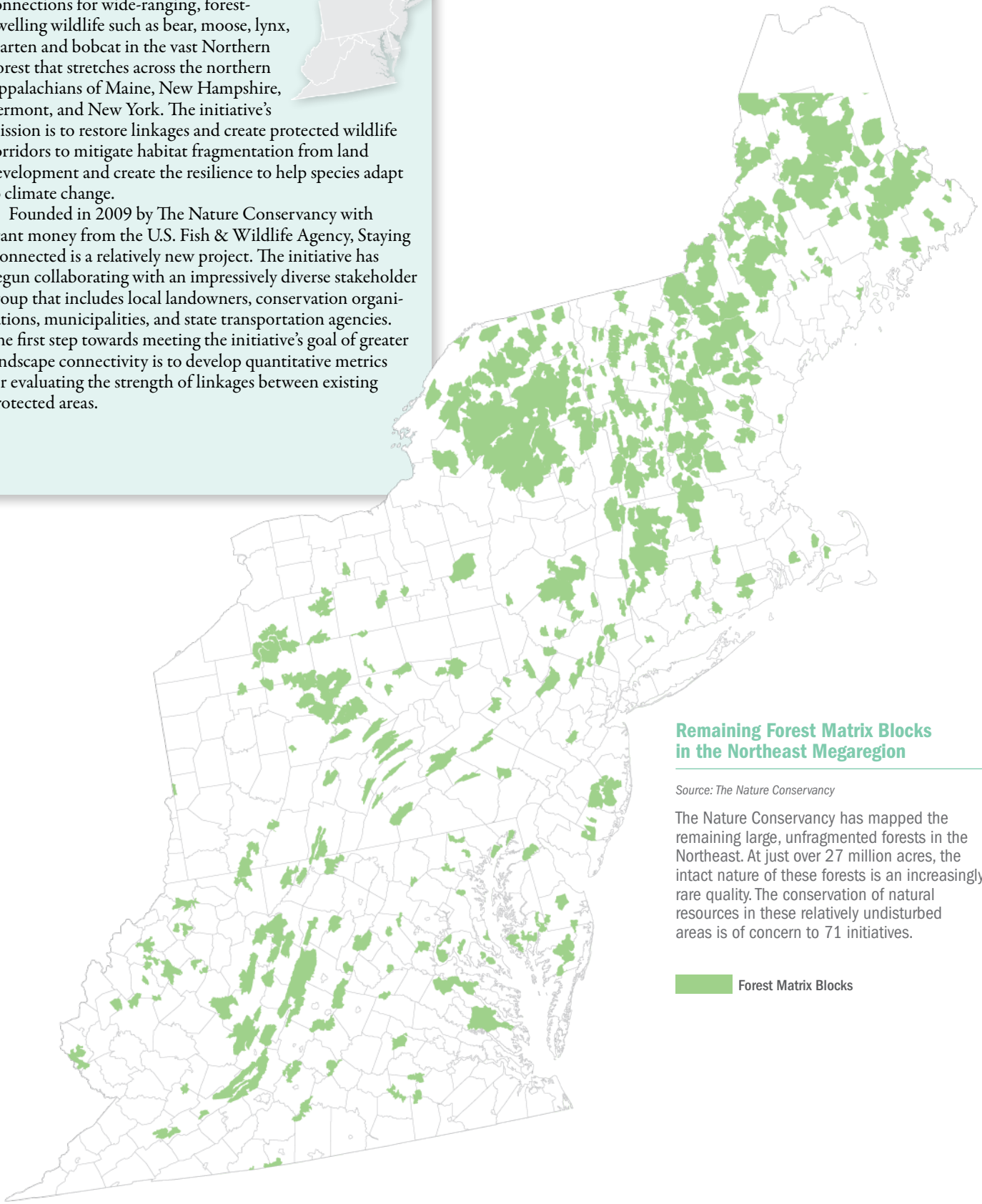
White-tailed yearling at Great Bay National Wildlife Refuge. Photo: U.S. Fish and Wildlife Service

Staying Connected Initiative



Staying Connected is a new initiative that aims to maintain and restore landscape connections for wide-ranging, forest-dwelling wildlife such as bear, moose, lynx, marten and bobcat in the vast Northern Forest that stretches across the northern Appalachians of Maine, New Hampshire, Vermont, and New York. The initiative's mission is to restore linkages and create protected wildlife corridors to mitigate habitat fragmentation from land development and create the resilience to help species adapt to climate change.

Founded in 2009 by The Nature Conservancy with grant money from the U.S. Fish & Wildlife Agency, Staying Connected is a relatively new project. The initiative has begun collaborating with an impressively diverse stakeholder group that includes local landowners, conservation organizations, municipalities, and state transportation agencies. The first step towards meeting the initiative's goal of greater landscape connectivity is to develop quantitative metrics for evaluating the strength of linkages between existing protected areas.



Remaining Forest Matrix Blocks in the Northeast Megaregion

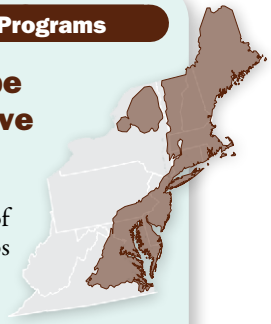
Source: The Nature Conservancy

The Nature Conservancy has mapped the remaining large, unfragmented forests in the Northeast. At just over 27 million acres, the intact nature of these forests is an increasingly rare quality. The conservation of natural resources in these relatively undisturbed areas is of concern to 71 initiatives.

Forest Matrix Blocks

On the Ground: **Federal Landscape Programs**

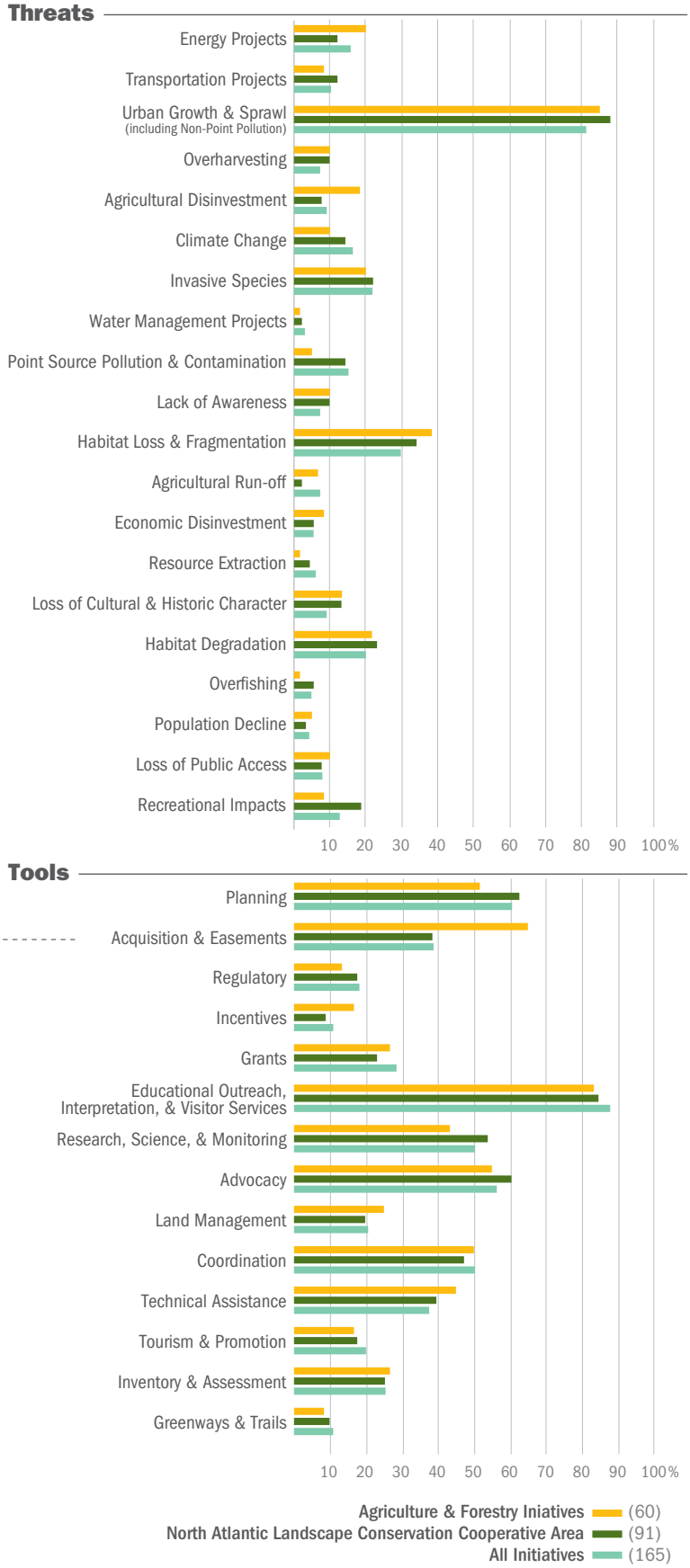
North Atlantic Landscape Conservation Cooperative



The U.S. Fish & Wildlife Service has created 21 Landscape Conservation Cooperatives to cover the land area of all 50 states. These stakeholder groups focus on issues that affect wildlife populations at the whole-systems scale, including such concerns as the impacts of climate change on habitats. The LCCs are unique in that they not only address landscape-scale environmental issues, but they also use the wider scale of a regional landscape in order to generate broad-based support and to create a more inclusive stakeholder group. The LCCs are bringing together scientists, government agencies, environmental groups, and concerned citizens for research, biological and conservation planning, and monitoring of specific species of wildlife.

As with the rest of the Northeast, a key concern for the 117 landscape initiatives operating within the territory of the North Atlantic LCC is urban growth and habitat fragmentation. Far fewer have programs designed to address the looming impacts of the changing climate on habitat.

Common Threats and Tools for Landscape Conservation Initiatives Protecting Working Lands *and* Initiatives Within the North Atlantic Conservation Cooperative Area



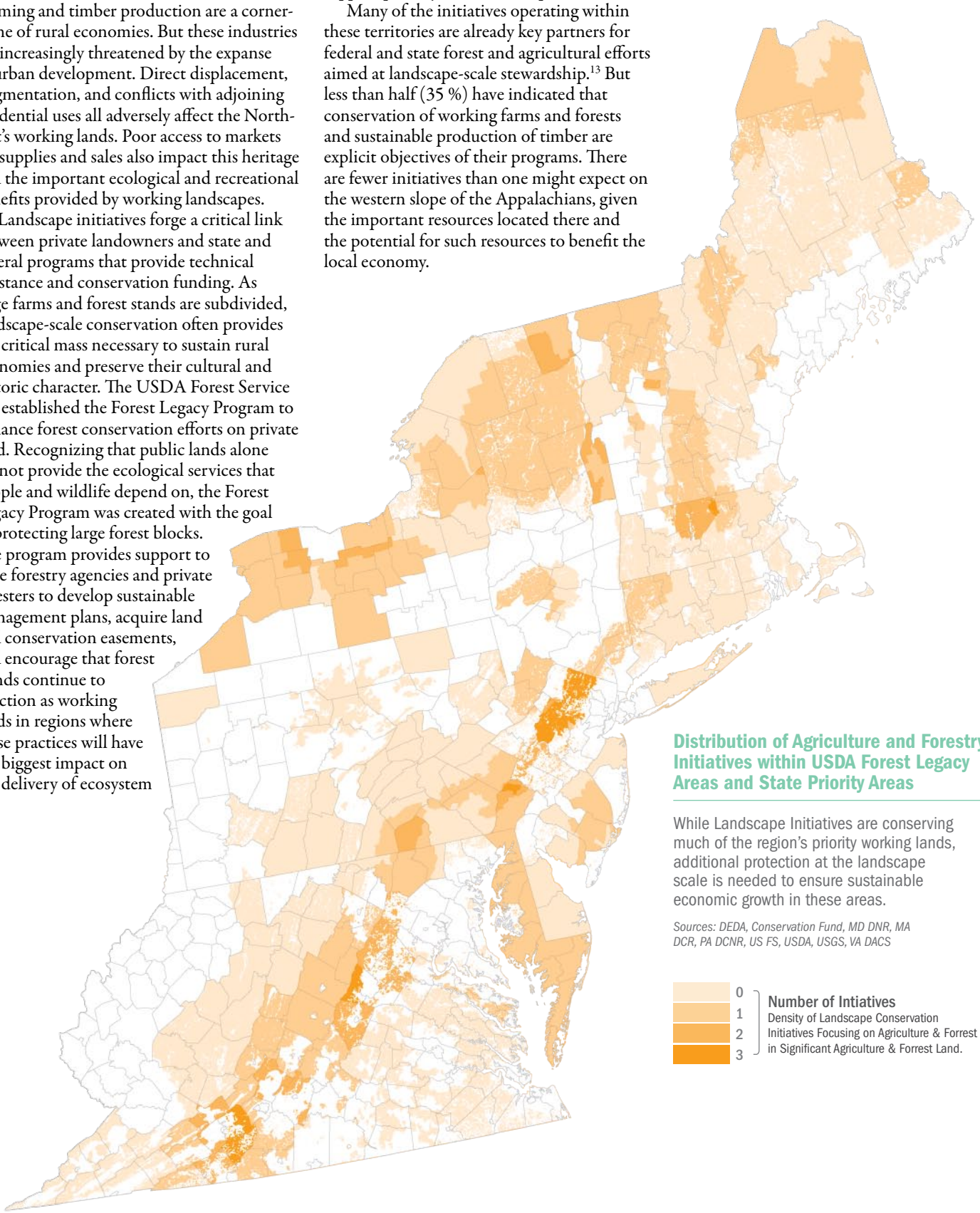
Acquisition of property and easements is a common tool for those landscape initiatives that make conservation of working lands an explicit objective. Urban growth and the associated threat of habitat loss and fragmentation are cited most often as a key threat to their success.

Agriculture and Forestry

Farming and timber production are a cornerstone of rural economies. But these industries are increasingly threatened by the expanse of urban development. Direct displacement, fragmentation, and conflicts with adjoining residential uses all adversely affect the Northeast's working lands. Poor access to markets for supplies and sales also impact this heritage and the important ecological and recreational benefits provided by working landscapes.

Landscape initiatives forge a critical link between private landowners and state and federal programs that provide technical assistance and conservation funding. As large farms and forest stands are subdivided, landscape-scale conservation often provides the critical mass necessary to sustain rural economies and preserve their cultural and historic character. The USDA Forest Service has established the Forest Legacy Program to enhance forest conservation efforts on private land. Recognizing that public lands alone cannot provide the ecological services that people and wildlife depend on, the Forest Legacy Program was created with the goal of protecting large forest blocks. The program provides support to state forestry agencies and private foresters to develop sustainable management plans, acquire land and conservation easements, and encourage that forest stands continue to function as working lands in regions where these practices will have the biggest impact on the delivery of ecosystem services.[12] Similarly, State Forest Action Plans include a review of the condition of each state's forest resources with an emphasis on long-term strategies for how to invest in and support priority forest landscapes.

Many of the initiatives operating within these territories are already key partners for federal and state forest and agricultural efforts aimed at landscape-scale stewardship.[13] But less than half (35 %) have indicated that conservation of working farms and forests and sustainable production of timber are explicit objectives of their programs. There are fewer initiatives than one might expect on the western slope of the Appalachians, given the important resources located there and the potential for such resources to benefit the local economy.



Distribution of Agriculture and Forestry Initiatives within USDA Forest Legacy Areas and State Priority Areas

While Landscape Initiatives are conserving much of the region's priority working lands, additional protection at the landscape scale is needed to ensure sustainable economic growth in these areas.

Sources: DEDA, Conservation Fund, MD DNR, MA DCR, PA DCNR, US FS, USDA, USGS, VA DACS

Agricultural Stewardship Association

ASA was founded in 1990 by local farmers concerned with the loss of farmland in Washington and Rensselaer counties in upstate New York. They are protecting land in order to sustain the local economy and preserve the region's historically agrarian character. In 2006, ASA adopted its Farmland Conservation Plan, which outlined a strategy for acquiring 20,000 acres of farmland in six Priority Conservation Areas. ASA also has been able to leverage significant state and federal money to fund a locally-based conservation agenda because their conservation goals coincide with regional efforts. ASA has also worked to expand New York State's Open Space Plan to include more acres of farmland.

By coordinating with nearby conservation programs and encouraging those programs to adopt some of ASA's priorities, the organization has raised over $10 million in state and federal grants for purchasing development rights as part of its acquisition campaigns. To date, it has used the funds from these sources to protect over 6,000 acres through a combination of fee-simple acquisitions, conservation easements, and the donation or purchase of development rights.

Top Producing Counties for Agricultural and Forestry Product

Source: USDA Agriculture Census.

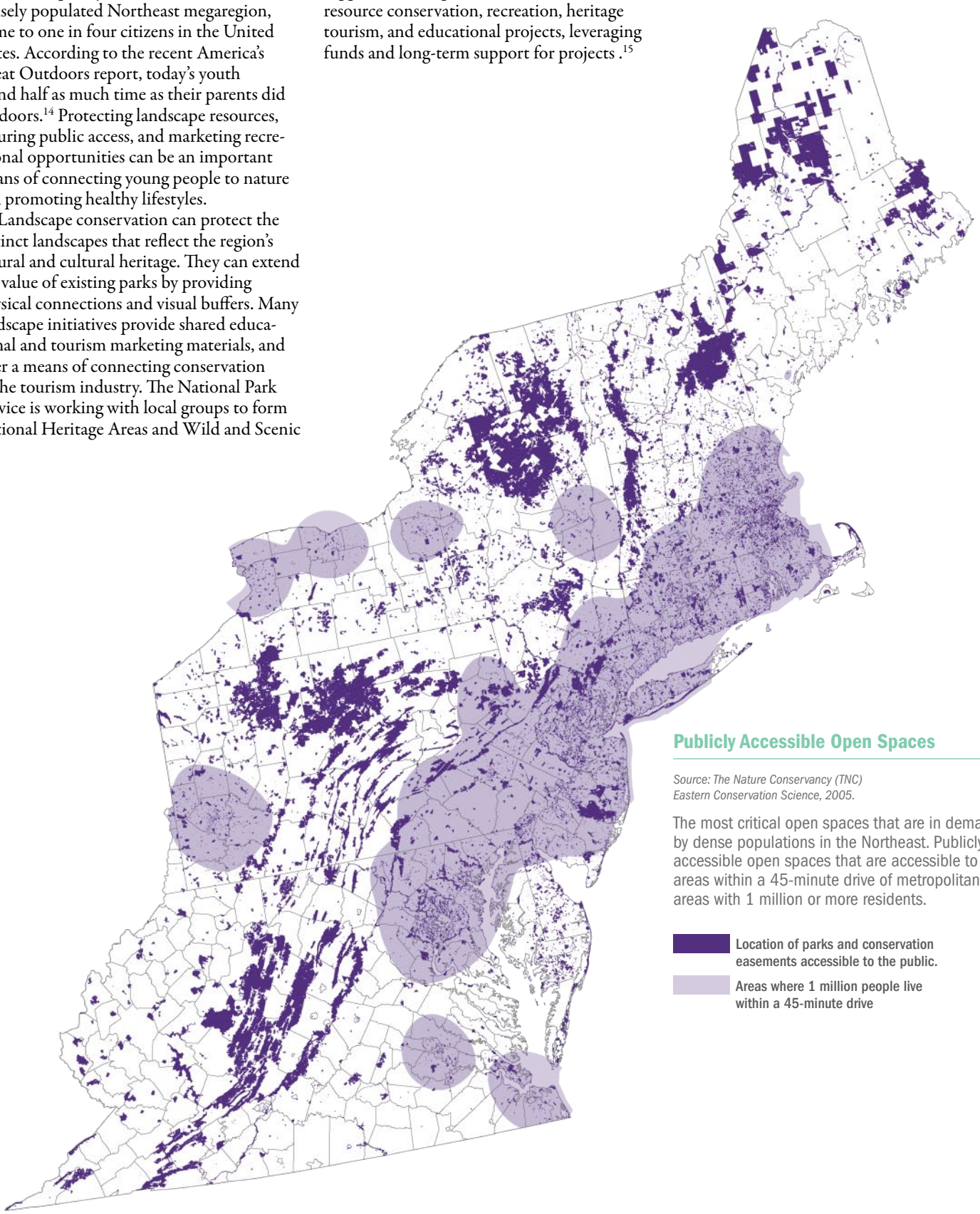
Working farmlands and forests remain an important element in the Northeast economy. Lancaster and Chester in Pennsylvania, Sussex in Delaware, and Rockingham in Virginia are the most important counties in terms of economic value.

Counties with significant agricultural and/or forestry economic activity: Top 1/5 of counties in total commodity value

Recreation

Access to outdoor recreation is critical to the health and quality of life for residents in the densely populated Northeast megaregion, home to one in four citizens in the United States. According to the recent America's Great Outdoors report, today's youth spend half as much time as their parents did outdoors.[14] Protecting landscape resources, ensuring public access, and marketing recreational opportunities can be an important means of connecting young people to nature and promoting healthy lifestyles.

Landscape conservation can protect the distinct landscapes that reflect the region's natural and cultural heritage. They can extend the value of existing parks by providing physical connections and visual buffers. Many landscape initiatives provide shared educational and tourism marketing materials, and offer a means of connecting conservation to the tourism industry. The National Park Service is working with local groups to form National Heritage Areas and Wild and Scenic River partnerships. National Heritage Areas are community-driven approach to conservation and economic development. Through public-private partnerships, Heritage Areas support historic preservation, natural resource conservation, recreation, heritage tourism, and educational projects, leveraging funds and long-term support for projects .[15]



Publicly Accessible Open Spaces

Source: The Nature Conservancy (TNC) Eastern Conservation Science, 2005.

The most critical open spaces that are in demand by dense populations in the Northeast. Publicly accessible open spaces that are accessible to areas within a 45-minute drive of metropolitan areas with 1 million or more residents.

Location of parks and conservation easements accessible to the public.

Areas where 1 million people live within a 45-minute drive

On the Ground: **Recreation**

Connecticut River Gateway Commission

The Connecticut River is a popular destination in southern New England because of its immense scenic beauty and the historic quality of the towns along its banks. Like most other places in the Northeast megaregion, this unique history and environment are constantly challenged by development pressures. In 1973, Connecticut's General Assembly created the Connecticut River Gateway Commission to protect the lower portion of the river. The commission is made up of Connecticut's Department of Environmental Protection, two regional planning agencies, and the governments of the eight towns that are in the *Gateway Conservation Zone*. One of the commission's primary goals is scenic preservation. Changing the physical appearance of the river valley takes away from the special character of the place and hurts the tourism and recreation-based economy of the region. The commission is empowered to acquire land and development rights for areas of high scenic quality, protecting over 1,000 acres to date. The commission has also established minimum protective standards that the eight municipalities in the conservation zone have adopted into their local land use laws. Over the last 40 years, the Commission has been highly successful at preserving the "natural and traditional river scene" in the Connecticut River valley.

On the Ground: **Recreation**

Boston Harbor Islands Partnership

Starting in 2020, the Boston metropolitan area will reach complete build-out, meaning that all viable land will be developed to 95% capacity. Finding ways to protect landscapes that are within a densely urban area is a unique challenge. The Boston Harbor Partnership brings together government agencies and non-profits to create outdoor recreational opportunities in an urban area. The partnership is focused on preserving habitat while maximizing public access – a reflection of the dual demands for both habitat protection and open space in response to increasingly crowded conditions.

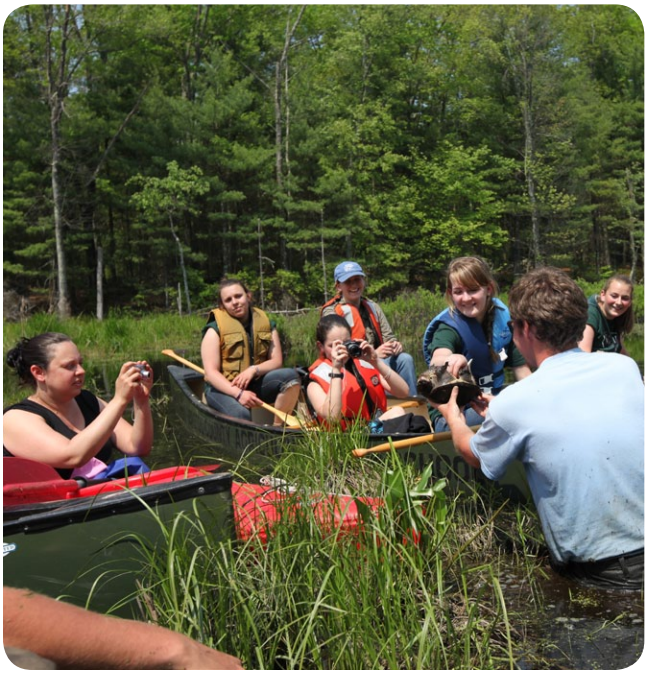
Success depends on sharing management responsibilities across several sectors. The National Park Service manages only part of the Boston Harbor Islands park. Half of the park territory is operated by Massachusett's state park agency, the Department of Conservation & Recreation. The Boston Harbor Islands Alliance, tribal organizations, colleges and universities, and civic organizations are also key contributors to the user experience.

On the Ground: **Recreation**

Virginia Outdoors Foundation & the Valley Conservation Council

In Virginia, conservation is a responsibility shared by state and local actors. In the Shenandoah Valley, this partnership is crucial to preserving the region's way of life. The Virginia Outdoors Foundation is a public-private conservation organization that was founded by the state's General Assembly in 1966 to preserve open space through the acquisition of land. The Valley Conservation Council is a local initiative that was founded in 1990 to protect farms and forests and curb sprawl. Low-density sprawl will be at the region's doorstep by 2020, threatening to convert agriculture and timber land for new housing development. Since the economies of the Valley communities rely heavily on these two industries, sprawl is more than just a threat to scenic views and the plant and animal species living there; it is a challenge to the very way of life in the region.

Together, the two organizations play a vital role in preserving the Shenandoah Valley's natural, cultural, and economic resources. When VCC encounters a landowner that is interested in a conservation easement for his or her property, it refers the landowner to VOF. VOF negotiates, acquires, and defends the easement in perpetuity. The close working relationship between VCC and VOF has contributed to the over 100,000 acres of protected land in the Shenandoah Valley.



Keith Shannon / U.S. Fish and Wildlife Service

Addressing Conservation Challenges 6

More than 80% of landscape initiatives surveyed cited urban growth – and by extension, related investments in transportation infrastructure – as a significant threat. Other threats identified by the initiatives include adapting to a changing climate and managing the impacts of energy projects. But of foremost concern for many landscape practitioners these days is finding the resources and capacity to continue and expand their work. Securing needed public and private financial support is critical to the success of landscape conservation.

Land Use Change and Urban Growth

In the next 30 years, population in the 13-state Northeast megaregion is expected to grow by around 20%.[16] Where these additional 15 million residents live and work will depend largely on decisions made today. Population growth and expansion of urban and suburban areas will affect the region through landscape conversion, construction of new roads, increase in impervious surfaces, and fragmentation of natural systems. But these development pressures will not affect the region uniformly. Better understanding of these challenges will help initiatives prioritize their objectives and implement strategies that are responsive to on-the-ground conditions.

Without appropriate planning and conservation measures, populations will continue to settle further and further from existing urban and suburban centers. The transportation, water, and energy infrastructure needed to connect and support these new communities will further consume lands and additional resources unnecessarily.

An analysis by America 2050 and RPA models how much land is likely to be urbanized in the Northeast megaregion over the coming decades and where land use pressures are greatest, given projected population increases of 500,000 people per year across the 13 states. The large metropolitan areas of Boston, New York City, Philadelphia, and Washington, D.C., will continue to grow, reaching build-out in existing cities and suburbs and expanding into the undeveloped, "exurban" land that surrounds them. Smaller metro areas such as Buffalo and Rochester, New York, Pittsburgh, and Richmond and Norfolk in Virginia, will also see significant increases in urbanized land over time. By 2040, many areas along the East Coast will be almost completely developed. Even if local zoning laws are amended to allow for denser development, 11 counties will reach complete build-out sooner than 2040.

Growth will occur more quickly in some areas than in others. Many communities on the exurban fringe of major municipal areas will experience extremely rapid growth. The character of these communities will change suddenly from rural or forested to low-density suburban. By 2020, the urban growth rate will lead to especially rapid suburbanization in New Jersey, Maryland and Virginia.[17] The challenges facing urban landscapes are unique to design constraints common to urban areas. Issues such as impaired water quality, flooding, stormwater run-off, combined sewer overflow, limited access to public open space, poor air quality, the urban heat island effect, and climate adaptation will all require extra attention.

At the same time that population is growing in suburban and exurban areas near the coast, the population of many census tracts west of Interstate 81 in the Appalachians is projected to trend downward in one or more decades between now and 2040. Significant population decreases will likely occur in rural stretches of New York, Pennsylvania, Virginia, and West Virginia. The loss of permanent residents may signal local economic hardships and new challenges to natural resources in the area.

Land use change, and its direct and indirect impacts, is cited by more than 80% of the initiatives as a key threat. The growing numbers of homes and businesses, roads, and other infrastructure both directly displace important natural resources as well as introduce a number of challenges, from habitat fragmentation to invasive species to intense recreational pressures.

As one of the most urbanized areas in the world, the Northeast megaregion has a long experience in addressing landscape conservation challenges in urban and suburban settings. Twenty-seven of the landscape initiatives are working in areas that were more than 30% urbanized in 2000. Most initiatives in urban areas influence decisions through a combination of encouraging best practices and coupling research, science, and monitoring with advocacy campaigns. Very few acquire or manage land.

The number of landscape initiatives contending with distinctly urban challenges will nearly double by 2040, with another 19 initiatives located in areas that will be dominated by urban uses. Many of these initiatives are in the high growth areas located in the exurbs of the New York/New Jersey, Philadelphia, and Washington, D.C., metropolitan

Northeast Landscape Atlas: Urban Growth Model

America 2050 and RPA's urban growth model forecasts the amount and geographic distribution of future urbanization in the 13-state Northeast megaregion. This was accomplished with a GIS-based model integrated with statistical regression analysis.

The model requires setting a template of existing development, establishing a growth factor that relates urban development to new population growth, and making assumptions about the likelihood of development and how much land is available for development.

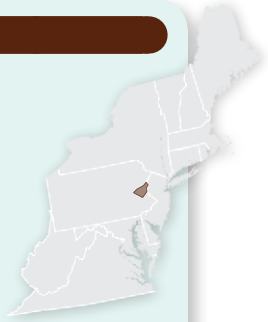
Urban growth was driven by county-level population projections from Woods and Poole[18], distributed to each individual census tract. Any remaining demand for new urban land for the census tract was distributed into other census tracts in the same county that had not reached their maximum capped capacity. This was repeated until all the demand in the county was absorbed. If all census tracts had reached their capped capacity and the demand was still not completely satisfied, the county was identified as reaching build out.

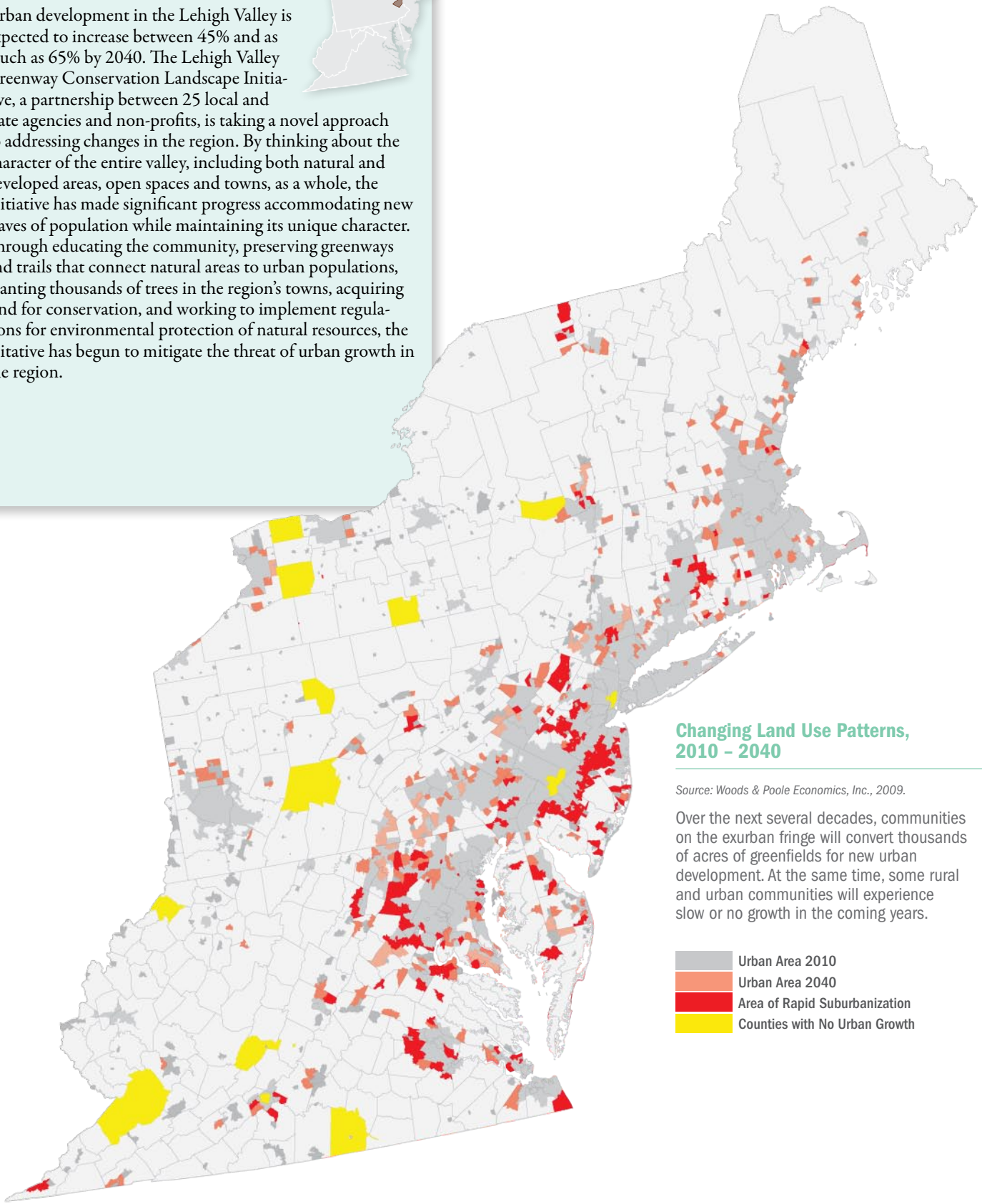
This process was performed for each of the ten year development cycles from 2000 to 2040. Once a county reached its maximum capped capacity, converting its land into new urban acres was stopped. It was assumed that any demand from a county reaching build out was absorbed within the county.

On the Ground: **Urban Growth**

Lehigh Valley Greenway Conservation Landscape Initiative

Urban development in the Lehigh Valley is expected to increase between 45% and as much as 65% by 2040. The Lehigh Valley Greenway Conservation Landscape Initiative, a partnership between 25 local and state agencies and non-profits, is taking a novel approach to addressing changes in the region. By thinking about the character of the entire valley, including both natural and developed areas, open spaces and towns, as a whole, the initiative has made significant progress accommodating new waves of population while maintaining its unique character. Through educating the community, preserving greenways and trails that connect natural areas to urban populations, planting thousands of trees in the region's towns, acquiring land for conservation, and working to implement regulations for environmental protection of natural resources, the initative has begun to mitigate the threat of urban growth in the region.





Changing Land Use Patterns, 2010 – 2040

Source: Woods & Poole Economics, Inc., 2009.

Over the next several decades, communities on the exurban fringe will convert thousands of acres of greenfields for new urban development. At the same time, some rural and urban communities will experience slow or no growth in the coming years.

- Urban Area 2010
- Urban Area 2040
- Area of Rapid Suburbanization
- Counties with No Urban Growth

regions. Not surprisingly, these initiatives are even more focused on land use change as a threat to natural resources.

But while urban growth is by far the most commonly cited threat to landscape resources, having an explicit land use planning and regulatory program is the exception. Fewer than a dozen initiatives in the high growth and urban areas have any direct control over land use decisions. These initiatives are also more likely to employ such tools as planning, grants, and education and outreach.

For the 27 initiatives located in the 16 counties that will experience slow or no growth over the next 30 years, a different set of concerns emerge. For these communities, leveraging conservation and working landscapes is of critical concern. These initiatives are more likely to use tools like Grants, Land Acquisition & Management, Tourism & Promotion, and Greenways & Trails. Planning and Advocacy are less popular tools.

Counties Reaching Build-Out 2000 – 2040

Massachusetts
Suffolk

Maryland
Baltimore City

New Jersey
Cape May
Hudson
Middlesex
Monmouth
Morris
Ocean
Passaic

Virginia
Roanoke City

Slow, Declining, or No Urban Growth Counties 2000 – 2040

Maine
Aroostook

Massachusetts
Berkshire

Maryland
Allegany

New Jersey
Essex

New York
Albany
Wyoming
Chemung
Montgomery
Orleans

Pennsylvania
Blair
Cambria
Cameron
Crawford
Greene
McKean
Elk
Philadelphia
Potter
Warren

Virginia
Alleghany
Clifton Forge
Covington
Buchanan
Halifax
Roanoke
South Boston

West Virginia
Brooke
Hancock
Kanawha
Logan
Marshall
McDowell
Cabell
Fayette

Rapidly Growing Counties 2000 – 2020

(Communities with a +50% growth rate between 2000 and 2020)

Deleware
Kent
Sussex

Massachusetts
Dukes
Nantucket

Maryland
Anne Arundel
Calvert
Caroline
Carroll
Cecil
Charles
Frederick
Harford
Howard
Queen Anne
St. Mary
Talbot
Wicomico
Worcester

New Hampshire
Carroll
Grafton
Merrimack

New Jersey
Gloucester
Ocean
Sussex

New York
Orange
Putnam
Richmond
Saratoga

Pennsylvania
Adams
Chester
Franklin
Lehigh
Monroe
Northampton
Pike
York

Virginia
Albermarle + Charlottesville
Amelia
Bedford + Bedford City
Botetourt
Caroline
Chesapeake
Chesterfield
Clarke
Culpeper
Fairfax + Fairfax City + Falls Church
Fauquier
Floyd
Fluvanna
Franklin
Frederick + Winchester
Gloucester
Goochland
Greene
Hanover
Henrico
Isle of Wight
James City + Williamsburg
King George
King William
Loudoun
Louisa
Madison
Middlesex
New Kent
Orange
Powhata
Prince William + Manassas + Manassas Park
Rockingham + Harrisonburg
Spotsylvania + Fredericksburg
Stafford
Suffolk
Virginia Beach
Warren
York + Poquoson

Vermont
Grand Isle

West Virginia
Berkeley
Hampshire
Jefferson

On Land Use Regulatory Commissions

The Northeast has several institutions where federal, state, and/or local governments work together to directly manage land use across a distinct landscape. These include the Adirondack Park Agency in upstate New York, the New Jersey Highlands Water Protection and Planning Council, and the tri-state Delaware River Basin Commission. In these places, elected leaders have made the decision that protection of vital natural resources – including drinking water supplies, rare ecosystems, and recreational amenities – are best managed in a comprehensive regional framework. Councils and commissions are authorized under state law to assume some measure of direct authority over land use decisions that ordinarily fall under the purview of individual localities.

The powers granted these entities vary, but in general the state legislative authority establishes a specific entity with the ability, clear legal authority, and independence to protect natural resources. A commission is often charged with identifying the preservation and compatible growth areas, and it is given state regulatory and financial powers to restrict or prohibit development in designated protection areas and to foster development where it is appropriate. Commissions also utilize planning and regulatory requirements, such as land use regulations, transfer of development rights programs, performance standards, municipal incentives, equitable taxing arrangements, state indemnification, and legal representation, and targeted use of state infrastructure investments. The legislation often requires consistency and coordination with local government and other state agencies.

Examples in the Northeast include:

- **The New Jersey Pinelands Commission** (New Jersey) was created by federal and state legislation to oversees county and municipal master plans. Land use ordinances must be in conformance with the comprehensive management plan and are subject to approval by the commission. Once the master plan is approved, the municipality is responsible for administering the ordinances with the commission's oversight.
- **The Central Pine Barrens Joint Planning and Policy Commission** (New York) also oversees the development and implementation of a comprehensive master plan for the area, but the Commission is under the control of the three local towns and Suffolk County. The state legislature has also provided long-term funding for land acquisition and on-going planning needs.
- **The Cape Cod Commission** (Massachusetts) reviews projects that may impact regional issues including water quality, historic values, open space, natural resources, and economic development. Developments of Regional Impact are referred to the commission for mandatory review. The legislation also calls for the nomination and creation of Districts of Critical Planning Concern and calls for the commission to provide technical assistance to localities.

Threats and Tools for Landscape Initiatives By Land Use, Objectives, and Geography

With just a few exceptions, landscape initiatives cite similar threats and use common tools even if their surrounding land use, geographic location, or key objectives differ. The darker the color in the chart, the greater the number of initiatives citing common factors.

	Total Initiatives	Urban (50-100% Developed)	Suburban (20-49% Developed)	Rural (<20% Developed)	Ag Forestry	Habitat	Water	Land Use Planning	Cultural Resources	Open Space	New England	Mid-Atlantic	DC Metro
	Factors	**Land Use**			**Selected Objectives**						**Geography**		
Threats													
Total Initiatives	165	10	44	111	60	132	109	67	69	125	63	96	33
Urban Growth	135	7	35	93	51	115	98	59	53	101	55	75	30
Habitat Loss and Fragmentation	51	2	14	35	23	49	43	31	26	39	22	32	9
Invasive Species	40	1	11	28	14	37	31	22	23	31	18	25	8
Habitat Degradation	35	5	14	16	13	33	32	28	18	28	11	24	4
Energy Projects	29	0	9	20	12	25	20	13	13	22	5	21	8
Climage Change	29	1	9	19	6	27	22	13	13	21	11	23	7
Point Source Pollution and Contamination	28	4	10	14	4	23	27	17	10	20	11	18	4
Recreational Impacts	22	1	8	13	5	22	19	14	10	20	9	13	2
Transportation Projects	20	1	7	12	5	19	14	10	12	17	9	14	5
Loss of Cultural and Historic Character	19	0	10	9	10	17	18	15	17	16	2	15	2
Agricultural Disinvestment	16	0	5	11	11	13	14	10	12	14	3	10	3
Lack of Awareness	16	1	8	7	7	13	12	9	12	15	3	11	3
Agricultural Run-off	14	0	4	10	5	12	13	7	6	8	3	13	5
Loss of Public Access	13	1	6	6	6	11	12	9	9	13	5	8	1
Overharvesting	12	0	2	10	6	12	9	6	4	9	10	5	1
Resource Extraction	12	0	3	9	2	10	9	6	7	8	1	12	3
Economic Disinvestment	9	0	4	5	5	6	5	5	6	7	1	7	1
Overfishing	8	0	3	5	1	8	7	3	3	5	5	4	2
Water Management Projects	7	0	5	2	2	6	6	5	5	6	0	7	1
Population Decline	7	0	2	5	3	3	2	4	4	6	0	5	2
Tools													
Education, Outreach, Interpretation, & Visitor Services	145	10	42	93	50	115	96	62	63	109	50	89	28
Planning	106	7	32	62	32	85	72	51	45	77	33	65	16
Advocacy	98	8	28	58	33	78	68	48	43	73	30	57	21
Research, Science, & Monitoring	91	8	23	56	26	76	65	40	28	62	37	55	16
Coordination	87	7	26	52	30	67	59	44	40	64	25	63	13
Acquisition & Easements	75	1	16	49	39	58	48	26	31	51	20	40	12
Technical Assistance	72	3	20	40	27	54	47	34	27	51	24	41	8
Grants	63	4	18	28	16	42	34	27	25	40	17	33	9
Tourism & Promotion	51	4	13	17	11	16	13	16	22	30	5	28	3
Regulatory	49	2	10	20	8	28	25	14	14	22	11	23	3
Land Management	47	2	9	23	15	31	23	20	17	25	9	26	4
Inventory & Assessment	44	6	14	23	16	38	38	30	21	34	14	30	5
Incentives	36	2	4	12	10	13	12	11	12	11	4	13	5
Greenway & Trails	34	1	10	10	6	17	15	12	14	18	3	17	2

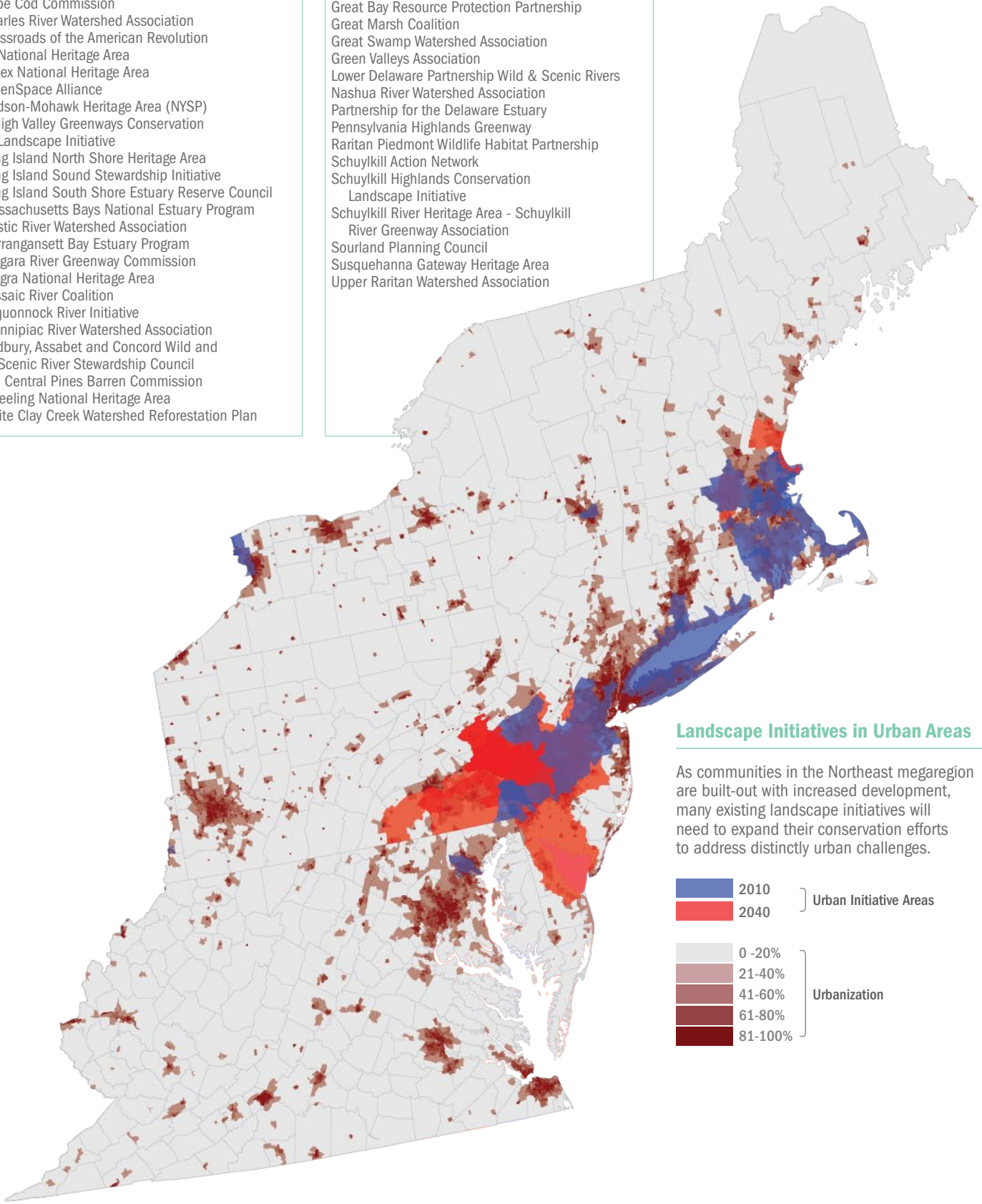
Individual cells are shaded with varying intensity depending on the percent of the total initiatives in the column that also cited the specific threat or tool.

Initiatives currently working in Urban Areas

Albany Pine Bush Preserve
Blackstone River Valley National Heritage Corridor
Blue Water Baltimore
Boston Harbor National Recreational Area
Brandywine Conservancy
Cape Cod Commission
Charles River Watershed Association
Crossroads of the American Revolution National Heritage Area
Essex National Heritage Area
GreenSpace Alliance
Hudson-Mohawk Heritage Area (NYSP)
Lehigh Valley Greenways Conservation Landscape Initiative
Long Island North Shore Heritage Area
Long Island Sound Stewardship Initiative
Long Island South Shore Estuary Reserve Council
Massachusetts Bays National Estuary Program
Mystic River Watershed Association
Narrangansett Bay Estuary Program
Niagara River Greenway Commission
Niagra National Heritage Area
Passaic River Coalition
Pequonnock River Initiative
Quinnipiac River Watershed Association
Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council
The Central Pines Barren Commission
Wheeling National Heritage Area
White Clay Creek Watershed Reforestation Plan

Additional Initiatives working in Urban Areas by 2020

Delaware & Raritan Canal Commission
Freedoms Way National Heritage Area
French and Pickering Creeks Conservation Trust
Friends of Patapsco Valley and Heritage Greenway
Great Bay Resource Protection Partnership
Great Marsh Coalition
Great Swamp Watershed Association
Green Valleys Association
Lower Delaware Partnership Wild & Scenic Rivers
Nashua River Watershed Association
Partnership for the Delaware Estuary
Pennsylvania Highlands Greenway
Raritan Piedmont Wildlife Habitat Partnership
Schuylkill Action Network
Schuylkill Highlands Conservation Landscape Initiative
Schuylkill River Heritage Area - Schuylkill River Greenway Association
Sourland Planning Council
Susquehanna Gateway Heritage Area
Upper Raritan Watershed Association



Landscape Initiatives in Urban Areas

As communities in the Northeast megaregion are built-out with increased development, many existing landscape initiatives will need to expand their conservation efforts to address distinctly urban challenges.

2010
2040
Urban Initiative Areas

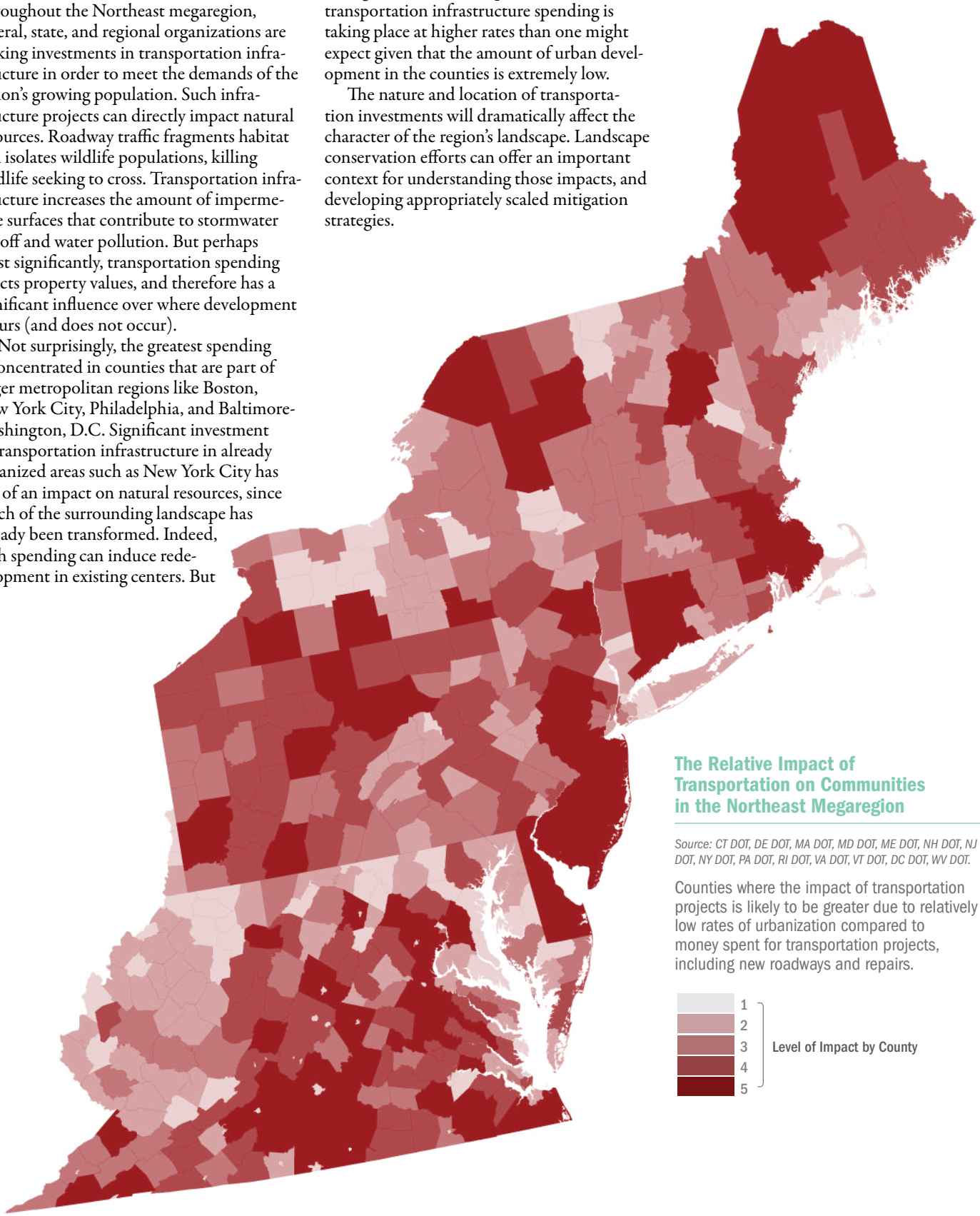
0 -20%
21-40%
41-60%
61-80%
81-100%
Urbanization

Transportation Infrastructure

Throughout the Northeast megaregion, federal, state, and regional organizations are making investments in transportation infrastructure in order to meet the demands of the region's growing population. Such infrastructure projects can directly impact natural resources. Roadway traffic fragments habitat and isolates wildlife populations, killing wildlife seeking to cross. Transportation infrastructure increases the amount of impermeable surfaces that contribute to stormwater runoff and water pollution. But perhaps most significantly, transportation spending affects property values, and therefore has a significant influence over where development occurs (and does not occur).

Not surprisingly, the greatest spending is concentrated in counties that are part of larger metropolitan regions like Boston, New York City, Philadelphia, and Baltimore-Washington, D.C. Significant investment in transportation infrastructure in already urbanized areas such as New York City has less of an impact on natural resources, since much of the surrounding landscape has already been transformed. Indeed, such spending can induce redevelopment in existing centers. But in those places where there is little urbanization, investment in transportation will have a far greater impact on surrounding resources. Bedford, VA, Cumberland, NJ, and Prince George's, MD, are examples of counties where transportation infrastructure spending is taking place at higher rates than one might expect given that the amount of urban development in the counties is extremely low.

The nature and location of transportation investments will dramatically affect the character of the region's landscape. Landscape conservation efforts can offer an important context for understanding those impacts, and developing appropriately scaled mitigation strategies.



The Relative Impact of Transportation on Communities in the Northeast Megaregion

Source: CT DOT, DE DOT, MA DOT, MD DOT, ME DOT, NH DOT, NJ DOT, NY DOT, PA DOT, RI DOT, VA DOT, VT DOT, DC DOT, WV DOT.

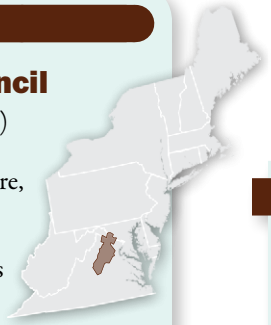
Counties where the impact of transportation projects is likely to be greater due to relatively low rates of urbanization compared to money spent for transportation projects, including new roadways and repairs.

1
2
3
4
5

Level of Impact by County

On the Ground: **Transportation**

Piedmont Environmental Council



The Piedmont Environmental Council (PEC) was founded in 1972 to preserve open spaces, viewsheds, historic landmarks, local agriculture, and clean air and water in the Shenandoah Valley and central Piedmont of greater Washington D.C. Its mission is to promote policies that preserve vital local economies, unique small towns, and treasured natural resources in the region.

PEC's multifaceted approach to sustainable transportation planning includes community organizing, research, and strategic partnerships with local and national transportation-oriented groups. In 2009, PEC organized a campaign opposing unnecessary road widening projects along the Route 29 corridor. Five of these road expansion plans have been canceled as a result of PEC's advocacy. In Loudoun, a suburban area roughly 40 miles from Washington D.C., PEC worked with traffic engineers and congestion specialists to successfully replace plans for an expensive four lane highway and interchange with a series of lower cost and lower impact roundabouts. Since their installation, congestion has diminished dramatically and the rural character of Loudoun has been preserved, all at a savings to tax payers.

The Piedmont Environmental Council also supports Journey Through Hallowed Ground (JTHG), a four state collaborative that raises local and national awareness about the Old Carolina Road from Gettysburg, Pennsylvania, to Monticello in Charlottesville, Virginia. JTHG successfully advocated for National Scenic Byway designation as a way to limit widening and new road construction projects in the corridor. The Byway designation also gives the region a competitive advantage when applying for federal funds. Communities along the Byway corridor are encouraged to implement standards for "context sensitive design" as a way of preserving and improving the scenic beauty and safety of the roadway.

On the Ground: **Transportation**

Casco Bay Estuary Partnership

In 1990, the Casco Bay in southern Maine was designated an "estuary of national significance" by the EPA and it is included in the agency's National Estuary Program. Today, the Casco Bay Estuary Partnership, a coalition of local, state and federal agencies, non-profits, local businesses, citizens, and universities, works to improve the environmental health of the bay while also encouraging compatible human uses.

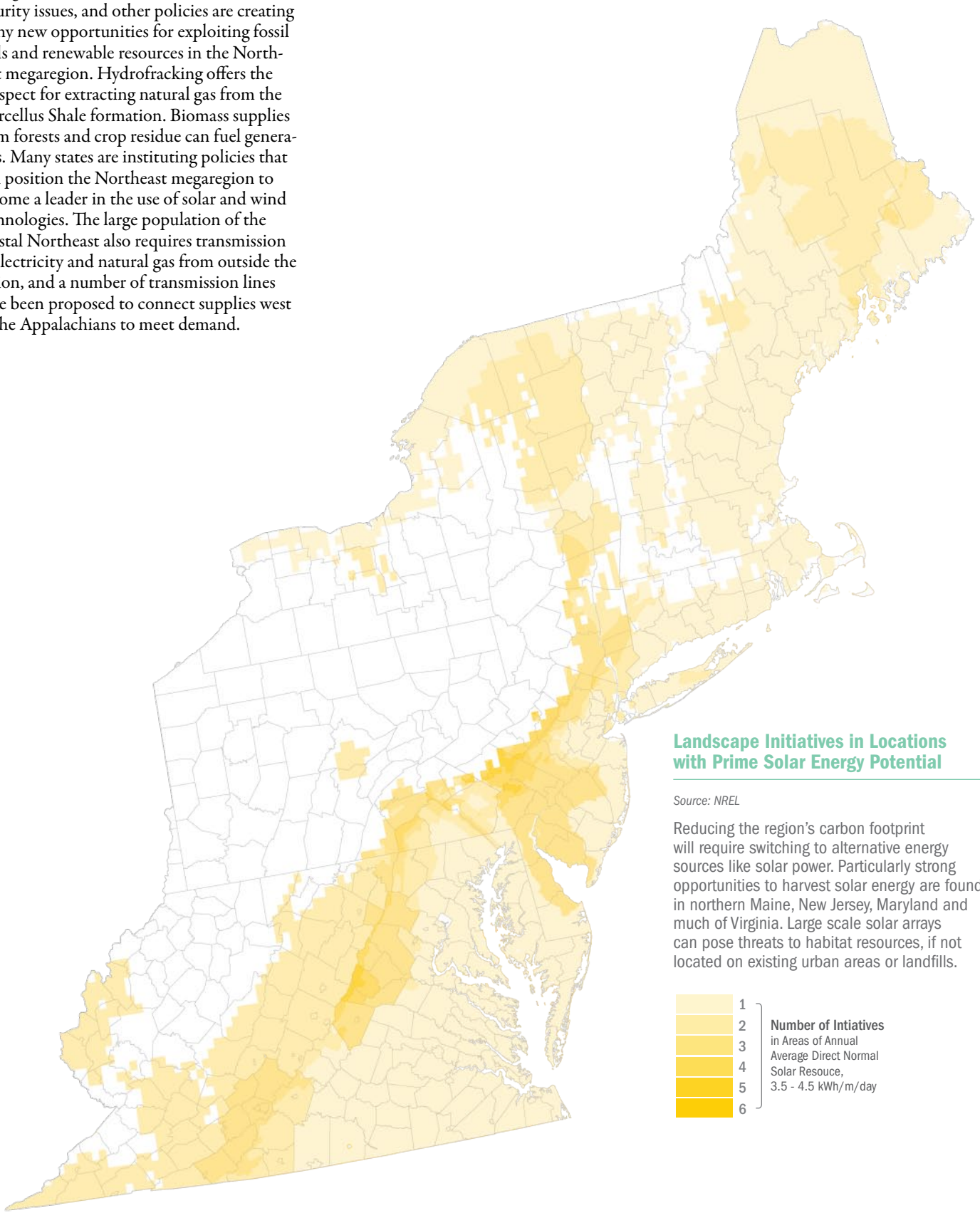
Nearly 25% of Maine's population lives within the watershed, and it is considered one of the fastest growing areas of the state. This growth has led to a number of new road construction projects that threaten to exacerbate the Casco Bay area's ongoing struggle to manage excess stormwater by adding to the impervious surface cover and increasing run-off. Road corridors also disrupt wildlife migration and encourage invasive plant species to proliferate in the road clearings.

CBEP has funded several pilot projects to improve the health of the estuary through better transportation infrastructure design. On the Pleasant River in Gray, Maine, the partnership funded a pilot project to test a new culvert design. The organization introduced an open bottom culvert design to replace older infrastructure that inhibited fish passage and that caused upstream sedimentation. CBEP staff regularly monitors the project and gathers feedback about its potential for success in other parts of the watershed.

Expansion of Japanese Knotwood along roadways.
Photo: U.S. Fish and Wildlife Service

Energy Infrastructure

Rising costs, concerns about climate, national security issues, and other policies are creating many new opportunities for exploiting fossil fuels and renewable resources in the Northeast megaregion. Hydrofracking offers the prospect for extracting natural gas from the Marcellus Shale formation. Biomass supplies from forests and crop residue can fuel generators. Many states are instituting policies that will position the Northeast megaregion to become a leader in the use of solar and wind technologies. The large population of the coastal Northeast also requires transmission of electricity and natural gas from outside the region, and a number of transmission lines have been proposed to connect supplies west of the Appalachians to meet demand.



Landscape Initiatives in Locations with Prime Solar Energy Potential

Source: NREL

Reducing the region's carbon footprint will require switching to alternative energy sources like solar power. Particularly strong opportunities to harvest solar energy are found in northern Maine, New Jersey, Maryland and much of Virginia. Large scale solar arrays can pose threats to habitat resources, if not located on existing urban areas or landfills.

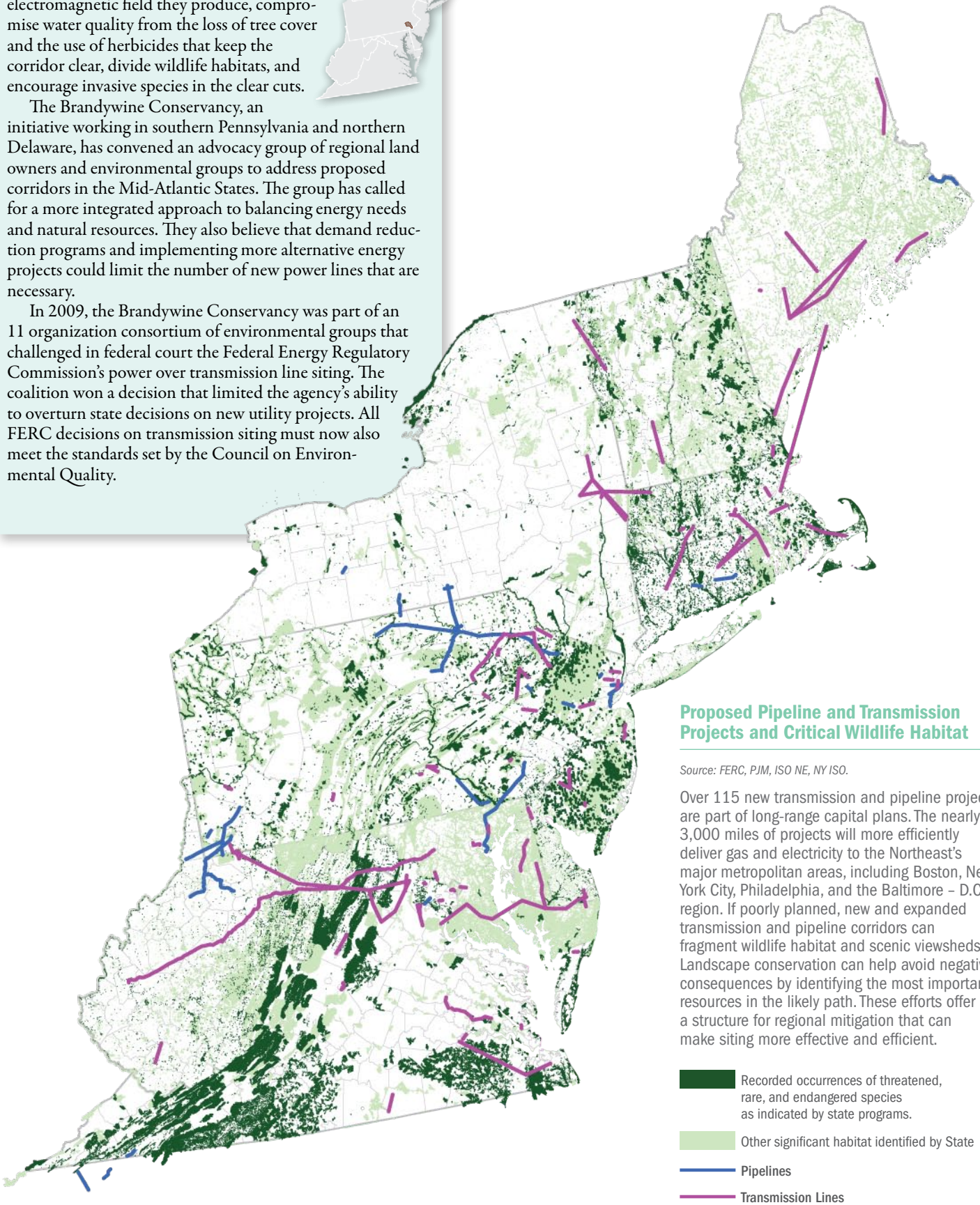
On the Ground: **Transmission Lines**

Brandywine Conservancy

New transmission lines can compromise scenic views, harm human health from the strong electromagnetic field they produce, compromise water quality from the loss of tree cover and the use of herbicides that keep the corridor clear, divide wildlife habitats, and encourage invasive species in the clear cuts.

The Brandywine Conservancy, an initiative working in southern Pennsylvania and northern Delaware, has convened an advocacy group of regional land owners and environmental groups to address proposed corridors in the Mid-Atlantic States. The group has called for a more integrated approach to balancing energy needs and natural resources. They also believe that demand reduction programs and implementing more alternative energy projects could limit the number of new power lines that are necessary.

In 2009, the Brandywine Conservancy was part of an 11 organization consortium of environmental groups that challenged in federal court the Federal Energy Regulatory Commission's power over transmission line siting. The coalition won a decision that limited the agency's ability to overturn state decisions on new utility projects. All FERC decisions on transmission siting must now also meet the standards set by the Council on Environmental Quality.



Proposed Pipeline and Transmission Projects and Critical Wildlife Habitat

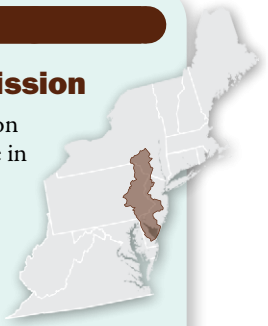
Source: FERC, PJM, ISO NE, NY ISO.

Over 115 new transmission and pipeline projects are part of long-range capital plans. The nearly 3,000 miles of projects will more efficiently deliver gas and electricity to the Northeast's major metropolitan areas, including Boston, New York City, Philadelphia, and the Baltimore – D.C. region. If poorly planned, new and expanded transmission and pipeline corridors can fragment wildlife habitat and scenic viewsheds. Landscape conservation can help avoid negative consequences by identifying the most important resources in the likely path. These efforts offer a structure for regional mitigation that can make siting more effective and efficient.

- Recorded occurrences of threatened, rare, and endangered species as indicated by state programs.
- Other significant habitat identified by State
- Pipelines
- Transmission Lines

On the Ground: **Hydrofracking**

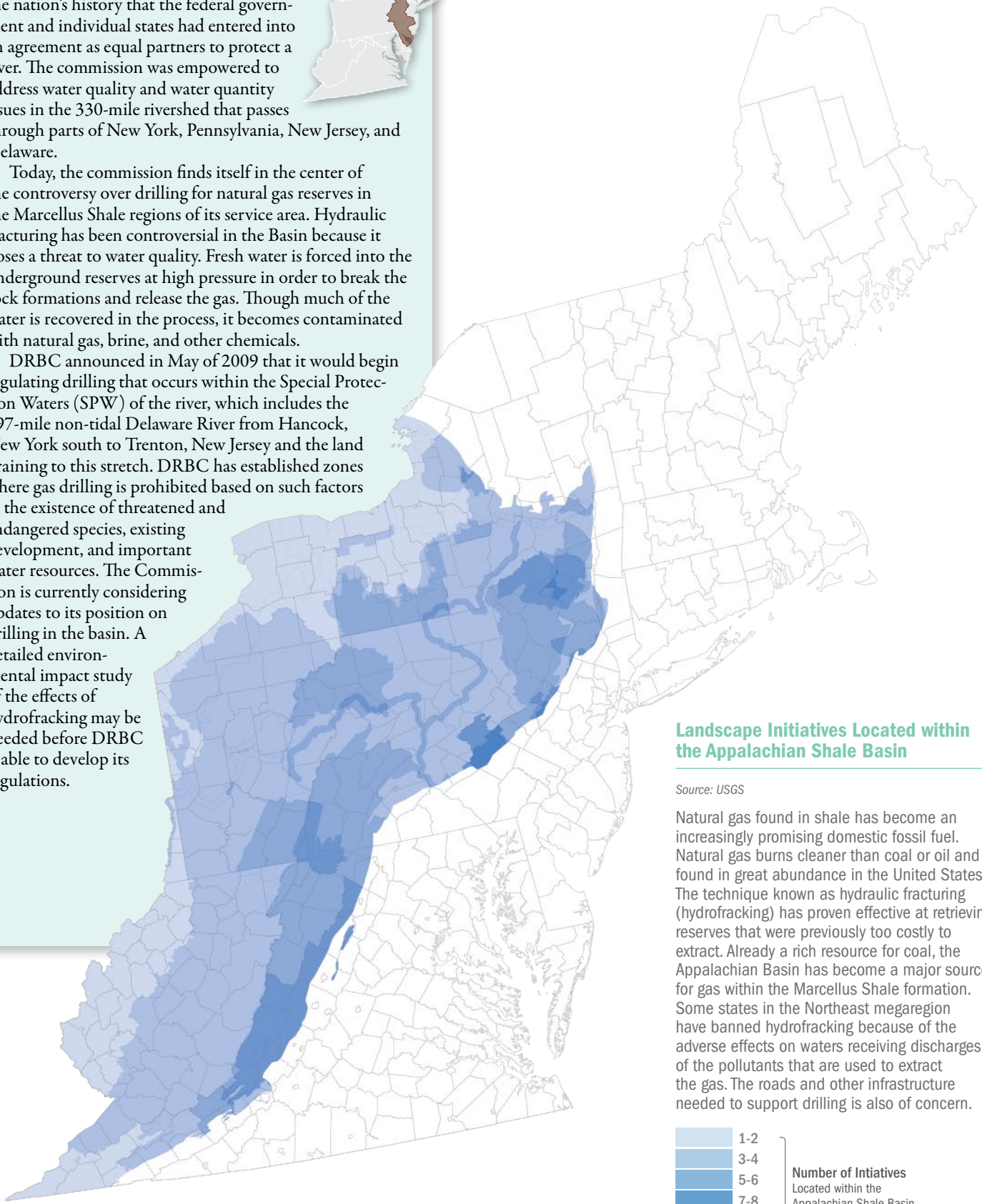
Delaware River Basin Commission



When the Delaware River Basin Commission was formed in 1961, it marked the first time in the nation's history that the federal government and individual states had entered into an agreement as equal partners to protect a river. The commission was empowered to address water quality and water quantity issues in the 330-mile rivershed that passes through parts of New York, Pennsylvania, New Jersey, and Delaware.

Today, the commission finds itself in the center of the controversy over drilling for natural gas reserves in the Marcellus Shale regions of its service area. Hydraulic fracturing has been controversial in the Basin because it poses a threat to water quality. Fresh water is forced into the underground reserves at high pressure in order to break the rock formations and release the gas. Though much of the water is recovered in the process, it becomes contaminated with natural gas, brine, and other chemicals.

DRBC announced in May of 2009 that it would begin regulating drilling that occurs within the Special Protection Waters (SPW) of the river, which includes the 197-mile non-tidal Delaware River from Hancock, New York south to Trenton, New Jersey and the land draining to this stretch. DRBC has established zones where gas drilling is prohibited based on such factors as the existence of threatened and endangered species, existing development, and important water resources. The Commission is currently considering updates to its position on drilling in the basin. A detailed environmental impact study of the effects of hydrofracking may be needed before DRBC is able to develop its regulations.



Landscape Initiatives Located within the Appalachian Shale Basin

Source: USGS

Natural gas found in shale has become an increasingly promising domestic fossil fuel. Natural gas burns cleaner than coal or oil and is found in great abundance in the United States. The technique known as hydraulic fracturing (hydrofracking) has proven effective at retrieving reserves that were previously too costly to extract. Already a rich resource for coal, the Appalachian Basin has become a major source for gas within the Marcellus Shale formation. Some states in the Northeast megaregion have banned hydrofracking because of the adverse effects on waters receiving discharges of the pollutants that are used to extract the gas. The roads and other infrastructure needed to support drilling is also of concern.

On the Ground: **Wind Power**

Atlantic Coast and Appalachian Mountains Joint Ventures

Today, two federal partnerships, the Appalachian Mountains and the Atlantic Joint Ventures, find themselves increasingly concerned over how wind power might affect migratory birds. The U.S. Department of Fish & Wildlife has convened a host of new partnerships between government agencies, conservation organizations, tribes, corporations, scientists, and concerned individuals to conserve migratory bird habitat corridors throughout the country.

Onshore wind production is most viable atop mountains with high elevation and in coastal areas, which are the defining landscapes of these two partnerships, respectively. Since large-scale wind production is still relatively new, no one is entirely sure what the affects are of wind turbines on the landscape.

The Atlantic Coast Joint Venture and its partners have embarked on a multi year study to evaluate how nocturnal bird and bat populations respond to wind power projects. The Joint Venture and its partners will use the research in developing best practices for siting wind projects that do not harm migratory bird habitat.

Landscape Initiatives in Locations With Prime Wind Power Potential

Source: AWS TruePower, NREL

The Atlantic coast of the Northeast megaregion offers great opportunity for offshore wind generation. On-shore wind resources are also abundant along the Appalachian Mountains from the Virginias up into Maine. Siting wind farms affects migratory birds, scenic views, forestry practices, and a range of other natural processes.

Good wind power density
(50m on-shore and 90m off-shore)

Initiative Concentration Density
(Number of Intiatives)

- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 15

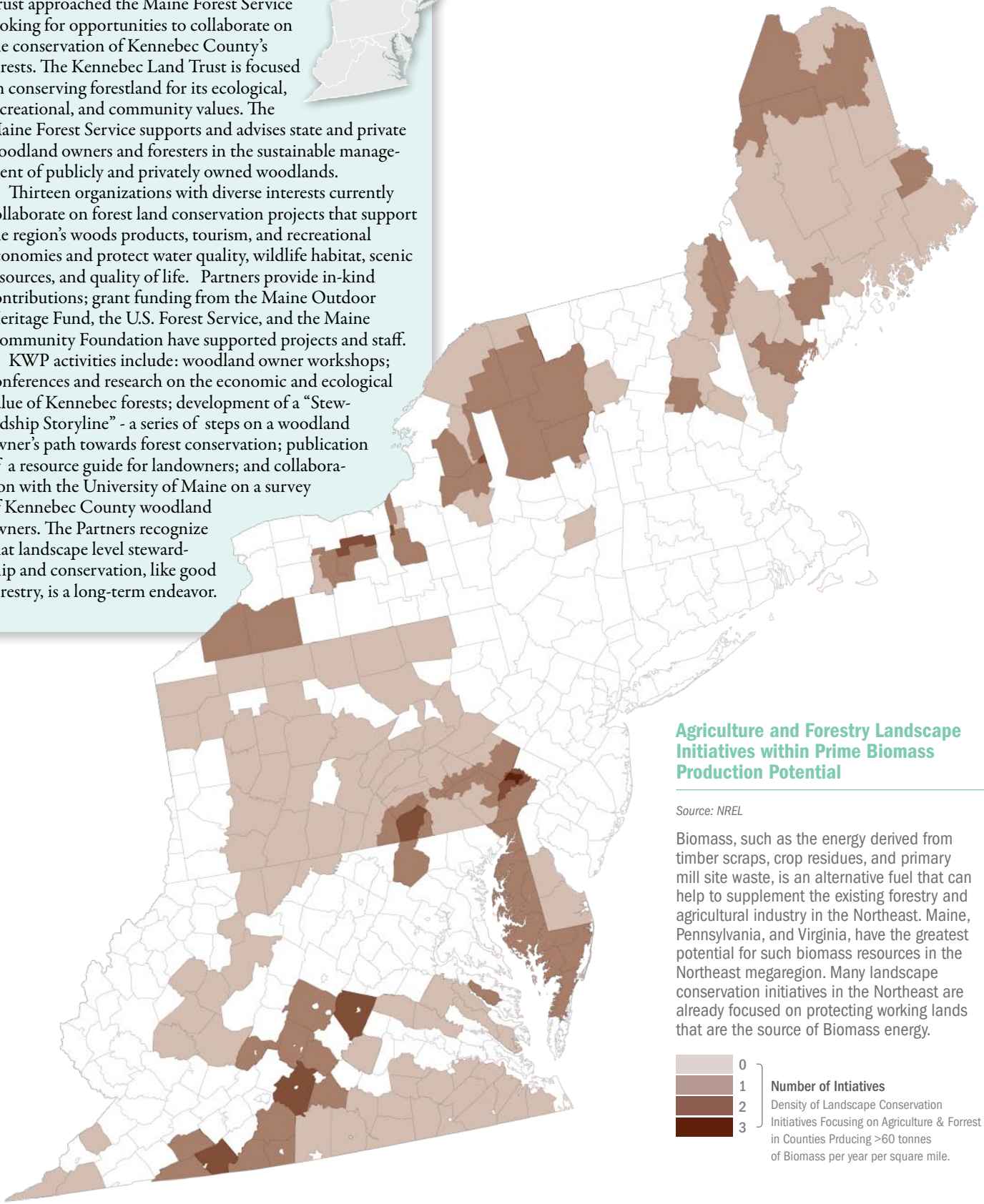
On the Ground: **Forestland Conservation**

Kennebec Woodland Partnership

The Kennebec Woodland Partnership (KWP) was founded in 2009 when the Kennebec Land Trust approached the Maine Forest Service looking for opportunities to collaborate on the conservation of Kennebec County's forests. The Kennebec Land Trust is focused on conserving forestland for its ecological, recreational, and community values. The Maine Forest Service supports and advises state and private woodland owners and foresters in the sustainable management of publicly and privately owned woodlands.

Thirteen organizations with diverse interests currently collaborate on forest land conservation projects that support the region's woods products, tourism, and recreational economies and protect water quality, wildlife habitat, scenic resources, and quality of life. Partners provide in-kind contributions; grant funding from the Maine Outdoor Heritage Fund, the U.S. Forest Service, and the Maine Community Foundation have supported projects and staff.

KWP activities include: woodland owner workshops; conferences and research on the economic and ecological value of Kennebec forests; development of a "Stewardship Storyline" - a series of steps on a woodland owner's path towards forest conservation; publication of a resource guide for landowners; and collaboration with the University of Maine on a survey of Kennebec County woodland owners. The Partners recognize that landscape level stewardship and conservation, like good forestry, is a long-term endeavor.



Agriculture and Forestry Landscape Initiatives within Prime Biomass Production Potential

Source: NREL

Biomass, such as the energy derived from timber scraps, crop residues, and primary mill site waste, is an alternative fuel that can help to supplement the existing forestry and agricultural industry in the Northeast. Maine, Pennsylvania, and Virginia, have the greatest potential for such biomass resources in the Northeast megaregion. Many landscape conservation initiatives in the Northeast are already focused on protecting working lands that are the source of Biomass energy.

Climate Change

Landscape conservation is critical to ensuring that large volumes of carbon stored in the rich soils and plant material of the Northeast are kept out of the atmosphere. Reforestation and afforestation offers the promise of enabling sequestration of additional carbon, and conservation initiatives have been discussed as a means of meeting the goals of the Regional Greenhouse Gas Initiative (RGGI).[19] These effects of climate change have implications for both humans and species of plants and animals in the Northeast's ecosystems. While scientists project at least a 5% increase in annual precipitation, the Atlantic coast and Appalachian Mountains will experience the greatest percent increase in annual precipitation overall. There is a marked difference in how the megaregion may be affected by climate change in the summer. By 2050, the forests of New England may be significantly drier in the month of July. A similar shift towards lower precipitation is occurring in the western part of Virginia and West Virginia. The remainder of the megaregion will see a significant increase in July precipitation by 2050, with areas such as the Washington, D.C. metro-region experiencing up to 10% increases. Similarly, shifts in temperature will occur across the megaregion by 2050, but the greater temperature increases will take place away from the moderating influence of the ocean.

Mitigating climate change by reducing CO_2 emissions, sequestering carbon, and adapting to these shifts in temperature and precipitation will require a coordinated effort across boundaries. Landscape conservation can provide a platform for bringing together the landowners, managers, scientists and economists needed to formulate credit programs or other schemes to recognize sequestration efforts. Hotter, drier summers on northern forests from Massachusetts to Maine will require that land managers and stakeholders work across boundaries on management.

Landscape conservation efforts in urban areas can also play a major role in addressing the heat island and air quality impacts of climate change. The USDA Forest Service has documented how tree planting can reduce ambient temperature and improve air quality by shading pavement and buildings and increasing transpiration. For example, Chesapeake Bay Foundation's Restore program is focused on planting trees along stream corridors to cool water temperatures and control run-off.

A landscape scale approach will help manage flooding caused by more frequent and intense storms. As climate change alters weather patterns and induces sea level rise, coastal areas and other places within the existing floodplains will require a combination of hard and soft infrastructure. In particular, landscape planning can help make room for coastal and riverine floods and reduce the demand for costly and often ineffective shoreline protection strategies, while providing important recreational and wildlife benefits.

On the Ground: **Climate Change Adaptation**

Partnership for the Delaware Estuary

The EPA's National Estuary Program (NEP) supports water quality protection and habitat restoration in estuaries of national importance around the country – one of which is the Delaware River Estuary of New Jersey, Delaware, and Pennsylvania.

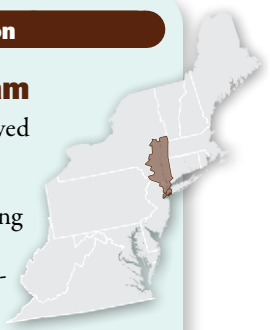
In 2008, PDE received one of six grants from the EPA's Climate Ready Estuaries Program to pilot climate adaptation strategies. PDE chose to study potential effects of climate change on drinking water, tidal wetlands, and shellfish. These resources were chosen because they are important to both people and the environment and they are projected to experience the most severe effects from climate change due to increased salinity and sea-level rise.

PDE had already conducted significant research on climate change, concluding that the most serious climate-related threats to the health of the Delaware Estuary will come from sea level rise, salinity rise, changing rainfall and snowfall patterns, changes in freshwater flow, habitat suitability for estuary species, invasive species, land use change, and population growth.

PDE's pilot study included a vulnerability assessment of vital resources, a study of the value of protecting those resources based on a method called "natural capital valuation", and an ongoing strategy for monitoring and management that tracks actual conditions to understand how closely they match predictions.

On the Ground: **Climate Change Adaptation**

Hudson River Estuary Program



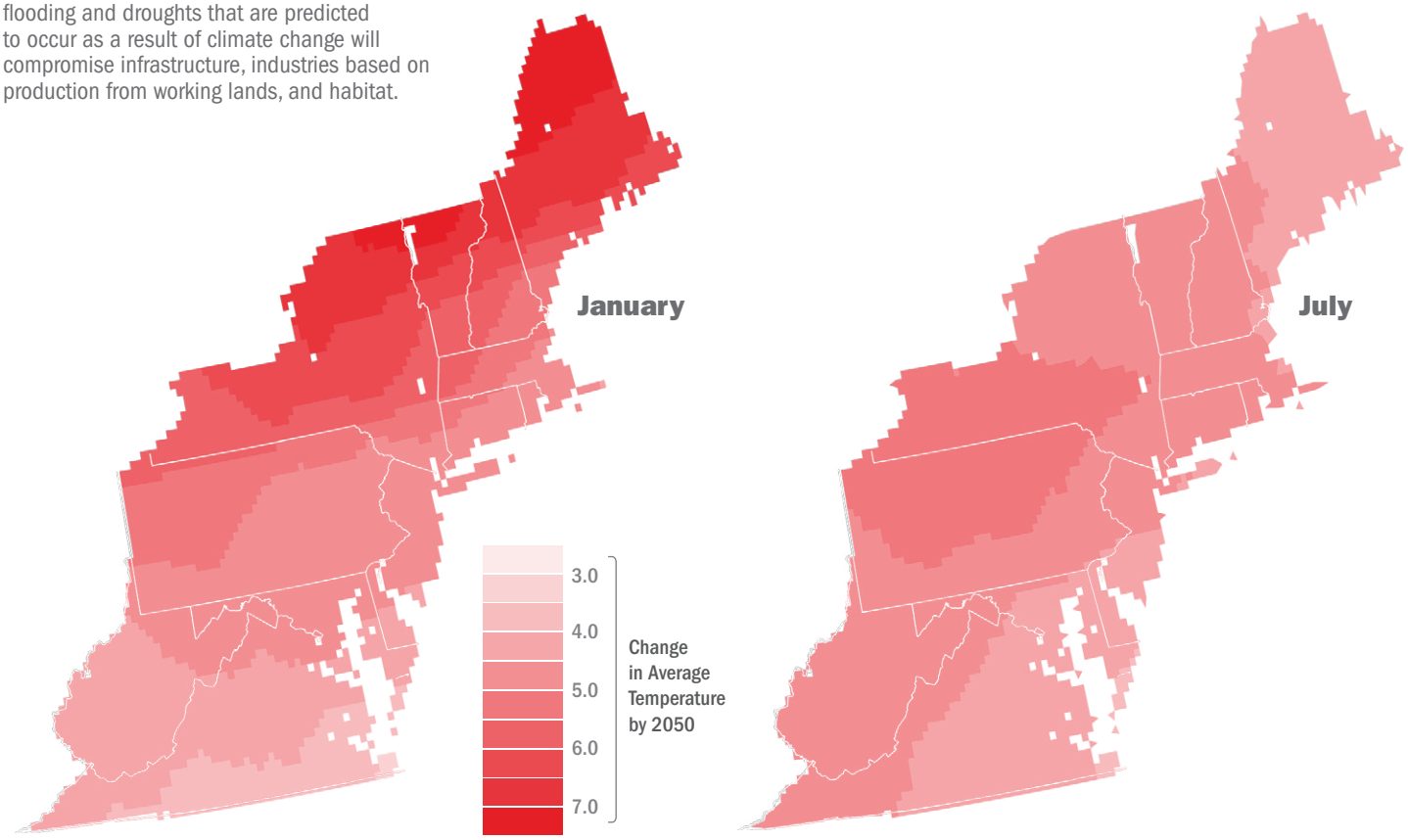
The Hudson River Estuary Program has moved forward aggressively to examine how best to adapt to increase precipitation and flood events. The program acknowledges that "rising sea levels and strong storms will cause localized floods and threaten shoreline infrastructure and development." In response to those threats, it has developed a four-year action plan to begin phasing in adaptation strategies.

The action plan identifies both short- and long-term targets for helping estuary communities adapt. The first target is mapping the estuary shoreline with LIDAR (light detection and ranging) technology, modeling sea-level rise projections on top of the LIDAR shoreline maps, and supplying communities with the vulnerability maps so that they can identify the areas of greatest risk. The vulnerability maps will also display natural systems and infrastructure (water and sewer intakes/outfalls, rail lines, roads, utilities, and brownfields) within the shoreline areas expected to flood regularly, and summary reports assessing the vulnerability to each infrastructure system will also be produced.

The Hudson River Estuary Program will provide technical assistance and advice to communities in the watershed based on the vulnerability studies it produced. The program's staff will help communities decide between "upgrading existing or siting new critical infrastructure, determining which shoreline areas are suitable for shoreline protection and which areas may require a planned retreat, and forming adaptive management strategies that consider the design life of infrastructure projects...to be flexible over time to respond to changing conditions."

Climate change poses significant challenges to wildlife and human populations. The flooding and droughts that are predicted to occur as a result of climate change will compromise infrastructure, industries based on production from working lands, and habitat.

Predicted Change in Temperature by Mid-Century

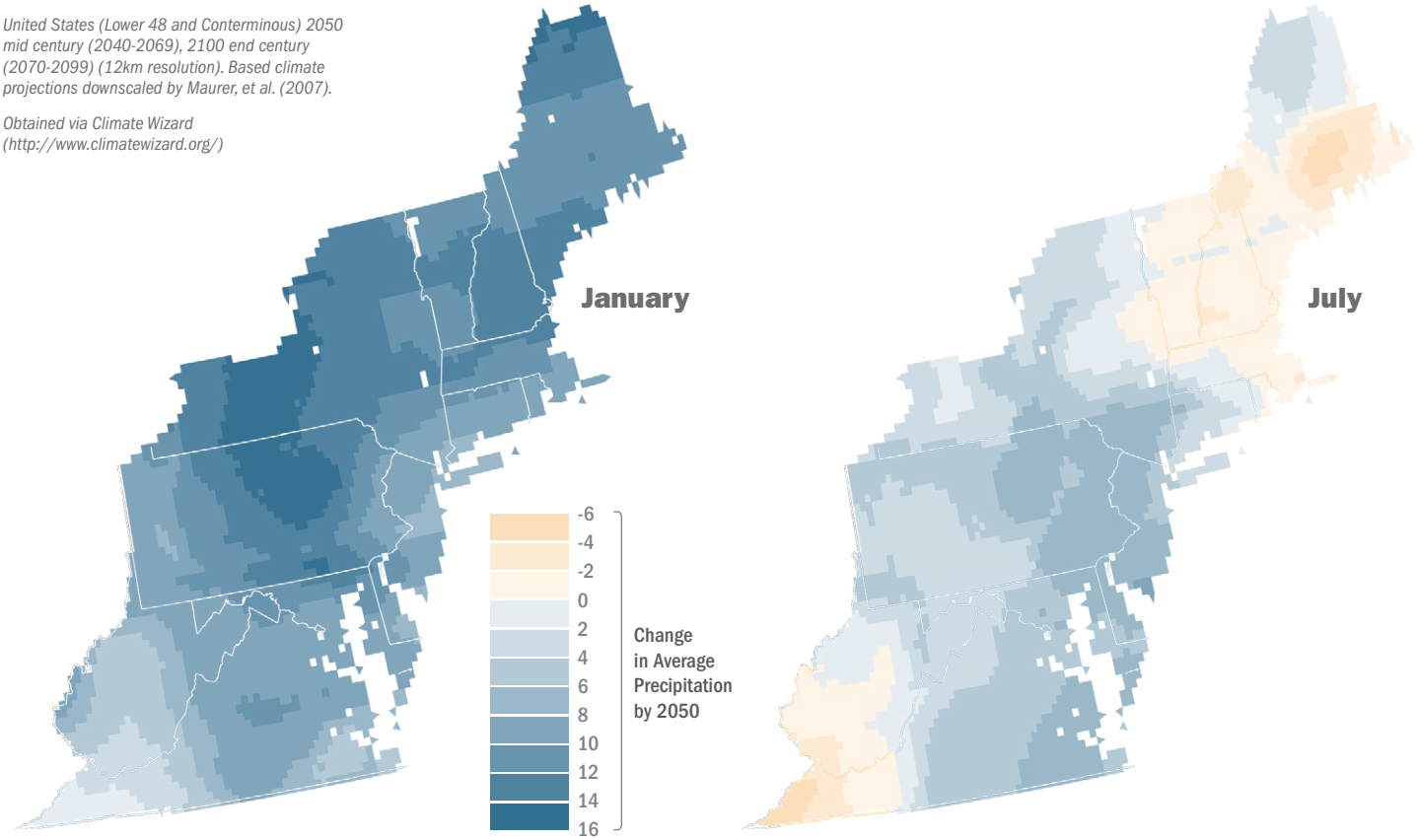


Source: United States (Lower 48 and Conterminous) past 50 years (1951-2006) (4km resolution) "PRISM Group, Oregon State University, created 4 Feb 2007."

United States (Lower 48 and Conterminous) 2050 mid century (2040-2069), 2100 end century (2070-2099) (12km resolution). Based climate projections downscaled by Maurer, et al. (2007).

Obtained via Climate Wizard (http://www.climatewizard.org/)

Predicted Change in Precipitation by Mid-Century

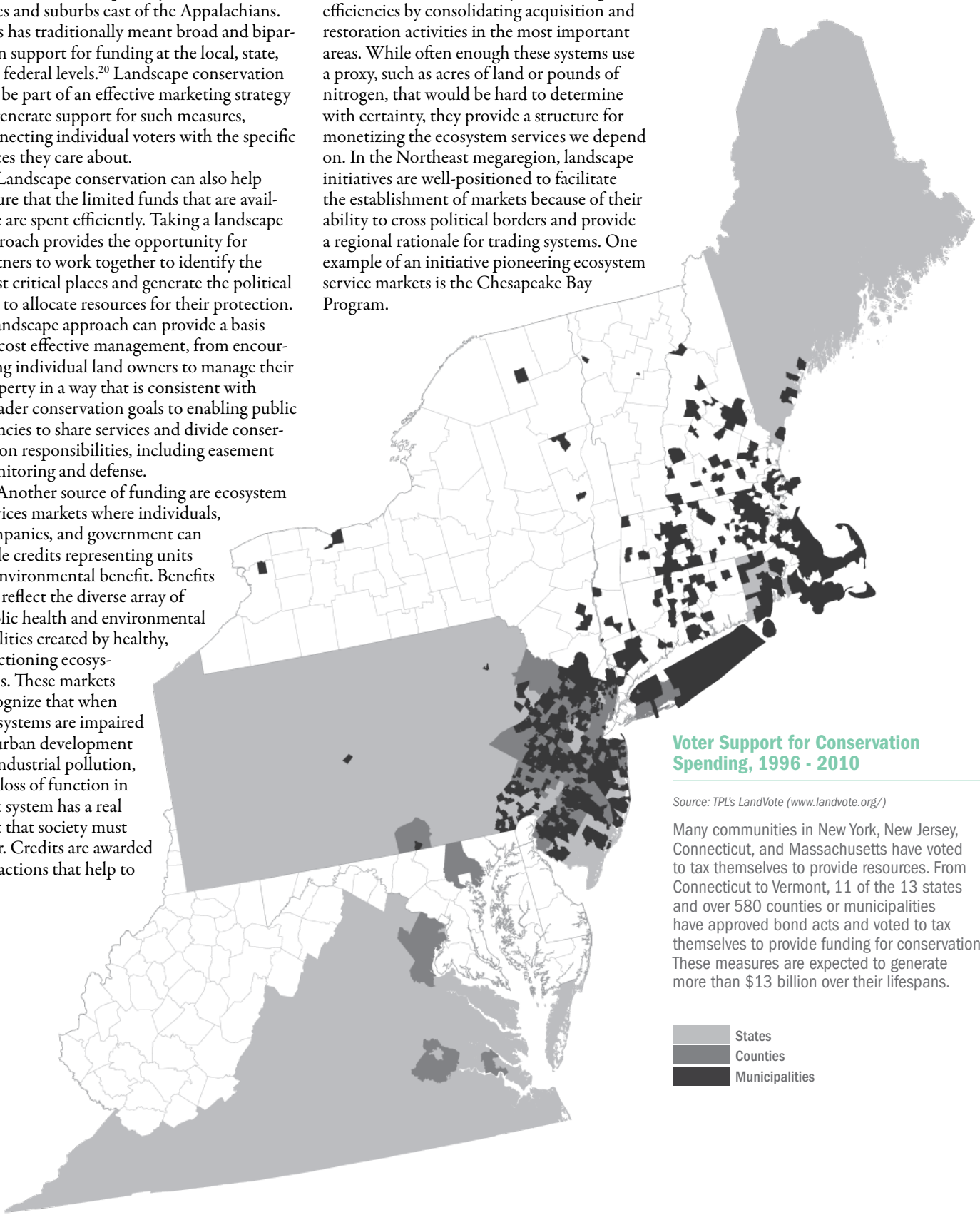


Meeting Funding Needs

Land conservation has generally been popular in the Northeast, especially in the crowded cities and suburbs east of the Appalachians. This has traditionally meant broad and bipartisan support for funding at the local, state, and federal levels.[20] Landscape conservation can be part of an effective marketing strategy to generate support for such measures, connecting individual voters with the specific places they care about.

Landscape conservation can also help ensure that the limited funds that are available are spent efficiently. Taking a landscape approach provides the opportunity for partners to work together to identify the most critical places and generate the political will to allocate resources for their protection. A landscape approach can provide a basis for cost effective management, from encouraging individual land owners to manage their property in a way that is consistent with broader conservation goals to enabling public agencies to share services and divide conservation responsibilities, including easement monitoring and defense.

Another source of funding are ecosystem services markets where individuals, companies, and government can trade credits representing units of environmental benefit. Benefits can reflect the diverse array of public health and environmental qualities created by healthy, functioning ecosystems. These markets recognize that when ecosystems are impaired by urban development or industrial pollution, the loss of function in that system has a real cost that society must bear. Credits are awarded for actions that help to conserve or restore ecosystem function. They can be purchased or traded as mitigation for activities elsewhere, providing a source of private capital, a means of capitalizing avoided costs, and/or a way to achieve greater efficiencies by consolidating acquisition and restoration activities in the most important areas. While often enough these systems use a proxy, such as acres of land or pounds of nitrogen, that would be hard to determine with certainty, they provide a structure for monetizing the ecosystem services we depend on. In the Northeast megaregion, landscape initiatives are well-positioned to facilitate the establishment of markets because of their ability to cross political borders and provide a regional rationale for trading systems. One example of an initiative pioneering ecosystem service markets is the Chesapeake Bay Program.



Voter Support for Conservation Spending, 1996 - 2010

Source: TPL's LandVote (www.landvote.org/)

Many communities in New York, New Jersey, Connecticut, and Massachusetts have voted to tax themselves to provide resources. From Connecticut to Vermont, 11 of the 13 states and over 580 counties or municipalities have approved bond acts and voted to tax themselves to provide funding for conservation.[21] These measures are expected to generate more than $13 billion over their lifespans.

On the Ground: **Ecosystem Services**

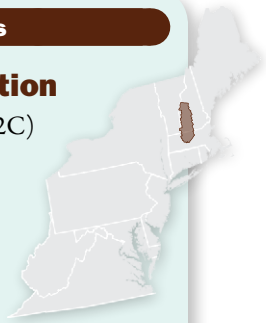
Watershed Agricultural Council (WAC)

The vast majority of New York City's drinking water comes from 19 upstate reservoirs that are located throughout the Catskills region. In the early 1990s, an EPA order to build a very costly filtration plant eventually led to a landmark agreement between the city and the residents living in its watershed. Today, the partnership between upstate and downstate interests is considered a successful model for how a landscape-scale approach can keep drinking water clean for downstream users. At the heart of the resolution between the city and its Catskills partners is the Watershed Agricultural Council (WAC).

When WAC was created in 1993, it adopted best management practices for agriculture and forestry as a way to protect water quality more cheaply than *end-of-the-pipe* solutions like a filtration plant. The WAC has led efforts to create Whole Farm Plans, a planning process for sustainable farming developed by the USDA, for 93% of the region's farms. The result is WAC-funded environmental demonstration projects designed to manage animal waste and runoff from farms. The Council also acquires conservation easements on strategically important farmland in order to preserve the region's agrarian character and economy. WAC has also developed a similar program of best management practices to train private foresters about how to sustainably harvest their timber. All of its efforts are fully funded by New York City's Department of Environmental Protection as a condition of its filtration avoidance waiver with EPA.

On the Ground: **Land Trusts & Landscapes**

Quabbin-to-Cardigan Connection



The Quabbin-to-Cardigan Connection (Q2C) was formed in 2003 to protect the Monadnock Highlands of northern Massachusetts and western New Hampshire. At approximately two million acres in size, the two-state corridor is one of the last remaining contiguous forests in New England. For this reason, it is strategically important in regional efforts to mitigate and adapt to climate change. The dense forest is a sink for carbon and an unfragmented habitat corridor for species that may need to migrate northward. In 2007, the group published its Quabbin-to-Cardigan conservation plan to help focus priorities in the region. The plan identified 600,000 acres of core landscape for protection and another 400,000 acres of land targeted for conservation through sustainable planning and land use as a buffer to support core areas.

Land Trusts are well represented in the group of 27 organizations that make up Q2C. They use the partnership as a coordination and information clearinghouse. Q2C sets a broad agenda and supports member projects, but individual members are directly responsible for actual land conservation efforts. The partnership hopes to engage as many large land owners as possible before the land is subdivided and the stakeholder group expands, which will make outreach and conservation efforts more complicated.

A farm in Staunton, Virginia, with cover crops and crop residue from no-till agriculture. Photo: Chesapeake Bay Program

On the Ground: **Marketing**

Blackstone River Valley National Heritage Area

The Blackstone River runs from Worcester, Massachusetts, to Providence, Rhode Island. Two hundred years ago, it was the focal point of America's Industrial Revolution, powering textile mills and creating a bustling economy in the process. By the middle of the 20th century, the textile industry was moving south. When many of the mills closed, the region was sent into an economic depression that lasted through the 1970s and most of the 1980s. The textile industry had moved away, but not before it required a dam on nearly every one of the river's forty miles and it severely polluted the river's waters.

Congress designated the 500 square miles around the Black Stone River a National Heritage Area in 1986 as a means to protect the region's natural and cultural heritage. Today, the area has been highly successful in its efforts to support environmental clean-up and heritage development based on tourism and historic preservation. The key innovation, though, has been the successful organization of the two states, 24 communities, and thousands of historic and scenic sites into a National Heritage Area overseen by a corridor commission that can bring together the diverse stakeholders in the region and advocate for improvements that benefit the entire river valley.

The National Park Service's involvement is also critical to the area's success. NPS offers a range of services, from planning and technical assistance to interpretation and financial assistance that enhance the user experience. The commission has sponsored dam removals, interpretive plans for historic sites, corridor-wide master plans (including a heritage landscape inventory), and small grants to help improve individual natural and historic sites.

Blue Water Baltimore Tree Planting. Photo: Shan Gordon

On the Ground: **Shared Services**

Blue Water Baltimore

Blue Water Baltimore is an urban initiative that was founded in 2010 to promote restoration of the Baltimore region's streams, rivers, and harbor, as well as education and advocacy. The organization's founding is significant because it represents the merger of five smaller conservation organizations. The organizations included in the merger joined together after the economic downturn that began in 2008.

Though practical considerations, like varying "finances, staff size, organizational age, board dynamics, and workplace arrangements" had in the past discouraged any real efforts to accomplish a merger, the diminished amount of funding from government and private sources began to outweigh other considerations. The five organizations found themselves competing more frequently for the same funds from a shrinking financial support base for water conservation in the Chesapeake Bay region.

The merger also made strategic sense. Several foundations in the Baltimore region had recognized that dividing environmental advocacy according to sub-watersheds diluted the overall ability to influence regional policy. Together, the five organizations have a stronger overall regional impact and are better able coordinate their efforts. The groups represent the full spectrum of land use types in the greater Baltimore region, including urban, suburban, and rural areas, and each organization lends expertise in different aspects of water conservation and protection.

Improving Practice

7

The preceding pages have provided a comprehensive view of the many diverse landscape conservation initiatives in the 13-state Northeast megaregion. These initiatives that are working to build sustainable economies and create healthy communities will face a number of obstacles as they try to accommodate the multiple visions that their stakeholders have for the landscape. Practitioners are confronting emerging challenges that transcend property boundaries and political jurisdictions: increasing populations and demands for urban uses and new infrastructure; adaptation to and mitigation of climate change; and meeting the growing challenges to finding sources of funding for conservation. This report is intended to start a conversation about three areas of landscape conservation practice where improvement is necessary[22]:

1. **Effective Governance and Management**
2. **Adequate Funding and Efficient Use of Available Resources**
3. **Building the Right Toolbox**

Effective Governance and Management

The management of landscape initiatives – including the work of the entity leading the effort and the makeup of its partners – varies widely across the Northeast. There is no one ideal: successful landscape initiatives develop management structures that work best for their given circumstances and political climate. Informal networks are often the most appropriate for an emerging initiative or one where flexibility and an ability to engage a wide variety of stakeholders are important. Partnerships and institutional structures allow greater government involvement generally critical to implementation, but may not be politically viable in every circumstance.

Success depends less on what the management structure looks like than whether the right people are around the table to inform the process, achieve the mission, and secure access to funding. There are different ways to structure an initiative – as an informal network, a contractual partnership, or a legal institution – but the vast majority of initiatives (68%) are led by non-profits, indicating a need for flexibility. Federal agencies – while not often the leader of initiatives – are important partners, directly or indirectly involved in nearly 60% of the surveyed initiatives, providing funding and technical assistance, initiating initiatives or officially recognizing them and making them eligible for federal funding. State agencies, while the lead institution in only 32 efforts, are critical partners in most of the initiatives that directly affect land use decisions. Some states, like Pennsylvania, offer critical support to non-profit organizations so that they can step up to lead. The human "infrastructure" of these collaborative projects is often challenged as unnecessary or duplicative. In practice many of these efforts would collapse without a regional or governmental convener. Because the landscapes are of a large scale, it is hard to measure ecosystem or economic benefits of the individual conservation actions.

What is critical is a sustained willingness to engage with internal and external stakeholders. Active collaboration is a hallmark of landscape work, and in many ways its driving impetus. Engagement will become ever more important as landscapes face increasing challenges from urban growth, transportation and energy infrastructure siting and the impacts of climate change. Landscape initiatives can provide a framework for a clear dialogue about these challenges – from hydrofracking to development restrictions in floodplains – helping sound decision-making that accounts for conservation values as well as other societal needs. They can help align governments, especially across agency jurisdictions. The precursor to success is getting local government and community leaders to the table early. What they value may not be immediately congruent with traditional conservation interests. But, in many cases, there is common ground that can lead to important opportunities for involving nontraditional sources of political support and funding for conservation, heritage preservation, and community development.

Measuring the success of landscape initiatives is challenging. The acres of protected conservation land are not the only valid metric; many others are more qualitative or difficult to collect. But it is difficult for any initiative to assess its own success without a plan that sets goals and objectives. By knowing where they are ultimately headed and which actions are most essential, managers can more effectively lead partners and stakeholders. While only a third of the initiatives are required to have plans, slightly more than half have adopted management plans. Not surprisingly only 5% of networks must have one while all of the surveyed institutions are required to create one. Creating a comprehensive strategic vision is an important element for establishing more formal partnerships.

To improve practice in the management of landscape initiatives, it will be important to address the following questions:

- What is the most effective way to organize management to confront the challenges of land use changes, infrastructure demand, climate change, and funding shortages?
- What are the most effective strategies for engaging partners, especially non traditional stakeholders?
- What are best practices in preparing and implementing comprehensive management plans for networks, partnerships, and institutions?

Adequate Funding and Efficient Use of Available Resources

Operating at the landscape scale offers opportunities for practitioners to become more creative and nimble in raising and spending limited funding dollars. Whether it is finding management efficiencies, creating partnerships that enable use of infrastructure funding, or priority setting that ensures that limited resources are spent in the most effective way, improving practice depends on making the most of limited resources.

Many initiatives have used the emotional appeal of their landscapes to galvanize public opinion and elected officials and secure additional conservation funding from local, state, and federal government and private philanthropy. Others have effectively addressed how landscape conservation can help meet the economic and social needs of residents and visitors. Indeed it's the promise of using the landscape message and coalition strength to tap new funding sources that lies at the heart of many efforts. Understanding potential sources of funding and most effectively marketing are critical skills.

Capital spending on conservation is a fraction of more traditional infrastructure investments energy, water, and especially transportation. Many initiatives have utilized these sources, such state revolving funds for water quality and transportation enhancement and congestion mitigation funding to meet their goals. In some cases, it has been incumbent on the initiative to explicitly make the case by demonstrating the specific ecosystem services delivered. Others have used a landscape framework to more effectively allocate mitigation dollars from large scale infrastructure projects. Tapping these sources for planning, land acquisition, and capital improvements is vitally important given current and prospective public budgets.

Initiatives with common goals and objectives in nearby geographies have found ways to band together to share services, such as joint marketing to promote tourism or through cooperative use of equipment and staff resources. Initiatives have also helped to prioritize how funding is spent, using scientific research and planning to wisely direct funding to the most critical areas.

As practitioners aim to improve practice in maximizing funding, it will be important to answer the following questions:

- How can practitioners brand landscapes to effectively communicate conservation needs and opportunities?
- How can landscape initiatives access or benefit from investments in transportation, water, and energy?
- What are the best approaches to establish shared priorities for conservation action?
- What are the opportunities and barriers to shared services across landscapes?

Building the Right Toolbox

Like any enterprise, success in building landscape conservation practice requires finding the right tools. The survey shows that for the vast majority of initiatives, education and outreach and other communication tools are most popular. They are incredibly important in ensuring that the mission of an initiative relates and extends to diverse and often far flung stakeholders.

Beyond this common need, initiatives employ a wide variety of practices. Acquisition of land and easements play an important – but expensive – role. But many landscape initiatives look to influence the actions of other entities indirectly through planning, advocacy, science, and coordination. Very few take on a direct regulatory or land management role.

Ensuring that the major challenges facing the Northeast's landscapes, including urban growth, energy and transportation infrastructure and climate change, are addressed may require landscape practitioners to utilize and develop new policy tools. While some initiatives have used land use regulatory powers and transfer of development rights programs to direct development away from critical areas, its relatively uncommon for initiatives to play a direct role in land use decisions, despite its importance.

To build the right toolbox, landscape practitioners should consider the following:

- How can landscape initiatives best communicate with their partners and important stakeholders?
- Can ecosystem service markets be used to generate financial support for conservation?
- How can landscape conservation initiatives most effectively engage land use and infrastructure decision makers?
- What can landscape initiatives do to address the need to mitigate and adapt to climate change?

Photo: Ken Sturm / U.S. Fish and Wildlife Service

Acknowledgments

This report was written by **Robert Pirani**, Vice President for Environmental Programs; **Robert Freudenberg**, Director, New Jersey Office; and Research Associate **Paul Winters**. The report was designed by **Jeff Ferzoco**, Creative and Technology Director, with **Benjamin Oldenburg**, Research Associate, Graphic Design. Jeff and Ben also produced the www.rpa.org/northeastlandscapes website. **Andrew Turco**, Research Associate, helped build the inventory of landscape initiatives. Associate Planner GIS **Fiona Zhu** was responsible for the mapping and spatial analysis that contributed to research and design for the report. Interns **Eric Bohn**, **Kyle Kozar**, **Sara Margolis**, **Jasmine Qin**, **Jackson Whitmore**, **Afzal Khaki**, and **Will Stein** also contributed to the creation of spatial products and other content for this report.

While RPA and America 2050 are solely responsible for the report's conclusions and any errors, we thank the following organizations for their generous financial support:

- The Doris Duke Charitable Foundation
- The Northeastern Area State and Private Forestry, U.S. Forest Service
- The Lincoln Institute of Land Policy

We owe special thanks to the members of the Northeast Landscapes Advisory Committee for their advice and guidance:

Nancy Ailes, Cacapon and Lost Rivers Land Trust
William Allen, The Conservation Fund
Ole Amundsen, The Conservation Fund
Carol Ash, Alliance for New York State Parks
Martina Barnes, United States Forest Service, Northeastern Area State and Private Forestry
Brenda Barrett, Pennsylvania Department of Conservation and Natural Resources
Robert Bendick, The Nature Conservancy
Karen Bennett, Delaware Department of Natural Resources and Environmental Conservation
Alexander Brash, National Parks Conservation Association
Paul Bray, New York State Department of Environmental Conservation
Armando Carbonell, Lincoln Institute of Land Policy
Kevin Case, Land Trust Alliance
Michael Catania, Conservation Resources, Inc.
Alice Chamberlin, Two Countries One Forest
Ernest Cook, Trust for Public Land
Jad Dadley, Trust for Public Land
Lee Epstein, Chesapeake Bay Foundation
Andrew Fahlund, American Rivers
Alexander Felson, Yale University School of Forestry and Environmental Studies and School of Architecture
Richard Hall, Maryland Department of Planning
Rose Harvey, New York State Office of Parks, Recreation and Historical Preservation
Wink Hastings, Chesapeake Bay Program
Brian Houseal, The Adirondack Council
Peter Howell, Open Space Institute
Mark Humpert, Association of Fish and Wildlife Agencies
T. Destry Jarvis, Outdoor Recreation and Park Services, LLP
Bill Jenkins, United States Environmental Protection Agency, Region 3
Shawn Johnson, University of Montana Center for Natural Resources and Environmental Policy
Bill Labich, Highstead
James Levitt, Harvard Forest
Kathryn Maloney, United States Forest Service, Northeastern Area State and Private Forestry
Mary McBryde, LTC Conservation Advisory Services
Matt McKinney, University of Montana Center for Natural Resources and Environmental Policy
Christopher Miller, Piedmont Environmental Council
Nora Mitchell, National Park Service
Carleton Montgomery, Pinelands Preservation Alliance
Marvin Moriarty, United States Fish and Wildlife Service
Matt Nicholson, United States Environmental Protection Agency, Region 3
Larry Orman, GreenInfo Network
Peter Pollock, Lincoln Institute of Land Policy
Luther Propst, Sonoran Institute
Dave Publicover, Appalachian Mountain Club
Dennis Reidenbach, National Park Service
Lynn Scarlett, Resources for the Future
Mike Slattery, National Fish and Wildlife Foundation
Patrick Starr, Pennsylvania Environmental Council
Dave Startzell, Appalachian Trail Conference
Peter Stein, Lyme Timber Land Company
Fritz Steiner, University of Texas School of Architecture
Petra Todorovich, America 2050 and Regional Plan Association
Scott Williamson, Wildlife Management Institute
Robert Yaro, Regional Plan Association

The report greatly benefited from discussions with the members of the Landscape Practioners' network convened by Lincoln Institute of Land Policy. More information available at http://www.lincolninst.edu/.

Special thanks to the following individuals for their help and support:

Mike Aaron, Blue Water Baltimore
Tara Boswell, Massachusetts Natural Heritage and Endangered Species Program
Mary Bruce Alford, The Trust for Public Land
Emily Brunkhurst, New Hampshire Fish and Game Department
Nicholas Conrad, New York State Department of Environmental Conservation
Chris Cryder, Save the Sound
Andrew duMoulin, The Trust for Public Land
Cindy Dunn, Pennsylvania Department of Conservation and Natural Resources
Peter Manning, The Catskill Center for Conservation and Development
Seth Mckee, Scenic Hudson
Jason McGarvey, Virginia Outdoors Foundation
John O'Leary, Massachusetts Department of Fish and Wildlife
John Parry, United States Forest Service, Northeastern Area State and Private Forestry
Breece Robertson, The Trust for Public Land
Phillip Rodbell, United States Forest Service, Northeastern Area State and Private Forestry
David Theobald, Colorado State University
Robert Wagner, American Farmland Trust
Sherri Wormstead, United States Forest Service, Northeastern Area State and Private Forestry

Endnotes

1. Ward, J, et al. The Nature Conservancy. (2011, July). *Stepping Up to the Challenge: The Whole System Approach to Conservation in North America*. Retrieved November 28, 2011, from http://www.conservationgateway.org/file/stepping-challenge-whole-system-approach-conservation-north-america

2. McKinney, M. J., & Johnson, S. (2009). *Working Across Boundaries: People, Nature, and Regions*. Cambridge, MA: Lincoln Institute of Land Policy.

3. McKinney, M. J., Scarlett, L., & Kemmis, D. (2010). *Large Landscape Conservation: A Strategic Framework for Policy and Action*. Cambridge, MA: Lincoln Institute of Land Policy.

4. The Pennsylvania Game Commission and Pennsylvania. (2005). *Pennsylvania Comprehensive Wildlife Conservation Strategy* (Version 1.0., p. 12-25). Retrieved September 26, 2011, from http://www.wildlifeactionplans.org/pdfs/action_plans/pa_action_plan.pdf

5. Barnes, M. C., Todd, A. H., Whitney Lilja, R., & Barten, P. K. (2009). *Forests, Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States* (p. 34). Newtown Square, PA: United States Department of Agriculture Forest Ser. Retrieved September 26, 2011, from http://na.fs.fed.us/pubs/misc/watersupply/forests_water_people_watersupply.pdf

6. Congressional Budget Office. (2010). *Public Spending on Transportation and Water Infrastructure* (p. Table A-8). Retrieved September 26, 2011, from http://www.cbo.gov/ftpdocs/119xx/doc11940/11-17-Infrastructure.pdf

7. The Trust for Public Land. (2010). *Conservation Almanac (Custom Query using Compare Tool)*. Retrieved September 26, 2011, from http://bit.ly/qesX4Q.

8. According to Federal Emergency Management Agency (FEMA) National Flood Hazard Layer map service.

9. See for example New York State Energy Research and Development Authority. (2010). *Responding to Climate Change in New York State* (Draft ed., p. 7). Retrieved September 26, 2011, from http://www.nyserda.org/programs/environment/emep/climaid-synthesis-draft.pdf

10. U.S. EPA. (2011, September 15). *About the National Estuary Program*. Retrieved September 26, 2011, from http://water.epa.gov/type/oceb/nep/about2.cfm

11. University of Michigan School of Natural Resources and Environment. (2008). *State Wildlife Action Plans in the Northeast*. Retrieved September 26, 2011, from http://www.snre.umich.edu/ecomgt/swap/Publications.html;

12. U.S. Forest Service. (2008). *Forest Legacy Program*. Retrieved September 26, 2011, from http://www.fs.fed.us/spf/coop/programs/loa/aboutflp.shtml

13. Northeastern Area Association of State Foresters and USDA Forest Service Northeastern area State and Private Forestry. (2011). *Landscape Stewardship Guide.* Retrieved February 2, 2012, from http://na.fs.fed.us/pubs/stewardship/stewardship-guide/landscape_stewardship_guide_11_screen.pdf

14. America's Great Outdoors Initiative. (2011). *America's Great Outdoors: A Promise to Future Generations* (p. 79). Retrieved September 26, 2011, from http://americasgreatoutdoors.gov/files/2011/02/AGO-Report-With-All-Appendices-3-1-11.pdf

15. National Parks Service. (2011, August 31). *National Heritage Areas*. Retrieved September 26, 2011, from http://www.nps.gov/history/heritageareas/FAQ/

16. Woods & Poole Economics, Inc., 2009.

17. The map of projected suburbanizing areas may not be as accurate for rural areas. The methodology relies on 1990 – 2000 urban growth statistics. These are used to set a trend that is applied to project growth in future decades. For rural areas with very little urban land use, a single large project completed between 1990 and 2000, such as a shopping center, can skew the results.

18. Woods & Poole Economics, Inc., 2009.

19. For more information, see Environment Northeast, Maine Department of Conservation, Maine Department of Environmental Protection, and Manomet Center for Conservation Sciences. A policy Framework for including Avoided Deforestation and Forest Management Practices as Forest Offset Types in the Regional Greenhouse Gas Initiative (2009). Retrieved January 30, 2012, from http://www.env-ne.org/public/resources/pdf/Final_Recommendations_to_RGGI_07-15-09.pdf and USDA Forest Service. Landscape Scale Conservation in the Northeast and Midwest: A Position Paper from the Three Mission Areas of the USDA Forest Service: Eastern Region, Northeastern Area, and Northern Research Station; and the Northeastern Area Association of State Foresters (2009). Retrieved January 30, 2012, from http://na.fs.fed.us/stewardship/pubs/conservation/landscale_conservation.pdf

20. Yonavjak, L. (2011, May 19). Public Ballot Measures Unlock Billions of Dollars for Conservation Nationwide. In *World Resources Institute*. Retrieved September 26, 2011, from http://www.wri.org/stories/2011/05/public-ballot-measures-unlock-billions-dollars-conservation-nationwide

21. The Trust for Public Land. (2005). In *TPL LandVote Database (All Measures by State)*. Retrieved September 26, 2011, from https://www.quickbase.com/db/bbqna2qct?a=dbpage&pageID=10

22. Levitt, J. N., & Chester, C. C. (2011). *Report on the 2011 Lincoln Institute Conservation Leadership Dialogue on the Future of Large Landscape Conservation in America*. Cambridge, MA: Lincoln Institute of Land Policy. Retrieved September 26, 2011, from http://www.lincolninst.edu/subcenters/regional-collaboration/pubs/Future-of-Large-Landscape-Conservation-May-2011.pdf; McKinney, M. J., Scarlett, L., & Kemmis, D. (2010). *Large Landscape Conservation: A Strategic Framework for Policy and Action*. Cambridge, MA: Lincoln Institute of Land Policy.

NY • NJ • CT
Regional Plan Association

NY 4 Irving Place, 7th floor
New York, NY 10003
212.253.2727

NJ 179 Nassau Street, 3rd floor
Princeton, NJ 08542
609.228.7080

CT Two Landmark Square, Suite 108
Stamford, CT 06901
203.356.0390

Regional Plan Association is America's oldest and most distinguished independent urban research and advocacy organization. RPA works to improve the infrastructure, economic competitiveness and sustainability of the New York- New Jersey-Connecticut metropolitan region. A cornerstone of our work is the development of long-range plans and policies to guide the growth of the region. Through our America 2050 program, RPA also provides leadership in the Northeast and across the U.S. on a broad range of transportation and economic-development issues. RPA enjoys broad support from the business, philanthropic, civic and planning communities.

For more information about Regional Plan Association, please visit our website, www.rpa.org.