

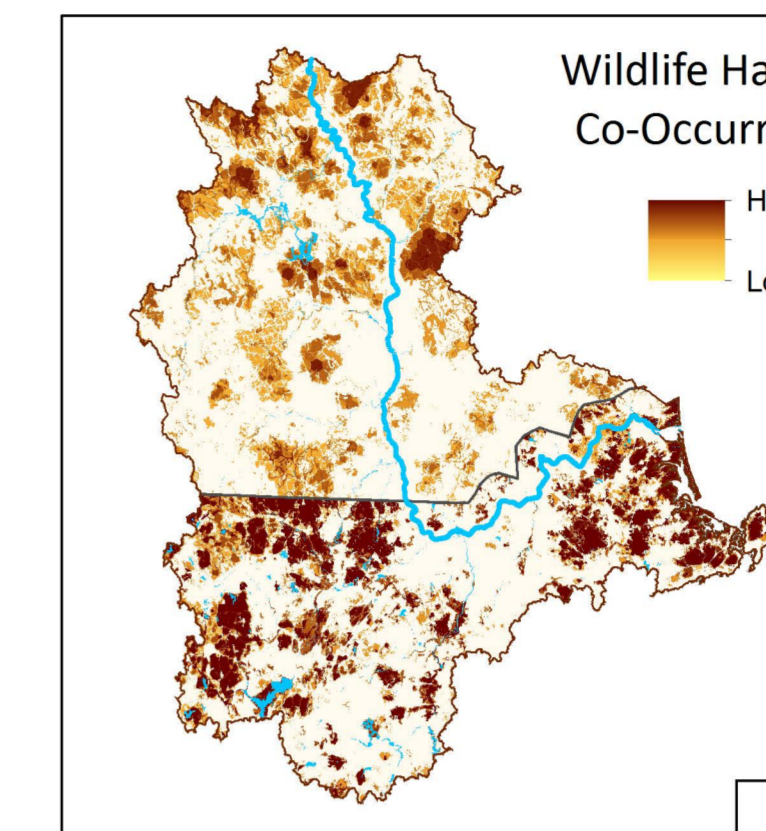
Conservation Focus Areas

Merrimack Valley Regional Strategic Conservation Plan

Why the Merrimack?

The Merrimack River flows through some of the region's most populous cities, including Manchester, Nashua, Lowell, and Lawrence, and its watershed's 2.6 million residents directly depend on the watershed for drinking water, local food and forest products, and outdoor recreation. But in 2010, the US Forest Service identified the Merrimack watershed as the most threatened in the nation in terms of projected loss of private forest land over the next twenty years, in part because it still has ample land (almost 2/3 of its area) left to develop.

In early 2012, a broad partnership of 33 private organizations and public agencies in New Hampshire and Massachusetts convened to develop a conservation plan that would focus and accelerate land conservation in the Merrimack River watershed of New Hampshire and Massachusetts. Working together, the group developed a science-driven, consensus land conservation plan that integrates the best-available natural resource data with expert judgment to prioritize land protection to protect water quality (especially drinking water supplies), preserve aquatic and terrestrial ecosystems, conserve the region's working farms and forests, and provide recreational open space.



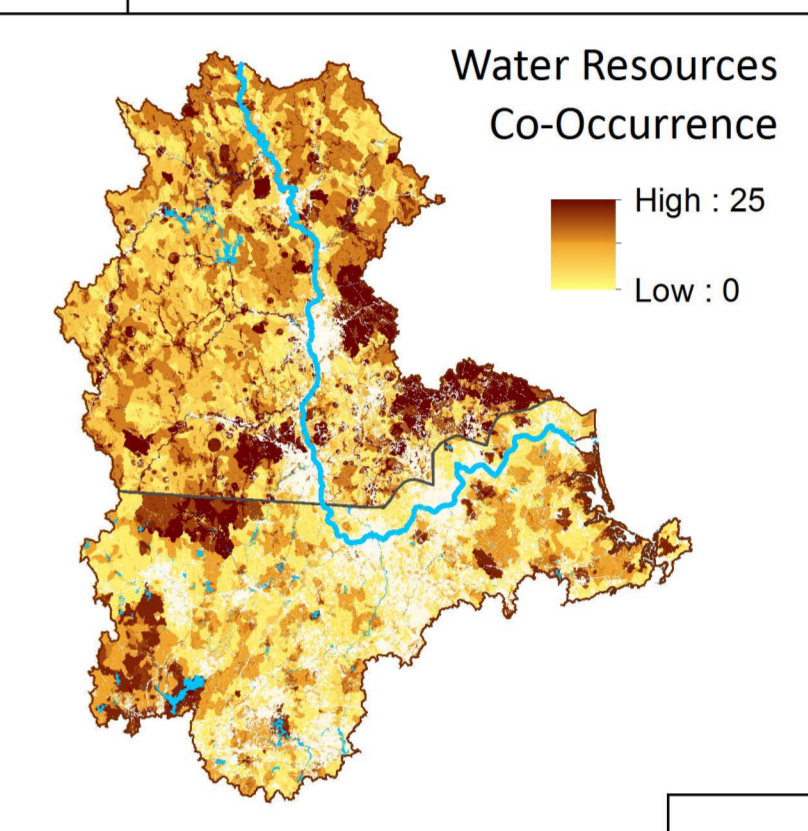
GIS-based Co-occurrence Analysis

The primary tool used to develop the Merrimack conservation plan was computer-aided mapping using Geographic Information System (GIS) software. Focus groups compiled 45 different natural resource GIS data sets covering the two watershed states. These layers were grouped into 4 themes – Wildlife, Water, Forests & Farms, and Recreation – and were ranked based on the anonymous votes of 18 different agencies and organizations.

Each of the 45 layers was given a score based on the average number of votes it received. A co-occurrence map was created for each theme – that is, a map was made showing the total score of all the data sets that occurred at the same geographic location on the ground. Those 4 thematic co-occurrence maps are shown here. The 4 individual maps were then "added together" to make the final co-occurrence map.

Wildlife Habitat

16 different data factors contributed to the Wildlife Co-occurrence Map. These included the highest ranked habitats in each state according to NH's Wildlife Action Plan and Massachusetts' BioMap2; seven critical but under-protected habitats—cliffs, coastal scrub-herb, freshwater marsh, grassland & shrubland, upland forest, wetland forest, and peatland; as well as the results of cutting-edge models depicting which habitats provide the most connectivity for wildlife movement and which will be most resilient in the face of climate change.

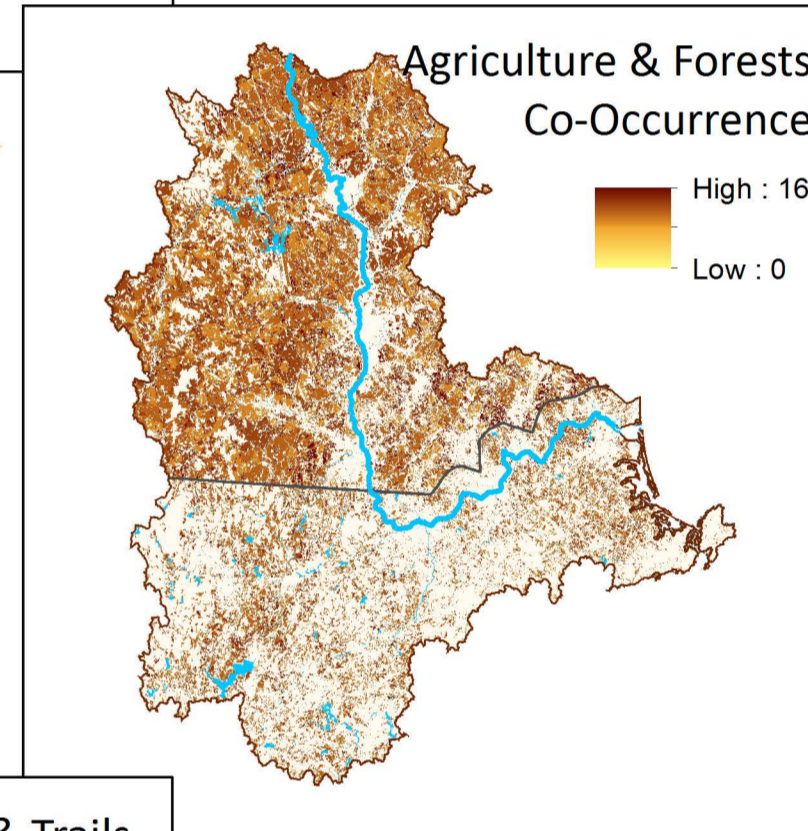


Water Resources

The Water Resources Co-Occurrence map displays the co-occurrence of 15 different data factors, including the watersheds of drinking water sources, buffers around community wellheads, high water quality areas due to low Phosphorus and Nitrogen loading, areas impaired by high Phosphorus and Nitrogen loading, floodplains, wetlands, aquifers, and outstanding river corridors.

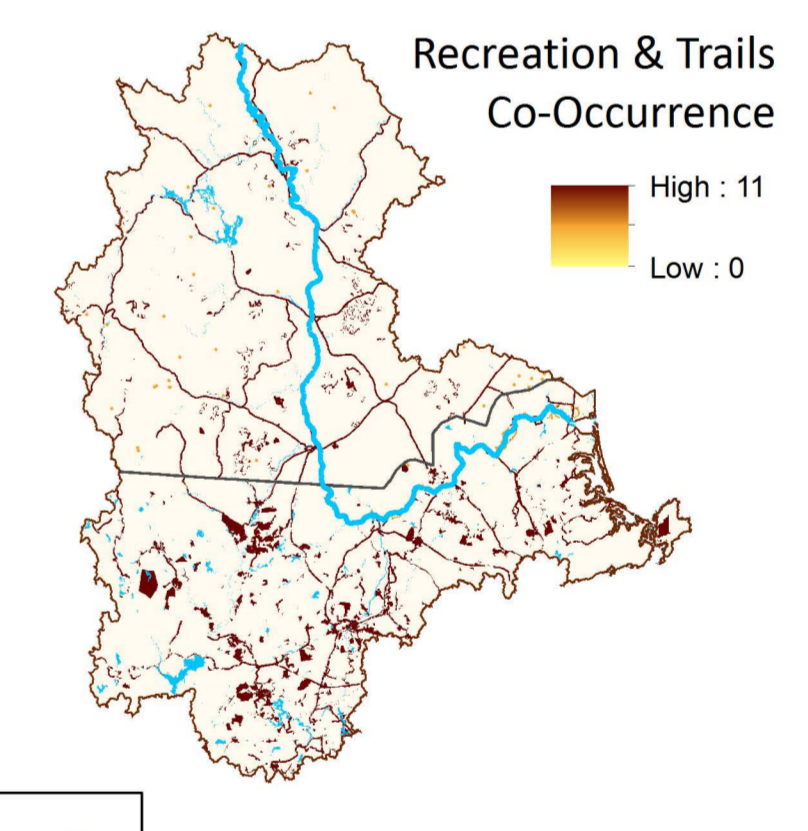
Calculating the Co-occurrence

Once the 45 contributing data layers were selected, participants were sent materials describing each layer and a ballot for ranking them. Each voter was given 100 points to allocate between the various layers. A voter could choose to give one layer all 100 points, or to divide them between those factors they considered most vital. Because not all data sets were available for both states, the stakeholders made the strategic decision to include state-specific data, and to allow each state to weight their data independently. Votes were tallied, and the mean score for each factor was calculated (see table at left). Finally, the scored layers were "added together" for each topical co-occurrence. The top 50% of scores for each topical co-occurrence were then added together to yield the final full co-occurrence.



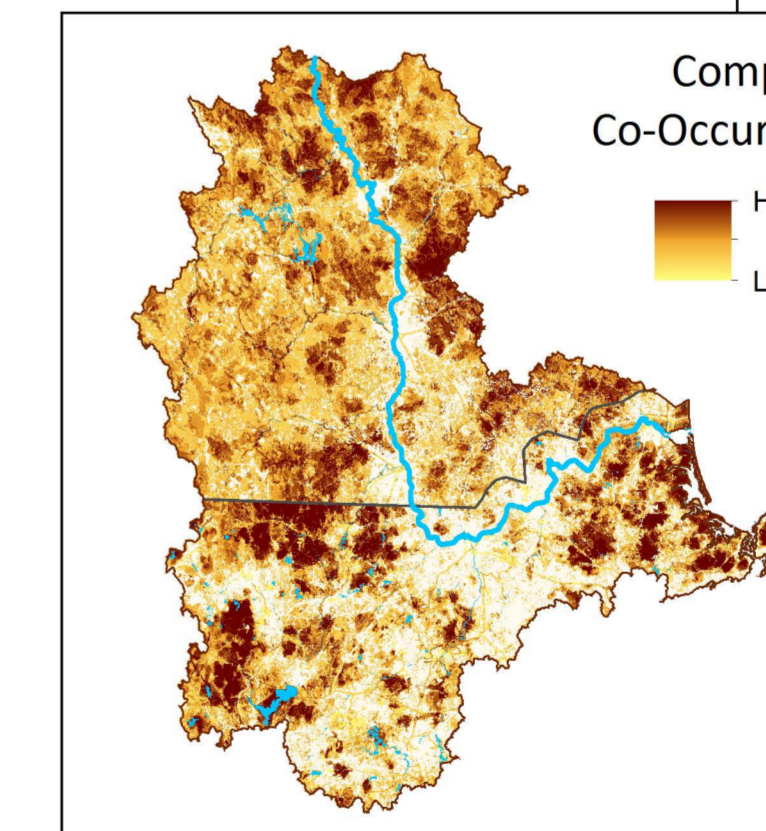
Agriculture & Forests

Eight data factors are represented in the Agriculture & Forests Co-occurrence Map. Forest blocks, or areas of intact forest defined by roadways and large bodies of water, were classified by size: 50-500 ac., 500-1,000 ac., 1,000-2,000 ac., 2,000-5,000 ac., and greater than 5,000 ac. Other data factors included prime forest soils (on blocks > 50 ac.), prime agricultural soils, and lands in active agricultural use (cropland, pasture, orchards, etc.).



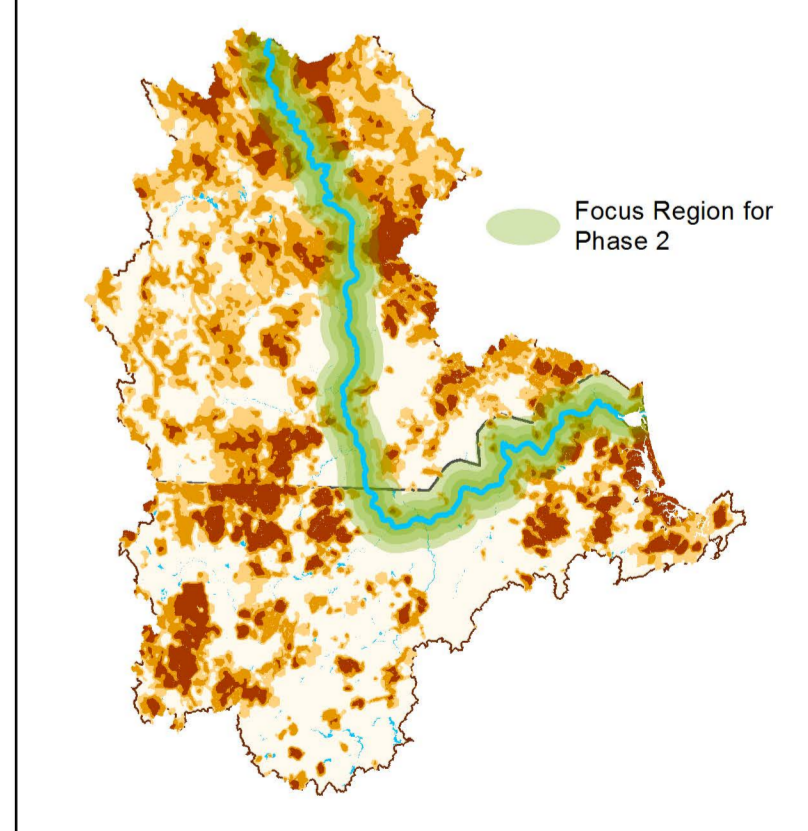
Recreation & Trails

The Recreation & Trails Co-occurrence Map is based on unprotected gaps in existing rail trails, hiking trails, and Heritage trails, as well as abandoned rail rights-of-way which may serve as potential linkages. In addition, historic sites, scenic landscapes, and distinctive cultural resources were included. Recreation and trails data, while ranked very highly by participants in the planning process, are typically small or linear features. As a result they did not strongly drive the final co-occurrence map.



Next Steps

The central portion of the mainstem, perhaps unsurprisingly given its densely populated and developed nature, has very little CFA coverage. A future phase of work will aim to identify the most significant natural areas along the mainstem.



The Conservation Focus Areas, or CFAs, represent those locations where layers with the highest point values co-occur. While they are the product of 45 different data sets and the complex co-occurrence process, they can be summarized as geographic areas where undeveloped land provides a combination of three core natural values: clean water, wildlife habitat, and good soils for growing food and forests. The Merrimack conservation plan stratifies the CFAs into tiers based on total co-occurrence score: Highest Scoring CFAs (>2 standard deviations above the mean) and Higher Scoring CFAs (1 to 2 SD above the mean). High scoring CFAs are areas with scores 2/3 to 1 SD above the mean OR with above average resiliency.

Collaborating Agencies & Organizations

- Bear Paw Regional Greenways (NH)
- Eight Towns and the Bay Committee (MA)
- Essex County Greenbelt (MA)
- Lowell Parks & Conservation Trust, Inc. (MA)
- City of Manchester, NH Water Works
- Massachusetts Audubon
- Massachusetts Office of Energy and Environmental Affairs (EEA)
- Massachusetts EEA Department of Agricultural Resources
- Massachusetts EEA Department of Conservation and Recreation
- Massachusetts EEA Department of Fish and Game
- Merrimack River Watershed Council (MA/NH)
- City of Nashua, NH
- Nashua River Watershed Association (MA/NH)
- National Oceanographic and Atmospheric Administration
- NH Association of Conservation Districts
- NH Department of Environmental Services
- NH DRED Division of Forests and Lands
- Massachusetts Audubon
- NH DRED Division of Parks and Recreation
- NH Fish & Game Department
- NH Rivers Council
- Northern Middlesex Council of Governments (MA)
- Piscataoguc Land Conservancy
- Rockingham Planning Commission (NH)
- Society for the Protection of New Hampshire Forests
- Southeast Land Trust of New Hampshire
- Southern Valley Trustees (MA)
- Town of Tewksbury, MA Water Treatment Plant
- Trust for Public Land
- The Trustees of Reservations (MA)
- US Army Corps of Engineers
- US Environmental Protection Agency, Region 1
- US Fish & Wildlife Service
- USDA Natural Resources Conservation Service
- USDA Forest Service, State & Private Forestry

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