An aerial photograph of a vast, rolling forest landscape. The foreground is dominated by a dense forest with trees showing early autumn colors, ranging from deep green to bright yellow. The middle ground shows a valley with a small settlement of houses and buildings. In the background, rolling hills and mountains stretch towards the horizon under a clear sky.

Conserving Northwest Connecticut

Adaptive Strategies for Accelerating the Pace of Conservation

Prepared for the Northwest Connecticut Land Conservancy and Save the Sound
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Executive Summary

This report explores what in Northwest Connecticut has already been conserved, the value of continued conservation work in the region, and strategies for how to approach conservation so that it is most ecologically beneficial, economically viable, and equitable.

The genesis of this report was the 30 x 30 initiative: a global conservation goal to conserve 30% of the Earth's oceans and land by 2030. In response to the climate crisis, global leaders set a target for 2030 to communicate the urgency of this work. This initiative seeks to ensure strategic conservation work that is rooted in science, informed by indigenous and local knowledge, and focused on ecological connectivity.

The benefits of conservation can be mutually reinforcing: clean water and air, wildlife habitat, climate resiliency, biodiversity, human health, sustainable agriculture, and opportunities for outdoor recreation all interconnect to build a world where humans coexist with nature. For example, protected forests provide habitat for wildlife, protect biodiversity, and filter water and air. While often described separately, these benefits multiply exponentially. They also are relevant for both rural and urban settings. In urban areas, a forest canopy reduces the heat island effect, intercepts stormwater, and provides shade along sidewalks and walking trails. A large swath of protected core forest in a rural setting also provides cooling benefits, filters water, and serves as habitat for wildlife. In both contexts, conservation provides valuable benefits for humans and ecosystems.

In Northwest Connecticut, 22.6% of land is conserved. This land is protected in perpetuity from development. There is also land that is currently kept as open space or protected in some capacity, which is termed quasi-protected land. More specifically, quasi-protected land includes natural lands and waters with statutory limits on sale, like water company

lands, or land owned by non-land-trust entities who reserve the use for conservation or recreation.

This report was enabled by Northwest Connecticut Land Conservancy (NCLC) and Save the Sound, who joined together to understand the possibility of increasing the pace of conservation in the region by exploring pathways to permanently protect quasi-protected lands. Other partners include The Nature Conservancy, the Housatonic Valley Association, and the Connecticut Land Conservation Council.

After detailing the current conservation landscape and the value of continued conservation work in the region, this report breaks down strategies for a pathway forward into three sections: ecology, economy, and equity.

An ecological approach looks to conserve land that supports the needs of plants and animals by protecting forests; rare ecosystems, like wetlands, swamps, or meadows; critical habitats; and rare species. The ecological analyses identify lands with either high ecological integrity or restoration potential to conserve for protection of critical wildlife habitat, forest resilience, and improved surface water quality.

An economic focus, in this report, encompasses protected land that serves a direct economic purpose, like farmland and working forests, and includes the human relationship to the environment, meaning outdoor recreation, tourism, and development needs. Economic considerations include protecting agricultural land, selectively harvesting timber, and further enabling outdoor recreation and tourism.

Equitable conservation ensures that historically marginalized communities – environmental justice communities and indigenous groups – benefit from the immense value of conserving land and waters. An equity focus involves including environmental justice populations and indigenous populations in decision-making and correcting the inequitable distribution of access to nature.



Introduction



The 30x30 initiative is a global conservation effort aimed at protecting 30% of the planet's lands and waters by 2030. The goal of this initiative is to preserve biodiversity, mitigate climate change, and ensure equitable access to the outdoors for all people (Dinerstein et al.). This ambitious goal was first proposed by scientists in 2019, and has since gained momentum with the support of governments, NGOs, and communities around the world.

At the global level, the 30x30 initiative is part of a larger effort to address the interconnected challenges of climate change, biodiversity loss, and development. The United Nations' Convention on Biological Diversity (CBD) has made the conservation and restoration of ecosystems a key priority for the post-2020 period, with a goal of conserving at least 30% of the world's lands and oceans by 2030 ("Getting to 30x30"). The CBD calls on governments, businesses, and civil society to work together to achieve this goal, recognizing that it is essential for the health and well-being of people and the planet.

President Joseph R. Biden's signing of an executive order in January of 2021 to back the movement gave the 30x30 initiative national momentum. The order calls for a whole-of-government approach to conservation, with the establishment of a task force to develop a strategy for conserving 30% of U.S. lands and waters by 2030. California, Nevada, South Carolina, New York, Michigan, Hawaii, Colorado, New Mexico, and Maine have all signed on or passed legislation on 30x30. This includes increasing protections for public lands and waters, supporting locally led conservation efforts, and investing in nature-based solutions to address climate change, along with eight progressive principles to follow when engaging in conservation work (Barnett).

30x30 addresses critical challenges facing human health and the survival of life on planet Earth. The world is currently facing a biodiversity crisis, with an estimated one million species at risk of extinction (Jung et al.). This loss of biodiversity has serious consequences for human well-being, including the loss of ecosystem services like clean air and water, food, medicine, and cultural values. Protecting the top ranked 30% of areas would conserve 62% of total carbon stocks, 68% of all fresh clean water and improve the conservation status for 70% of at risk species (Jung et al.).

8 PRINCIPLES OF 30X30 INITIATIVE

- 1. Pursue a Collaborative and Inclusive Approach to Conservation**
- 2. Conserve America's Lands and Waters for the Benefit of All People**
- 3. Support Locally Led and Locally Designed Conservation Efforts**
- 4. Honor Tribal Sovereignty and Support the Priorities of Tribal Nations**
- 5. Pursue Conservation and Restoration Approaches that Create Jobs and Support Healthy Communities**
- 6. Honor Private Property Rights and Support the Voluntary Stewardship Efforts of Private Landowners and Fishers**
- 7. Use Science as a Guide**
- 8. Build on Existing Tools and Strategies with an Emphasis on Flexibility and Adaptive Approaches**

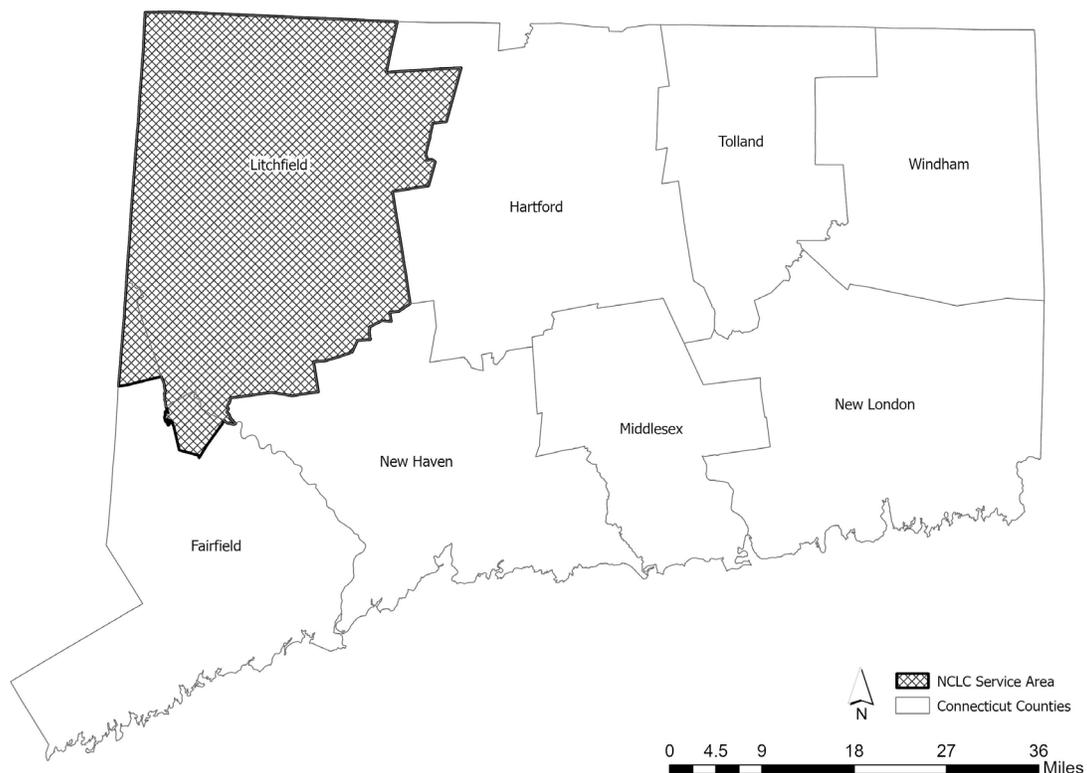
Conserving and Restoring America the Beautiful

“Our analysis suggests that 30% land conservation combined with climate change action could reduce extinction risk by half or more...”

Hannah et al.

In addition, the 30x30 initiative acknowledges the impacts of climate change and intended actions to help reduce the effects. Natural systems such as forests, wetlands, and oceans are some of the most effective carbon sinks on the planet (“Why 30%?”). Protecting and restoring these systems can help mitigate the effects of climate change by sequestering carbon and reducing greenhouse gas emissions. The 30x30 initiative also recognizes the role of nature-based solutions in addressing climate change, such as innovative forest management techniques to increase carbon sequestration rates and continue carbon storage in these systems (Forest Carbon | UMass Amherst MassWoods), and urban greenspace creation to reduce pollution, heat, and provide access to nature for historically marginalized groups (Rider).

There is much at stake in the efforts to achieve the 30 x 30 goal. Failure to conserve and restore natural systems could have dire consequences, including the loss of biodiversity and ecosystem services, increased vulnerability to climate change and natural disasters, and cascading impacts on human health and well-being. Northwest Connecticut Land Conservancy (NCLC) is rising to this challenge and has partnered with Save the Sound to fund the research and development of this document. This report aims to advance the 30 x 30 goal in Northwest Connecticut focusing on NCLC’s service area: Litchfield County and northern Fairfield County, Connecticut. Northwest Connecticut has the opportunity to be a leader in this movement and set an example for the rest of the state and other regions to follow.



Past and Current Land Use

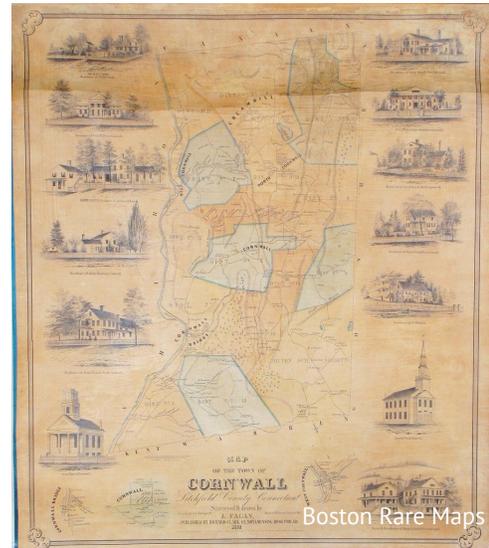


The landscapes of Northwest Connecticut have been managed differently throughout time. Indigenous peoples managed the forests to have visibility while they hunted and cleared small areas near freshwater for villages. European settlers changed the landscape dramatically. Today, the forests still show evidence of their previous land uses, from stone walls, to soil profiles, to forest species.

Historical Land Use

After glaciers receded north at the end of the last ice age around 12,000 years ago, the land was cleared of much vegetation and sculpted by glacial movements and deposits of rocks and sediments. Indigenous tribes, who lived in New England shortly after the last ice age ended, managed these landscapes for thousands of years until the 1600s. Some of their management strategies included using controlled burns, which helped clear the understory to make passage, foraging, and hunting easier (Forest). There were early successional habitats in open areas that were burned. The forest canopy was dense with old-growth trees and various descriptions of the landscape describe the darkness and shadow cast by the forest canopy. Along rivers and water sources, coarse grasses stabilized the low banks. Indigenous peoples farmed maize, squash, and beans in floodplains. Wildlife was abundant, with many mammals that are no longer found in Connecticut roaming the forests. Waterfowl and fish were prevalent near and in water bodies. Early European settlers noted an abundance of wild fruit, forage, large trees, and game (Forest).

European colonizers changed the landscape dramatically. Forests were cleared for hunting, wood harvests, and farming. Many mammal species were extirpated from the region like elk, beaver, moose, mountain lion, and wolves (Connecticut's Past: Inland



One of the first known printed maps of Cornwall, Connecticut in Litchfield County.

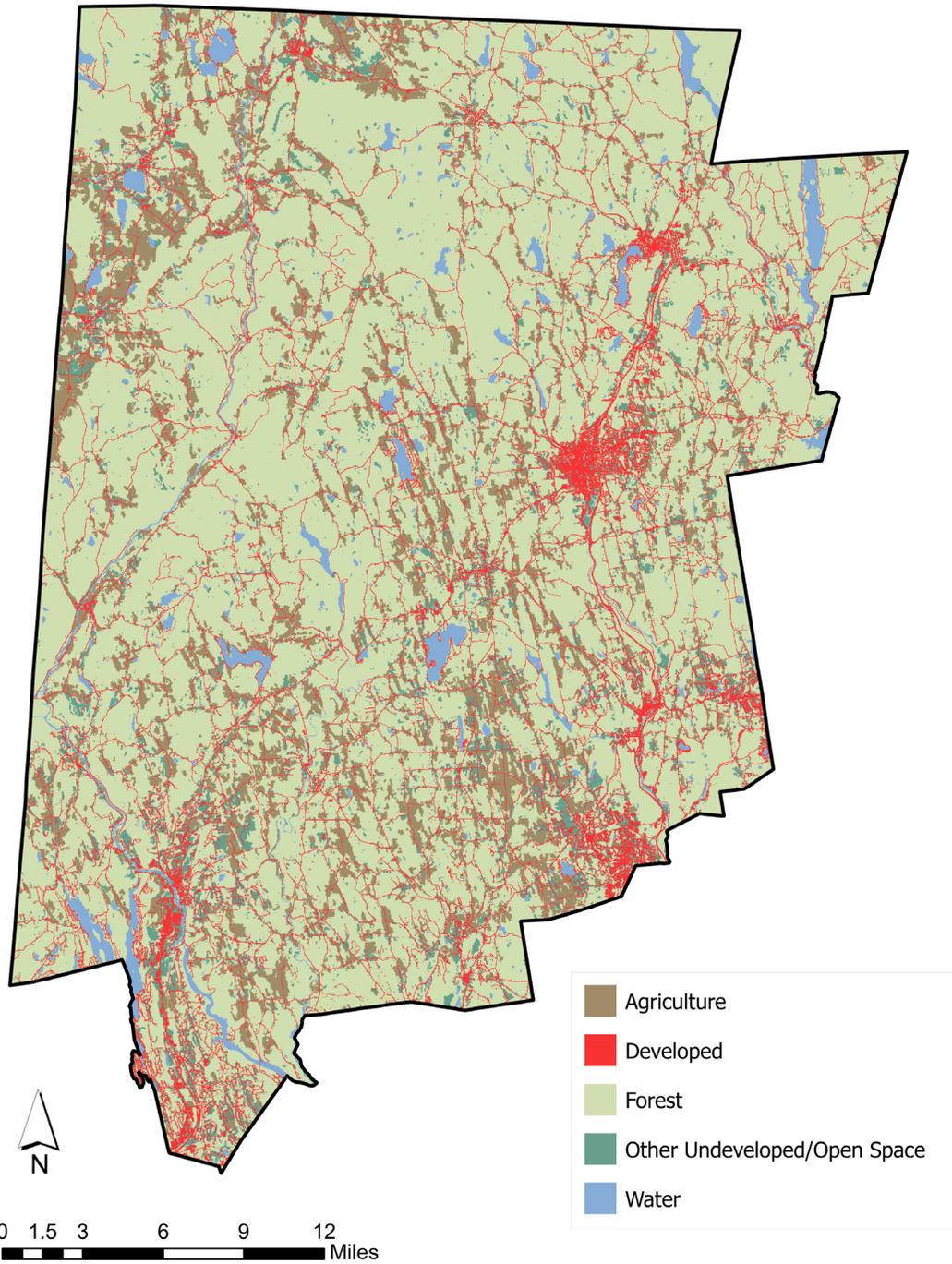
Mammals). In the 1830s, agriculture peaked as much of the landscape here and across New England was deforested. Agriculture then started to shift west to other parts of the country. Farm fields were abandoned and trees began to establish, mainly white pines. As these old-field pines matured, they were cut and milled. This led to early succession of hardwoods in the early 1900s and continued as many hardwood species are able to quickly regenerate from stumps after logging (Harvard Forest).



Artistic representation of pre-settlement New England forests. This diorama shows how forests managed by Indigenous people were burned for hunting visibility. Variations in soil, geology, and natural disturbances also impacted species composition.



Rachel Mauwee, Abigail Harris, Jim Harris, and Value Kilson on the Schaghticoke Reservation photo estimated to be taken between 1890-1900.



2-1 Land Cover Most of Northwest Connecticut is forested. Data from 2015 shows development hubs on the south and east sides of the region.



The Housatonic River spans 149 miles. Its watershed is nearly 2000 square miles, which is larger than the Long Island Sound.



Appalachian Hemlock-Hardwood Forests is a generalist forest that occurs on a variety of landforms and bedrock types.



Barred owls are a common gray owl found in southern Canada and across the United States, while the fisher was reintroduced to Northwest Connecticut in 1988.

Northwest Connecticut Today

Today, mountainous areas are largely forested, including a stretch of the Appalachian Mountains in the northwest corner of Connecticut. The Litchfield Hills blend into the lower lying areas of both forest and pasture land to the southeast of the Appalachians. Crop production and built infrastructure are most prevalent in these lower lying areas. Northwest Connecticut is largely in the Housatonic Watershed. Three major rivers flow through the region: the Housatonic River, the Naugatuck River, and the Farmington River all of which flow into the Long Island Sound.

Northwest Connecticut's Forests

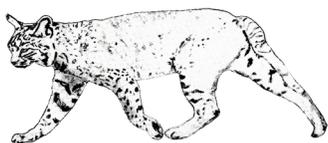
Given the intense reforestation across New England in the 1920s and 30s, much of the forest is even-aged today. Connecticut is 60% forested, making it the fourteenth most forested state in the country. The two main forest types in Northwest Connecticut are Northeastern Interior Dry-Mesic Oak Forests and Appalachian Hemlock-Hardwood Forests.

Appalachian Hemlock-Hardwood Forests are part of the Northern Hardwood and Conifer forest macrogroup and are dominated by sugar maple, American beech, yellow birch and Eastern hemlock. Northern red oak and white oak are also common. In more nutrient rich or historically disturbed sites black cherry, black birch, white pine, and tulip tree are common. Common understory plants include witch hazel, blueberry, spicebush, and Christmas fern. Common birds found in these forests include barred owl, Eastern wood-pewee, and many species of warblers and thrushes. Common mammals include black bears, fishers, gray foxes, porcupines, shrews, squirrels, and mice. This habitat type typically occupies low to mid-elevations and can be found on a variety of landforms and bedrocks. Hemlock woolly adelgid and a warming climate are contributing to a shift in tree composition to one which more closely resembles Southern Appalachian Oak Forests (Terrestrial Habitat Guides).

Northeastern Interior Dry-Mesic Oak Forests are part of the Central Oak-Pine macrogroup of forests. These oak-dominated forests usually exhibit closed canopies consisting of red oaks, white oaks, black oaks, scarlet oaks, and hickories. Red maple, black birch, and yellow birch are also associated with these forests. The understory is typically composed of American wintergreen, common Alexanders, and early buttercup. Common birds include warblers, thrushes, red-bellied woodpeckers, and summer tanagers. Common mammals include black bears, bobcats, meadow voles, short-tailed shrews, and white footed mice. Many of these forests are still in a mid-successional stage because of historical human habitation and are either dominated or co-dominated by white pines. Chestnuts were a prominent tree in these forests before their effective extinction from disease (Terrestrial Habitat Guides).

Across Connecticut, fire is infrequent so forest disturbance can most often be attributed to logging or storm events with high winds, like Hurricane Sandy in 2012. Further, increasing severity of storms with climate change could increase the amount of forest disturbance. When trees fall and begin to decompose, the stored carbon reenters the carbon cycle. After a storm when large canopy trees like white pines fall, different species regenerate that prefer more sunlight in the newly opened canopy.

An open canopy can also invite understory plants and invasive species. For example, Japanese knotweed populations increased in Connecticut following Tropical Storm Irene and Hurricane Sandy (“How Climate Change Impacts Forests”). Further, warmer winters, also expected with climate change, make it easier for invasive plants to grow, especially Japanese barberry (“Warmer Winters Feed into Growth and Spread of Invasive Plants in Connecticut”).



The highest concentration of bobcats is in the northwest corner of Connecticut.



The red-bellied woodpecker is commonly found in deciduous forests across the Eastern United States.



Northeastern Interior Dry-Mesic Oak Forests generally occur on rolling slopes in low to mid elevations.



After Tropical Storm Irene, muddy sediment flowed through the Connecticut River into the Long Island Sound. This illustrates both the storm’s destruction of soil and forests and its effect on aquatic systems.

Development and Demographics in Northwest Connecticut

Northwest Connecticut is less densely populated and less developed than the other three corners of Connecticut and has thus retained significant ecological integrity. According to the University of Connecticut's Center for Land Use Education and Research only 10% of land cover is categorized as suburban or urban built environment in the region. There are just over 200,000 residents in Northwest Connecticut and Torrington is the most populous town in the area with about 30,000 residents. The population is aging, with 53% of residents over the age of 45. The area is wealthy with a median income of \$98,000 annually, but there are several areas with lower median income. Many second homes in the region are owned by residents of New York City. Low-density development follows major highways along the coast and through the center of the state.

The Northwest Connecticut Chamber of Commerce defines five economic focus areas for the region: fiber optic networks, tourism, farming, manufacturing, and innovation. Modernizing the region's communications infrastructure will lay the foundation for connectivity. Tourism is focused around arts and culture, but nature also brings visitors particularly in the fall for leaf peeping. Farming once dominated the economy in the state of Connecticut and it still plays an important role today. Manufacturing is an important component of the region's economy and the state. Lastly, a project titled "Rural Lab" is a newer initiative focused on bringing young people to the region to support economic innovation through agricultural technologies and healthcare ("Comprehensive Economic Development Strategy (CEDS)").

Why Conserve Northwest Connecticut?

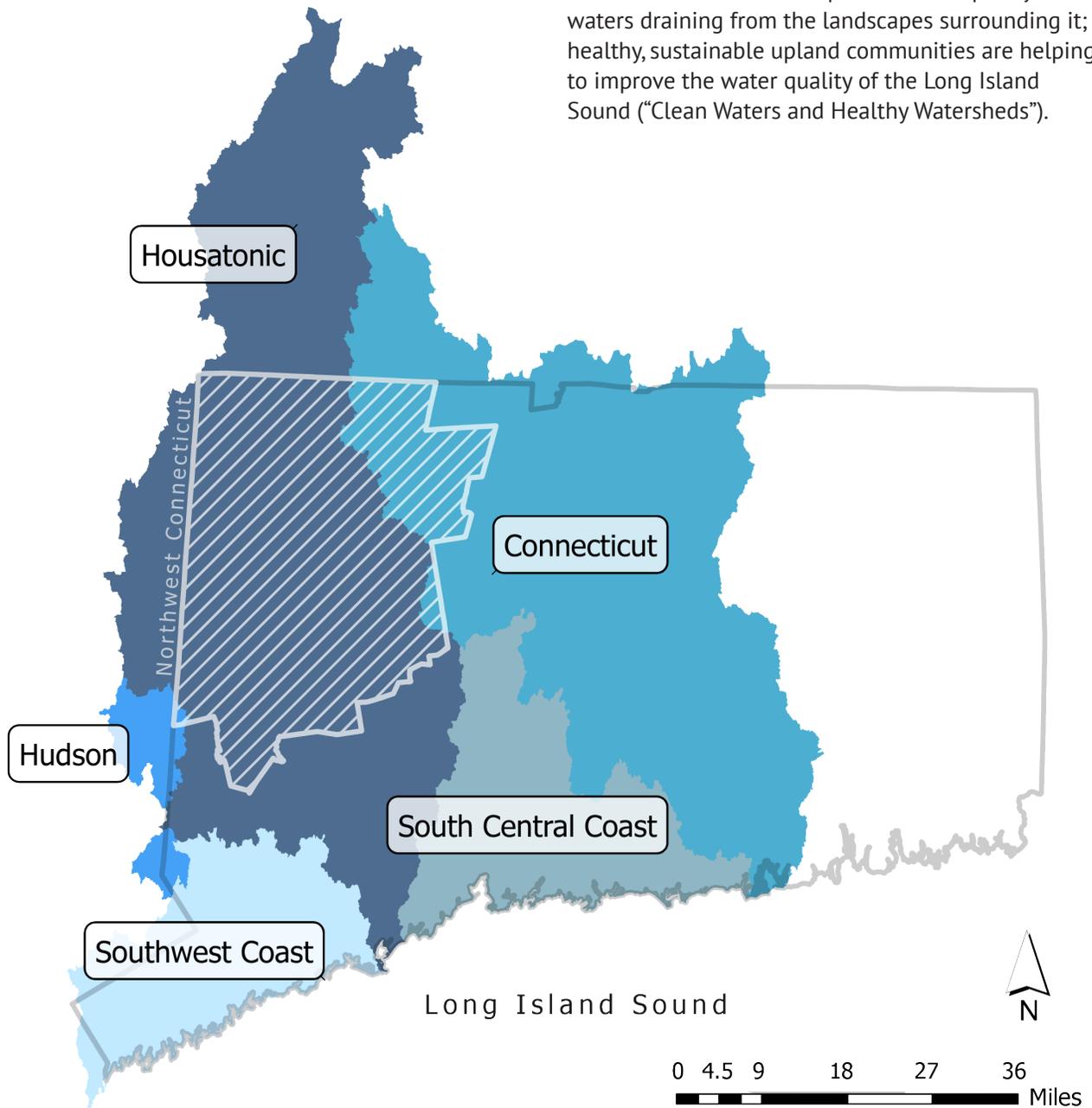


Worldwide, the benefits of conservation are mutually reinforcing, overlapping, and interconnected. This section outlines a number of these benefits as they pertain to the 28 towns and 632,771 acres of Northwest Connecticut.

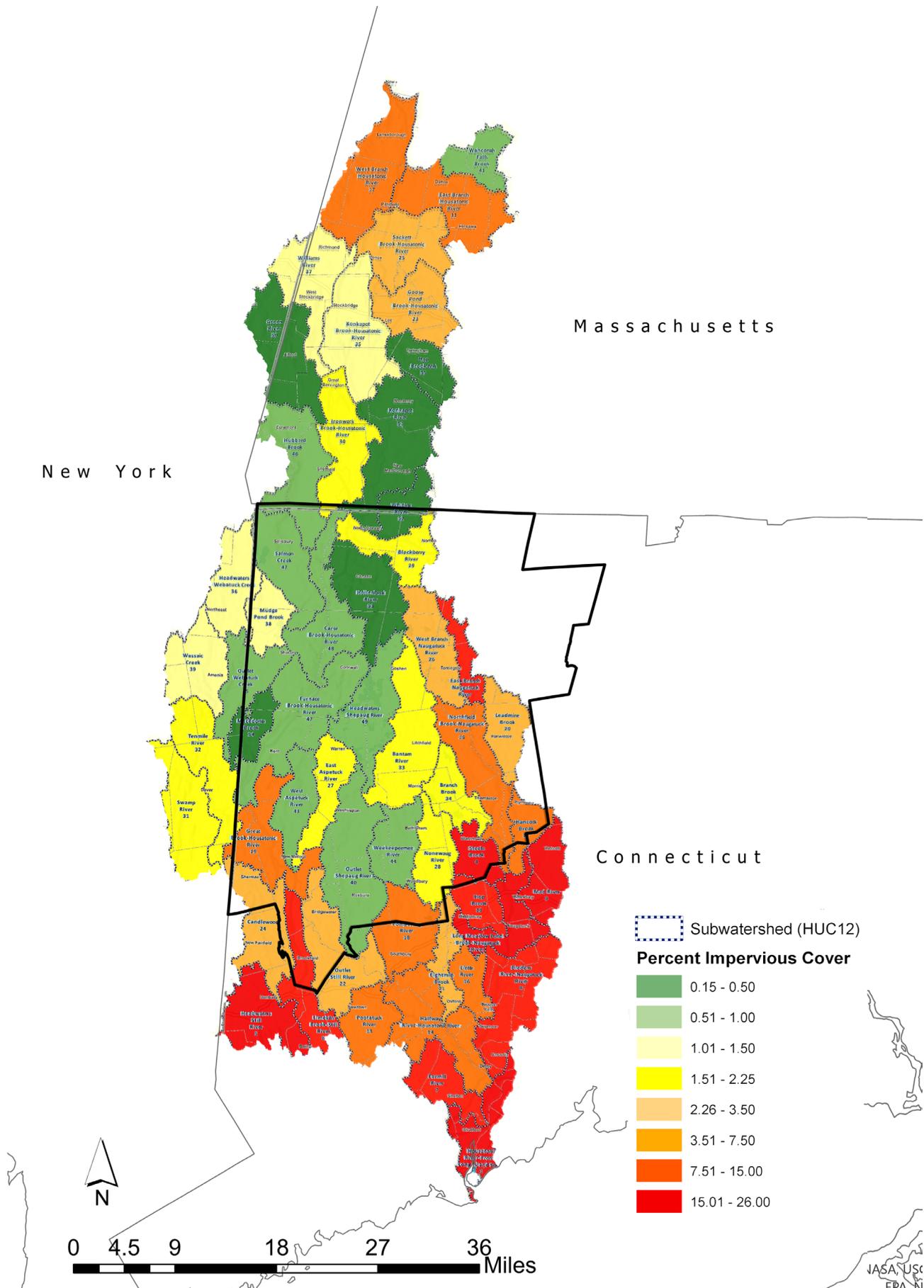
CLEAN WATER

Northwest Connecticut is located mid-stream on both the Housatonic and Connecticut Rivers, which empty into the Long Island Sound.

What happens on land directly impacts the quality of the water flowing across it. The Housatonic and Connecticut River watersheds extend from their headwaters near the Canadian border, down to estuaries, and into the Long Island Sound. The condition of the Sound depends on the quality of the waters draining from the landscapes surrounding it; healthy, sustainable upland communities are helping to improve the water quality of the Long Island Sound (“Clean Waters and Healthy Watersheds”).



3-1 Major Watersheds in Western Connecticut Northwest Connecticut is largely in the Housatonic River Watershed.



3-2 Housatonic Watershed Impervious Surfaces Northwest Connecticut has more pervious area than the other sub basins in the watershed.

“The ecological health of a stream depends very much on a single factor: the percentage of the land in its watershed that is paved.”

Connecticut Council on
Environmental Quality

The portion of Northwest Connecticut in the Housatonic River Watershed stands out as a highly pervious region compared to subsections of the watershed closer to the Connecticut coastline. Undeveloped land can lessen the intensity of drought and flooding by absorbing stormwater, while impervious surfaces characteristic of development increase runoff to water bodies. Runoff from these surfaces often ends up in water bodies untreated as overland flow or via a separate storm sewer system. Polluted stormwater runoff is also one of the biggest threats to water quality (US EPA).

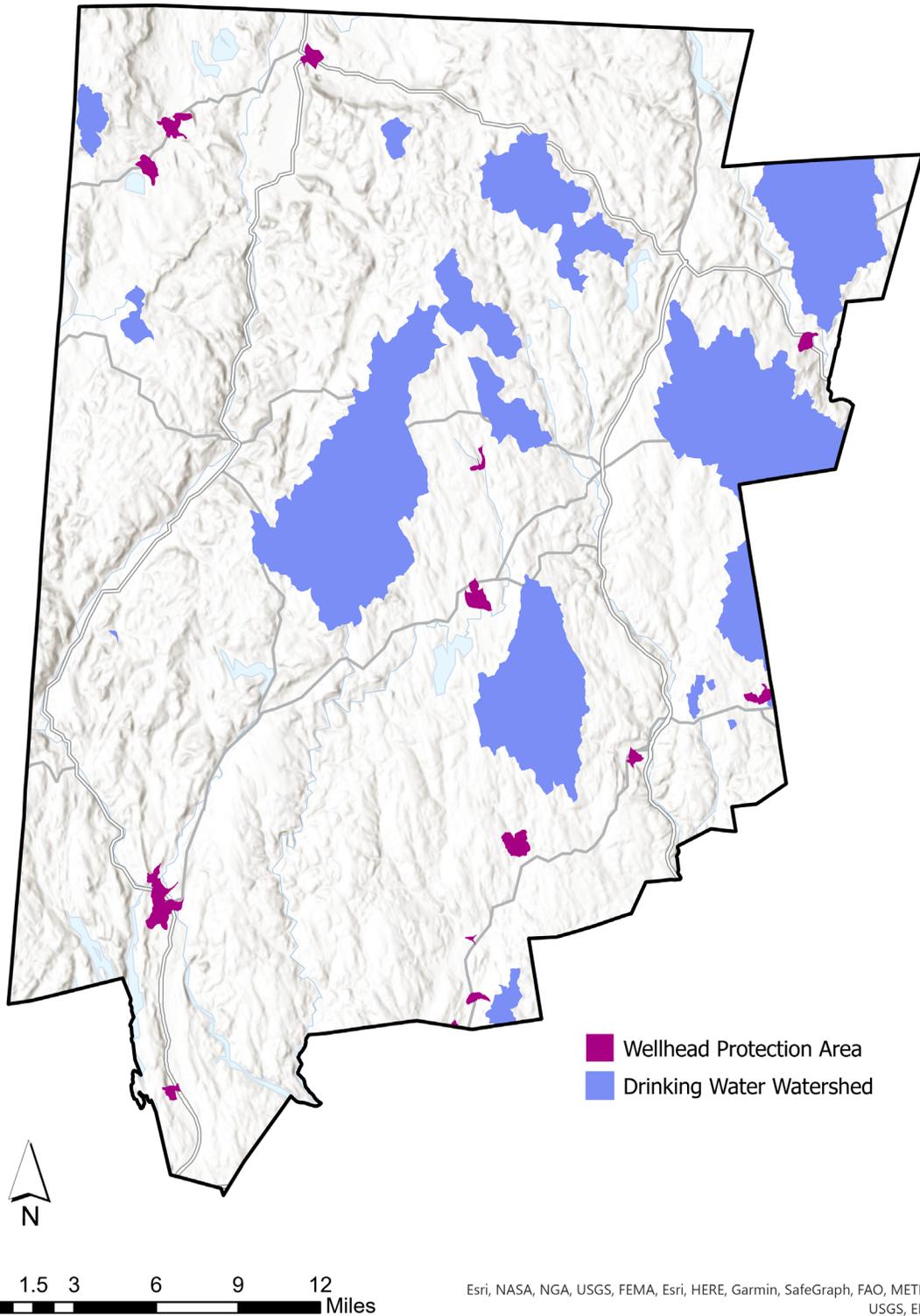
Northwest Connecticut contains source

watersheds for large populations' drinking water supply ("Connecticut Drinking Water"). Aquifer protection areas, or wellhead protection areas, are protected by municipalities which must adopt land use regulations consistent with the State's ("Aquifer Protection Program"). Both surface and groundwater sources are vulnerable to potential contamination from non-point source pollution, which unlike pollution from industrial and sewage treatment plants, comes from widely distributed sources such as highways, large impervious parking areas, or land that is prone to erosion. Keeping vegetated buffers around identified drinking water watersheds and high-yield well fields to slow and filter runoff from developed areas helps protect drinking water that sustains human life (Mayer).

In Northwest Connecticut, governments and non-profit conservation organizations both work on drinking water source protection activities including protective zoning regulations, land acquisition in critical source water areas, and the implementation of best management practices for the control of non-point pollution and the safe handling, storage, and disposal of hazardous materials ("Drinking Water Section").



The Barkhamsted Reservoir photographed from the Saville Dam in southwestern Barkhamsted, Connecticut. The Barkhamsted Reservoir is the primary water source for Hartford, Connecticut.



3-3 Drinking Water Supplies in Northwest Connecticut The Public Water Supply Map from the Department of Health shows where ground and surface water is critical for clean drinking water.

WILDLIFE HABITAT

Northwest Connecticut is part of a nationally important, multi-state wildlife corridor extending from New York to Vermont.

Large swaths of forest in Northwest Connecticut link the Hudson Highlands of New York to the Green Mountains of Vermont, creating a connected corridor of habitat for wide-ranging species such as black bear, moose, and bobcat. The Berkshire Wildlife Linkage has an estimated 75% forest cover and includes the most intact forest ecosystem in southern New England (Appalachians).

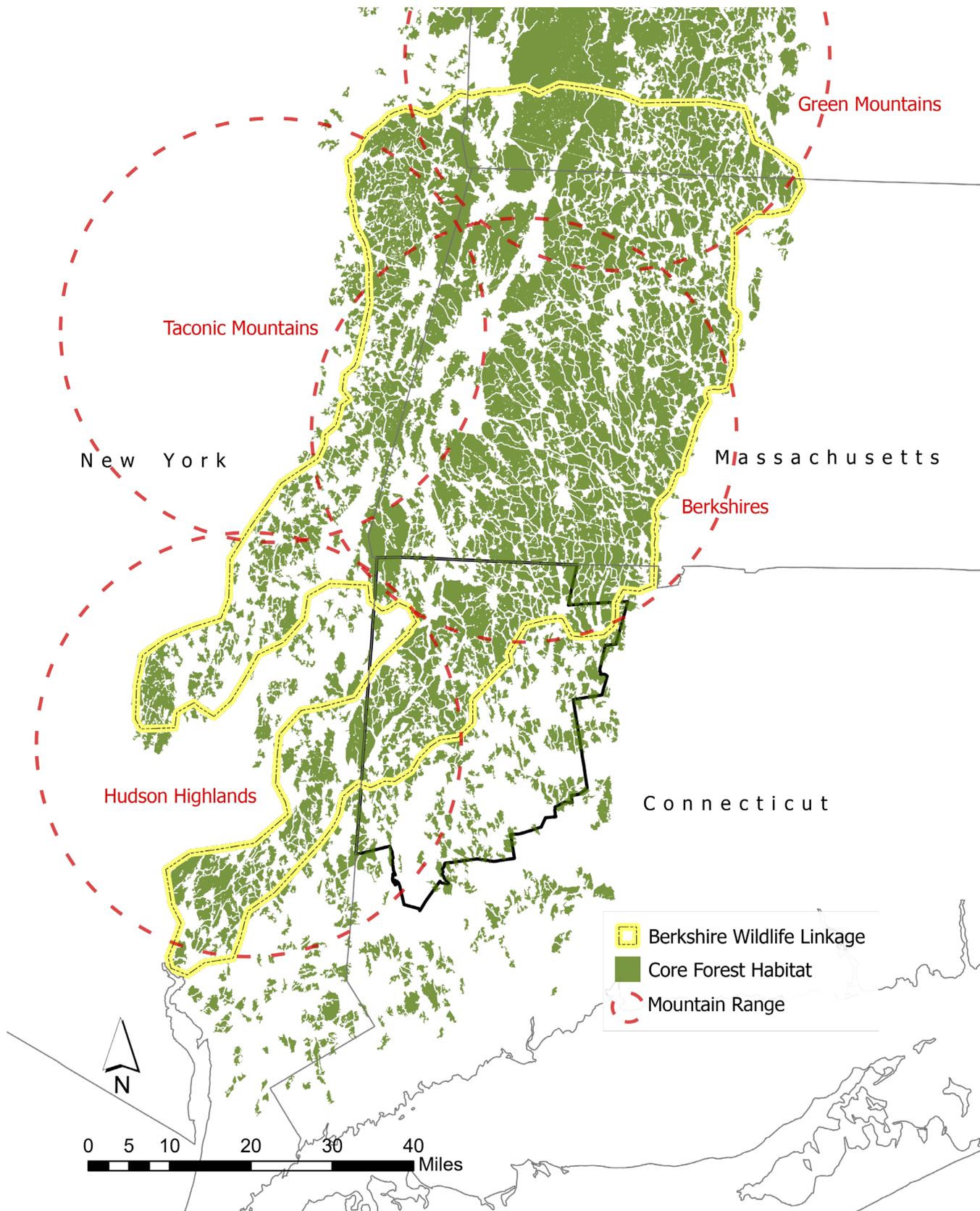
Preserving intact forests is crucially important for many wide-ranging species of wildlife. Deep-woods nesters like scarlet tanagers, wood thrushes, ovenbirds, and Blackburnian and cerulean warblers require nest sites, food and foraging substrates, singing perches, and cover from predators—all of which are provided by intact forests. Conservation of habitat along this corridor can preserve the function of critical pathways for migratory and wide-ranging species.

“This diversity of habitats and ecosystems in such a small area makes the Berkshire Wildlife Linkage among the most important areas in all of New England for long-term survival of rare and endangered species.”

The Nature Conservancy

Black bears' individual home ranges are 15 square miles or more. They follow seasonal landscape changes to find food sources throughout the year. Large, uninterrupted natural lands—including forests and wetlands—provide critical habitat for these large, wide-ranging mammals (American Black Bear (U.S. National Park Service)).





3-4 Core Forests and Mountain Ranges in Berkshire Wildlife Linkage The Berkshire Wildlife Linkage and the Follow the Forest initiative aim to protect habitat corridors of wildlife habitat for migrating species.

FOOD AND AGRICULTURE

Northwest Connecticut has significant agricultural land. Preventing its conversion to development preserves these lands for food production.

Farmland provides food, and the demand for food continues to increase. By 2050 the world will need to increase food production by 60% (“What’s at Stake”). Additionally, when properly and intentionally managed, farmland and rangeland can support wildlife and recharge ground water; sustainable and organic agricultural techniques can also increase carbon sequestration in soils, compared to conventional industrial techniques.

The United States is losing farmland at an increasing rate. Farmland is frequently targeted for development because it is cleared, relatively flat, and usually well-draining, making it easier for developers to build on. From 1985 to 2019, Connecticut has lost over 87,000 acres of farmland to development (“Farmland”). Currently Connecticut ranks seventh in the nation of states at risk of losing their farmland to development (“Farms Under Threat”). As settlement sprawls out from urban centers, pressure to convert agricultural land for single-family residential development will rise, including in the rural Litchfield County.

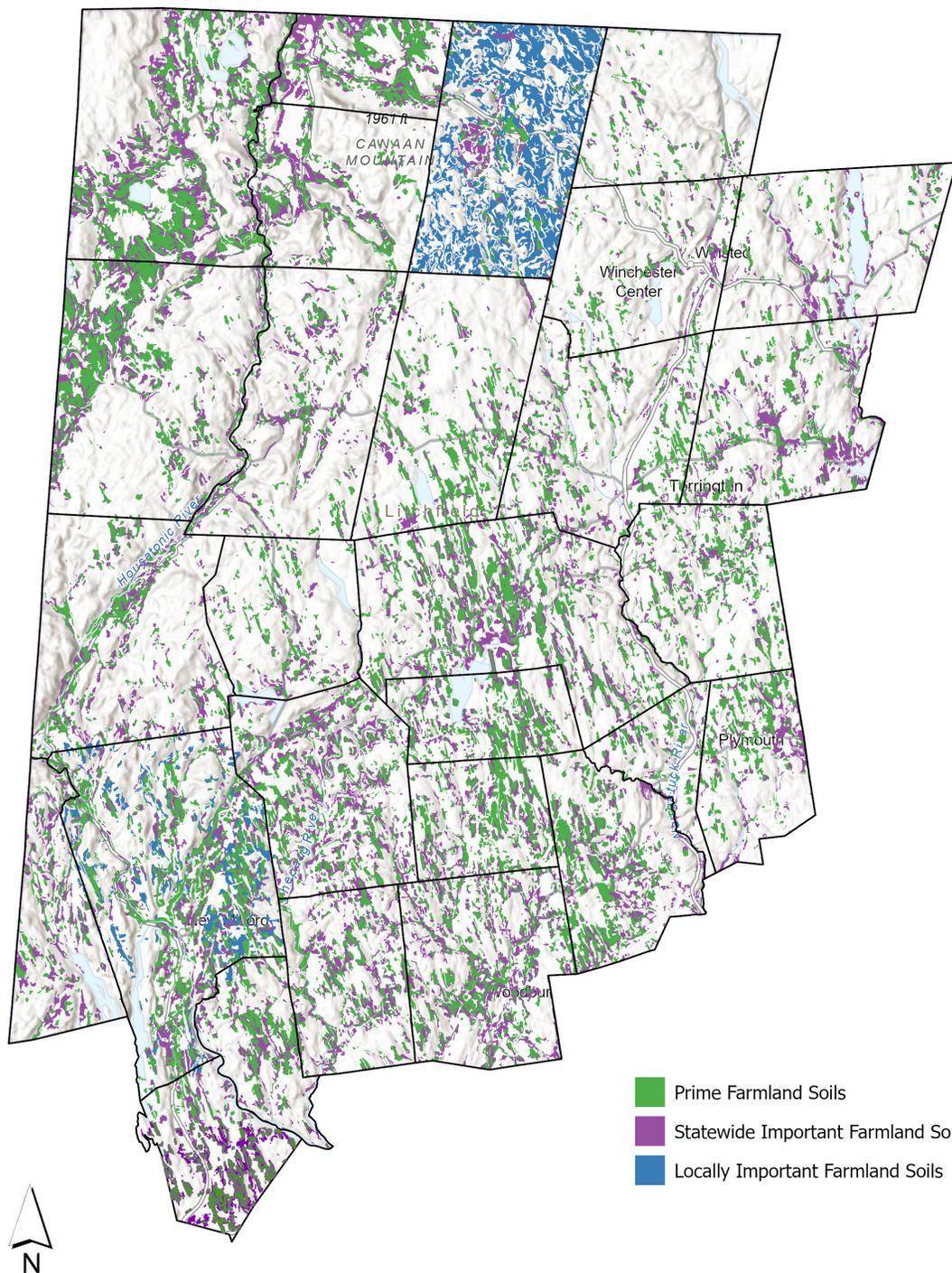
In Litchfield County there are 1,217 farms, covering 90,322 acres and producing \$41,135,000 worth of products annually (USDA). Only 19% of farmland in Northwest Connecticut is permanently protected from future development. Therefore, 81% of Connecticut’s farmland is not protected from development and are potentially at risk for subdivision and development.

The Natural Resources Conservation Service designates three farmland soil types: prime, statewide important, and local. Prime Farmland Soils have the characteristics required to produce food, feed, and fiber. They also have the growing season and moisture supply to economically produce a sustained level of yields. Important Farmland Soils fail to meet the prime requirements, but still can economically produce high yields of food, feed, fiber, and forage. Locally Important Farmland Soils are not of prime or statewide importance but are used for production of food, horticulture, and fiber. The land may be important to the local economy. In Connecticut, the only towns with locally important designated soils are Ashford, Canterbury, Chaplin, Eastford, Lebanon, Milford, New Milford, and Norfolk (Farmland Soils).



Jerry Monkman

The picturesque barn at Smyrski Farm in New Milford, Connecticut. Northwest Connecticut Land Conservancy owns the land that is managed by local farmers.



Esri, NASA, NGA, USGS, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

3-5 Farmland Soil Designations The Natural Resource Conservation Service designates three farmland soil types. Prime farmland soil is the highest quality.

BIODIVERSITY

Conservation in Northwest Connecticut protects biodiversity hotspots where rare and endangered flora and fauna find habitat.

Ecological communities are complex interconnected webs of different species that consume, decompose, and feed other species. Some species are considered keystone species, because of their irreplaceable values to ecosystems: their removal causes major changes to the food web and these changes can severely impact entire ecosystems. The diversity of ecosystems is directly correlated to their ability to adapt to changes (Vos et al.). A more diverse ecosystem will have more species able to shift their functional relationships in response to major change, while a less diverse ecosystem is at risk of major extinctions in response to major change. Loss of diversity acts as a snowball effect causing more and more extinctions.

In Connecticut, around 600 plants and animals are listed as endangered, threatened, or of special concern by the states' Wildlife Action Plan. ("CT-WAP Current Status"). Over 300 of those can be found within Litchfield County including 9 reptiles, 182 plants, 8 mammals, 65 invertebrates, 4 fish, 33 birds and 7 amphibians ("CT-WAP Current Status"). Upland forests are the dominant natural habitat in the region, supporting a wide variety of wildlife species through the canopy, sub-canopy, shrub, and ground vegetation layer habitats.

Northwest Connecticut plays an important role in protecting biodiversity by providing some of the last remaining intact forest cores in the state in the Appalachian Mountains. According to The Nature Conservancy, the Appalachian Mountains' variety of species confers a natural resiliency comparable to the Amazon Rainforest and the Kenyan grasslands ("Appalachians"). The Nature Conservancy calls the Appalachians "one of the most globally important landscapes for tackling climate change and conserving biodiversity."

NCLC's Wimisink Preserve and surrounding area is an example of permanent conservation that supports flourishing biodiversity, including rare, threatened, and endangered species. This 80-acre landscape was dry enough to produce hay in the 1930s. Then

beavers, a keystone species, moved in and created a calcareous wetland complex that is now recognized as an Important Bird Area. Permanent protection was achieved through six transactions, including a combination of fee ownership and conservation easement. The preserve now supports populations of wood ducks, hooded mergansers, green herons, great blue herons, and belted kingfisher, as well as the secretive Virginia rail and sora. State and Federally listed species present at Wimisink include American bittern, Sedge (Dion) skipper butterfly, Eyed brown butterfly, and Eastern box turtle. State-listed plants include Indian paintbrush, Autumn willow, and several sedges.

Protecting connectivity of ecosystems is the most important factor in protecting biodiversity; studies show that species richness tends to be 21% higher in conserved areas than in adjacent unprotected areas (Dinerstein et al.). In the face of the sixth mass extinction and rapid climate change, urgent actions are needed to ensure the survival of many species. As the climate warms at an increasing rate, many species will need to migrate north and upslope to find new areas that meet their habitat requirements. To ensure that these species can migrate, they will need connected networks of habitat—especially those oriented north-south—that allow them to move freely to reach their desired climates. Northwest Connecticut serves such purpose.

“The Appalachians’ rich variety of species, natural resiliency and diverse communities and cultures put it alongside the Amazon Rainforest and the Kenyan grasslands as one of the most globally important landscapes for tackling climate change and conserving biodiversity.”

The Nature Conservancy

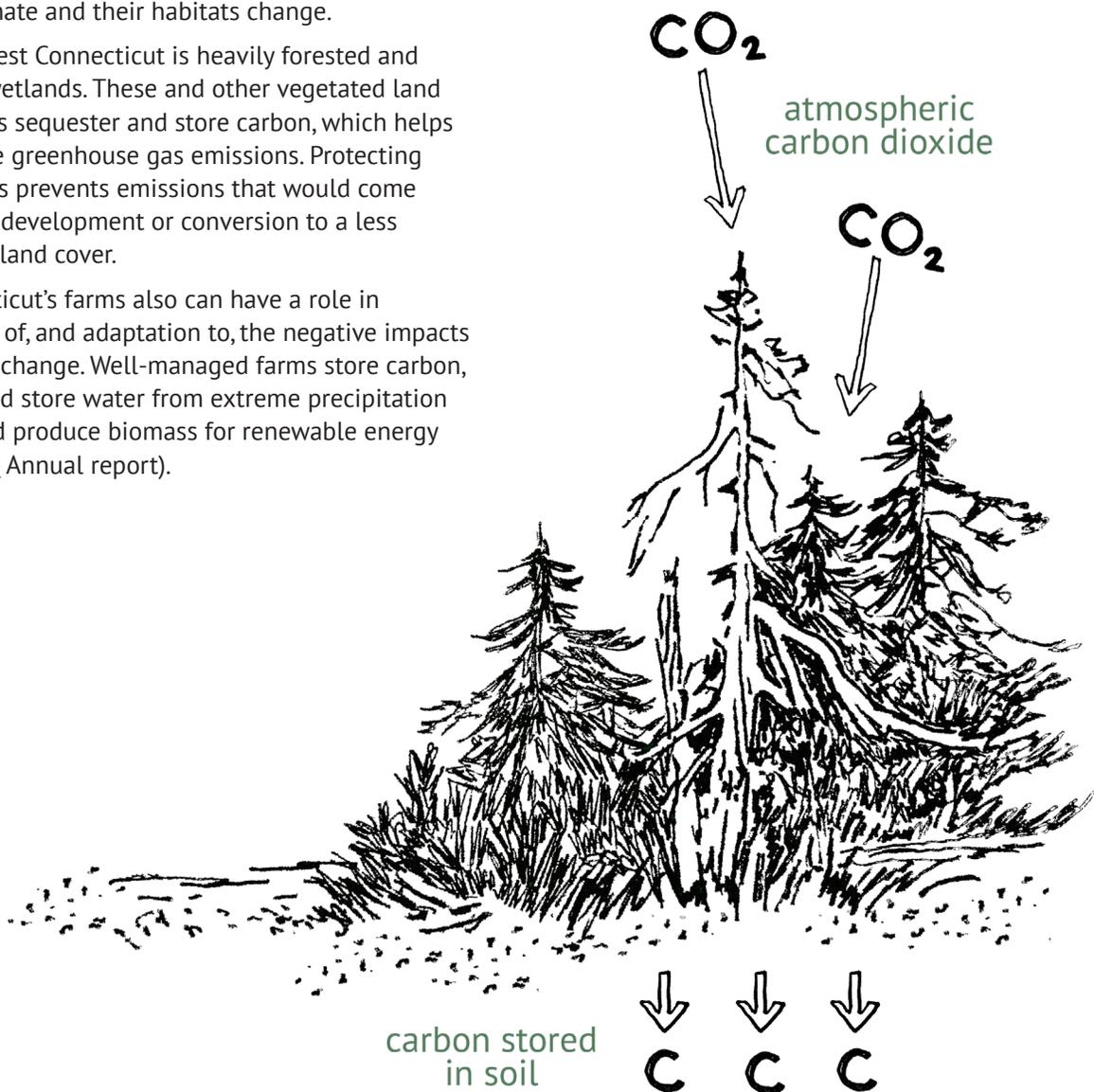
CLIMATE RESILIENCY

Conservation in Northwest Connecticut increases climate resiliency by protecting lands that can adapt to changing conditions, like forests, grasslands, and wetlands, and limiting sprawling development.

Healthy ecosystems are challenged by the changing climate. As climate change brings more extreme weather events, aiding ecosystems' capacity to adapt is crucial. Ecosystems that are protected from development and fragmentation, and connected to other larger natural areas, allow species to migrate as the climate and their habitats change.

Northwest Connecticut is heavily forested and contains wetlands. These and other vegetated land cover types sequester and store carbon, which helps to mitigate greenhouse gas emissions. Protecting these areas prevents emissions that would come from their development or conversion to a less vegetated land cover.

Connecticut's farms also can have a role in mitigation of, and adaptation to, the negative impacts of climate change. Well-managed farms store carbon, capture and store water from extreme precipitation events, and produce biomass for renewable energy (2021 CEQ Annual report).



Vegetated land types sequester carbon dioxide and store carbon, which helps to mitigate greenhouse gas emissions.

CLEAN AIR

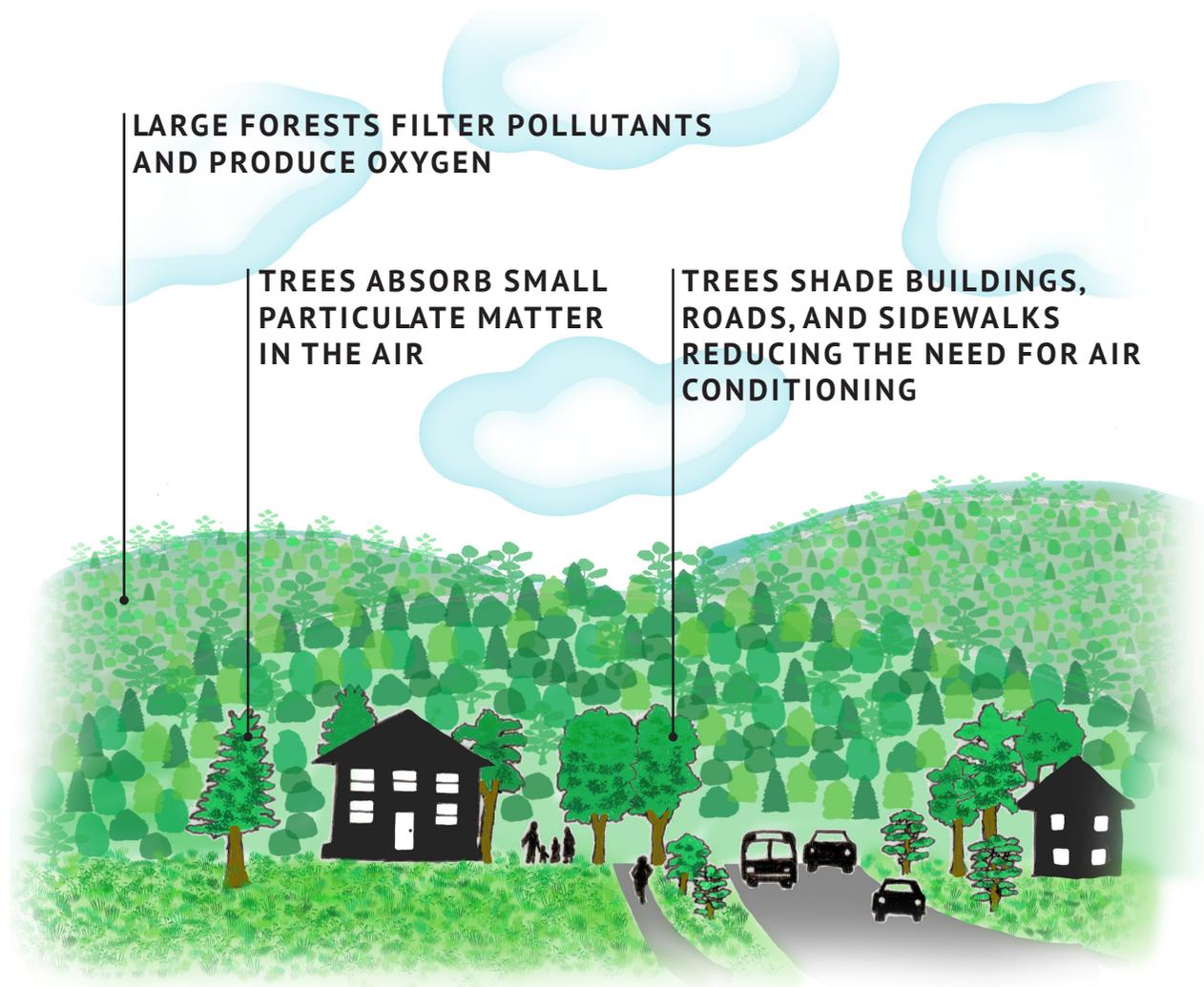
Northwest Connecticut's 70% forest cover helps to maintain air quality in the region and reduces the effects of severe heat.

Trees in Northwest Connecticut filter air pollutants and, in populated areas, mitigate urban heat island effects. They make our environments more comfortable and safe, benefiting the well-being of residents and visitors alike. In Northwest Connecticut, over 70% of the land cover is forest.

Trees and other vegetation can help absorb and filter pollutants such as nitrogen oxides, sulfur dioxide, ground-level ozones, and particulate matter.

These pollutants can have harmful effects on human health and the environment, so reducing their levels in the air can have numerous health benefits (“The Wellness Benefits of the Great Outdoors”; The Importance of Trees).

Urban areas tend to be warmer than surrounding less developed areas due to the absorption and retention of heat by buildings and pavement. Trees help reduce temperatures by shading buildings, sidewalks, and roads. Their processes of evapotranspiration also help regulate and cool the air. Throughout the state, Connecticut's urban communities have the highest tree cover of any state at 62% (The Importance of Trees).



Protecting trees in both urban and rural areas has numerous air quality benefits.

HUMAN HEALTH AND RECREATION

In Northwest Connecticut, conservation projects that enable public access to protected, undeveloped space provide recreation opportunities for residents. Restoration work that improves air and water quality can improve the physical health of residents.

Conserved land in Northwest Connecticut protects open space that can provide opportunities for physical activity such as hiking, fishing, birdwatching, snowshoeing, biking, swimming, and skiing. Engaging in regular physical activity has been linked to numerous health benefits, including reduced risk of chronic diseases such as obesity, Type 2 diabetes, and heart disease. Studies have also shown that exposure to nature can lower levels of the stress hormone cortisol and improve mood (“The Wellness Benefits of the Great Outdoors”). Spending time in nature can help reduce symptoms of depression and anxiety, and improve overall mental well-being. Conserved land can provide opportunities for social connections and community building. People gather at trailheads to participate in group outdoor activities, attend events, and meet neighbors through volunteer work (“The Wellness Benefits of the Great Outdoors”).

As stated previously, Connecticut’s urban communities have the highest tree cover of any state in the country (The Importance of Trees). This combined with the large amount of undeveloped forest land in Northwest Connecticut, contributes to the region’s high air quality levels (Association).

Almost one quarter of all rivers in the project area are listed as impaired by the 2022 Integrated Water Quality Report. Many of these flow through land with the highest concentration of development. Restoration and improvement of water bodies and riparian buffers that flow through these areas could improve access to safe areas for water recreation.

Conserved forests, riparian buffers, and trails are invaluable. By supplying space for physical activity, reducing stress, improving mental health, improving air and water quality, and providing opportunities for social connections, they can help improve the overall health and wellbeing of residents and visitors alike.



Paddlers in canoes on the Connecticut River. Clean water enables aquatic recreation.



Hikers head into the Mallory Preserve in Sherman, Connecticut on boardwalks built over a wetland.



Cross country skiers recreate outside through the winter in Washington, Connecticut.

TOURISM AND SCENIC VIEWS

Conservation in Northwest Connecticut maintains the character of small New England villages and open landscapes which local residents identify with and tourists visit the area to enjoy.

The northwest region of Connecticut is defined by its open spaces of expansive fields and forested hills. The rural character of the region is valued by residents according to local land trusts and councils of governments. Northwest Connecticut is the least developed region in the state, giving a breath of fresh air to visitors from more urban areas like New York City.

The region is known for its small villages among scenic rolling hills. Maintaining the natural landscape and keeping the visual appeal of the region also is essential for tourism and local businesses.

Iconic viewsheds can have historical and cultural significance and are often associated with local traditions, folklore, and legends. Conserving them preserves aspects of the cultural identity of the region.

Visitors from outside the region create revenue for local businesses and communities. In 2017, travelers to Connecticut contributed \$15.5 billion in business sales (“Economic Impact of Tourism”). Tourism generated \$2.2 billion in tax revenues in 2017, including \$960 million in state and local taxes to Connecticut. 84,254 jobs are directly supported by tourism in the state as well (“Economic Impact of Tourism”). By preserving the natural and cultural heritage of the region to enable sustainable tourism, local organizations ensure that visitors continue to enjoy Northwest Connecticut.



Rolling hills, farmland, and forest define the visual character of Northwest Connecticut and bring tourists to the area, particularly in the fall for leaf peeping.

State of Conservation in Northwest Connecticut



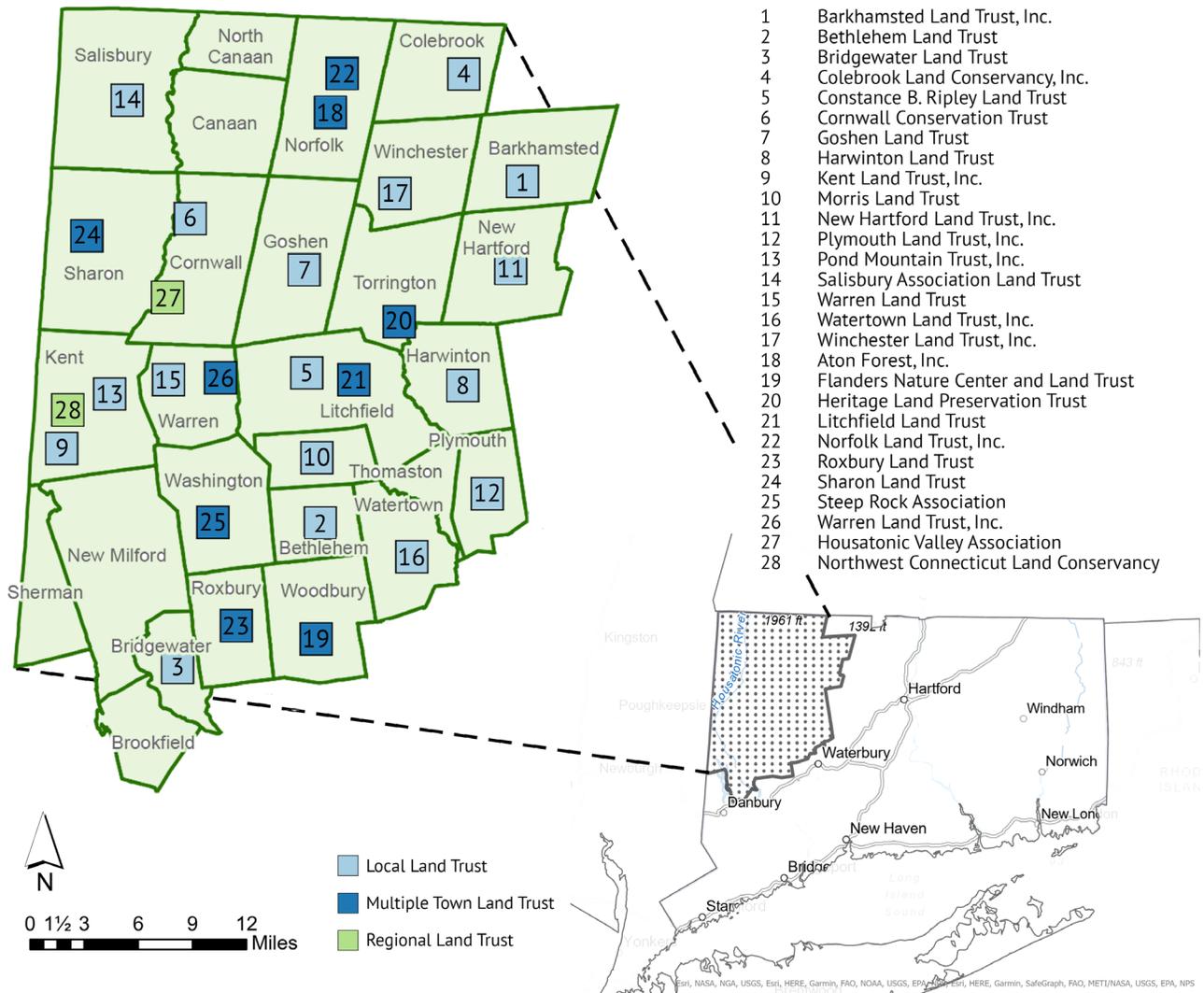
Non-profits, municipalities, and other organizations in and beyond the region are continuously working to support conservation in Northwest Connecticut. Their conservation work maintains air and water quality, protects working lands from development, and mitigates the negative impacts of climate change.

WHO IS CONSERVING NORTHWEST CONNECTICUT?

Privately held conserved land, through conservation restriction or fee ownership makes up 44.6% of protected land in the region. There are 28 private, non-profit land trusts in Northwest Connecticut. When all the land trusts were surveyed in February 2023, several of the sixteen local land trust respondents cited development pressure and high cost of land as challenges to conserving more land. However, land trusts in the region successfully protected over 9,700 acres between 2010 and 2020, with an average of 888 acres per year. Most local

land trusts are thinking strategically about habitat connectivity to prevent the harmful impacts of land fragmentation.

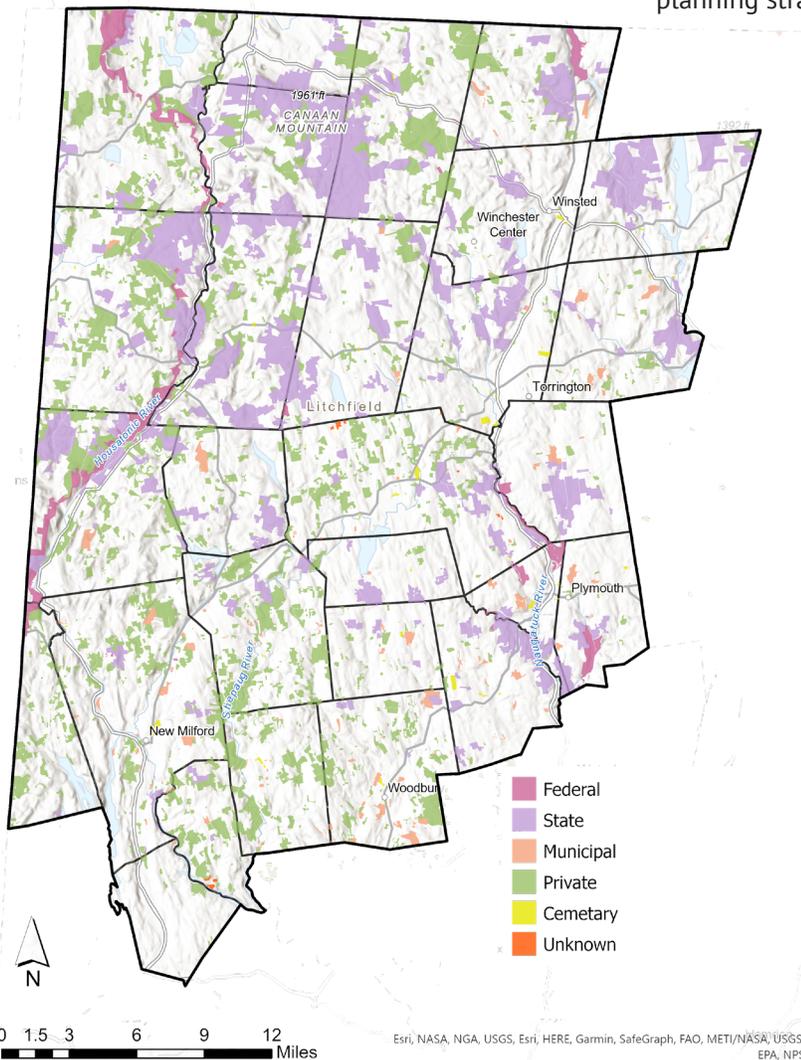
When surveyed, the majority of land trust respondents reported high levels of support from residents for continued conservation work in the region. Some of the land trusts that expressed support also shared that residents see a need to work towards conservation goals in tandem with other priorities, including affordable housing and creating new jobs to attract younger residents.



4-1 Land trusts in Northwest Connecticut There are 28 land trusts in the region. The Northwest Connecticut Land Conservancy works in all 28 towns with an office in Kent.

The state and federal government are significant landowners in the region. Federal (6.7%) and state (38.9%) governments own 45.6% of conserved land in Northwest Connecticut. The state set a goal to conserve 21% of Connecticut’s land area by the end of 2023 in the Green Plan, Connecticut’s official land conservation plan (“Connecticut Council on Environmental Quality”). In the region, some of the largest contiguous areas of state-owned land are the Housatonic State Forest in Canaan, North Canaan, and Sharon; and the Peoples State Forest in Barkhamsted.

Municipalities and regional councils of government own 9.5% of conserved land in the region. Regional and local governmental organizations play a role in the prioritization and allocation of funding for conservation projects. Federal grant applications for conservation projects must demonstrate alignment with Plans of Conservation and Development at the state, regional, and local level. In stakeholder engagement sessions held in March 2023 with the three councils of government representing towns in the Northwest Connecticut region, staff expressed support for conservation projects as part of the region’s broader planning strategy.



4-2 Permanently protected land by ownership 45.6% of conserved land in Northwest Connecticut is publicly-owned by the federal (6.7%) and state (38.9%) governments

WHAT IS CONSERVED IN NORTHWEST CONNECTICUT?

The Northwest Connecticut Land Conservancy completed a Pace and Scale of Conservation in Northwest Connecticut report in 2022. According to this report, land trusts in the region have collectively protected nearly 10,000 acres of forests, farms, and natural waters from development in the last 10 years. If the current pace of land acquisition in the region continues it will take approximately 44 years to reach a 30 x 30 goal (“Publications”).

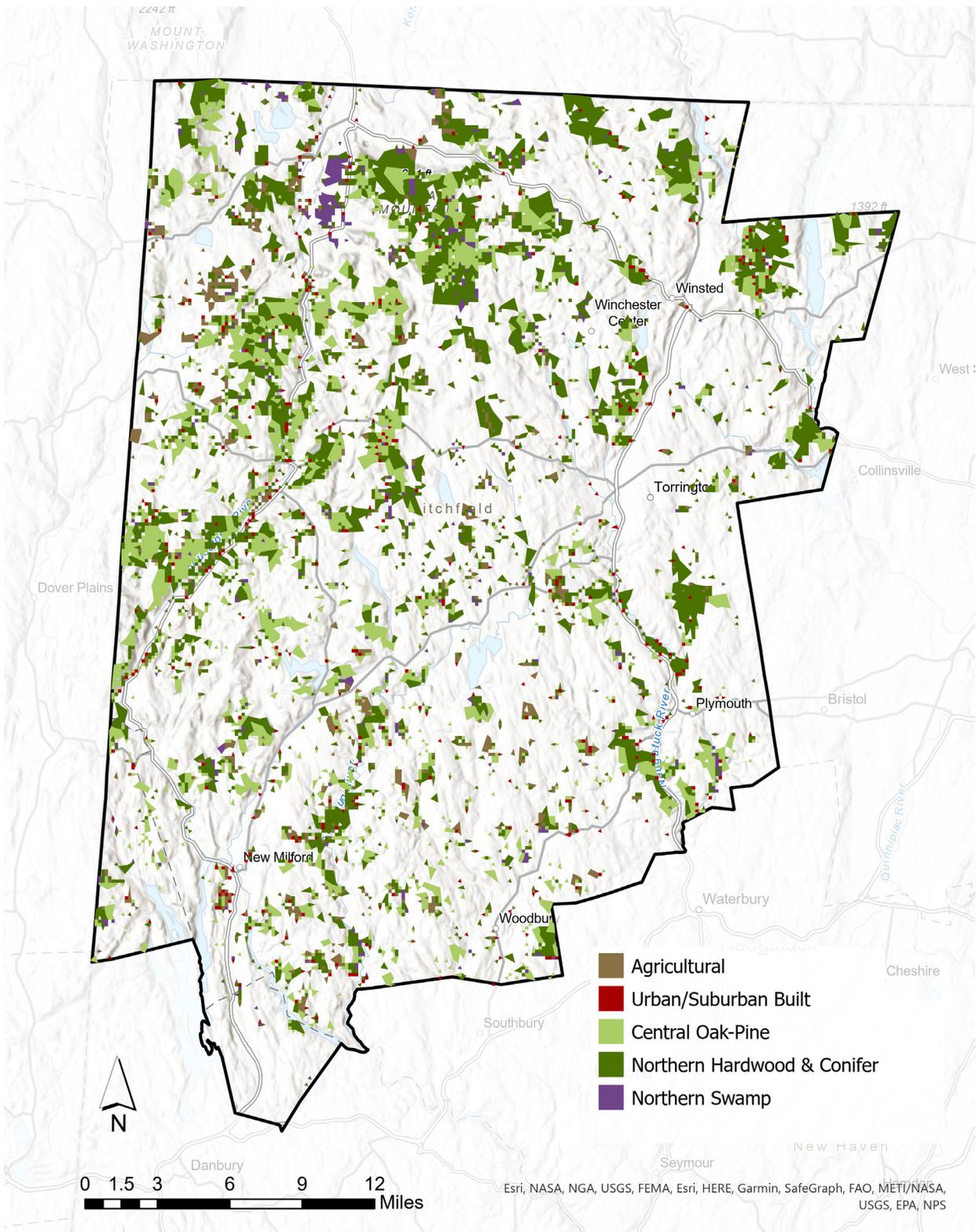
In addition to permanently protected lands, there are 39,090 acres of quasi-protected land. The Northwest Connecticut Land Conservancy defines quasi-protected land as land that is either owned by private organizations other than land trusts used primarily for conservation and/or outdoor recreation purposes or natural lands with statutory limits on sale and conversion. These land uses are deemed quasi-protected because they are not protected in perpetuity. In the region, most quasi-protected land is owned by water supply companies. Including quasi-protected lands, the percentage of protected lands in NCLC’s region increases to 28.79% (“Publications”).

Permanently Protected Land

In Northwest Connecticut, permanently protected land includes forests, farms, and waters. As mentioned in the previous section, these protected lands provide habitat, support biodiversity, build climate resilience, and maintain air and water quality. This section focuses on permanently protected land by ecosystem type and permanently protected land in relation to surface and drinking water.

Almost 42% of the land cover in the service area is Northern Hardwood & Conifer Forest and another 28.75% is Central Oak-Pine, totaling 70% forest cover. Of the lands that are protected, a similar proportion are forest: central oak-pine and northern hardwood & conifer forests are the land cover on 79% of protected lands. Agricultural lands and northern swamps are also protected in similar proportions to their occurrence in the region, with agricultural lands slightly below their percent cover in the region. This high-level analysis highlights a lack of obvious gaps in ecosystem types protected, but does not consider fine-grained differences in the rarity and ecological function of natural communities.





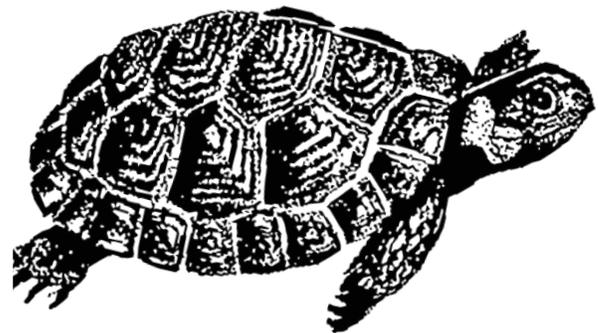
4-3 Permanently protected land by ecosystem Central Oak-Pine and Northern Hardwood & Conifer forests cover 79% of protected lands.

Ecosystem Type	Percent of Protected	Percent in Region
Northern Hardwood & Conifer	45.80%	41.60%
Central Oak-Pine	32.98%	28.75%
Agricultural	9.10%	11.58%
Urban/Suburban Built	3.66%	10.28%
Water	1.81%	3.12%
Northern Swamp	3.57%	2.69%
Wet Meadow / Shrub Marsh	1.04%	0.84%
Emergent Marsh	1.02%	0.58%
Cliff and Talus	0.82%	0.43%
Central Hardwood Swamp	0.06%	0.07%
Large River Floodplain	0.06%	0.05%
Glade, Barren and Savanna	0.03%	0.01%
Northern Peatland	0.05%	0.01%
Total Acres	143,066	632,771

Wetland and Swamps

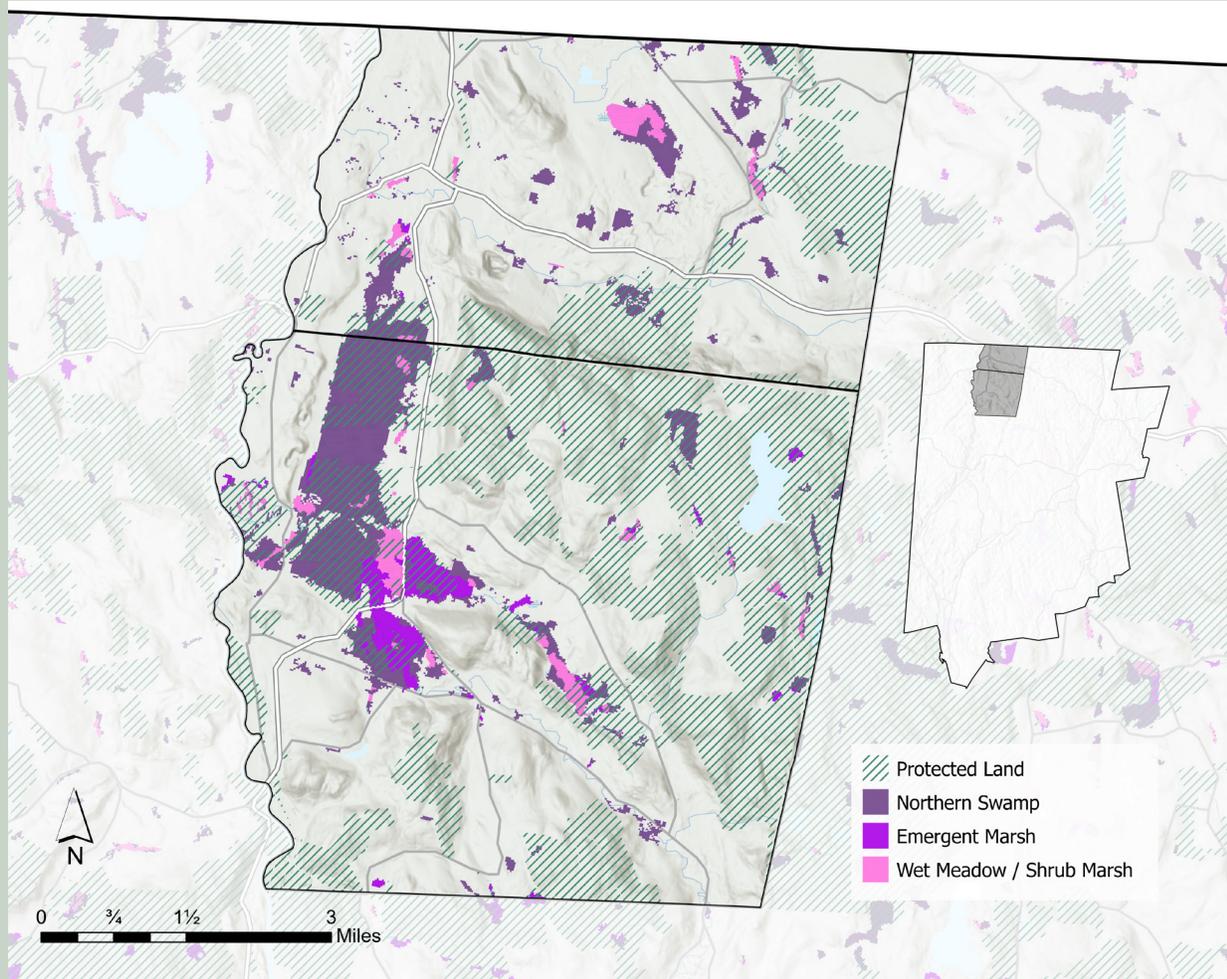
Other ecosystems, including wetlands and swamps, provide critical ecosystem services. Historically, Connecticut's wetlands have been used for hunting, native cranberry and blueberry harvest, timber and salt hay production, and livestock grazing. Human uses also include destructive, often irreversible actions such as drainage for agriculture and filling for industrial, commercial, and residential development. In the past, most people have considered wetlands to be wastelands, but wetlands in their natural state maintain stream flows, control erosion, sequester carbon, and provide a home to many threatened and endangered species (Metzle).

Calcareous soils underlying valleys in the northwest corner of the region support calcareous wetland ecosystems, which are considered critical habitat. Calcareous fens are non-forested wetlands that are fed by base-rich groundwater and support numerous rare or uncommon plant and animal species (Motzkin). The State endangered bog turtle is just one example in the region. These ecosystems are sensitive to disruption by human activities; land use changes even from elsewhere in the landscape, can alter their hydrology ("Calcareous Fens").



The state endangered bog turtle is the rarest turtle in Connecticut. It lives in calcareous wetlands.

ROBBINS SWAMP, NORTH CANAAN



4-4 Protected land around Robbins Swamp wetland complex Several public and private entities protect land around Robbins Swamp, the largest inland wetland complex in the state.

In 2017, the Norfolk Land Trust was given 24 acres in North Canaan that are within the 1,500-acre Robbins Swamp, the state's largest inland wetland complex. The Nature Conservancy and the state already hold large portions of the swamp as conserved land. Native populations of northern white cedar, which can be found in Canaan and North Canaan, are threatened in Connecticut by development (e.g. residences, roads, railroads), habitat alteration (e.g., sediment/pollution in runoff, trash dumping), and recreational overuse (Langdon et al.). This species and other plants it tends to grow with occur only in a few calcareous wetlands in the northern marble valley in western Connecticut (Metzle).

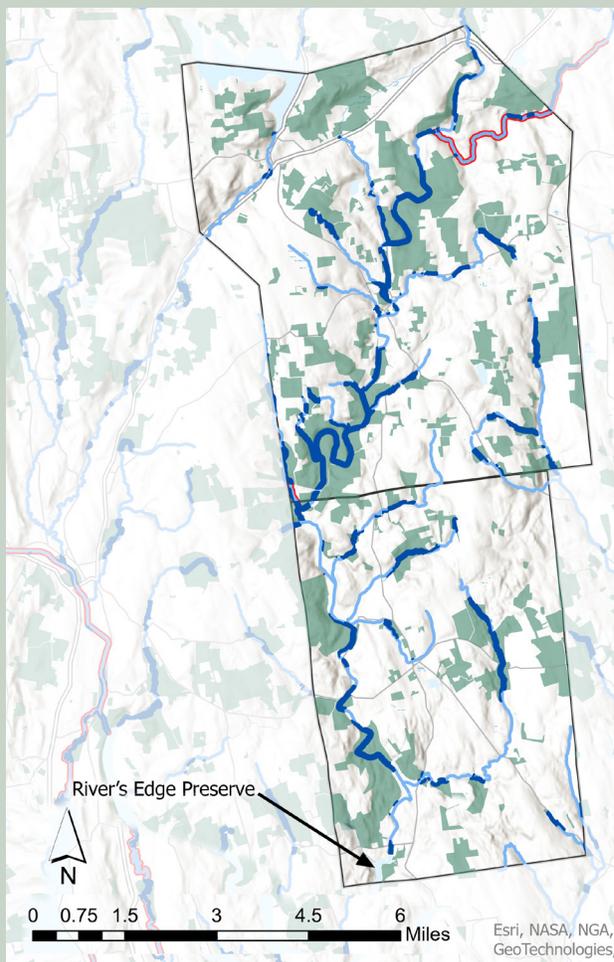
Protected River Buffers

In the region, there are 8,380 acres of permanently protected land within a 200' buffer of major perennial rivers. The Naugatuck River Greenway protects land along the Naugatuck River. Protected land along the Housatonic River overlaps with the Appalachian Trail on federally-owned land.

In 2021, the Connecticut General Assembly passed Public Act No. 21-29 which expands the responsibility of zoning commissions to protect water quality in the Long Island Sound. For communities in watersheds that drain to the Sound, this includes expanding zoning restrictions in riparian buffers (Zoning Strategy).

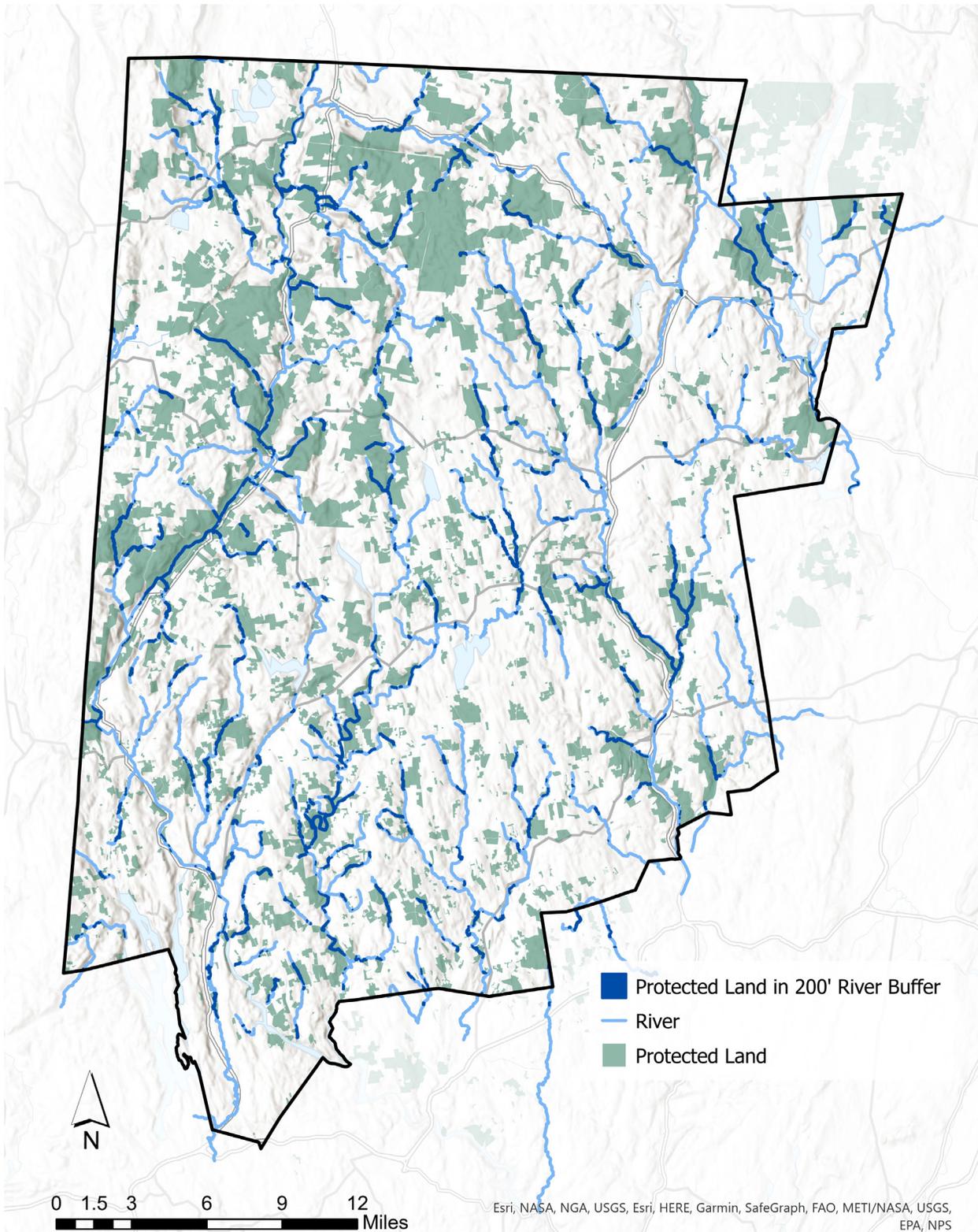
The National Pollutant Discharge Elimination System (NPDES) permit program limits pollutants from source points like manufacturing, sewage, and construction. There is less regulation, however, limiting nonpoint source pollutants. Nutrients such as nitrogen and phosphorus can lead to the hypoxic environments in Long Island Sound. Vegetating and protecting riparian buffers can filter and absorb pollutants before they enter the waterways which can in turn improve water quality in streams, rivers, and the Long Island Sound.

RIVER'S EDGE PRESERVE, ROXBURY

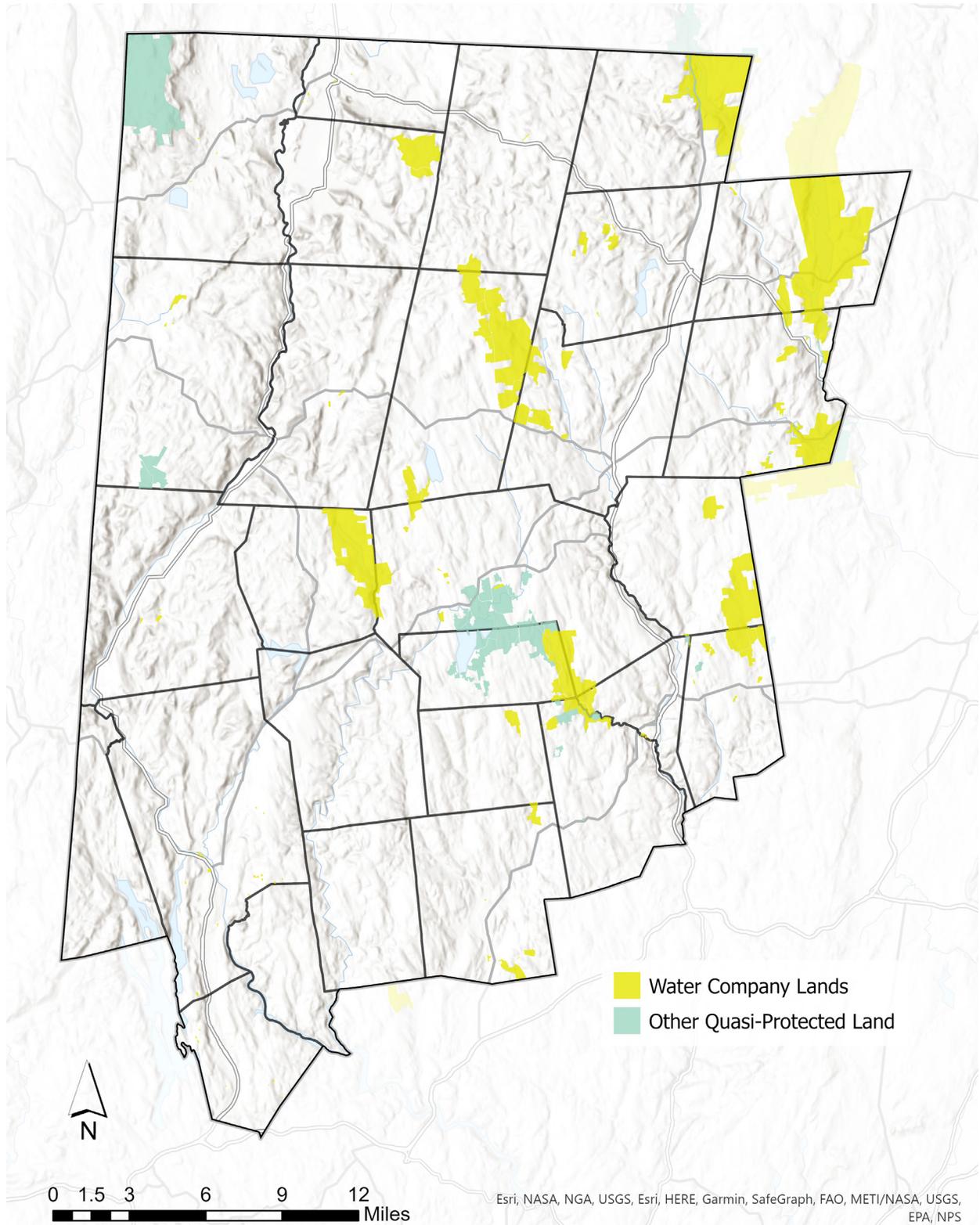


Around the Shepaug River in Roxbury and Washington, there is a noticeable concentration of protected land in river buffers. The Roxbury Land Trust has several properties that abut the Shepaug River, including the aptly named “River’s Edge Preserve.” The preserve borders the eastern bank of Lake Lillinonah at the mouth of the Shepaug River. An anonymous gift enabled the Roxbury Land Trust to purchase the property from Connecticut Light & Power, which had been using parts of it as a gravel mine (River’s Edge Preserve). Reforested riparian areas such as these protect, and even improve, water quality by reducing the amount of sediment, nutrients, and pollutants that enter surface waters.

4-5 Protected land at River’s Edge Preserve The 24-acre preserve abuts the Shepaug River.



4-6 Protected land in river buffers There are 8,380 acres of permanently protected land within a 200 foot buffer of major perennial rivers in the region.



4-7 Quasi-protected land by owner There are 39,090 acres of quasi-protected land in the region mostly owned by water supply companies.

Quasi-Protected Land

Quasi-protected lands are critical to the conservation future of Northwest Connecticut. To achieve 30 x 30, conservation organizations and municipalities will need to ensure no net loss of the region's quasi-protected lands. Conservation easements are an ideal tool to protect quasi-protected lands because they allow for private ownership, management, and access to continue, and for municipalities to continue to collect property tax. Conservation easements ensure the land will remain in its natural state even if landowners change or if the property is no longer statutorily protected as Class I, II, or III watershed land.

All water company land (whether private or publicly owned) falls under the three-tier classification system. Class I includes watershed land nearest to water supply sources, (e.g., within 250 feet of a reservoir, 200 feet of a well, or 100 feet of a watercourse). It also includes certain environmentally sensitive lands, such as those that are steeply sloped or where bedrock is less than 20 inches from the soil surface. Class II land is either in the public drinking supply watershed but not included in Class I and/or completely out of the watershed but within 150 feet of a reservoir or a major stream that runs into it. Class III consists of the rest of the company's land. Class I and II lands require a Department of Public Health (DPH) permit to transfer or change their use.

Drinking Water Watersheds

State law in Connecticut restricts the sale and conversion of water company owned land in drinking water watersheds. In recent years, water companies have argued that the Department of Health should not have jurisdiction over any inactive water supply sources, including emergency water supply, in those watersheds ("MDC Pauses Proceedings Seeking to Remove DPH Jurisdiction over Future and Emergency Water Supplies"). This would make large swaths of land vulnerable to sale and development. Save the Sound continues to look for additional tools to protect water company land in drinking water watersheds regardless of whether they are active or inactive.

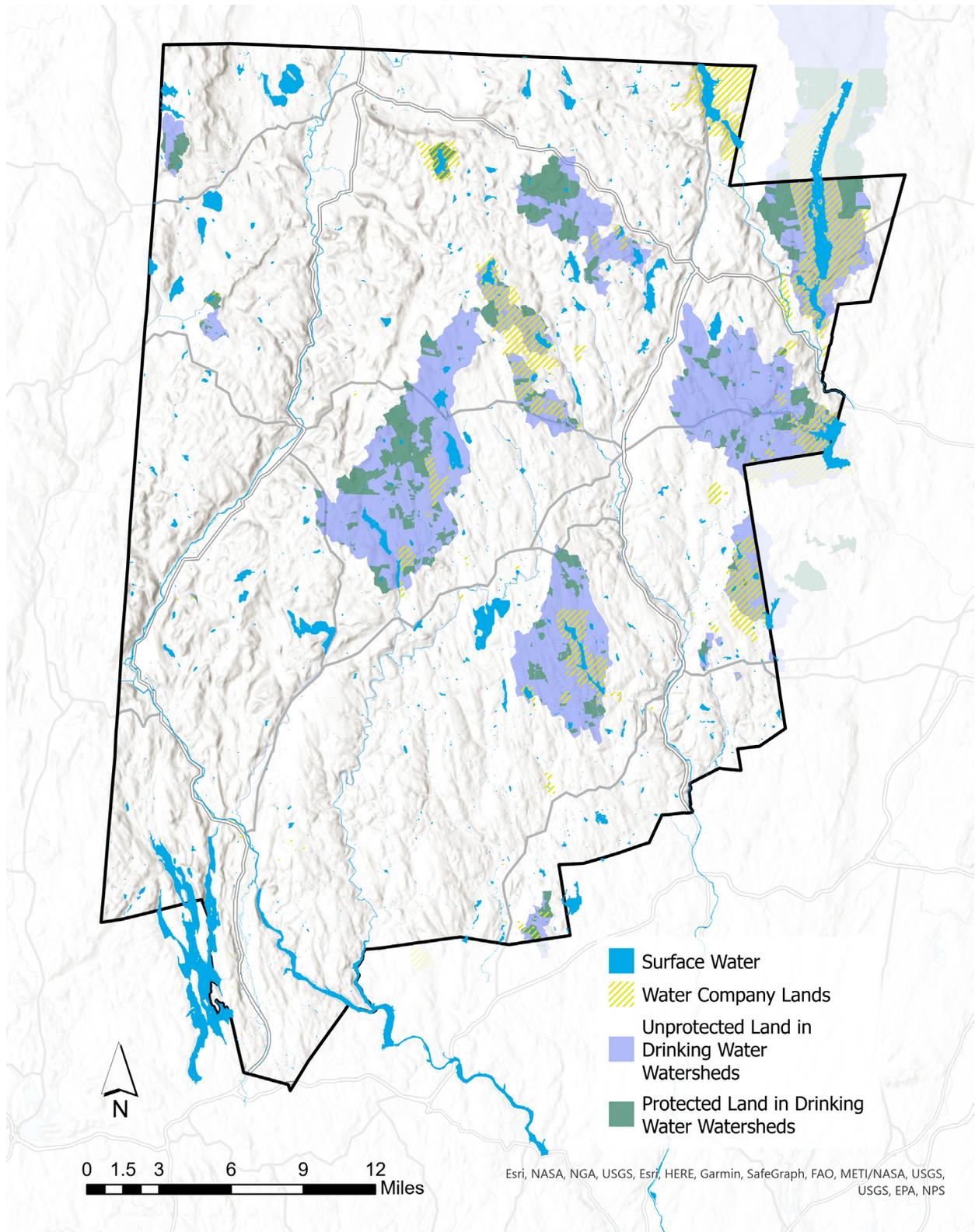
While there are permanently protected areas in these drinking water watersheds, significant portions of land are unprotected or quasi-protected. Permanent protection is possible. In 2022, the Connecticut Water Company transferred a total of six parcels which are no longer needed for water supply purposes to the Borough of Naugatuck, the Town of Prospect, the Killingworth Land Conservation Trust, and the Bethany Land Trust to be permanently preserved as open space. Save the Sound helped facilitate the process to permanently protect these 82 acres which otherwise may have been sold and developed for private use ("Press Release").

In Torrington, the majority of public water demand is supplied locally by individual wells or by the Torrington Water Company. The privately-held Torrington Water Company, established in 1873, supplies drinking water from its 5,400-acre watershed in Torrington, Goshen, and Norfolk to residents of Torrington, Litchfield, New Hartford, and Harwinton in nearly 9,000 households. Approximately two thirds of the watershed land is currently perceived as open space but little has been formally preserved (Planning & Zoning Commission).

The City's Plan for Conservation and Development recommends working with the water company to secure much of this land in perpetuity as open space or water supply land. Land trusts can collaborate with the City on this unified goal, perhaps assuming ownership and stewardship of those lands.

Conclusion

To meet the goal of 30% conserved land by 2030, conservation organizations and governments will need to increase their yearly land acquisition. But, acquiring a particular percent of land for protection is only one piece of a larger conservation strategy. The next portion of this report highlights opportunities for strategic land acquisition, opportunities for increased protections on quasi-protected lands, and strategies for managing acquired lands. The large-scale patterns observed in these analyses and the principles set by the federal commitment to 30 x 30 inform a pathway forward.



4-8 Protected and quasi-protected land in drinking water watersheds A significant portion of land in drinking water watersheds is unprotected or quasi-protected.

Ecological Considerations



Jerry Monkman

This section recommends a strategy for conserving lands with high ecological integrity to ensure safeguarding of wildlife habitat and forest resilience and to restore lands with lower ecological value with particular emphasis on improving water quality.

ECOLOGICALLY SIGNIFICANT AREAS

Ecological integrity is a measure of the relative intactness of an environment. Meaning, it determines how free the land is from both built infrastructure and frequent disturbances. Large cores of undisturbed ecosystems provide stronger wildlife habitat compared to environments that are interspersed with houses, power lines, and roads. Ecological integrity can also describe the land's resilience to environmental change: its relative ability to recover or adapt to changing environmental conditions driven by human land use and climate change.

Northwest Connecticut retains significant ecological integrity compared to the developed coastline and Hartford area, with 22.6% of the region protected from development. Protecting more land would help make the region more resilient to climate change, maintain forest connectivity and wildlife habitat, and improve air and water quality.

The initial maps presented in this section aim to identify areas with (a) high ecological value that are not yet protected and (b) areas in need of ecological restoration. An approach that identifies both types of areas will ultimately yield a stronger ecosystem and healthier human communities.

The Northwest Connecticut Land Conservancy and its partners utilize science-based mapping with NCLC's weighted GIS model. This model weighs sixteen conservation criteria, including climate resiliency, critical habitats, rare species, and core forests, and allows NCLC to assess every parcel in Northwest Connecticut by individual or multiple criteria instantaneously. This information helps NCLC and its partners to prioritize their conservation work and direct their resources to conserve the most important remaining conservation lands in the region.

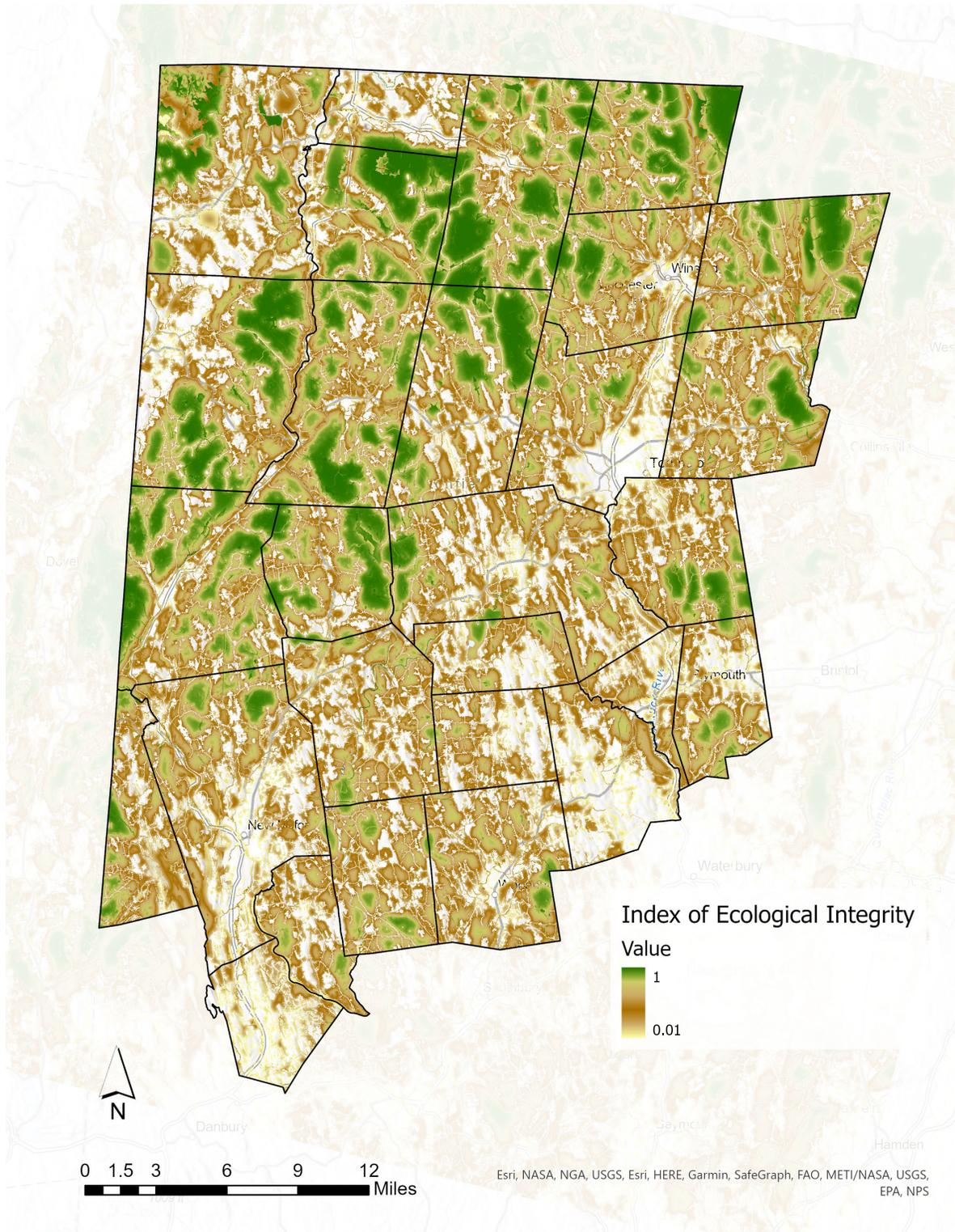
In areas that are more developed and more densely populated, restoration is often necessary due to the amount of impervious ground cover. For areas of Connecticut beyond the northwest region, restoration may be a stronger conservation priority to ensure that the benefits of water and air quality extend to residents of developed areas.

Index of Ecological Integrity

Designing Sustainable Landscapes, a project from the University of Massachusetts Amherst provides data for strategic habitat conservation, evaluating regional connectivity, assessing risk of development, and modeling for microclimates and wildlife habitat. This tool ranks areas with high ecological value as a 1 and decreases as the landscapes are fragmented. It provides another data set for examining land with high ecological value and aligns with data from The Nature Conservancy, Housatonic Valley Association, and the state of Connecticut.

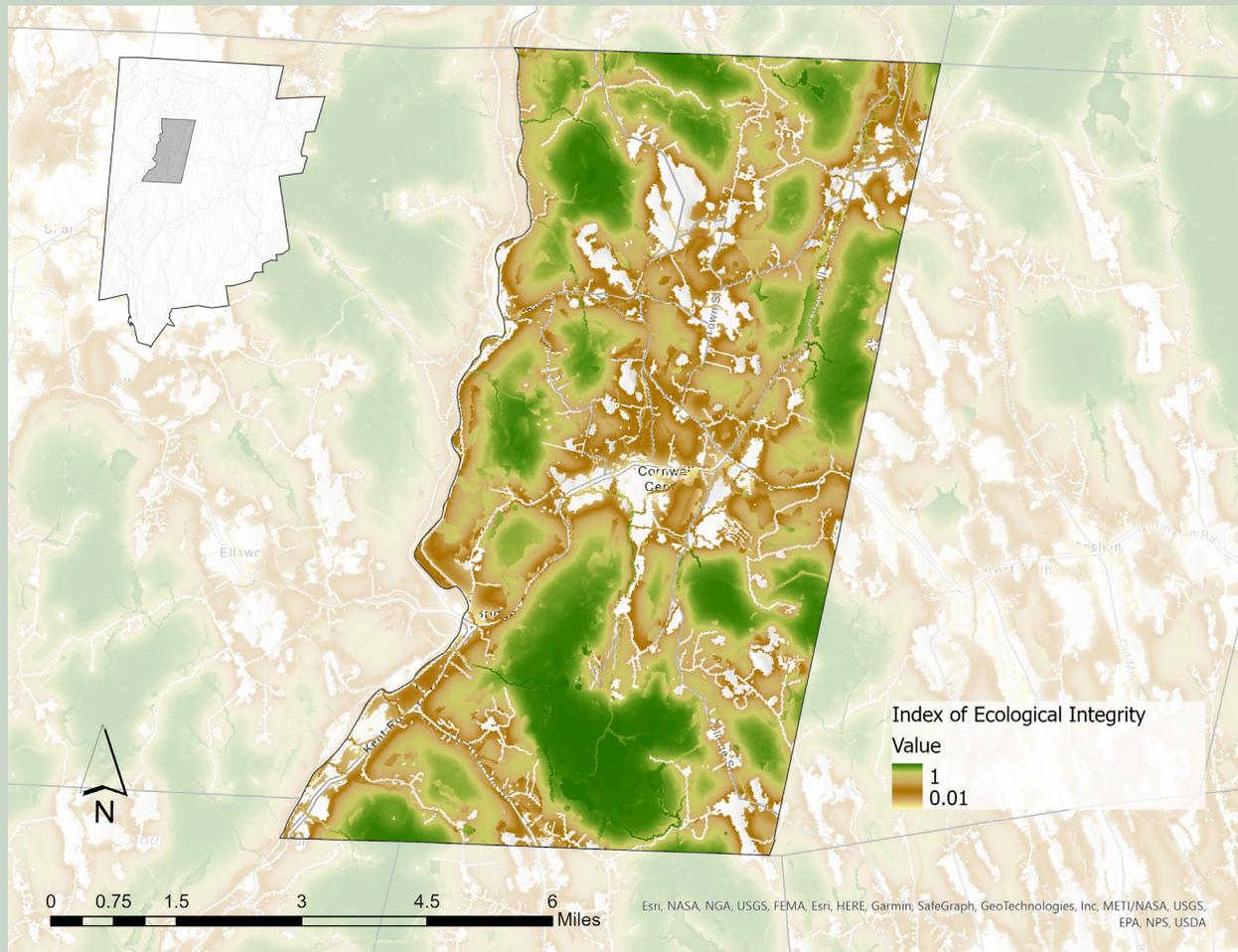
Northwest Connecticut is largely forested and forest connectivity is important for wildlife habitat, biodiversity, and long-term ecological resilience and is a key criterion for evaluating ecological integrity. Connectivity allows for movement of species and the flow of natural processes. Without strong connectivity, ecosystems cannot function properly. Conservation is essential to maintain intact ecosystems and allow for this flow to continue (Hilty et al.).

As previously discussed, fragmentation of forests and other habitats is a growing concern as development pressure increases. Many species, like forest nesting birds, need large forest cores to survive. While some species need edge habitat, creating edges by clearing forest can leave those newly exposed trees vulnerable to winds. It also creates opportunities for invasive species and pests to proliferate in the landscape. In Northwest Connecticut specifically, the Appalachian mountains provide unique habitat for migratory species that need safe passage. Intact ecosystems also can improve air and water quality and climate resilience. Continuing to preserve areas with high ecological integrity will protect forest cores. Healthy forested ecosystems can improve air and water quality and build climate resilience.



5-1 Index of Ecological Integrity There is a corridor of high ecological integrity from the New York border in the west to the Massachusetts border in the north.

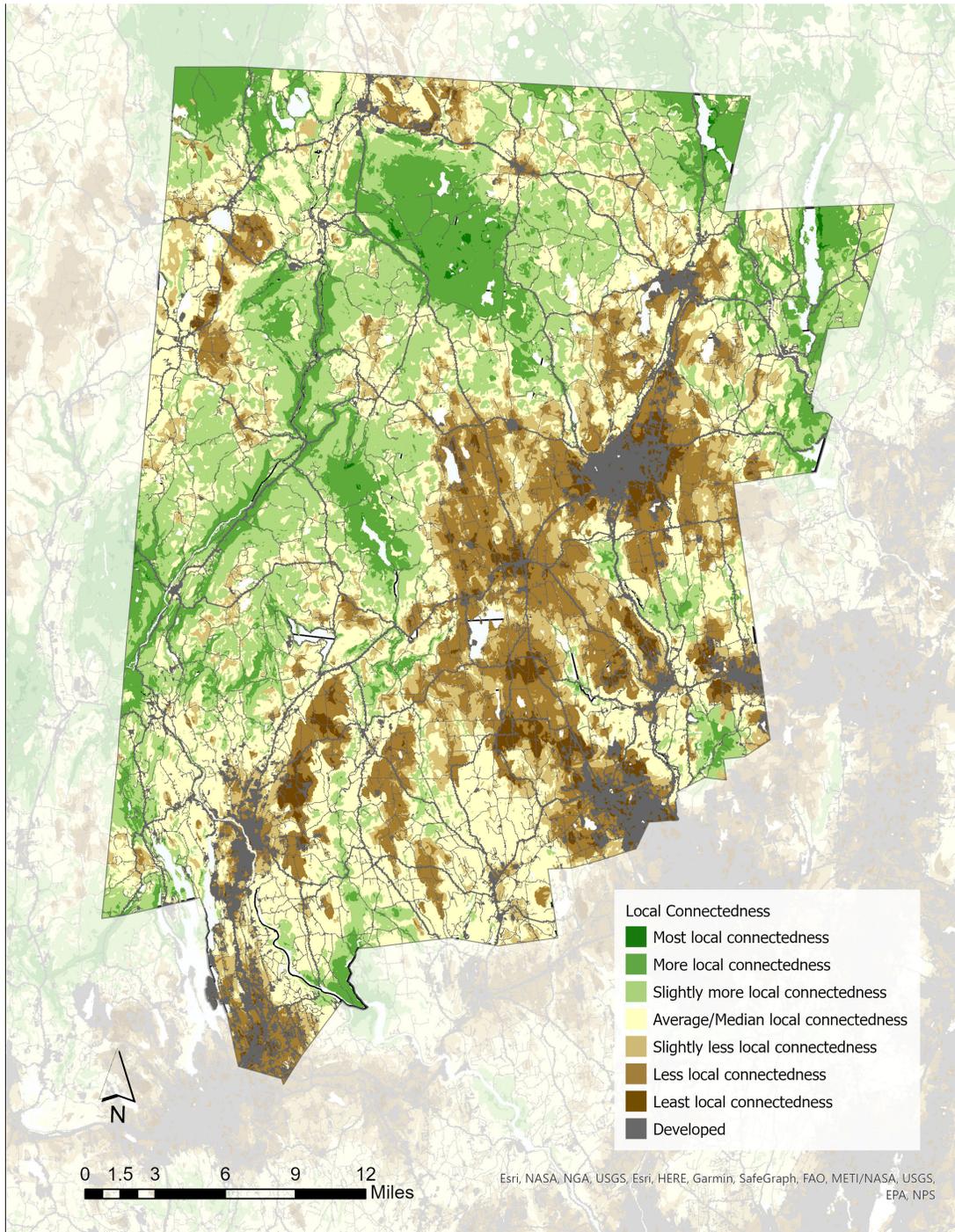
CORNWALL, CT



5-2 Index of Ecological Integrity for Cornwall, CT Cornwall has significant intact forest cores and retains high ecological integrity.

Cornwall has a significant amount of conserved land that mainly protects forest cores. Cornwall is 81% forested (Cornsoc). The Trinity Forest Preserve, owned by the Cornwall Conservation Trust, is a 317-acre parcel that abuts the Housatonic State Forest. Together, this creates 1,000 acres of continuous forest (Trust, "Trinity Forest Preserve"). Dense forest cores like this provide habitat for animals like bobcat, skunk, turkey, weasels, and trout. This forest also filters water that flows into the Housatonic River.

Near the Trinity Forest Preserve and also owned by the Cornwall Conservation Trust, the Ballyhack Preserve is one of a few surviving old growth forests in Connecticut; it contains multiple trees that are over 200 years old (Trust, "Ballyhack Preserve"). It is home to the second-tallest white pine in Connecticut at 149 feet (Kaputa). Historically, much of New England was deforested in the late 1800s for agriculture and timber production. Areas that were not deforested may have higher biodiversity.



5-3 Local Connectedness Data from The Nature Conservancy shows areas of connectedness within the landscape. Areas in brown are fragmented areas containing more roads, housing, and built infrastructure.

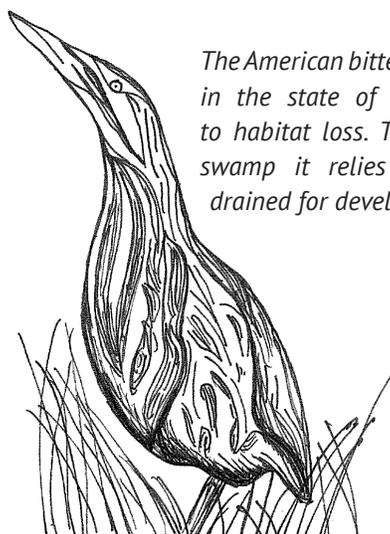
Important Wildlife Habitat

To identify which lands to prioritize for conservation, this map combines habitat-focused data layers to examine habitat for rare and endangered species. Weighting unconserved parcels with high habitat value adjacent to permanently protected lands against parcels that are less intact and not abutting protected lands would prioritize building habitat corridors. Conserving land in larger, intact cores, rather than parcels surrounded by development, protects high quality habitat and allows for migration between microclimates for flora and fauna.

The Critical Habitats and the Natural Diversity Database Areas layers show approximate locations of endangered, threatened, and special concern species and important natural communities in Connecticut (Natural Diversity Data Base Areas). Important Bird Areas are defined by the Audubon Society and include critical habitats for endangered birds, identified nesting areas for birds, or unique habitats that may support specialist species of birds.

In Northwest Connecticut, adding to conserved areas where there is documented wildlife habitat will

preserve important habitats and build corridors. From the New York border north to the Massachusetts border, there is a corridor of heavily forested area that has documented wildlife habitat. Along this corridor, there are also wetlands, fens, wet meadows, marshes, and swamps which some species, plant and animal, rely on exclusively for habitat. Expanding conservation within this corridor will continue to preserve habitat for local wildlife.

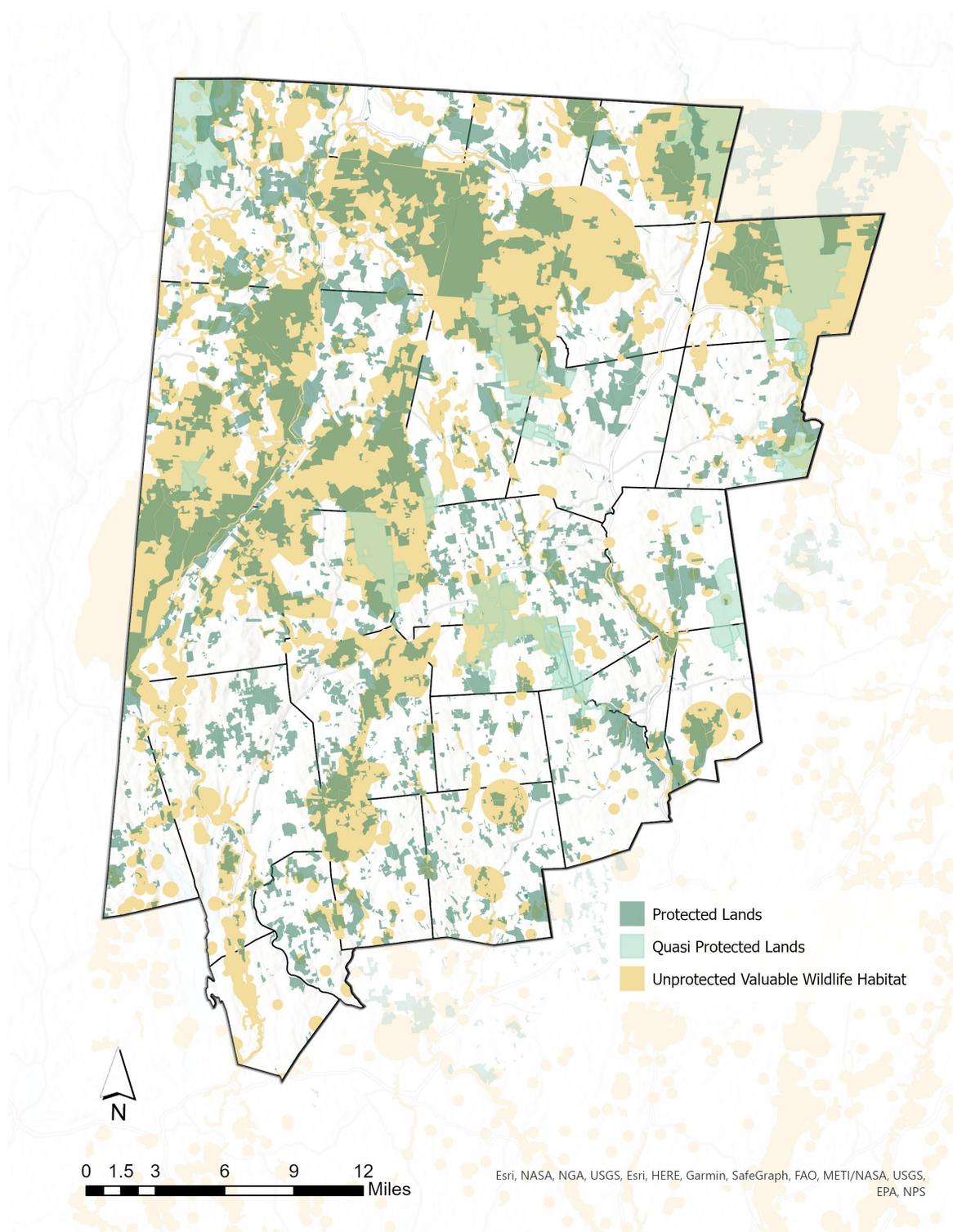


The American bittern is endangered in the state of Connecticut due to habitat loss. The marshes and swamp it relies on have been drained for development (CT Gov).

BERKSHIRE WILDLIFE LINKAGE & FOLLOW THE FOREST

Two ongoing projects in the region work towards increasing conservation of ecologically valuable land. The Berkshire Wildlife Linkage is a project between The Nature Conservancy and its partners with the goal of protecting wildlife habitat and rare species from the Hudson Highlands in New York to the Green Mountains in Vermont. This landscape is estimated to have 75% forest cover and contains some of the most intact forests in southern New England. Secondly, the Follow the Forest partners initiative aims to protect and connect forests from the Hudson Valley to Canada enabling safe passage for wildlife. The partnership works to identify pinch-points in the landscape where the safe passage of wildlife is stagnated.

The Nature Conservancy manages a number of preserves within the boundary of the Berkshire Wildlife Linkage Project. In Northwest Connecticut, the 182-acre Hollenbeck Preserve provides grassland habitat for several rare plant and animal species. It also supports at risk grassland bird species. The river in this protected area is connected to the Robbins Swamp, a protected wetland, and drains to the Housatonic River. The Nature Conservancy maintains the fields to provide this important grassland habitat (Hollenbeck Preserve). The Follow the Forest initiative provides extensive mapping services to their land conserving partners. They educate the public and other stakeholders about the issue of forest fragmentation and the importance of habitat connectivity.



5-4 Unprotected Valuable Wildlife Habitat Protecting land with high habitat value that is adjacent to protected lands will build habitat corridors and increase the amount of intact land for wildlife habitat.

OPPORTUNITIES FOR RESTORATION

To improve surface water quality in Northwest Connecticut and downstream, there is an opportunity to focus on restoring land adjacent to rivers and streams and installing green infrastructure. These actions will benefit aquatic species, water quality, and the health of the Long Island Sound.

Impaired Rivers and Conserved Land

In Northwest Connecticut, there is a correlation between surface water quality and conservation land. In areas where there is more land conserved, there is higher water quality in streams and ponds. Impaired rivers are designated by the state of Connecticut in its Integrated Water Quality Report. Several factors can contribute to impaired water quality including high amounts of impervious surfaces in the watershed, erosion, and polluted runoff. Nonpoint source pollutants, like agricultural runoff that may contain pesticides and fertilizers, are the main contributors to impairments in Northwest Connecticut (Dykes).

Green infrastructure is an approach to water management that uses vegetation to filter and absorb stormwater (US EPA). The term encompasses both large scale land conservation, which protects large swaths of vegetation and open space and therefore prevents the installation of impervious surfaces on this land, and micro-scale stormwater installations, like bioswales, urban tree canopy, and rain gardens.

In the face of a changing climate, more intense precipitation can be expected. Riparian corridors play an important role in flood mitigation. In Northwest

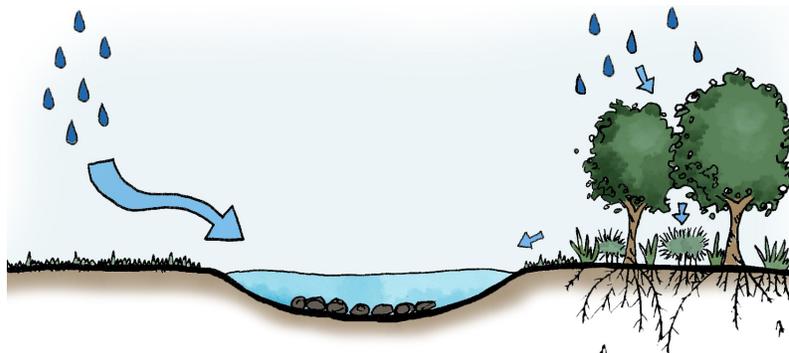
Connecticut, there is significant vegetated land which is better equipped to withstand inundation than areas with high impervious surfaces. In developed areas, green infrastructure can prevent disastrous and costly flooding in urban areas after a large storm event.

Restoring Land Along Rivers and Streams

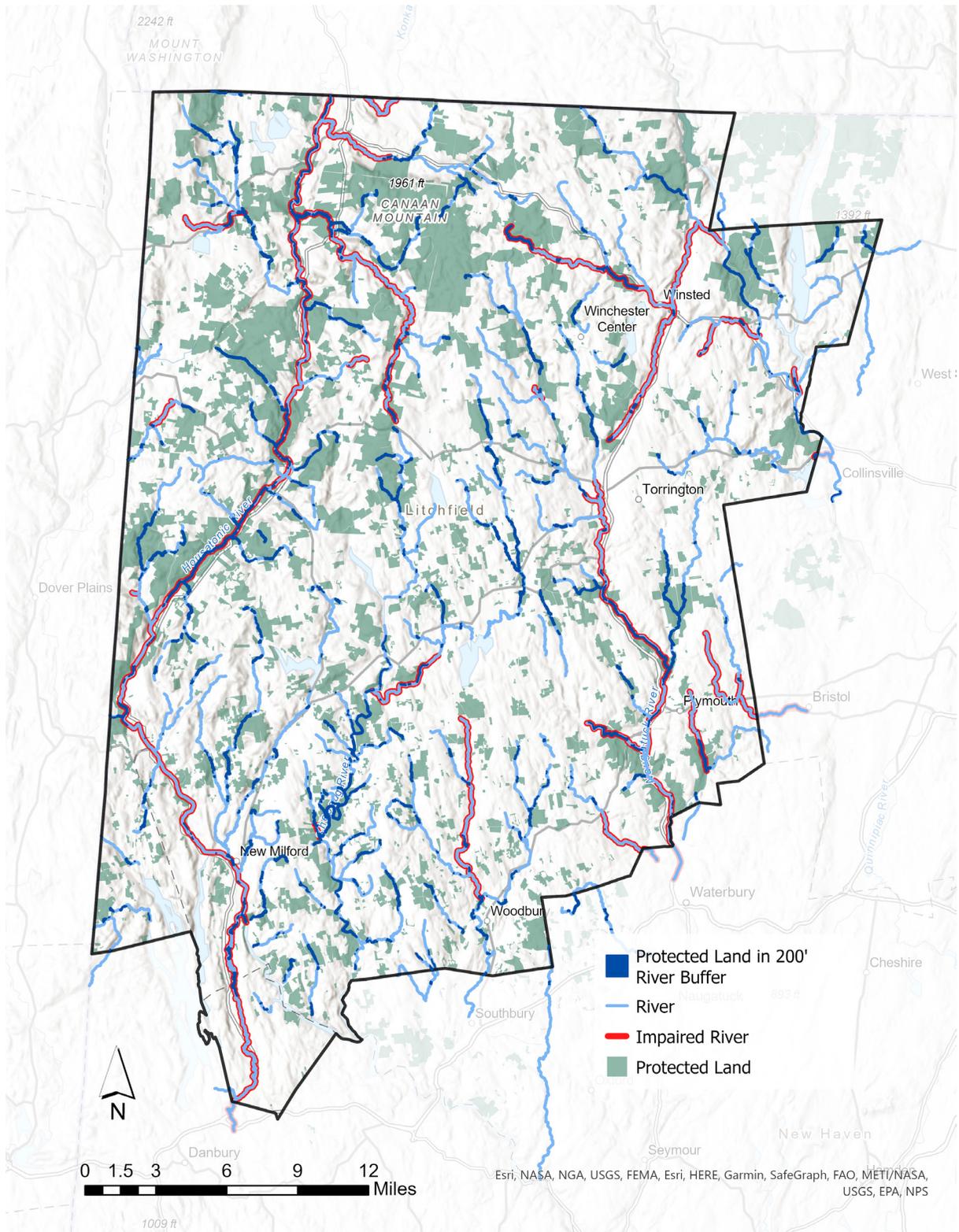
Riparian areas are lands adjacent to rivers or streams. Maintaining vegetation in these areas prevents erosion of stream banks, improves habitat for aquatic and terrestrial life, and can filter and intercept pollutants from nonpoint source runoff (US EPA).

Prioritizing riparian restoration by stabilizing eroded stream banks, daylighting streams (opening up buried waterways), and increasing the width of buffers may improve water quality. Runoff doubles within a watershed when impervious surfaces cover more than 20%; green infrastructure and riparian restoration can make a big impact in developed areas by removing impervious surfaces and better intercepting water (EnviroAtlas).

The protection and restoration of riparian stream buffers can preserve and improve water quality in impaired waterbodies (Riparian Restoration | Bureau of Land Management). Forested riparian zones intercept water and complex root systems stabilize riverbanks limiting erosion. Vegetation also traps pollutants in runoff limiting how much enters the water body. In more wild areas, riparian ecosystems provide an important link between forested habitats and aquatic habitats.



Vegetated stream banks intercept precipitation and break down pollutants before water enters a stream or river.



5-5 Impaired Rivers and Protected Land Protecting land adjacent to water bodies and restoring riparian buffers can improve surface water quality and the health of the Long Island Sound.

MILL RIVER RESTORATION IN NEW HAVEN, CONNECTICUT

This restoration project was co-sponsored by Save the Sound. A vacant lot was transformed into a park with green infrastructure, in the form of bioswales, for the residents to enjoy via walking trails. The green infrastructure was focused on improving drainage in the area and treating the runoff before it entered the Mill River. The site design also connected the park to the already existing greenway directly adjacent to the Mill River. This park provides accessible walking trails, solves a drainage issue within the landscape, and cleans and filters stormwater before it flows into the river. Projects like these can improve water quality, increase climate resilience, and access to outdoor recreation (“Mill River Trail Green Infrastructure Park”).

Before



After



Treating Stormwater Runoff

Lack of stream buffers is not always the leading cause of water impairment; it is often decommissioned factory buildings adjacent to water bodies, separate storm and sewer systems and combined sewer overflows (CSOs). Limiting polluted runoff before it enters waterways is essential for water quality improvement. Treating stormwater runoff with green infrastructure interventions can support improvement of water quality. Vegetation intercepts precipitation which in turn prevents erosion, and certain species of plants can break down and absorb pollutants so that less reach waterways.

Conclusion

Ecological actions for Northwest Connecticut can be summarized as 1) increasing conservation of ecologically valuable parcels, specifically parcels adjacent to currently conserved land, and 2) acquiring and restoring parcels with the potential to provide ecosystem services, such as water quality improvement, flood storage, and outdoor recreation. Further, this approach supports wildlife habitat and biodiversity in both urban and rural settings.

Economic Considerations



Often the viewpoint of conservation is that it has negative impacts on local economies by taking land off the tax roll and preventing future development. However, conserved land can provide many economic benefits, and studies show that in the long run when you consider the management costs of developed areas, undeveloped areas require much fewer input costs (Sims et al.).

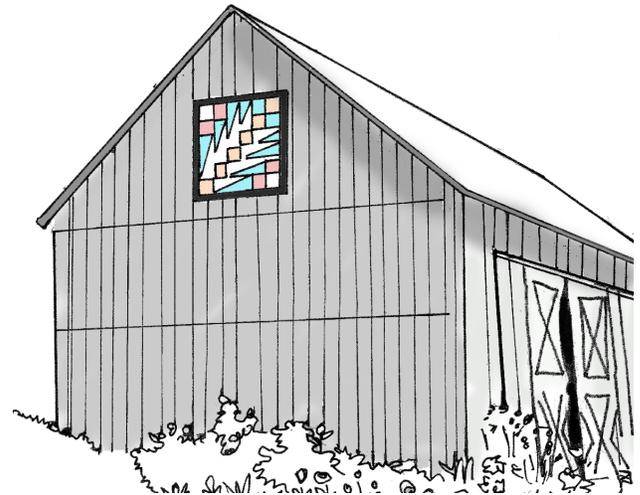
As land trusts and other conservation organizations become major landowners in the region and state, they will need to consider what exceptional stewardship of their land entails. Many people depend on this land and the uses and condition of these lands will impact people's livelihoods. Conserved land can directly benefit farmers, fisherfolk, foresters, hunters, and outdoor recreation enthusiasts depending on the allowed uses and ease of access. The 30 x 30 initiative highlights the importance of conservation for its contribution to local economies.

AGRICULTURAL LAND

Agriculture has been a major part of Connecticut history. Indigenous peoples farmed in Connecticut for thousands of years and European colonists started farming in Connecticut when they arrived and settled the original 13 colonies. Agriculture remains a significant industry in Connecticut, providing 22,000 jobs and contributing \$4 billion annually statewide (“Connecticut Department of Agriculture”). Connecticut has 5,521 farms covering an area of 381,539 acres and producing \$580,114,000 worth of products as of 2017 (USDA - National Agricultural Statistics Service). Litchfield county has 1,217 farms covering 90,322 acres and producing \$41,135,000 worth of products as of 2017 (USDA - National Agricultural Statistics Service).

In the face of climate change, local farms can play a crucial role in providing food to communities. Local food production reduces emissions from transportation and keeps dollars local, bolstering the local economy. There are many farmers markets in Litchfield County and over 41 farm stands (Group). As mentioned in a stakeholder session with local land trusts, food sovereignty will become more important as the climate changes.

Increasing rates of development threaten farmland. Often, farmland is selected for development because it is clear, relatively flat, and usually well-draining, making it easier for developers to build on. Since 1985, Connecticut has lost over 87,000 acres of farmland to development (“Farmland”). It is likely that developmental pressures will rise in rural Litchfield County, which saw an influx of in-migration from larger urban areas during the pandemic (“A Tidal Wave”: New Yorkers Snapping up CT Homes).



The barn quilt on Hunt Hill Farm’s barn symbolizes the forage grasses and hay grown in the surrounding fields.



NORTHWEST CONNECTICUT REGIONAL FOOD HUB

The NWCT Food Hub began in 2017 and works to connect local farms, some of which are protected by land trusts, with wholesale buyers including grocery stores, restaurants, and other institutions. By aggregating locally grown and produced food, farmers can spend less time marketing and selling their food and residents still benefit from locally produced food. It also creates recurring, consistent orders for farms so that they can plan more efficiently. The Hub also partners with schools in the region to bring healthy food to cafeterias, provides fresh produce to senior centers, and piloted a subscription for low-income residents of Torrington and Winsted (NWCT Regional Food Hub).

To combat the loss of farmland, the Connecticut Department of Agriculture created two programs in the late 1970s: the Farmland Preservation Program (FPP) and the Community Farms Preservation Program. These voluntary programs prevent development on preserved farmland by changing the property's deed to restrict non-agricultural uses. The farms remain in private ownership and owners continue to pay local property taxes. These programs are voluntary and provide attractive incentives to landowners, such as working capital to assist farm operation. As of 2020 the programs have preserved more than 45,300 acres on 373 farms, with a long term goal of preserving 130,000 acres ("Farmland Preservation Overview").

Land trusts and other entities can also purchase conservation easements that provide similar protections and incentives. Since 2015, NCLC has partnered with the Connecticut Department of

Agriculture to assist farmers and land trusts through the FPP process. To date, NCLC has enrolled fourteen farms in the program and, of those, six projects have been completed, protecting more than 400 acres of working lands.

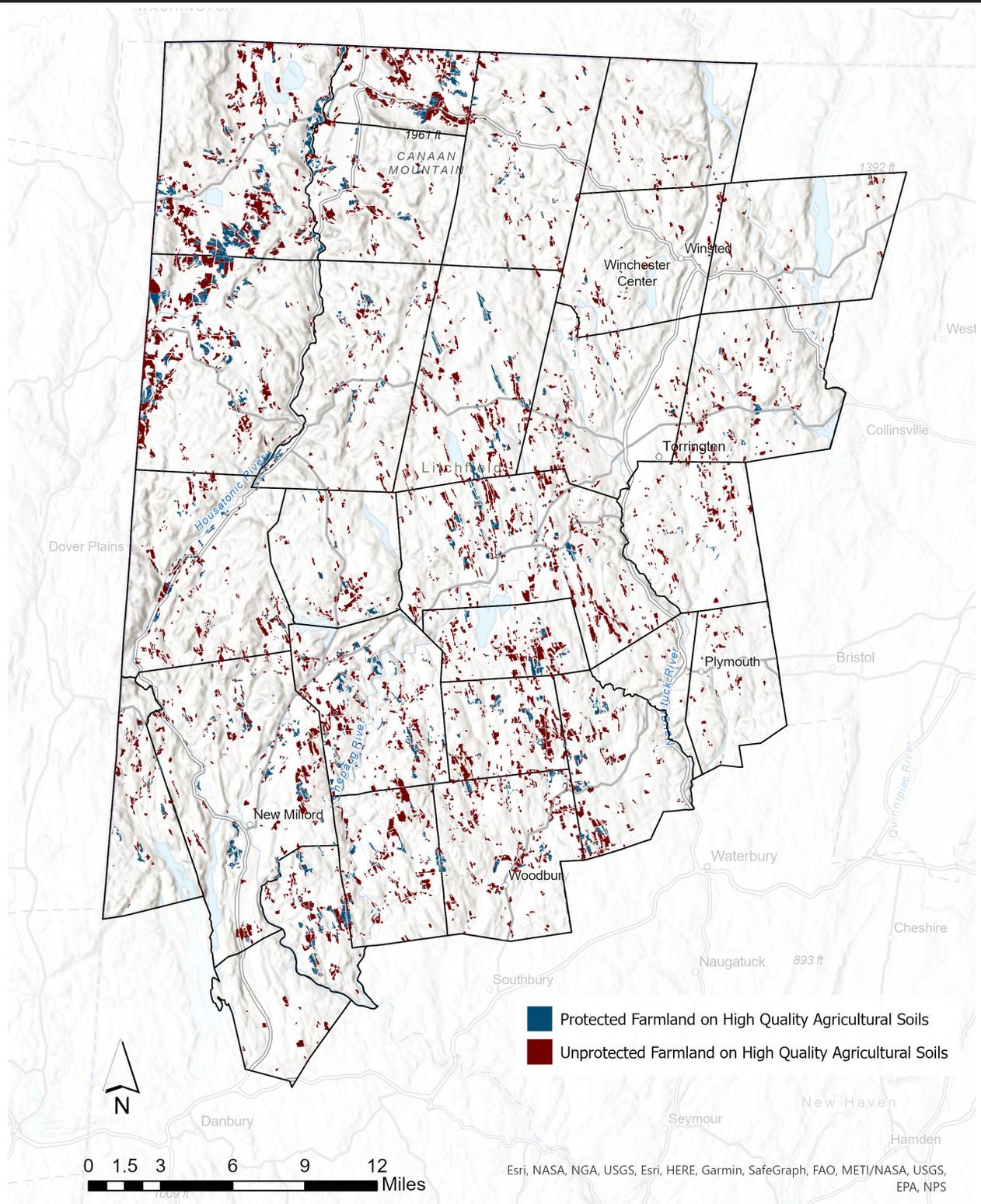
There are also Agricultural Property Tax Exemptions and Abatements that can incentivize farmers to keep their land as a working farm and can be used by farmers participating in the previously mentioned preservation programs ("Laws Pertaining to Agricultural Property Tax Exemptions and Abatements"). Conservation organizations and government agencies can help to share information about these programs with farmers and large property owners. Increasing data availability for locally important high-quality agriculture soils would be beneficial for conservation organizations and towns in prioritizing farmland conservation with the highest quality soils.

PLANNING FOR FARMLAND PRESERVATION IN SUFFIELD, CT

The town of Suffield has 2,376 acres of Preserved Farmland & Open Space, which is about 17% of their open space designated parcels. In its 2022 Conservation and Development Plan, the town cited encouraging agri-tourism, considering ways to provide marketing support for local farmers, and continuing to support and preserve farmland parcels as their strategies for maintaining the agricultural economy in Suffield. The Suffield Planning & Zoning Commission adopted regulations to permit weddings and other private functions on farms as a way of diversifying revenue streams for farmers (Planning & Zoning - Town of Suffield).



A view of Hastings Farms, 141 acres of preserved farmland in Suffield.



6-1 Farmland on high quality agricultural soils Compilation of prime agricultural soils, statewide important soils, and locally important soils. Indicates farms that are found on any of these high quality soils that are permanently protected from development or unprotected and at risk to possible subdivision and development.

WORKING FORESTS

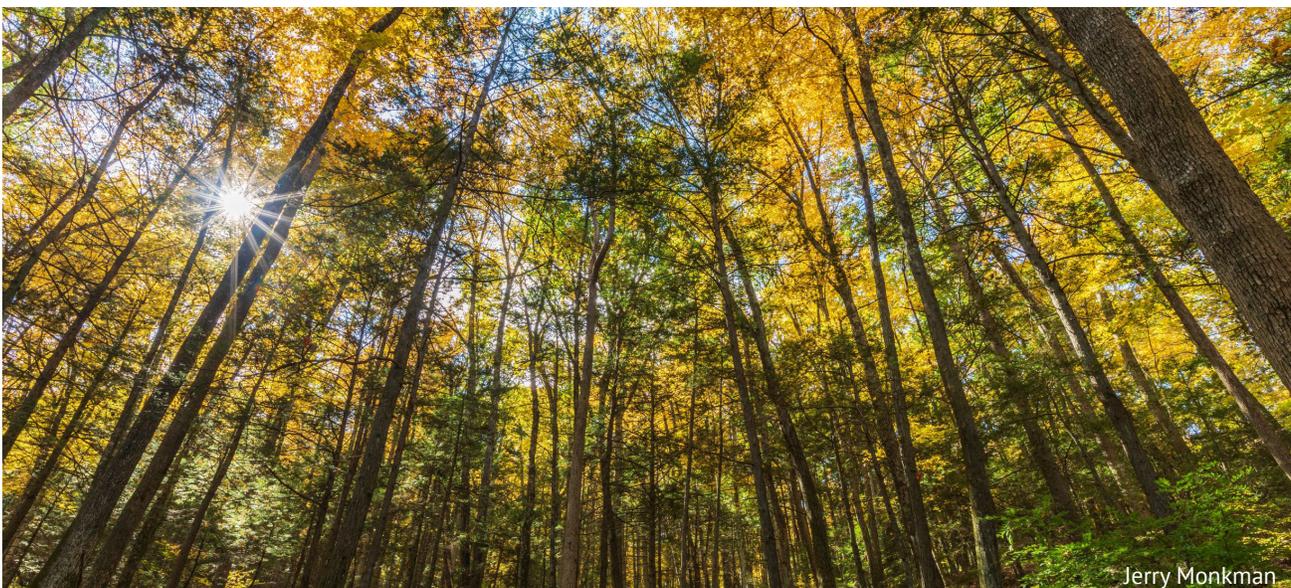
From the construction of homes, to heating those homes, to even filing permitting paperwork on those homes, timber products are a part of our everyday life. In today's market, importing wood from foreign sources has become a common practice.

Since the mid 1800s Connecticut's forests have been increasing in area, nearly doubling from their historic lows of 923,000 acres in 1860 to just under 1,800,000 acres today. In Northwest Connecticut, there are over 445,000 acres of forest, which covers 71% of the region. Nearly 125,000 acres of forest are currently protected from development.

Yet even with such high amounts of forest, New England imports 1.48 billion cubic feet of wood each year (The Path to Sustainability). This demand for timber products continues to lead to deforestation on a global scale, regardless of forest preservation close to home (The Illusion of Preservation). In many cases it is outsourced to less developed countries with little to no environmental regulations on timber harvesting, and can have harmful effects on fragile ecosystems (Sustainable Timber Harvesting in New England). Most paper products are from boreal forests or tropical rainforests. Because countries with these ecosystems usually have less rigorous environmental protections and inexpensive land, harvesting these countries' natural resources is more affordable to the end consumer, but it has many

negative impacts on the populations of these countries and the climate. These forests are usually primary forests, meaning they have never been logged by humans before (Berlik). They take an extremely long time to recover, if they ever do, to their old growth state. These forests are the largest forest carbon stores in the world and continued clear cutting of them increases greenhouse gas emissions into the atmosphere (Berlik). These forests are also very fragile ecosystems with highly specialized species that are not resilient to dramatic landscape changes, and intense clear cutting can lead to species loss that may never recover (Berlik). While forest protection in New England does have many local benefits it can have the effect of outsourcing natural resource extraction and disturbance to a different location and having a larger climatic impact than locally sourced timber products.

Local forestry using selective harvesting techniques is much more environmentally friendly than clear cutting of fragile pristine ecosystems (The Illusion of Preservation, Forest Carbon). Working forests can still be permanently protected from development through the use of conservation easements. Environmental and forestry regulations can ensure forests are harvested in a sustainable way to minimize impacts and create robust and healthy forests (Wildlands and Woodlands).



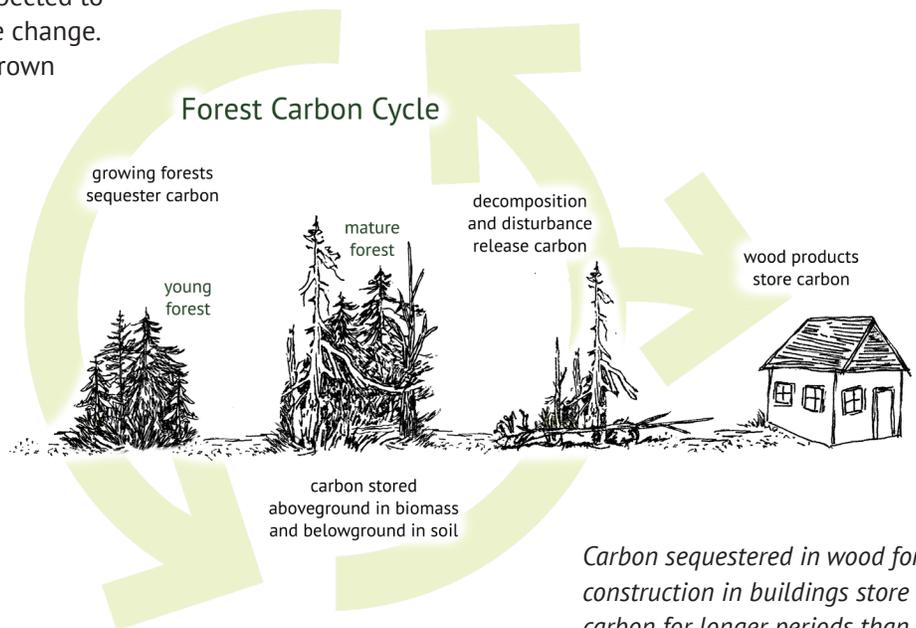
Jerry Monkman

Connecticut's forests have also been increasing in total biomass; with 96.1 million cubic feet grown in 2011, only 13.7 million cubic feet of wood was harvested in Connecticut ("Connecticut Forest Product Economic Resources"). However, the state consumed 366 million cubic feet, 96% more wood than it produced. With over 1.3 million acres of forest available for timber management that are on large enough parcels and are not currently restricted from timber harvests, Connecticut could be harvesting an additional 100 million cubic feet of wood each year sustainably and without the loss of soil carbon stores (The Path to Sustainability). In total New England could produce 686 million more cubic feet of wood than it consumes each year.

Managed forests can also still provide quality wildlife habitat, and intentional management can increase the diversity of forest structure and habitat. Managed forests can still provide all the same recreational opportunities and improve the safety of use in these areas (The Path to Sustainability). With increased diversity of forest structure and size, forests are not as susceptible to large blowdown events from large storms, which are expected to increase in severity with climate change. Even-aged stands that have regrown from clearcutting are more susceptible to blowdowns during large storms, compared to selectively harvested forests that contain a diverse forest structure and age class (The Path to Sustainability; Forest Resiliency). Managed forests also provide clean air and intercept and infiltrate rainfall. Wood products from managed forests can be used for building material, furniture, paper products, and fuel for heating. Carbon sequestered in wood for construction in buildings has been proven to store carbon for longer periods than

it would naturally in a forest as it decomposes (Sustainable Timber Harvesting in New England).

By using selective harvesting techniques, foresters can keep forests at a balance of active new carbon sequestration and storage. Forests composed of young trees have the greatest rate of carbon sequestration, but old growth forests contain the greatest carbon stores in soils (Forest Carbon). Traditional forestry techniques of clear cutting result in soil carbon stores being completely released into the atmosphere. With minimal-disturbance selective harvesting, soil carbon stores can be preserved and forests can be kept at an age class and diversity that can also maximize the rate of new carbon sequestration (Forest Carbon).

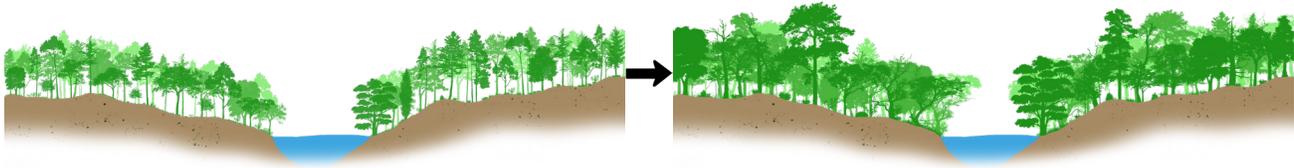


Carbon sequestered in wood for construction in buildings store carbon for longer periods than it would naturally in a forest as it decomposes, keeping CO₂ out of the atmosphere.

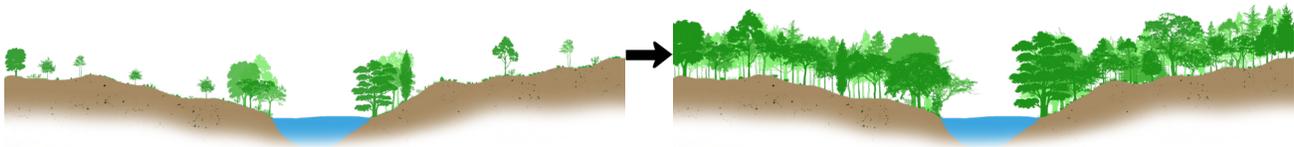
CURRENT DAY

30-50 YEARS IN THE FUTURE

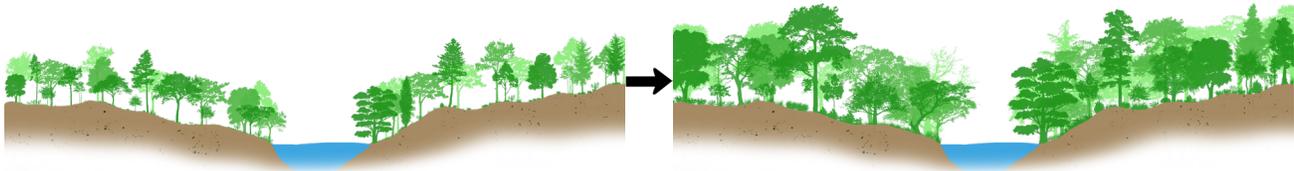
Unmanaged



Clear Cut



Selective Harvest



PROGRESSION OF FOREST MANAGEMENT TECHNIQUES

Current day forests are regrowing from more recent unregulated clear cuts. These forests have even-aged stands with dense canopies and limited understory. If these forests are left **unmanaged** they slowly progress to a more diverse structure and age class as trees naturally die off and are replaced by later successional species. In a dense forest such as this, competition is high and high quality timber growth is limited.

Clear cutting techniques remove all marketable timber from a forest, causing large disturbance levels and releasing carbon stored in soils. These soils also are then susceptible to erosion after tree removal which can impact water quality and riparian habitats. As these forests regrow they are dominated by even age class trees that shade out the understory and a structure that will resemble current day forests.

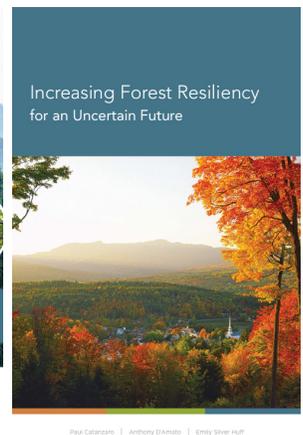
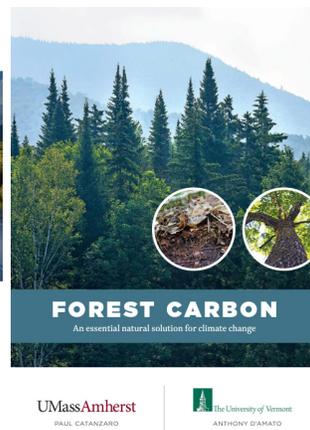
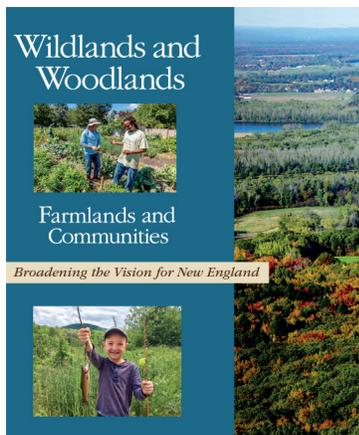
Selective harvesting techniques select specific trees to harvest, while leaving the majority of trees, to allow for a continually functioning forest ecosystem. Selective harvesting can create edge habitats and open more light to the understory, allowing for more understory growth. Forestry harvests on parcels that have been more recently clear cut can remove earlier succession species and advance forest structure to later successional species. As these forests progress and age they resemble those closer to pre-colonial settlement, with greater structure and age class diversity with a robust and flourishing understory. These forests continue to build up carbon stores in soils while timber is routinely harvested for human uses, creating multi-purpose land use. Large trees are left to grow in the forest and younger trees fill in open areas, which lends to less competition of even aged trees and maximizing growth and sequestration.

Old growth forests, wildlife preserves, or other important conservation areas are not appropriate for forestry practices. If there are sensitive habitats or wildlife that could be impacted, these areas should be avoided. On private property where forests have been logged more recently, forestry might provide a source of income for land owners and an incentive to protect their land from development. Public Act 490 allows for farms, forests, and open space land to be assessed at its use value, as opposed to its fair market value (“Public Act 490 - The Basics”). This can result in significant property tax reductions for property owners that keep their land in agriculture, forestry, or other undeveloped land types.

Currently in Connecticut forest product outputs directly employ over 8,200 people and generate \$2.1 billion annually (“Connecticut Forest Product Economic Resources”). A strong local forestry industry in Connecticut could not only employ foresters and

loggers, but also encourage local mills, local craftsmen, and carpenters to make local wood products and shops to carry and sell these products.

Increasing local forestry can decrease the pressure to log forests elsewhere and use fossil fuels to transport those wood products. With environmental and forestry regulations in place sustainable harvesting can provide income for land owners. Not only can these lands be productive, these forest lands can also be permanently protected with conservation easements to prevent future development. Guidance can be taken from the Woodlands and Wildlands report (Wildlands and Woodlands), Why We Manage Connecticut State Forests (“Forest Management on State Lands”), Forest Carbon: An Essential Natural Solution for Climate Change (Forest Carbon), and Increasing Forest Resiliency for an Uncertain Future (Forest Resiliency) when considering specific actions and forestry techniques.



VERMONT WOODWORKING & FOREST FESTIVAL

One example of a coordinated campaign to encourage forestry and local wood products is the Vermont Woodworking & Forest Festival. This annual festival, which began in 2003, promotes Vermont’s forestry industry and showcases the state’s talented woodworkers. The festival is organized by the Vermont Wood Manufacturers Association (VWMA), a nonprofit organization that represents the interests of the state’s wood products industry, and takes place at Marsh-Billings-Rockefeller National Historical Park. The VWMA works to support and promote Vermont’s small-scale forestry operations, sawmills, and woodworking shops. The festival has helped to increase demand for locally-sourced wood products, which has led to more local milling and crafting as part of Vermont’s rural economy (Vermont Fine Furniture, Woodworking & Forest Fest).

QUALITY OF LIFE

Conserving land in Connecticut can provide numerous direct economic benefits, as well as many indirect benefits to residents that can be quantified economically.

Reduced Maintenance Costs

One significant economic benefit of conserving land is reducing municipal costs of building and maintaining infrastructure to accommodate new development (Lerner et al.). Developed land often requires significant infrastructure, such as roads, utilities, and public services like schools and emergency services. In contrast, preserving land in its natural state may require only minimal maintenance for land owners—such as controlling invasive species or maintaining trails—and the maintenance for municipalities is often only road maintenance to access points.

Jobs in Restoration

In order to ensure the biodiversity and health of ecosystems protected, restoration may be necessary. Restoration is an important part of conservation and creates job opportunities, especially for youth excited to start a career in conservation work. The population in Northwest Connecticut is aging, and land trusts and municipalities in the region both see the need to create new jobs to attract younger residents.

Increased Options for Recreation

Conserving natural areas can provide opportunities for ecotourism and outdoor recreation, generating revenue for local businesses. This is a large industry in Connecticut, generating \$3.9 billion annually and accounting for 44,000 jobs (Economic Impact by State) and increasing areas for recreation can increase these figures. The management of conserved lands with allowable uses by the public was mentioned at a meeting of local land trusts in February 2023 as an area of focus in the region.



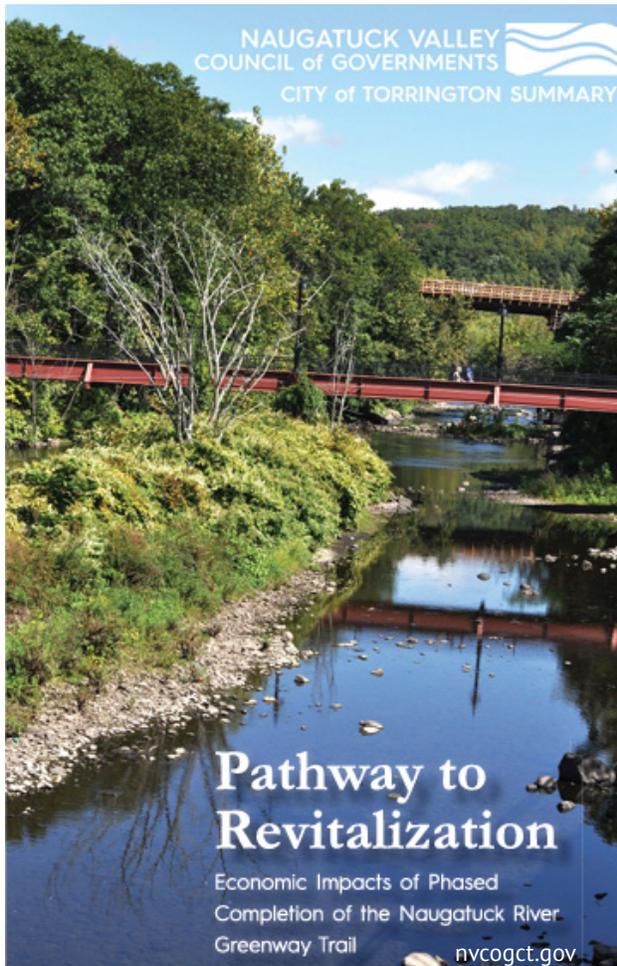
Devin Rodgers

Hikers on the Appalachian Trail overlooking the hills of Northwest Connecticut.

Health Benefits

A study published in the Journal of Physical Activity and Health estimated that the health benefits from walking and cycling on the Farmington Canal Heritage Trail in Connecticut could save the state approximately \$7 million annually in healthcare costs (“Benefits of Trails and Greenways”). Similarly, the Naugatuck River Greenway in the region is expected to have a cumulative health impact of \$259.6 million (NRG Economic Impact Study).

Conserving and restoring land in Connecticut can provide numerous economic benefits through improvements to human health. While it can be challenging to precisely quantify the economic value of these benefits, studies suggest that they are substantial and highlight the importance of preserving natural areas for the health and well-being of residents.



Increased Property Values

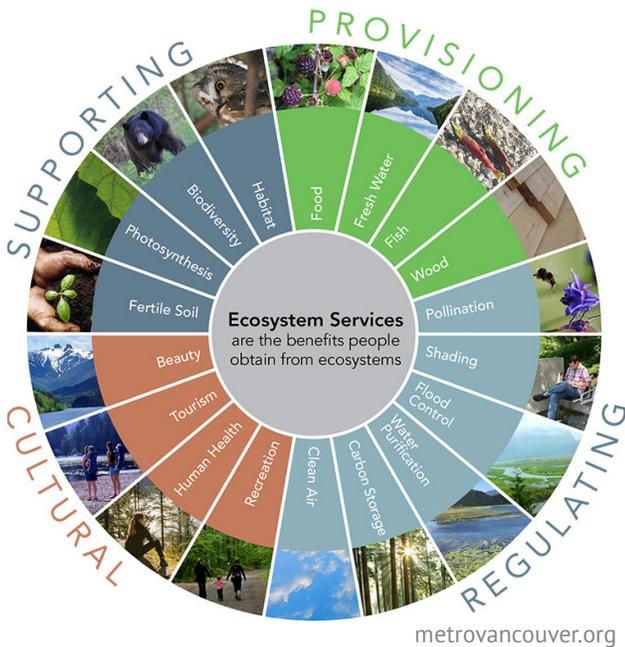
Properties located near conserved areas and greenways often have increased value due to the proximity to natural areas and recreational opportunities. This can generate revenue for local governments through increased property tax revenue and support for local businesses.

- A study conducted by the Trust for Public Land found that in Connecticut, homes located within 500 feet of a park or open space had a 10% higher median sales price compared to homes farther away from these amenities. The study also found that the value of homes within a quarter-mile of a park increased by approximately \$1,000 for every acre of parkland (Lerner et al.).
- A study conducted by the University of Connecticut found that homes located within 1,000 feet of open space in Connecticut had a 4 to 5% higher median sales price compared to homes further away from these areas. The study also found that homes located within 500 feet of open space had an even higher increase in value, with a median sales price that was approximately 6% higher than homes further away (Theobald).
- A study conducted by the Connecticut Department of Energy and Environmental Protection in 2015 found that the creation of a new state park in Connecticut had a positive impact on nearby property values. The study found that homes located within one mile of the new park had a 2.5% increase in median sales price compared to homes further away (Gunther et al.).



ECOSYSTEM SERVICES

Healthy ecosystems filter air and water, sequester carbon, mitigate the impacts of flooding and drought, and more. Collectively referred to as “ecosystem services,” these functions are essential for human well-being and are the foundation of many economic and social activities.



Air Quality

Conserving land can improve air quality by reducing the amount of pollutants in the air. Trees and other plants absorb pollutants such as ozone, nitrogen dioxide, and particulate matter. These pollutants can contribute to respiratory problems, heart disease, and cancer. Urban forests alone in Connecticut provide an estimated \$94.8 million worth of air pollution remediation (The Importance of Trees).

Water Quality

One of the most important ecosystem services provided by Connecticut’s natural systems is water supply. The state’s forests and wetlands play a critical role in maintaining the quantity and quality of water resources by capturing and storing rainfall, reducing the risk of flooding, and ensuring a steady supply of surface water. Wetlands serve as natural water filters, removing pollutants and excess nutrients from water runoff before it enters streams and rivers which flow

to the Long Island Sound. The value of the natural capital of the Long Island Sound alone is worth between \$17 billion to \$36 billion annually (Sound).

Carbon Sequestration

Another important ecosystem service provided by Connecticut’s natural systems is carbon sequestration. Forests and other ecosystems absorb and store carbon dioxide from the atmosphere, helping to mitigate the impacts of climate change. In Connecticut, forests alone store an estimated total of 209 million tons of carbon (“New England Forests”), which is equivalent to the annual emissions of over 45 million cars (US EPA).

Pollination, Pest Control, and Soil Fertility

Finally, Connecticut’s natural systems support important agricultural activities, providing essential ecosystem services such as pollination, pest control, and soil fertility. The value of pollination services to Connecticut’s agriculture is almost \$12 million annually, with a national total of \$14 billion (Stafford). The state’s natural systems provide pest control services, reducing the need for chemical pesticides that can harm human health and the environment. For agriculture, soil health is essential for plant growth, capacity to hold water, storage and release of nutrients, and suppression of pests and diseases. Healthy soils also sequester and store carbon, detoxify harmful chemicals, filter ground water, and control erosion. Diversity of soil microbes and plants directly impact soil health and support the ecosystem services they provide (Stirling et al.).



Swallowtail butterfly pollinating an echinacea flower.

Equity Considerations



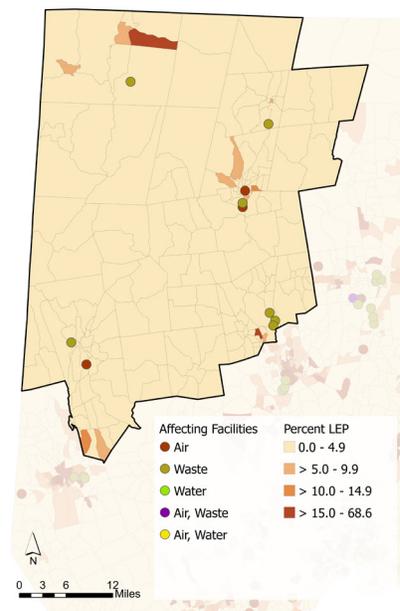
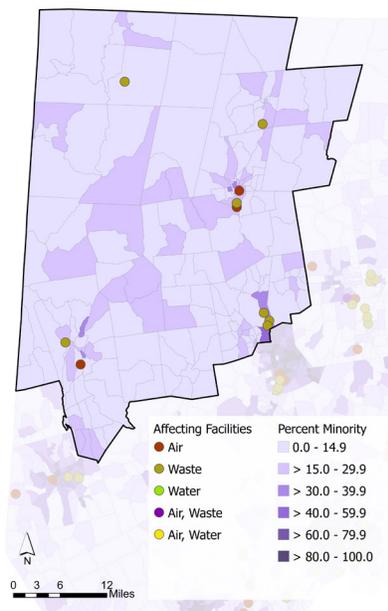
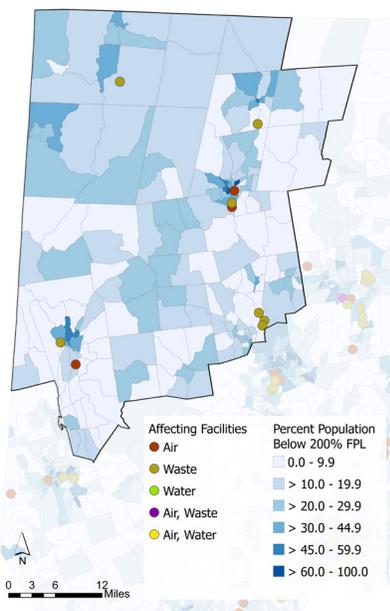
Increasing equity in conservation is an ongoing process of recognizing that all people do not benefit equally from land conservation and making adjustments to correct this imbalance. It also crucially involves shifting the power to determine where and how conservation occurs.

ENVIRONMENTAL JUSTICE

Equity is a cornerstone of the federal and global 30 x 30 initiatives. President Biden’s January 2021 Executive Order makes a commitment that 40% of the overall benefits from federal investments in conservation will flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution (“From 30x30 to America the Beautiful”; “Justice40 Initiative”). To responsibly engage in conservation work today is to consider equity in decision-making, programming, and land management.

What is Environmental Justice?

For years, advocates have organized to challenge racist planning policies and environmental degradation that disproportionately impact Black people, Indigenous people, and other people of color. It is well documented in Connecticut and across the country that low-income, limited English proficiency, and predominantly “minority” (or non-white) communities do not benefit equally from the environmental benefits of conservation (“Working Group Meetings 2022”). An Environmental Justice approach seeks to right these wrongs.



Percent Low-Income: The percent of the population whose income is below 200% of the federal poverty level (FPL). In 2020, 22.3% percent of the State population was low-income.

Percent Minority: The percent of the population that identifies their race as a race other than white alone and/or identifies their ethnicity as Hispanic and/or Latinx. In 2020, 34% percent of the State population identified as minority.

Percent Households LEP: The percent of households that identify as having limited English proficiency (LEP). In 2020, 5.1% percent of households in the State identified as having limited English proficiency.

7-1 Percent low-income, minority, and limited English proficiency block groups and affecting facilities All three demographic factors overlap spatially on Environmental Justice communities.

Environmental Justice policy is guided by the use of census data to identify vulnerable populations and to map where these populations coincide with environmental hazards. In Connecticut, an Environmental Justice community is defined as a distressed municipality, as designated by the Connecticut Department of Economic and Community Development, or census block groups where 30% of the population is living below 200% of the federal poverty level. Percent of the population identifying as a racial minority and percent of households with limited English proficiency are also mapped spatially.

By definition, Environmental Justice communities spatially coincide with environmental hazards. “Affecting facilities”—like landfills, waste incinerators, and sewage treatment plants—are concentrated in distressed municipalities and Environmental Justice communities. They are defined in section 22a-20a of the Connecticut General Statutes as any facility that falls under at least one of the following categories:

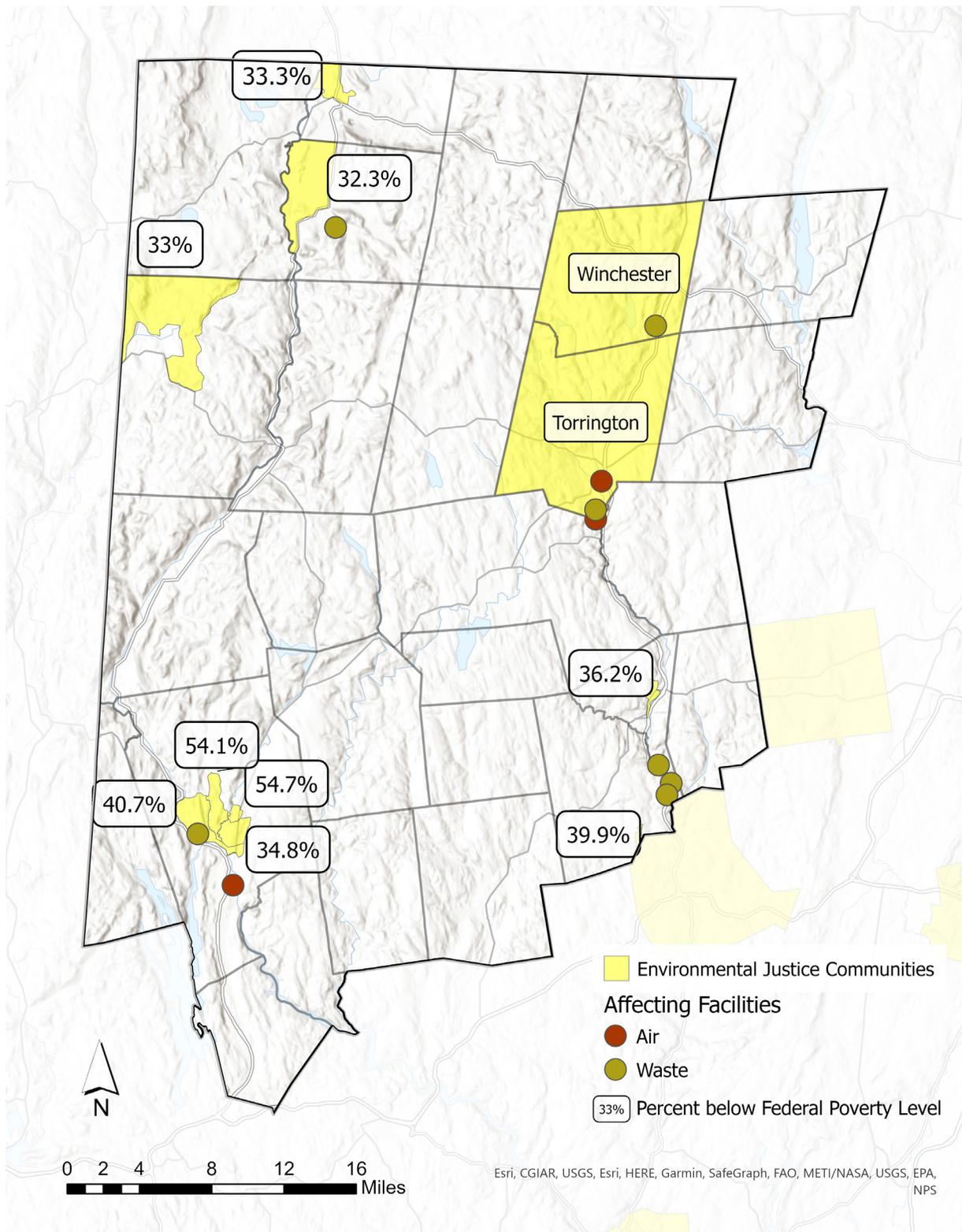
- (A) electric generating facility with a capacity of more than 10 megawatts;
- (B) sludge or solid waste incinerator or combustor;
- (C) sewage treatment plant with a capacity of more than 50 million gallons per day;
- (D) intermediate processing center, volume reduction facility or multi town recycling facility with a combined monthly volume in excess of 25 tons;
- (E) new or expanded landfill, including, but not limited to, a landfill that contains ash, construction and demolition debris or solid waste;
- (F) medical waste incinerator; or
- (G) major source of air pollution, as defined by the federal Clean Air Act

Environmental Justice in Northwest Connecticut

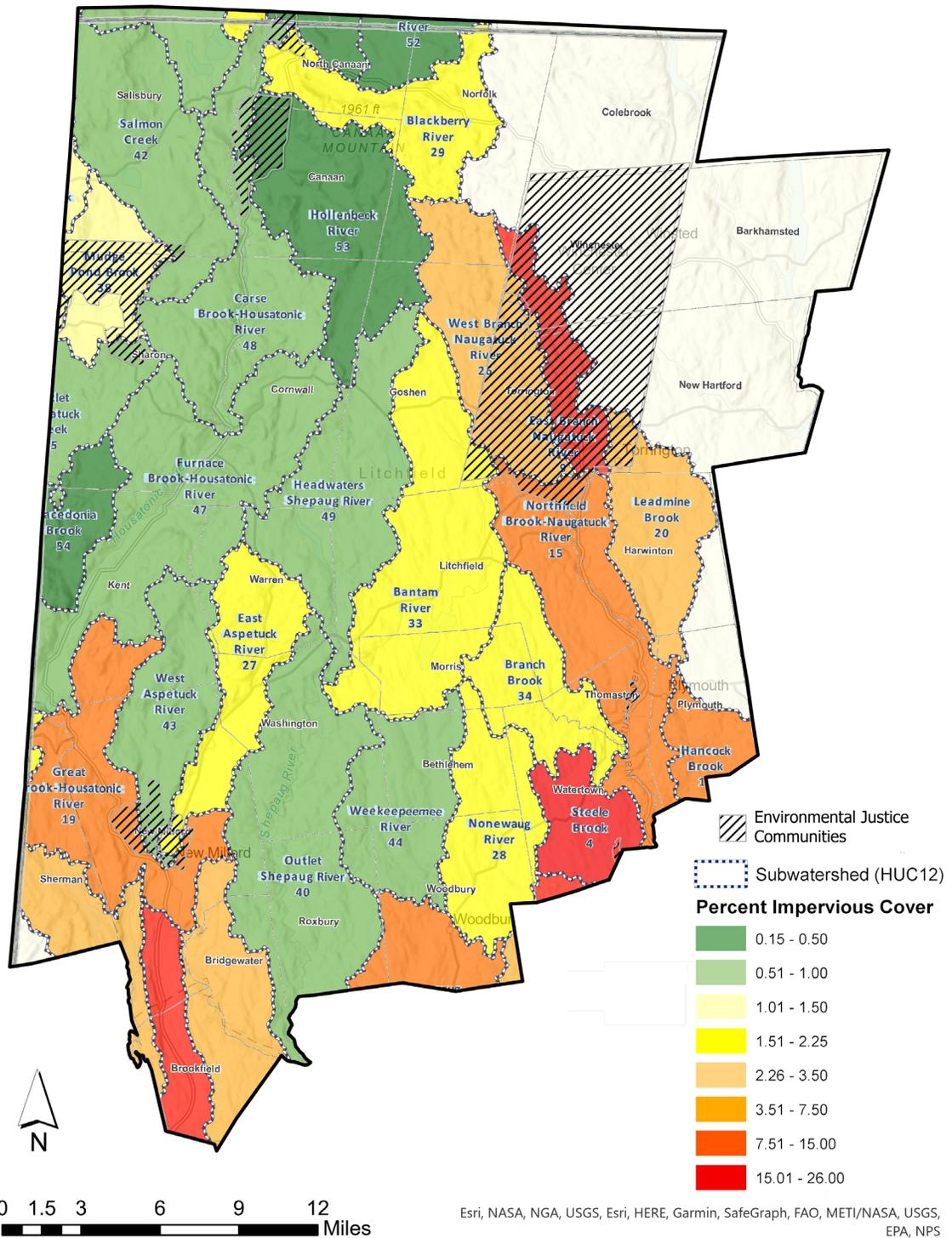
Torrington and Winchester are the two distressed Environmental Justice municipalities in the region; Bristol and Waterbury are also distressed municipalities that abut the region. Distressed municipality designation is used by state agencies to target funds for needs which may include housing, open space, brownfield remediation, and economic development programs, among others.

In the mid-1800s Torrington was a burgeoning industrial city, recently linked to other population centers by the Naugatuck Valley railroad. Industrialists harnessed the rapidly moving water of the Naugatuck River to provide waterpower for brass mills (History of Torrington). Today, this former mill town has 35,357 residents and is projected to soon have 50% of the population over 55 years old. Torrington’s neighbor to the north, Winchester, was also an industrial city and a major producer of mechanical clocks in the 1900s (“Winchester - Connecticut History”). Today, with a population of approximately 10,650, Winchester is a mid-sized hub of activity in the region (About Winchester). Between Winchester and Torrington, there are two regional waste facilities and two jet power facilities that impair air quality (CT DEEP) (“Water Quality Monitoring Program”).

In Northwest Connecticut, nine census block groups are designated as Environmental Justice Block Groups based on their percentage of low-income and/or minority populations. Block groups are the smallest geographical unit for which the US Census Bureau publishes data. Four of those block groups are in New Milford. Over 90% of the total population of Litchfield County identified as white alone in the last census. In the four Environmental Justice block groups, on average 19.75% identified as “minority,” or a race other than white alone and/or identified their ethnicity as Hispanic and/or Latinx (CT DEEP). Waste treatment, transfer stations, and electric generating facilities are the most common affecting facilities near these census block groups.



7-2 Affecting facilities and Environmental Justice communities In the region, waste facilities and facilities that negatively impact air quality coincide with low-income residential communities.



7-3 Environmental Justice communities and impervious surfaces Torrington, Winchester, and Watertown stand out as municipalities with the highest percentage of impervious cover.

Impervious Surfaces

Generally, as stated in the 30 x 30 report, high impervious cover and lack of access to greenspaces is correlated with Environmental Justice communities. Impervious cover refers to hard surfaces across the landscape such as roads, sidewalks, parking lots and roofs. Studies have found that impervious cover forces rain to run off the land, carrying pollutants quickly and directly to lakes and streams instead of soaking into the ground and being filtered by the soil (“Water Quality Monitoring Program”). However, Northwest Connecticut is a highly pervious component of the Housatonic watershed overall (see page 17). Local watersheds with the highest percent impervious cover are generally in the southern and eastern edges of the region; Torrington and Watertown stand out as cities with the highest percentage of impervious cover.



Hearst Connecticut Media

Downtown Torrington has the highest impervious surface cover in the region. Once impervious surfaces reach 10–20% of local watershed area, surface runoff doubles.

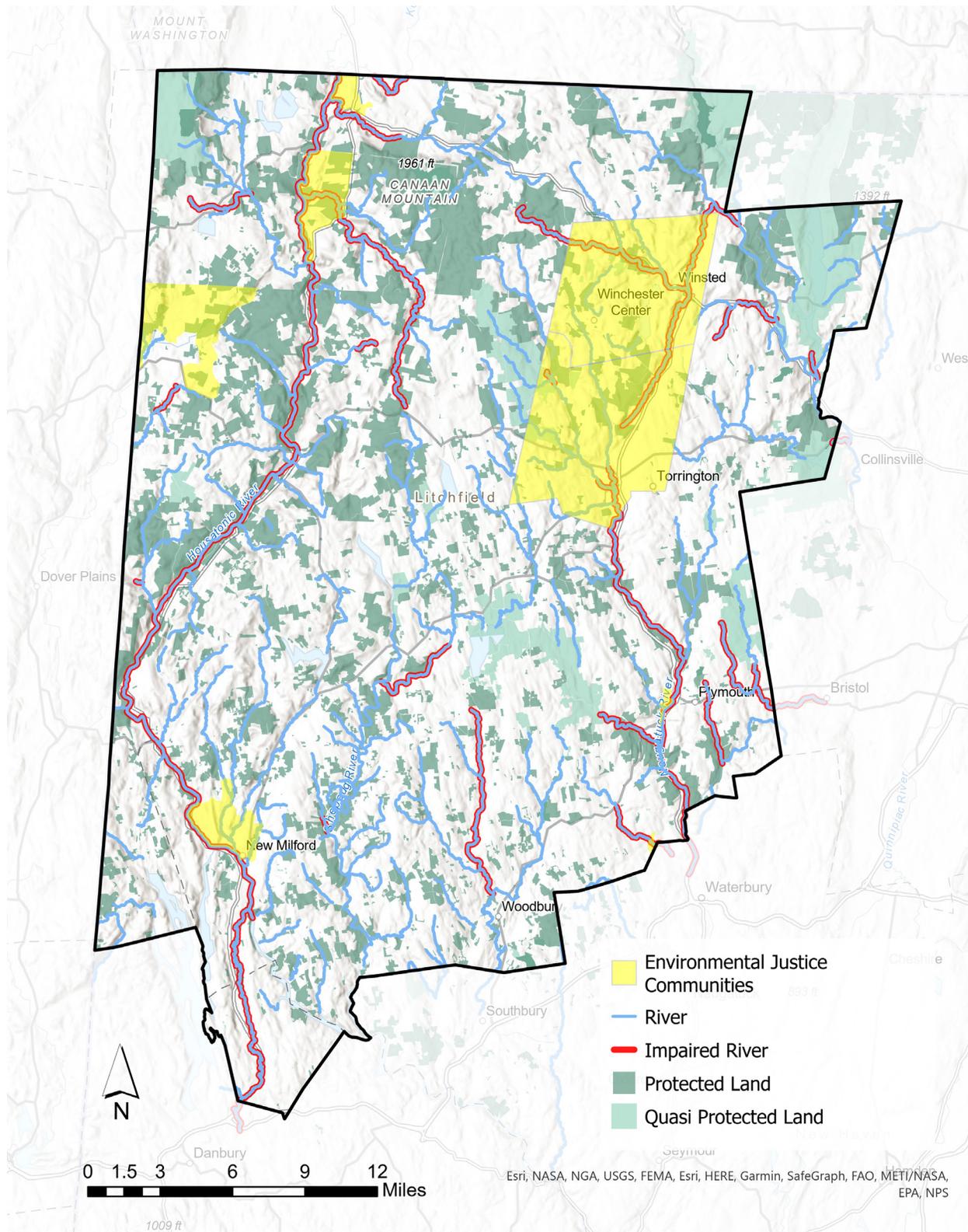
Impaired Waterways

In the preceding Ecological Considerations for Northwest Connecticut chapter, the benefits of protecting and restoring impaired waterbodies is discussed. Impaired waterways abutting and traversing Environmental Justice communities reveal a high-impact opportunity to improve surface water quality. River impairment limits outdoor recreation for residents of these communities. Efforts to protect land around rivers and remediate high levels of contaminants are critical and ongoing. Intervention may in some cases need to occur upstream if the pollutant source is located upstream of the impaired area. Coordinated efforts on a watershed scale are important for correcting impaired waterways. See a map of impaired rivers and Environmental Justice communities on page 68.



Naugatuck River Revival Group

Nonpoint source pollutants—like agricultural runoff and bacteria from faulty septic systems—are the main contributors to impairments in Northwest Connecticut. River impairment limits outdoor recreations for residents nearby.



7-4 Environmental Justice communities and impaired waterways Impaired rivers present an opportunity for restoration not just in Environmental Justice communities but throughout the region.

Affordable Housing

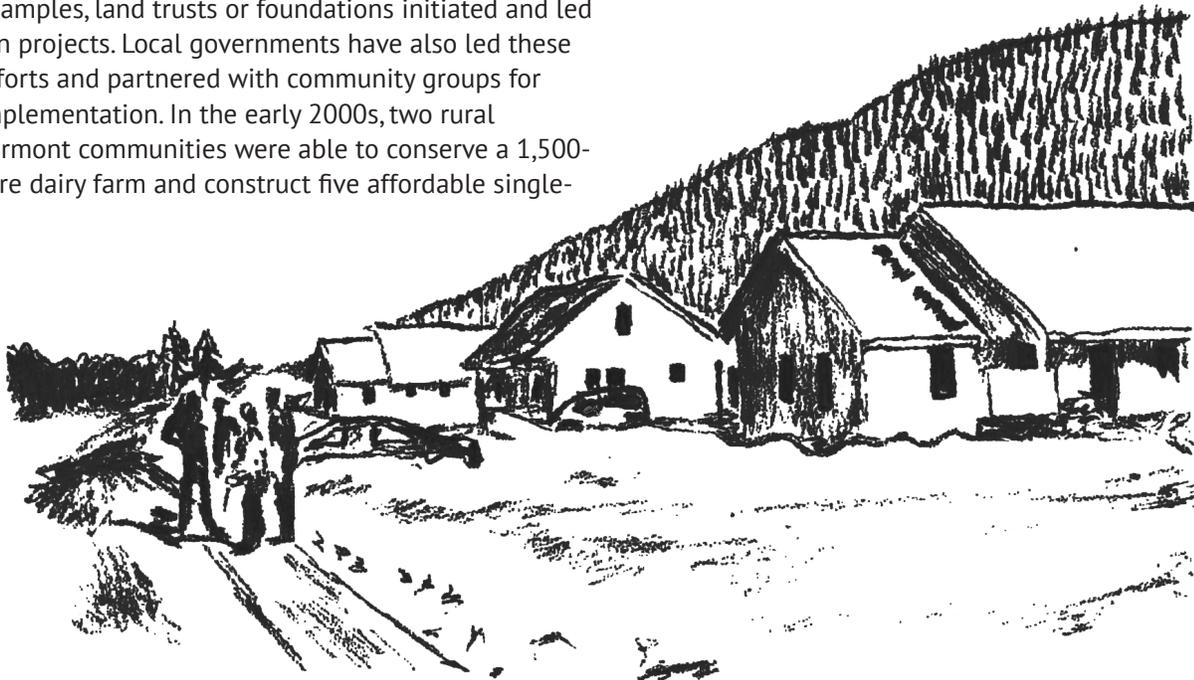
Environmental Justice block groups and distressed municipalities can also spatially represent some of the areas heavily impacted by the lack of affordable housing and declining rates of job creation. Like many places across the country, Western Connecticut is confronting a lack of affordable housing. The Partnership for Strong Communities Housing Data Profiles (2020) for Litchfield County reported that 45% of renters, 21% of homeowners without mortgages, and 30% of homeowners with mortgages are cost-burdened, that is, spend 30% or more of their income on housing. In New Milford, the Partnership for Strong Communities Housing Data Profile (2018) found that 55% of renters and approximately 29% of homeowners are cost burdened (Affordable Housing). Non-profit land trusts' collaboration with municipalities can further both the causes of land conservation and affordable housing through advocacy for denser development in downtowns to reduce sprawl and increase housing stock.

The Conservation Fund's Conservation Based Affordable Housing report includes several examples of a holistic, integrated approach to land conservation and affordable housing. Of the fifteen examples, land trusts or foundations initiated and led ten projects. Local governments have also led these efforts and partnered with community groups for implementation. In the early 2000s, two rural Vermont communities were able to conserve a 1,500-acre dairy farm and construct five affordable single-

family homes located in the town center. In addition to the protection of a productive farm, the project added to the National Forest and provided recreational access to the White River (Briechle).

“Piecemeal development decisions can often slowly eat away at the rural and agricultural landscape. But development linked to strategic conservation of the rural lands can help ensure continuation of the rural character and industries such as farming and forestry while providing housing for rural residents.”

Conservation Based Affordable Housing



Taylor Meadows houses in Hancock, Vermont. Five affordable single family homes were built near the town center.

Trail Access

Another aspect of equity is access to conserved land. While 95% of buildings in Northwest Connecticut are within a 15-minute drive of a trail access point, only 6% of buildings are within a 15-minute walk of a trail access point. There are no widespread public transportation options in the region, which disproportionately impacts the elderly and disabled. All regional councils of governments in western Connecticut identify the need to increase public transit to diversify transportation options. Conservation organizations may have an interest in municipalities building denser, more walkable and rollable communities connected by regional public transportation. Public transit may help those without

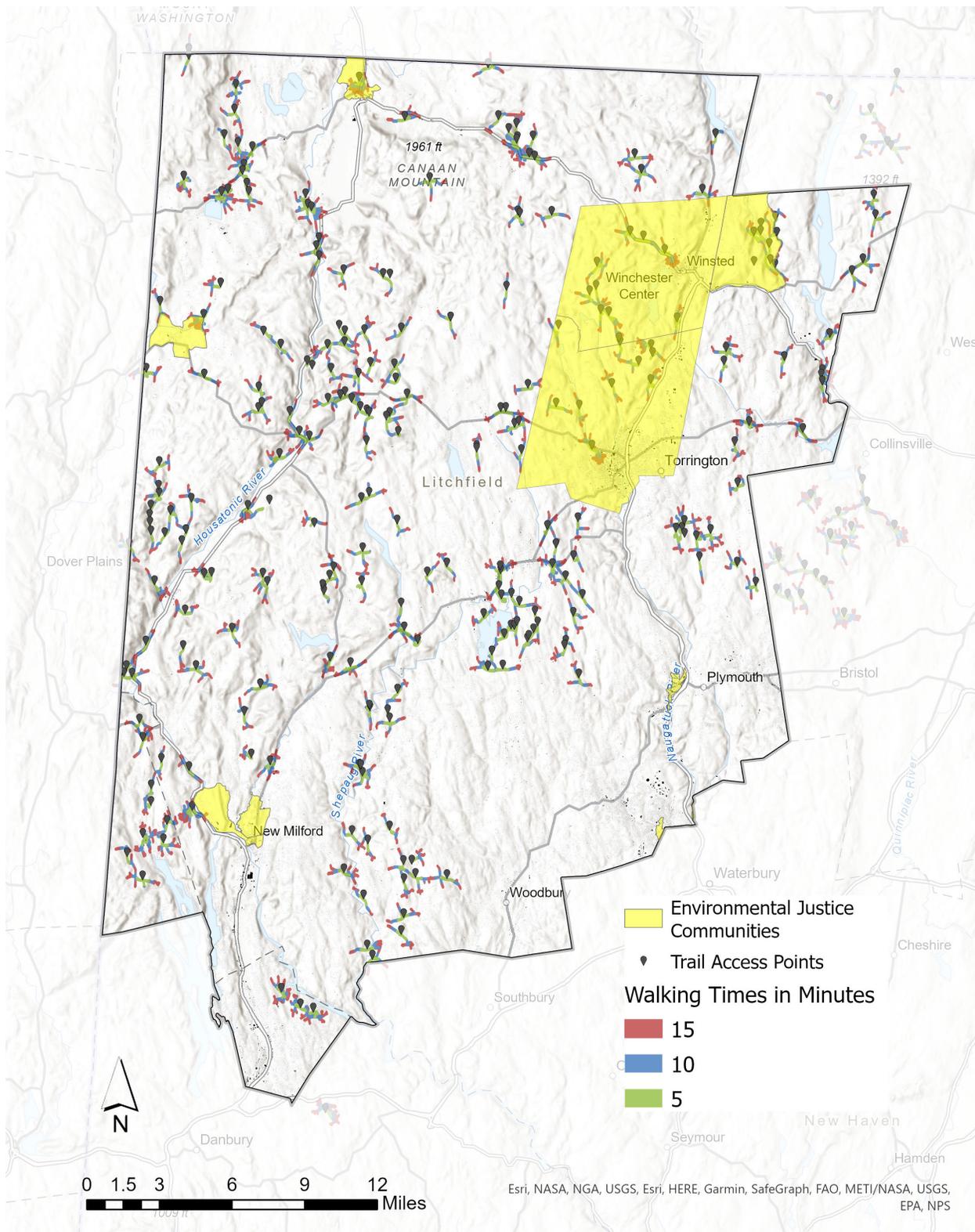
cars and unable to drive access trails. Focusing first on areas where Environmental Justice communities live can increase outdoor recreation and reduce reliance on cars for people likely to live in the region year-round.

Projects to combine pedestrian and bicycle paths with green infrastructure on conserved land in towns can have dual benefits of filtering pollutants out of runoff to prevent additional waterway impairment and increasing access to greenspace in built areas. Green infrastructure captures “both broad scale land conservation as well as micro-scale stormwater practices” that filter and absorb stormwater where it falls (Myers).

MILL RIVER TRAIL GREEN INFRASTRUCTURE CORRIDOR



The Mill River Trail Green Infrastructure Corridor showcases how green infrastructure can be incorporated along trails. In 2018, Save the Sound produced the Mill River Watershed Based Plan, which called for the implementation of gray and green infrastructure to manage stormwater and prevent Combined Sewer Overflow and urban runoff discharges to the Mill River in New Haven. Along the Mill River Trail, a 12,000-square-foot section of dead-end, unused, and frequently flooded roadway was retrofitted into a small park. It receives and treats runoff from the adjacent roadway while enhancing the beauty, connectivity, and ecological function of the Mill River Trail and the surrounding community (Younts Design Inc). Ultimately, strategic projects like these on conserved land near population centers can improve human health outcomes.



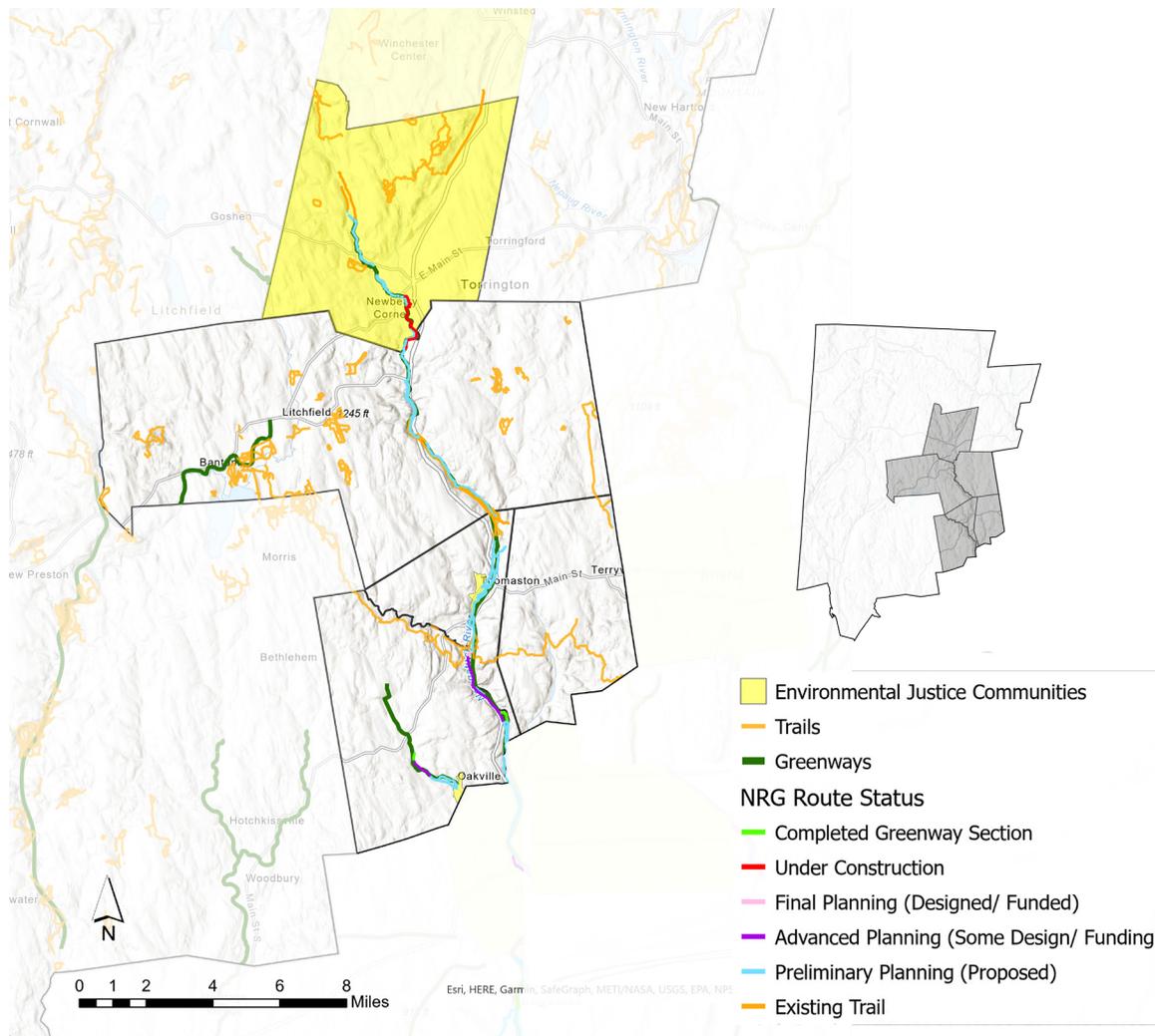
7-5 Trail access by walking times While 95% of buildings in Northwest Connecticut are within a 15-minute drive of a trail access point, only 6% of buildings are within a 15-minute walk of a trail access point.

Greenways

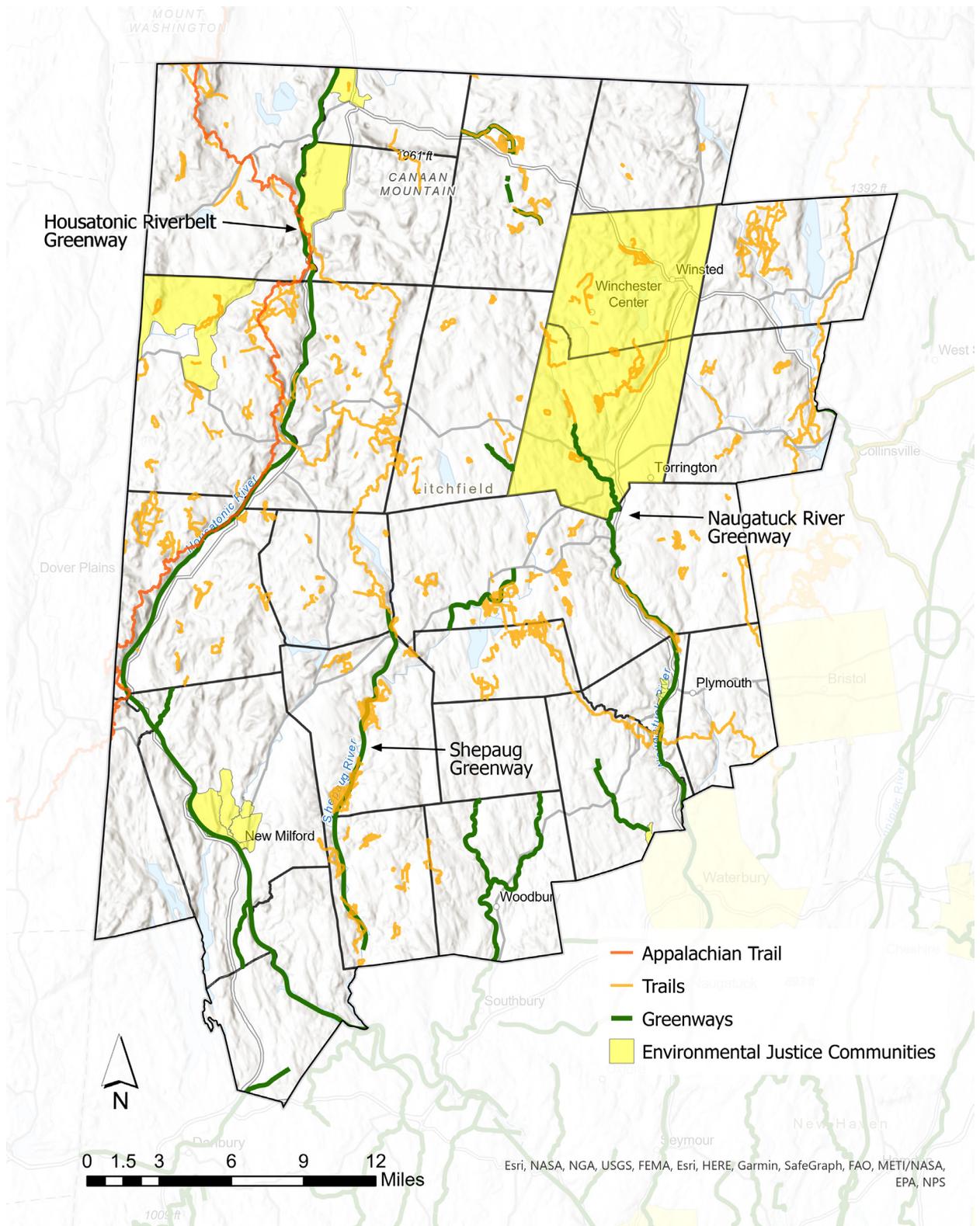
Greenways are corridors of open space that may protect natural resources or provide recreational opportunities, and typically follow a natural feature like a river or manmade features like a canal or unused rail bed. As mentioned above, the Naugatuck River Greenway (NRG), an officially designated Connecticut State Greenway, runs from Torrington through Litchfield, Thomaston, Plymouth, and further into southern Connecticut (“Official Connecticut Greenways”). The greenway begins in a distressed municipality, passes through an Environmental Justice block group in Thomaston and exits the region into Waterbury, another distressed

municipality. The Naugatuck Valley Council of Governments is working to add a multi-use trail to the Naugatuck River Greenway. As segments are completed, it will provide a non-motorized transportation option and improve the health and quality of life of residents.

A key element of greenways’ success as a public recreation amenity hinges on public outreach to residents. Land trusts and others can maximize the positive impacts of their work by engaging communities—especially Environmental Justice communities near trails—throughout the planning, design, and implementation process.



7-6 Trail status along the Naugatuck River Greenway Preliminary planning is underway for trail routes along the Naugatuck River Greenway in and alongside Environmental Justice communities.



7-7 Greenways and trails with Environmental Justice communities Several state-designated greenways wind through the region and pass Environmental Justice communities.

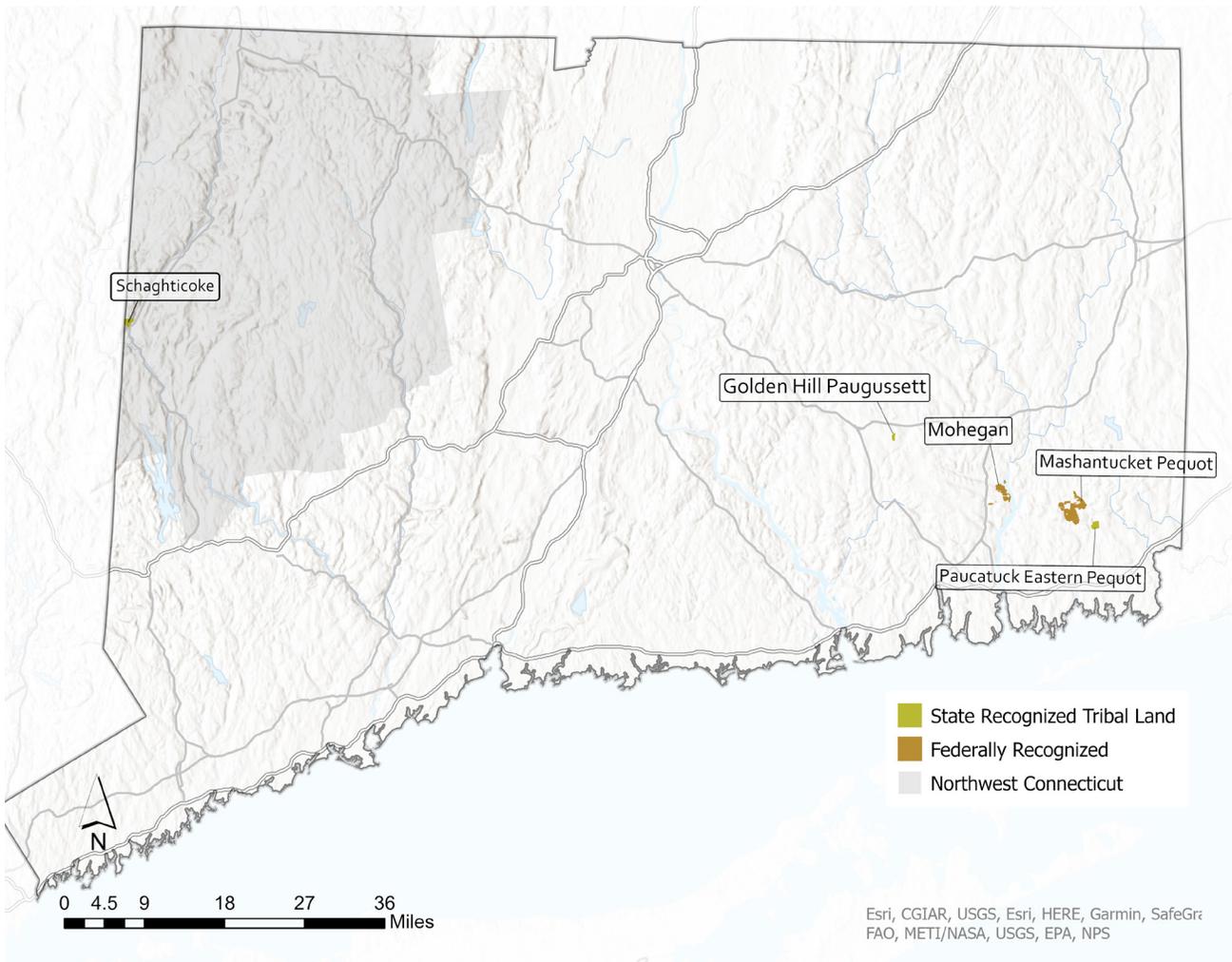
TRIBAL LAND AND SOVEREIGNTY

In Connecticut, five tribes—the Golden Hill Paugussett tribe, Mashantucket Pequot tribe, Mohegan tribe, Paucatuck Eastern Pequot tribe, and Schaghticoke Tribal Nation—are recognized by the federal and/or state government. Today, their combined territories are 0.13% of the land area of Connecticut.

To apply the Honor Tribal Sovereignty principle of the 30x30 initiative, land trusts and large landowners should consider initiating tribal consultation, supporting tribal-led conservation and restoration priorities, co-stewarding lands and waters, and assisting in the repatriation of land.

“Efforts to conserve and restore America’s lands and waters must involve regular, meaningful, and robust consultation with Tribal Nations.”

American the Beautiful Report



7-8 Tribal land in Connecticut The Golden Hill Paugussett tribe, Mashantucket Pequot tribe, Mohegan tribe, Paucatuck Eastern Pequot tribe, and Schaghticoke Tribal Nations’ combined territories are 0.13% of the land area of Connecticut.

PASSAMAQUODDY AND PINE ISLAND, MAINE



In Maine, the Passamaquoddy Tribe, with the help of land trusts, reacquired land stolen over 150 years ago. In the fall of 2020, William Nicholas, the chief of the Passamaquoddy Indian Township reservation reached out to First Light, an umbrella group of 65 land trusts, timber companies, philanthropies, and conservation groups. A member of First Light, the Maine chapter of The Nature Conservancy, in effect gave the tribe the funds to purchase the island—known as White’s Island by Euro-American settlers since the 1850s but as Kuwesuwi Monihq, or Pine Island, by the Passamaquoddy—from the seller (Woodard). The Nature Conservancy, one of the world’s largest conservation organizations, has institutionalized the transfer of ecologically important land with its Indigenous Peoples and Local Communities Program in both the U.S. and globally.

Conclusion

In summary, equitable actions for Northwest Connecticut can be considered in two main categories: 1) involving Environmental Justice populations and indigenous tribes in decision-making and 2) correcting the inequitable distribution of access to nature.

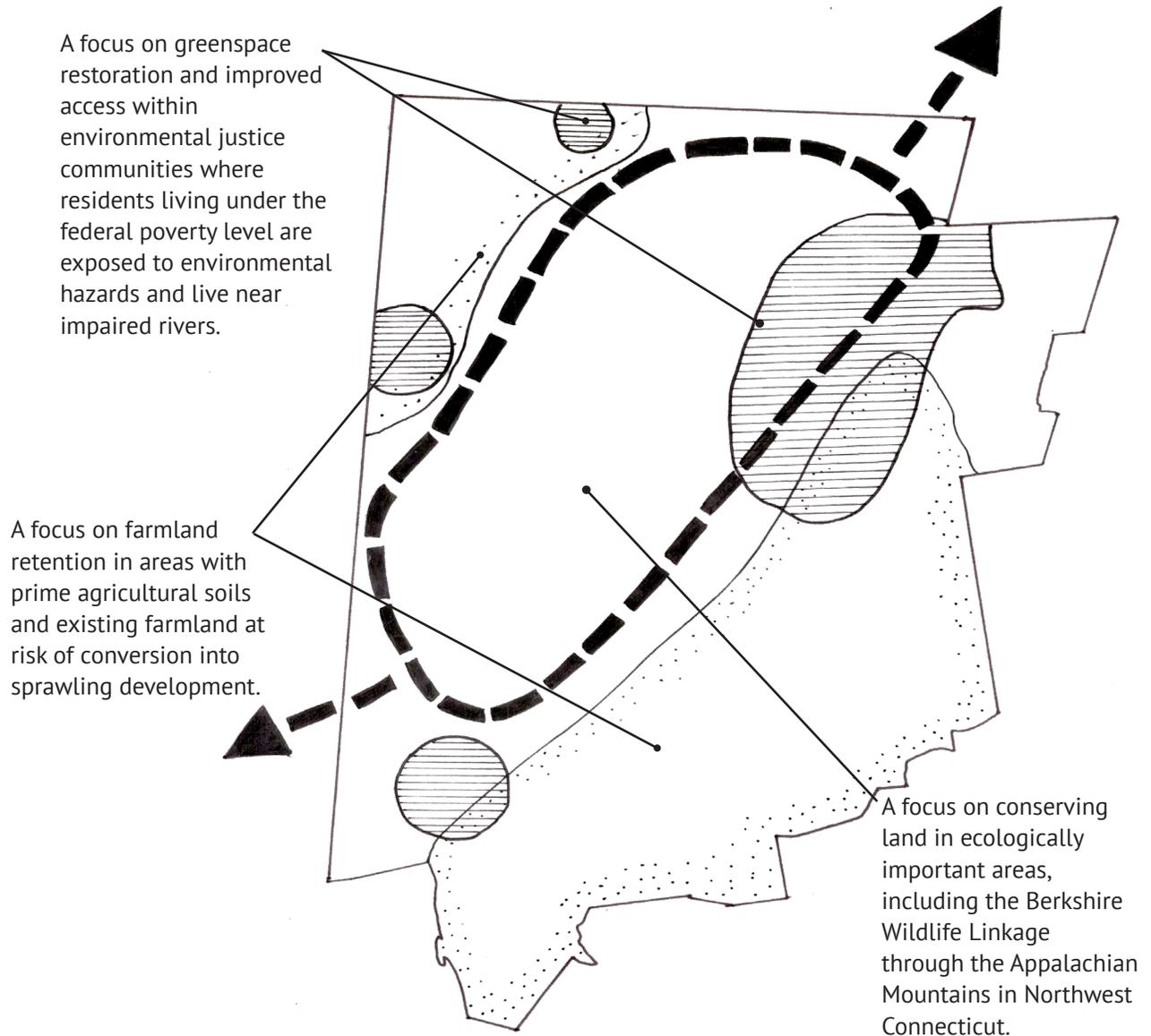


Implications Summary



As this report shows, ecological, economic, and equitable considerations for conservation work in Northwest Connecticut are not distinct nor mutually exclusive. A single greenway project can meet all three objectives; protecting a highly ecologically valuable swamp or a collaborative project with an Indigenous group may prioritize a single consideration but remain highly important and yield other benefits.

A strategic approach to conservation uses available data and analysis to find opportunities to combine these considerations. In Northwest Connecticut, large-scale patterns emerge through site analysis with implications that can guide a regional conservation strategy:



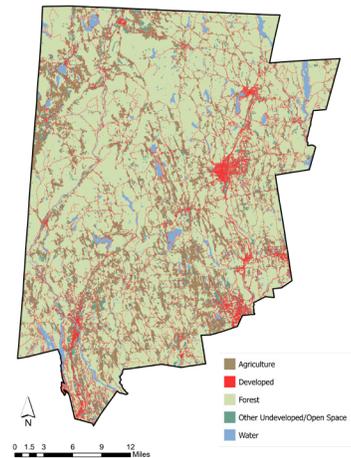
Although a useful benchmark, 30% of land and water conserved is not—in and of itself—the singular conservation goal. As Rebecca Neary, Board President of the Warren Land Trust said, the goal is to “preserve land with high conservation value then turn to best-practice stewardship, [including] sustainable agriculture, and undertake regular outreach that effectively conveys the importance of our work.”

Appendix: Indexed Maps

CHAPTER 2

2-1 Land Cover in Connecticut

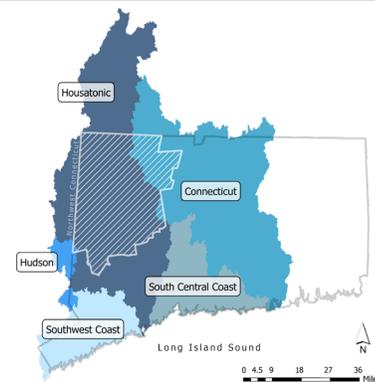
- 2015 land cover data at 30m resolution from University of Connecticut Center for Land Use Education and Research



CHAPTER 3

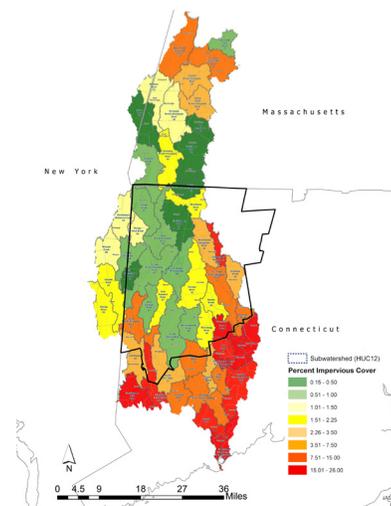
3-1 Major Watersheds in Western Connecticut

- Connecticut Major Drainage Basins from Connecticut Department of Energy and Environmental Protection (DEEP)
- Northwest Connecticut extent from Northwest Connecticut Land Conservancy



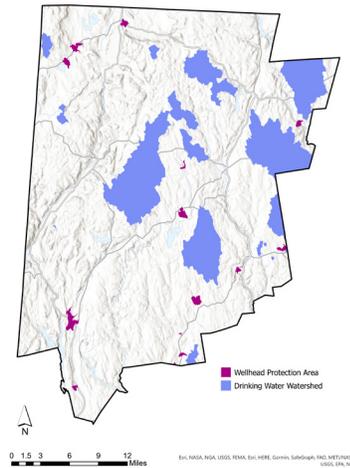
3-2 Housatonic Watershed Impervious Surfaces

- Percent impervious surface cover from Housatonic Valley Association



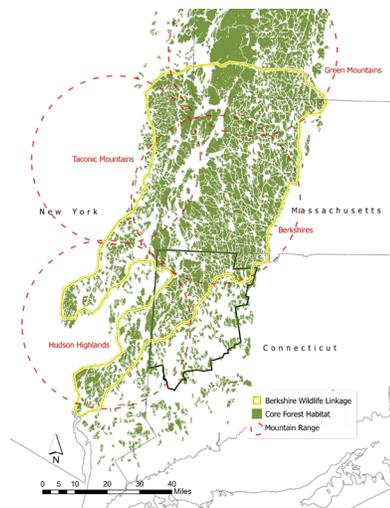
3-3 Drinking Water Supplies in Northwest Connecticut

- Wellhead Protection Areas is Aquifer Protection Areas from Connecticut Department of Energy and Environmental Protection (DEEP)
- Public Water Supply Map for Drinking Water Watersheds from Connecticut Department of Energy and Environmental Protection (DEEP)



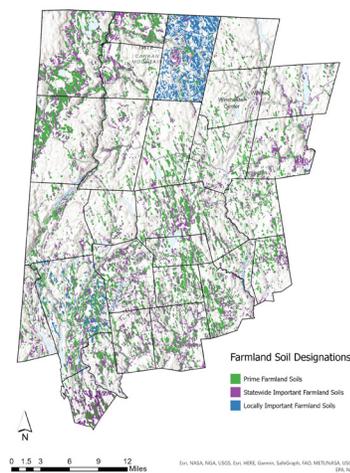
3-4 Core Forests and Mountain Ranges in Berkshire Wildlife Linkage

- Core forest habitat from Housatonic Valley Association Follow the Forest
- Berkshire Wildlife Linkage from The Nature Conservancy



3-5 Farmland Soil Designations

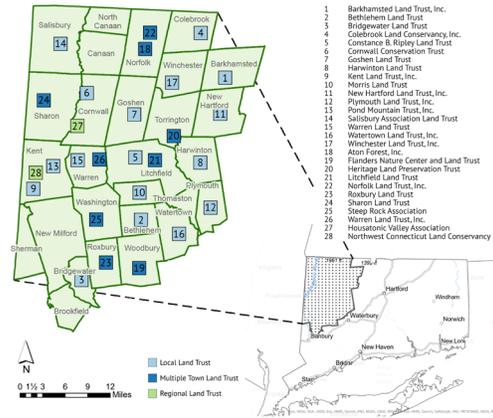
- Farmland Soils from Connecticut Environmental Conditions Online (CT ECO)



CHAPTER 4

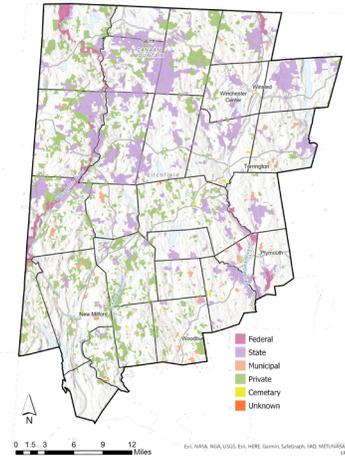
4-1 Land trusts in Northwest Connecticut

- From Connecticut Land Conservation Council



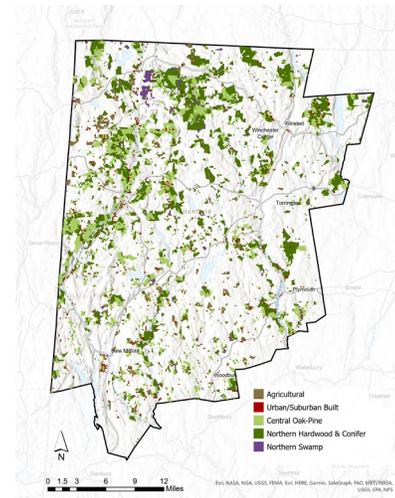
4-2 Permanently protected land by ownership

- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy



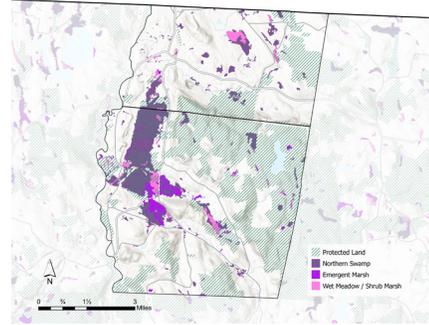
4-3 Permanently protected land by ecosystem

- Terrestrial habitats from Conservation Gateway, The Nature Conservancy
- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy



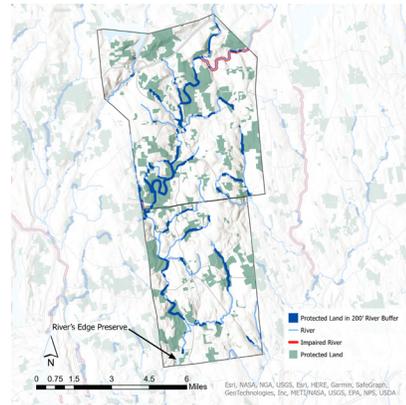
4-4 Protected land around Robbins Swamp wetland complex

- Terrestrial habitats from Conservation Gateway, The Nature Conservancy
- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy



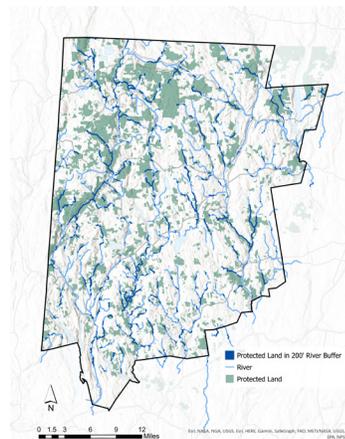
4-5 Protected land at River's Edge Preserve

- 200' buffer calculated from Connecticut 305b Assessed River 2020 accessed through Connecticut DEEP
- Impaired rivers from Connecticut 303(d) Impaired Waters 2020 accessed through Connecticut Department of Energy and Environmental Protection (DEEP)
- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy



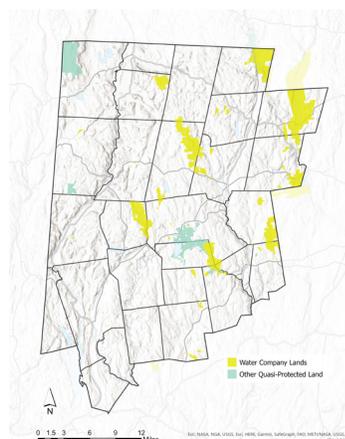
4-6 Protected land in river buffers

- 200' buffer calculated from Connecticut 305b Assessed River 2020 accessed through Connecticut Department of Energy and Environmental Protection (DEEP)
- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy



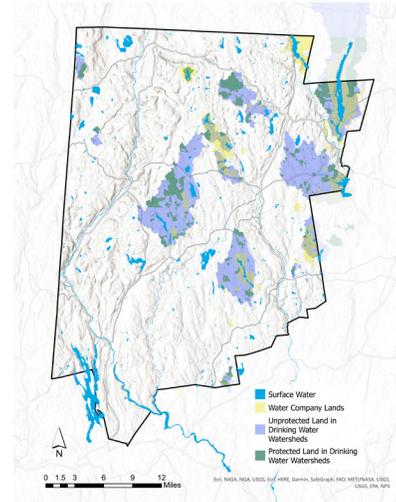
4-7 Quasi-protected land by owner

- Quasi protected land layer compiled from the Metropolitan District, the Connecticut Department of Health, NCLC, and the Naugatuck Valley Council of Government via NCLC



4-8 Protected and quasi-protected land in drinking water watersheds

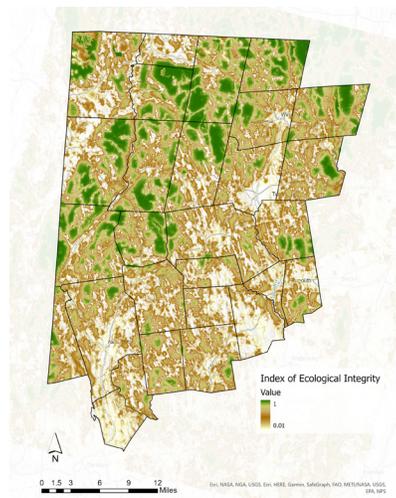
- Protected lands from Greenprint via NCLC
- Quasi protected land layer compiled from the Metropolitan District, the Connecticut Department of Health, NCLC, and the Naugatuck Valley Council of Government via NCLC
- Drinking water watersheds from CT.gov Public Water Supply Map
- Surface water quality polygon from Connecticut Department of Energy and Environmental Protection (DEEP)



CHAPTER 5

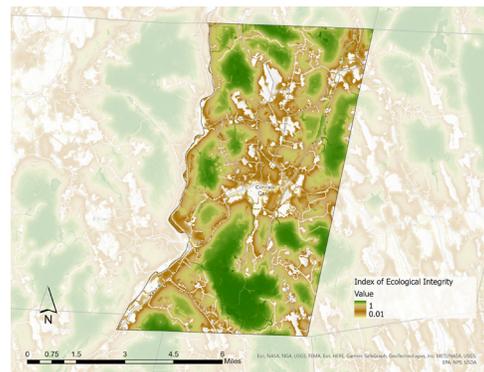
5-1 Index of Ecological Integrity

- University of Massachusetts Amherst DSL - Designing Sustainable Landscapes (2020)



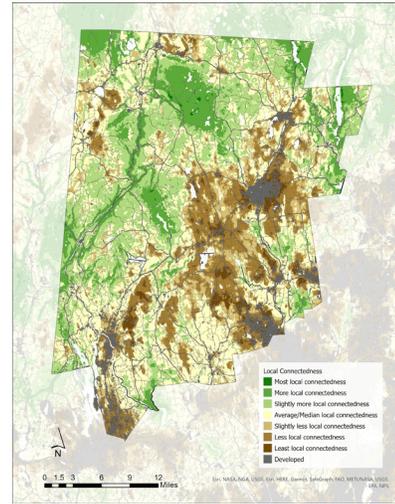
5-2 Index of Ecological Integrity for Cornwall, CT

- University of Massachusetts, Amherst, Designing Sustainable Landscapes



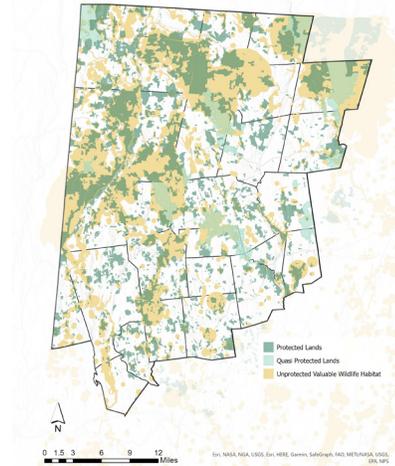
5-3 Local Connectedness

- The Nature Conservancy Resilient Land Mapping Tool



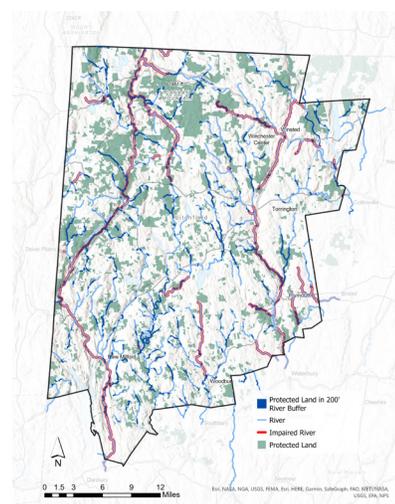
5-4 Unprotected critical wildlife habitat

- Protected lands from Greenprint via the Northwest Connecticut Land Conservancy
- Natural Diversity Database (CT DEEP), Critical Habitats (CT DEEP), Important Bird Areas (National Audubon Society)



5-5 Protected land and impaired rivers

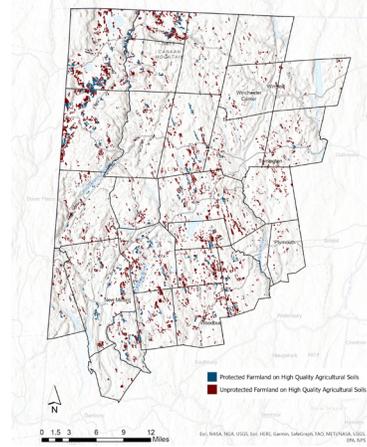
- Impaired rivers from Connecticut 303(d) Impaired Waters 2020 accessed through Connecticut Department of Energy and Environmental Protection (DEEP)
- 200' buffer calculated from Connecticut 305b Assessed River 2020 accessed through Connecticut Department of Energy and Environmental Protection (DEEP)
- Protected lands from Greenprint via NCLC



CHAPTER 6

6-1 Farmland on high-quality agricultural soils

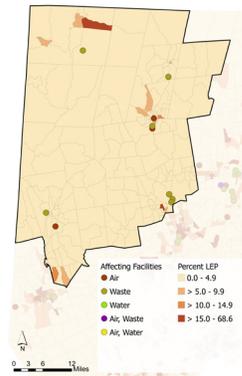
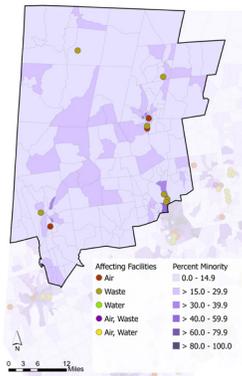
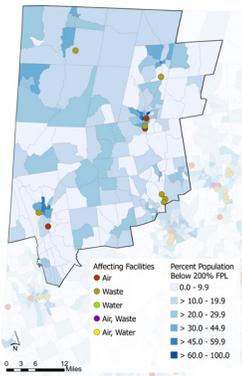
- Protected lands from Greenprint via NCLC
- Farmland Soils from Connecticut Environmental Conditions Online (CT ECO)
- 2015 land cover data at 30m resolution from University of Connecticut Center for Land Use Education and Research



CHAPTER 7

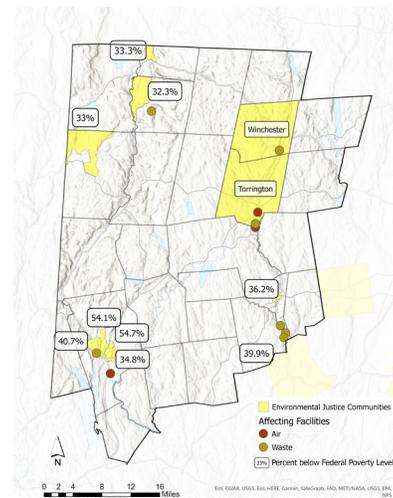
7-1 Percent low-income, minority, and limited english proficiency block groups and affecting facilities

- Environmental Justice Block Groups from Connecticut Department of Energy and Environmental Protection (DEEP)
- Demographics and Affecting Facilities from Connecticut Department of Energy and Environmental Protection (DEEP)
- The list of 2022 distressed municipalities was published by the Connecticut Department of Economic and Community Development



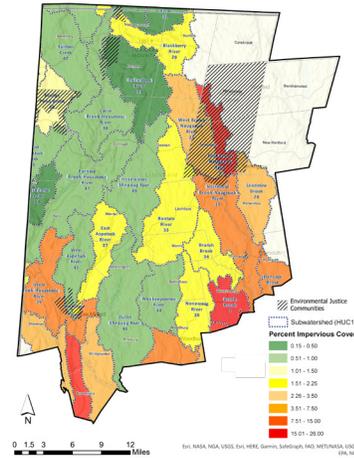
7-2 Affecting facilities and Environmental Justice communities

- Environmental Justice Block Groups from Connecticut Department of Energy and Environmental Protection (DEEP)
- Demographics and Affecting Facilities from Connecticut Department of Energy and Environmental Protection (DEEP)
- The list of 2022 distressed municipalities was published by the Connecticut Department of Economic and Community Development



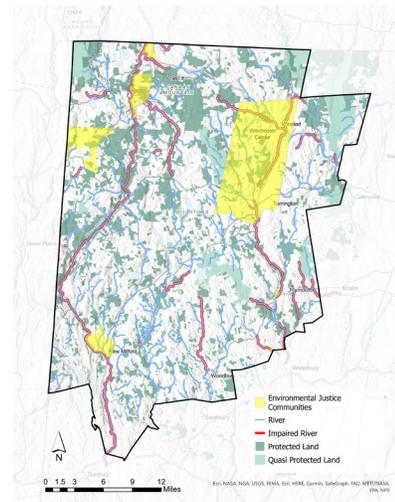
7-3 Environmental Justice communities and impervious surfaces

- Environmental Justice Block Groups from Connecticut Department of Energy and Environmental Protection (DEEP)
- The list of 2022 distressed municipalities was published by the Connecticut Department of Economic and Community Development
- Impervious surface cover in Housatonic River Watershed from Housatonic Valley Association



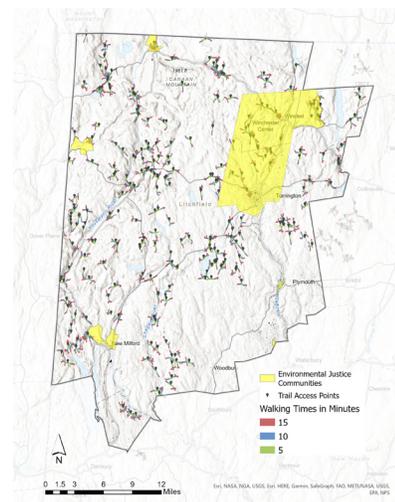
7-4 Environmental Justice communities and impaired waterways

- Environmental Justice Block Groups from Connecticut Department of Energy and Environmental Protection (DEEP)
- The list of 2022 distressed municipalities was published by the Connecticut Department of Economic and Community Development
- Impaired rivers from Connecticut 303(d) Impaired Waters 2020 accessed through Connecticut Department of Energy and Environmental Protection (DEEP)



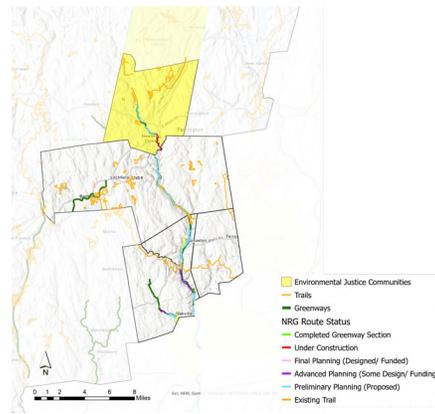
7-5 Trail Access by walking times

- Trail Points from CT.gov and trail Point data provided by NCLC
- Performed an Isochrones analysis in ArcGIS Pro



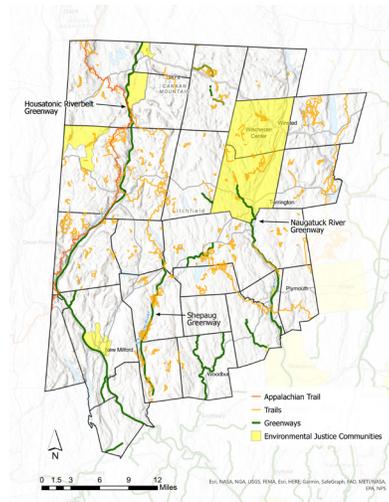
7-6 Trail status along the Naugatuck River Greenway

- Trails from Connecticut Department of Energy and Environmental Protection (DEEP)
- Official Connecticut Greenways from Connecticut Department of Energy and Environmental Protection (DEEP)
- Naugatuck River Greenway Trail Status from the Naugatuck Valley Council of Governments



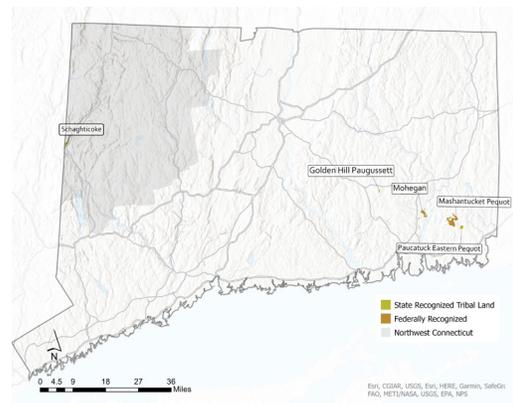
7-7 Greenways and trails with Environmental Justice communities

- Environmental Justice Block Groups from Connecticut Department of Energy and Environmental Protection (DEEP)
- The list of 2022 distressed municipalities was published by the Connecticut Department of Economic and Community Development
- Trails from Connecticut Department of Energy and Environmental Protection (DEEP)
- Official Connecticut Greenways from Connecticut Department of Energy and Environmental Protection (DEEP)



7-8 Tribal land in Connecticut

- CT Tribal Lands 2020 feature layer from Department of Energy and Environmental Protection (DEEP)



Works Cited

CHAPTER 1

- Barnett, Eve Sokolow. Year One Report America the Beautiful. Conserving and Restoring America the Beautiful. <https://www.noaa.gov/america-the-beautiful>. Accessed 14 Mar. 2023.
- Dinerstein, E., et al. "A Global Deal For Nature: Guiding Principles, Milestones, and Targets." *Science Advances*, vol. 5, no. 4, Apr. 2019, p. eaaw2869. [science.org \(Atypon\), https://doi.org/10.1126/sciadv.aaw2869](https://doi.org/10.1126/sciadv.aaw2869).
- Forest Carbon | UMass Amherst MassWoods. <https://masswoods.org/caring-your-land/forest-carbon>. Accessed 15 Mar. 2023.
- "Getting to 30x30: Guidelines for Decision-Makers." *Defenders of Wildlife*, 15 July 2020, <https://defenders.org/publications/getting-30x30-guidelines-decision-makers>.
- Jung, Martin, et al. Areas of Global Importance for Terrestrial Biodiversity, Carbon, and Water. *bioRxiv*, 16 Apr. 2020, p. 2020.04.16.021444. [bioRxiv, https://doi.org/10.1101/2020.04.16.021444](https://doi.org/10.1101/2020.04.16.021444).
- Rider, Hannah. "Road to 30: Urban Conservation." *Westwise*, 28 Oct. 2020, <https://medium.com/westwise/road-to-30-urban-conservation-3d238e82b1f1>.
- "Why 30%?" Campaign For Nature, <https://www.campaignfornature.org/why-30-1>. Accessed 14 Mar. 2023.

CHAPTER 2

- Connecticut's Past: Inland Mammals. <https://www.registercitizen.com/news/article/Connecticut-s-past-inland-mammals-12126722.php>. Accessed 21 Mar. 2023.
- Dioramas | Harvard Forest. <https://harvardforest.fas.harvard.edu/dioramas>. Accessed 14 Mar. 2023.
- Forest, John William De. *History of the Indians of Connecticut from the Earliest Known Period to 1850*. W.J. Hammersley, 1853.
- "How Climate Change Impacts Forests." *CT.Gov - Connecticut's Official State Website*, <https://portal.ct.gov/DEEP/Forestry/Climate-Change/How-Climate-Change-Impacts-Forests>. Accessed 14 Mar. 2023.
- Terrestrial Habitat Guides. <http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/hg/terrestrial/Pages/default.aspx>. Accessed 14 Mar. 2023.
- "Warmer Winters Feed into Growth and Spread of Invasive Plants in Connecticut." *Connecticut Public*, 17 Feb. 2023, <https://www.ctpublic.org/2023-02-17/warmer-winters-feed-into-growth-and-spread-of-invasive-plants-in-connecticut>.

CHAPTER 3

- American Black Bear (U.S. National Park Service). <https://www.nps.gov/articles/000/american-black-bear.htm>. Accessed 15 Mar. 2023.
- Appalachians | The Nature Conservancy. <https://www.nature.org/en-us/about-us/where-we-work/priority-landscapes/appalachians/>. Accessed 14 Mar. 2023.
- "Aquifer Protection Program." *CT.Gov - Connecticut's Official State Website*, <https://portal.ct.gov/DEEP/Aquifer-Protection-and-Groundwater/Aquifer-Protection/Aquifer-Protection-Program>. Accessed 14 Mar. 2023.
- Association, American Lung. *State of the Air 2022 Connecticut*. <https://www.lung.org/media/press-releases/sota-ct-2022>. Accessed 15 Mar. 2023.
- "Clean Waters and Healthy Watersheds." *Long Island Sound Study*, <https://longislandsoundstudy.net/our-vision-and-plan/clean-waters-and-healthy-watersheds/>. Accessed 14 Mar. 2023.
- "CT-WAP Current Status." *CT.Gov - Connecticut's Official State Website*, <https://portal.ct.gov/DEEP/Wildlife/CT-Wildlife-Action-Plan/CT-WAP-Current-Status>. Accessed 14 Mar. 2023.
- Dinerstein, E., et al. "A Global Deal For Nature: Guiding Principles, Milestones, and Targets." *Science Advances*, vol. 5,

- no. 4, Apr. 2019, p. eaaw2869. science.org (Atypon), <https://doi.org/10.1126/sciadv.aaw2869>.
- “Drinking Water Section.” CT.Gov - Connecticut’s Official State Website, <https://portal.ct.gov/dph/Drinking-Water/DWS/Drinking-Water-Section>. Accessed 14 Mar. 2023.
- “Economic Impact of Tourism.” CT.Gov - Connecticut’s Official State Website, https://portal.ct.gov/DECD/Content/Tourism/04_Research-and-Stats/Economic-Impact-of-Tourism. Accessed 15 Mar. 2023.
- “Farmland.” CT.Gov - Connecticut’s Official State Website, https://portal.ct.gov/CEQ/AR-19-Gold/2019-CEQ-Annual-Report-eBook/Land-Preserved_Land/Farmland. Accessed 14 Mar. 2023.
- Farmland Soils. https://cteco.uconn.edu/guides/Soils_Farmland.htm. Accessed 21 Mar. 2023.
- “Farms Under Threat: The State of the States.” FIC, <https://farmlandinfo.org/publications/farms-under-threat-the-state-of-the-states/>. Accessed 22 Mar. 2023.
- The Importance of Trees. <https://www.conngardener.com/the-importance-of-trees/>. Accessed 14 Mar. 2023.
- “The Wellness Benefits of the Great Outdoors.” US Forest Service, 24 Mar. 2021, <https://www.fs.usda.gov/features/wellness-benefits-great-outdoors>.
- USDA - National Agricultural Statistics Service - 2017 Census of Agriculture - Volume 1, Chapter 2: County Level Data. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_2_County_Level/Connecticut/. Accessed 14 Mar. 2023.
- Vitt, Pati, et al. “Assisted Migration of Plants: Changes in Latitudes, Changes in Attitudes.” *Biological Conservation*, vol. 143, no. 1, Jan. 2010, pp. 18–27. ScienceDirect, <https://doi.org/10.1016/j.biocon.2009.08.015>.
- Vos, Claire C., et al. “Adapting Landscapes to Climate Change: Examples of Climate-Proof Ecosystem Networks and Priority Adaptation Zones.” *Journal of Applied Ecology*, vol. 45, no. 6, 2008, pp. 1722–31.
- “What’s at Stake.” American Farmland Trust, <https://farmland.org/about/whats-at-stake/>. Accessed 14 Mar. 2023.

CHAPTER 4

- “Calcareous Fens: Understanding This Rare, Special and Sensitive Wetland Type.” Mitigation Partners, Inc (MPI), <https://www.mitigationpartnersinc.com/resources/calcareous-fens>. Accessed 22 Mar. 2023.
- “Connecticut Council on Environmental Quality.” CT.Gov - Connecticut’s Official State Website, <https://portal.ct.gov/CEQ>. Accessed 14 Mar. 2023.
- Langdon, Stephen F., et al. “Tree Encroachment Varies by Plant Community in a Large Boreal Peatland Complex in the Boreal-Temperate Ecotone of Northeastern USA.” *Wetlands*, vol. 40, no. 6, Dec. 2020, pp. 2499–511. DOI.org (Crossref), <https://doi.org/10.1007/s13157-020-01319-z>.
- “MDC Pauses Proceedings Seeking to Remove DPH Jurisdiction over Future and Emergency Water Supplies.” Save the Sound, 21 Feb. 2023, <https://www.savethesound.org/2023/02/21/mdc-pauses-proceedings-seeking-to-remove-dph-jurisdiction-over-future-and-emergency-water-supplies/>.
- Metzle, Kenneth J. *Wetlands of Connecticut*.
- Motzkin, G. “Calcareous Fens of Western New England and Adjacent New York State.” *Rhodora*, 1994. Semantic Scholar, <https://www.semanticscholar.org/paper/Calcareous-fens-of-western-New-England-and-adjacent-Motzkin/3ecb8fca5b38ca08e10181596a2443ac1c3b45a4>.
- Planning & Zoning Commission | Torrington CT. <https://www.torringtonct.org/planning-zoning-commission>. Accessed 14 Mar. 2023.
- “Press Release: Over 82 Acres of Connecticut Water Company Property in Naugatuck, Killingworth, Bethany, and Prospect Headed toward Permanent Conservation.” Save the Sound, 1 June 2022, <https://www.savethesound.org/2022/06/01/press-release-over-82-acres-of-connecticut-water-company-property-in-naugatuck-killingworth-bethany-and-prospect-headed-toward-permanent-conservation/>.
- “Publications.” Northwest Connecticut Land Conservancy, <https://ctland.org/publications/>. Accessed 14 Mar. 2023.
- River’s Edge Preserve | Roxbury Land Trust. <https://www.roxburylandtrust.org/preserves/rivers-edge-preserve/>. Accessed 14 Mar. 2023.
- Zoning Strategy. Riparian Corridor Protections | Western Connecticut Council of Governments. 18 Aug. 2021, <https://westcog.org/2021/08/zoning-strategy-riparian-corridor-protections/>.

CHAPTER 5

- Aerial Survey of Connecticut 1934 Photograph 08321. <https://cslib.contentdm.oclc.org/digital/collection/p4005coll10/id/5356>. Accessed 15 Mar. 2023.
- Cornsoc. "Introduction." Cornwall Historical Society, 12 Apr. 2021, <https://cornwallhistoricalsociety.org/introduction/>.
- EnviroAtlas - Percentage of Stream and Water Body Shoreline Lengths within 30 Meters of $\geq 5\%$ or $\geq 15\%$ Impervious Cover by 12-Digit HUC for the Conterminous United States. U.S. Environmental Protection Agency, Office of Research and Development-Sustainable and Healthy Communities Research Program, EnviroAtlas (Point of Contact). Data.gov, <https://catalog.data.gov/dataset/enviroatlas-percentage-of-stream-and-water-body-shoreline-lengths-within-30-meters-of-5-or-15-i>. Accessed 15 Mar. 2023.
- Hilty, Jodi, et al. Guidelines for Conserving Connectivity through Ecological Networks and Corridors. IUCN, 2020. portals.iucn.org, <https://doi.org/10.2305/IUCN.CH.2020.PAG.30.en>.
- Hollenbeck Preserve. <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/hollenbeck-preserve/>. Accessed 15 Mar. 2023.
- Kaputa, Frank. "Connecticut's Notable Trees." Connecticut's Notable Trees, <https://oak.conncoll.edu/notabletrees/>. Accessed 15 Mar. 2023.
- Natural Diversity Data Base Areas. https://cteco.uconn.edu/guides/Natural_Diversity_Database.htm. Accessed 15 Mar. 2023.
- Riparian Restoration | Bureau of Land Management. <https://www.blm.gov/documents/national-office/blm-library/technical-reference/riparian-restoration>. Accessed 15 Mar. 2023.
- Riparian Zone and Stream Restoration | Risk Management Research | US EPA. <https://archive.epa.gov/ada/web/html/riparian.html>. Accessed 15 Mar. 2023.
- Trust, Cornwall Conservation. "Ballyhack Preserve." Cornwall Conservation Trust, <https://cornwallconservationtrust.org/ballyhack-preserve/>. Accessed 15 Mar. 2023.
- "Trinity Forest Preserve." Cornwall Conservation Trust, <https://cornwallconservationtrust.org/trinity-forest-preserve/>. Accessed 15 Mar. 2023.
- US EPA, OW. What Is Green Infrastructure? 30 Sept. 2015, <https://www.epa.gov/green-infrastructure/what-green-infrastructure>.

CHAPTER 6

- "A Tidal Wave": New Yorkers Snapping up CT Homes as They Flee the City. <https://www.thehour.com/business/article/After-exodus-flight-to-Fairfield-County-and-CT-15272856.php>. Accessed 14 Mar. 2023.
- "Benefits of Trails and Greenways." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DEEP/Outdoor-Recreation/Greenways/Benefits-of-Trails-and-Greenways>. Accessed 14 Mar. 2023.
- "Connecticut Forest Product Economic Resources." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DEEP/Forestry/FPA-and-UM/UM/Connecticut-Forest-Product-Economic-Resources>. Accessed 14 Mar. 2023.
- "Connecticut's Top 10 Hiking Trails." Visit CT, 5 Feb. 2016, <https://www.ctvisit.com/articles/connecticuts-top-10-hiking-trails>.
- Economic Impact by State – Outdoor Recreation Roundtable. <https://recreationroundtable.org/economic-impact-by-state/>. Accessed 14 Mar. 2023.
- "Farmland." CT.Gov - Connecticut's Official State Website, https://portal.ct.gov/CEQ/AR-19-Gold/2019-CEQ-Annual-Report-eBook/Land-Preserved_Land/Farmland. Accessed 14 Mar. 2023.
- "Farmland Preservation Overview." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DOAG/ADaRC/Programs/Farmland-Preservation-Overview>. Accessed 14 Mar. 2023.
- Forest Carbon | UMass Amherst MassWoods. <https://masswoods.org/caring-your-land/forest-carbon>. Accessed 14 Mar. 2023.
- "Forest Management on State Lands." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DEEP/>

Forestry/Management-on-State-Lands/Forest-Management-on-State-Lands. Accessed 14 Mar. 2023.

Forest Resiliency | UMass Amherst MassWoods. <https://masswoods.org/caring-your-land/forest-resiliency>. Accessed 14 Mar. 2023.

Group, The Matthews. "Washington CT Farms | Local Farms in Litchfield County CT." William Raveis Lifestyles Realty, <https://raveislifestyles.com/activities/local-farms/>. Accessed 14 Mar. 2023.

Gunther, Peter, et al. "Economic Impact of State Parks, Forests and Natural Resources under the Management of Department of Environmental Protection." CCEA Studies, 2011-December-01, June 2011. ideas.repec.org, <https://ideas.repec.org/p/uct/cceast/2011-dec-01.html>.

lii, Kirby C. Stafford. Honey Bees and Beekeeping in Connecticut. "Laws Pertaining to Agricultural Property Tax Exemptions and Abatements." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DOAG/Commissioner/Commissioner/Agricultural-Property-Tax-Exemptions-and-Abatements>. Accessed 14 Mar. 2023.

Lerner, Steve, et al. The Economic Benefits of Parks and Open Space: How Land Conservation Helps Communities Grow Smart and Protect the Bottom Line. 1 Jan. 1999. ROSA P, <https://rosap.nsl.bts.gov/view/dot/14457>.

"New England Forests: A Natural Climate Solution." Highstead, <https://highstead.net/library/forests-as-a-natural-climate-solution/>. Accessed 14 Mar. 2023.

NRG Economic Impact Study – NVCOG CT – Naugatuck Valley Council of Governments. <https://nvcogct.gov/what-we-do/naugatuck-river-greenway/naugatuck-river-greenway-economic-impact-study/>. Accessed 14 Mar. 2023.

NWCT Regional Food Hub. <https://www.nwctfoodhub.org/>. Accessed 14 Mar. 2023.

Planning & Zoning - Town of Suffield. 13 Apr. 2023, <https://www.suffieldct.gov/departments/pz>.

"Public Act 490 - The Basics." CT.Gov - Connecticut's Official State Website, <https://portal.ct.gov/DOAG/Commissioner/Commissioner/Public-Act-490---The-Basics>. Accessed 14 Mar. 2023.

Sims, Katharine R. E., et al. "Assessing the Local Economic Impacts of Land Protection." *Conservation Biology*, vol. 33, no. 5, 2019, pp. 1035–44. Wiley Online Library, <https://doi.org/10.1111/cobi.13318>.

Sound, Cfe/Save the. "Advocates Hit Capitol Hill to Promote Long Island Sound Value." *Green Cities Blue Waters*, 29 Apr. 2015, <https://greencitiesbluwaters.wordpress.com/2015/04/29/advocates-hit-capitol-hill-to-promote-long-island-sound-value/>.

Stirling, Graham, et al. *Soil Health, Soil Biology, Soilborne Diseases and Sustainable Agriculture: A Guide*. Csiro Publishing, 2016.

The Illusion of Preservation: A Global Environmental Argument for the Local Production of Natural Resources - Berlik - 2002 - *Journal of Biogeography* - Wiley Online Library. <https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1365-2699.2002.00768.x>. Accessed 14 Mar. 2023.

The Importance of Trees. <https://www.conngardener.com/the-importance-of-trees/>. Accessed 14 Mar. 2023.

The Path to Sustainability - New England Forestry Foundation. 5 Apr. 2016, <https://newenglandforestry.org/connect/publications/path-to-sustainability/>.

"The Vision." *Wildlands & Woodlands*, <https://wildlandsandwoodlands.org/the-vision/>. Accessed 14 Mar. 2023.

Theobald, David M. "Land-Use Dynamics beyond the American Urban Fringe." *Geographical Review*, vol. 91, no. 3, 2001, pp. 544–64. JSTOR, <https://doi.org/10.2307/3594740>.

US EPA, OAR. Greenhouse Gas Emissions from a Typical Passenger Vehicle. 12 Jan. 2016, <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>.

USDA - National Agricultural Statistics Service - 2017 Census of Agriculture - Volume 1, Chapter 2: County Level Data. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Connecticut/. Accessed 14 Mar. 2023.

Vermont Fine Furniture and Woodworking Festival. <https://www.vermontwoodfestival.org/>. Accessed 15 Mar. 2023.

"Vermont Fine Furniture, Woodworking & Forest Fest Opens Sept 27." *Woodworking Network*, <https://www.woodworkingnetwork.com/wood-market-trends/woodworking-industry-trends-press-releases/Vermont-Fine-Furniture-Woodworking-Forest-Festival-September-Fall-Events-269215381.html>. Accessed 14 Mar. 2023.

CHAPTER 7

About Winchester. <https://www.townofwinchester.org/our-town/about-winchester>. Accessed 14 Mar. 2023.

Affordable Housing : Town of New Milford, CT. <https://www.newmilford.org/affordablehousing>. Accessed 14 Mar. 2023.

Background Story – Litchfield Community Greenway. <https://litchfieldcommunitygreenway.org/background-story/>. Accessed 14 Mar. 2023.

Briechle, Kendra J. THE CONSERVATION FUND.

“From 30x30 to America the Beautiful.” The Conservation Fund, <https://www.conservationfund.org/impact/blog/2467-from-30x30-to-america-the-beautiful>. Accessed 14 Mar. 2023.

History of Torrington | Torrington CT. <https://www.torringtonct.org/live-links-residents/pages/history-torrington>. Accessed 14 Mar. 2023.

Inc, Younts Design. Biohabitats » Mill River Trail Green Infrastructure Corridor. <https://www.biohabitats.com/project/mill-river-trail-green-infrastructure-corridor/>. Accessed 14 Mar. 2023.

“Justice40 Initiative | Environmental Justice.” The White House, <https://www.whitehouse.gov/environmentaljustice/justice40/>. Accessed 14 Mar. 2023.

Myers, David. “Green Infrastructure, Greenways, and Trail Planning: Frameworks for Sustainability in Maryland.” Proceedings of the Fábos Conference on Landscape and Greenway Planning, vol. 4, no. 1, Jan. 2013, <https://scholarworks.umass.edu/fabos/vol4/iss1/21>.

“Official Connecticut Greenways.” CT.Gov - Connecticut’s Official State Website, <https://portal.ct.gov/DEEP/Outdoor-Recreation/Greenways/Official-Connecticut-Greenways>. Accessed 14 Mar. 2023.

“Water Quality Monitoring Program.” CT.Gov - Connecticut’s Official State Website, <https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/Water-Quality-Monitoring-Program>. Accessed 14 Mar. 2023.

“Winchester - Connecticut History | a CTHumanities Project.” Connecticut History | a CTHumanities Project - Stories about the People, Traditions, Innovations, and Events That Make up Connecticut’s Rich History., 27 Oct. 2011, <https://connecticuthistory.org/towns-page/winchester/>.

“Working Group Meetings 2022.” CT.Gov - Connecticut’s Official State Website, <https://portal.ct.gov/DEEP/Climate-Change/GC3/Working-Group-Meetings-2022>. Accessed 14 Mar. 2023.

Woodard, Colin . “Passamaquoddy Tribe Reacquires Island Stolen More than 150 Years Ago.” Press Herald, 17 May 2021, <https://www.pressherald.com/2021/05/17/passamaquoddy-tribe-reacquires-island-stolen-more-than-150-years-ago/>.

This report explores the conservation landscape in Northwest Connecticut, highlights the importance of continued conservation work in the region, and shares strategies for how to approach conservation going forward. These strategies are organized into three sections: ecology, economy, and equity. This report was enabled by Northwest Connecticut Land Conservancy (NCLC) and Save the Sound, who joined together to understand the possibility of increasing the pace of conservation in the region by exploring pathways to permanently protect quasi-protected lands. Other partners include The Nature Conservancy, the Housatonic Valley Association, and the Connecticut Land Conservation Council.

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