



2019

Natural Resources Assessment and Co-Occurrence Mapping

Town of Barrington, New Hampshire

Acknowledgments



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Town of
BARRINGTON
New Hampshire

Table of Contents



Introduction.....	1
Goals and Objectives.....	3
Map 1: Soils.....	4
Map 2: Water Resource Conservation Focus Areas.....	5
Map 3: Wetlands.....	6
Map 4: Wildlife.....	7
Map 5: Connectivity.....	8
Map 6: Conservation Focus Areas.....	9
Map 7: Other Surface and Groundwater Resources.....	10
Map 8: Climate Change Resilient and Connected.....	11
Co-occurrence Mapping Results.....	12
Opportunities and Recommendations.....	13

Introduction



With an active Conservation Commission tasked with identifying and promoting awareness of the town's natural resources and encouraging wise decisions for their protection, it is no coincidence that Barrington has a long and successful history of land protection activities. In particular, the town has completed several large conservation projects including Stonehouse Pond, Stonehouse Forest, and the Samuel A. Tamposi Water Supply Reserve (SATWaSR). These efforts are helping to reach a regional goal of 75% of conservation focus areas, identified in the "Land Conservation Plan for NH's Coastal Watershed", conserved by 2025, as referenced in PREP's 2018 State of Our Estuaries report.

In 2001, the Barrington Natural Heritage Committee (NHC), a volunteer committee created by the Board of Selectmen and reporting to the Conservation Commission, developed Barrington's first natural resources inventory (NRI) that was designed to help guide the community in protecting environmentally valuable parcels of land throughout town. Eight years later, the Town applied for and received a grant from what was then called the New Hampshire Estuaries Project – now known as the Piscataqua Region Estuaries Partnership – to update the 2001 plan. Nearly a decade later, the Town once again found themselves in need of an update.



Co-Occurrence Map of Barrington NH, 2009 [SRPC]

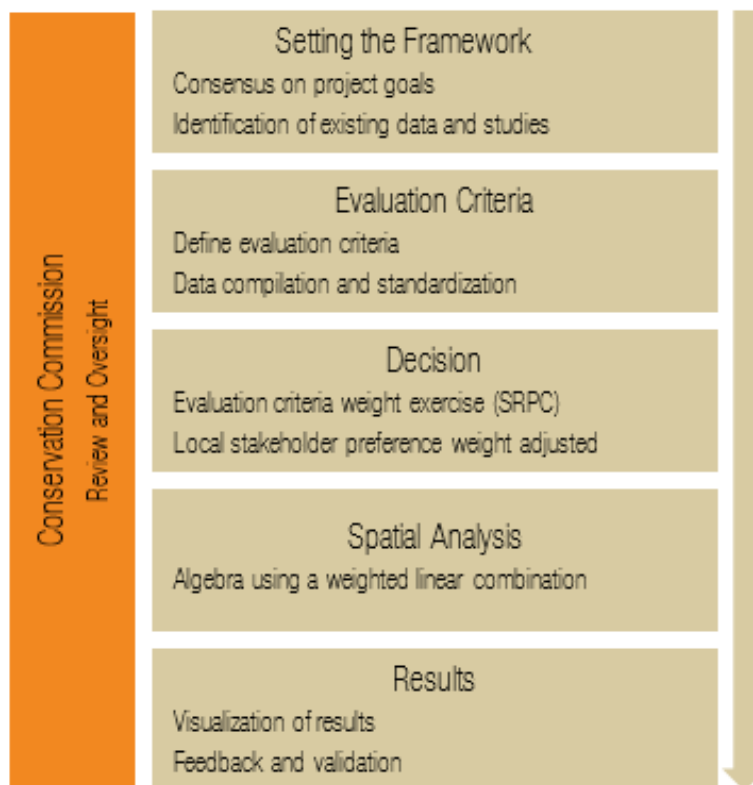
In 2018, the Barrington Conservation Commission approached the Strafford Regional Planning Commission (SRPC) with a request to update the Town's 2009 NRI, as many of the maps and datasets used had become outdated. To meet the goals of the community, while recognizing limited capacity and fiscal constraints, SRPC suggested a modified approach to a traditional NRI. This approach would rely on a detailed spatial analysis using Geographic Information System (GIS) that would identify key geographic areas where multiple natural resource features and priority conservation areas are co-located.

SRPC, in partnership with the Barrington Conservation Commission, applied for and received a small planning grant from the Lamprey River Advisory Committee to undertake the GIS-based natural resource assessment and spatial analysis. The Barrington Conservation Commission supplemented this grant with additional funding from the Town's Conservation Fund.

Information, GIS and a Participatory Process

The foundation of this Natural Resources Assessment (NRA) is a map-based GIS inventory of the town's existing natural resources and conservation priorities' initiatives. Eight primary natural resource-based criteria maps were developed to display the spatial distribution of soils, water resource conservation focus areas, wetlands, wildlife, landscape connectivity, conservation focus areas, other surface and groundwater resources, and climate change resilient and connected. The main goal was to create a weighted co-occurrence map that helps identifying the presence of multiple key natural resources-based criteria important for conservation. Our approach was built off the previous 2009 NRI and included a set of strategies that relied on the participation of members of the conservation commission. They actively provided input throughout different stages in the process by 1) reviewing the criteria and establishing weights based on their local values; 2) reviewing the preliminary results and making any adjustments to the analysis; and, 3) developing strategic conservation recommendations for the town to consider of the next several years.

The spatial analysis process included a weighted linear combination algebra map with all the criteria selected. The analysis was performed using ArcGIS ESRI (2018). A brief description of each the evaluation criteria and the final co-occurrence map is included in this document. A more detailed description of the data



Introduction cont.



and methodology for the co-occurrence map is included in Appendix A. These results were also included in a large 36x36" version of the map as part of this NRA and is available with the Barrington Conservation Commission and on the town's website.

Natural Resource	Criteria Weight Rankings Used		
	2019 Co-occurrence Map	Barrington Points	Max Value
		2019	
Soils	Ag Soils - Local Importance	10	25
	Ag Soils - Statewide Importance	15	
	Ag Soils - Prime	20	
	Active Farms (extracted from Land Use 2015)	25	
Water Resource Conservation Focus Areas	Buffers for Water Quality	15	45
	Flood Storage and Risk Mitigation	15	
	Public Water Supply Protection	15	
	Flood Storage and Risk Mitigation; Public Water Supply	30	
Wetlands (Riparian Habitat)	Wetlands	10	20
	Prime Wetlands	20	
Wildlife (by Tier)	WAP Supporting Landscape	15	25
	WAP Highest Rank in Region	20	
	WAP Highest Rank in State	25	
Connectivity	Unfragmented Land > 500 - <= 1000 acres	15	50
	Unfragmented Land > 1000 acres	25	
	Land within 1/4 mile of existing conservation land	10	
	Coastal wildlife corridors (connect the coast)	25	
Conservation Focus Areas TNC 2006	LCP Supporting Lands	10	20
	LCP Core Focus Areas	20	
Other Surface and Groundwater Resources	Land within 300' of lakes and ponds and 4th order streams	20	55
	Land within 300' of 1st, 2nd, 3rd order streams		
	Stratified Drift Aquifers	20	
Climate Change Resilient and Connected	Resilient Area with Confirmed Diversity	40	40
	Resilient Area Only	30	

Strategic Conservation Recommendations

The co-occurrence map in this document provides an overview of the priority conservation areas based on local values. In addition to the co-occurrence conservation areas, general strategies for outreach, management, and regulatory action are included. This map is a valuable resource to help designing and implementing strategic conservation actions and to support efforts that might help individual projects or initiatives.

Intended Use

The NRA and co-occurrence map are intended to provide information about specific habitats and resources-at both the site and town scale-that can support land use decisions and conservation priorities. This NRA provides a benchmark for observing short- and long-term changes, and it should be updated as conditions change and when new information is available. This baseline assessment may be refined through field investigations and ground truthing and further developed into a comprehensive natural resources master plan chapter. It is intended to serve as an informational tool that may inform future changes in zoning, land use regulations, and policies. Finally, it is an educational resource for town staff, boards, students, residents, and other interested individuals.



Barrington Conservation Commission (SRPC Photo)

Goals and Objectives



The goal of this project was to identify and prioritize key areas for conservation and protection that provide habitat for wildlife, preserving rare or sensitive species and ecosystems, and ensures the sustainability of the ecological services that support a high quality of life in Barrington, NH. We aimed on to develop a user-friendly report that captures Barrington's this goal through existing natural resources and a co-occurrence map. The co-occurrence map would be used to guide the future preservation of environmentally valuable land and guide improvement or development of recreational amenities on existing easements. The map would include: the most updated conservation, natural resources, and other thematic layers; natural corridors favored by wildlife that serve as ideal greenways; and areas where conservation values overlap to guide resource protection efforts.

The objectives of this project were to:

- Create a snapshot of Barrington's natural resources for use as a baseline in tracking land use trends and for a comprehensive natural resources master plan chapter
- Synthesize information and provide visual resources for decisions-makers to support planning and policy decisions
- Promote collaboration among the different stakeholders on mapping local interests, concerns, risks, and opportunities using participatory techniques, expert knowledge, and the best available information
- Develop a tool as an educational resource to raise public awareness about the natural resources and the most valuable conservation areas in Barrington

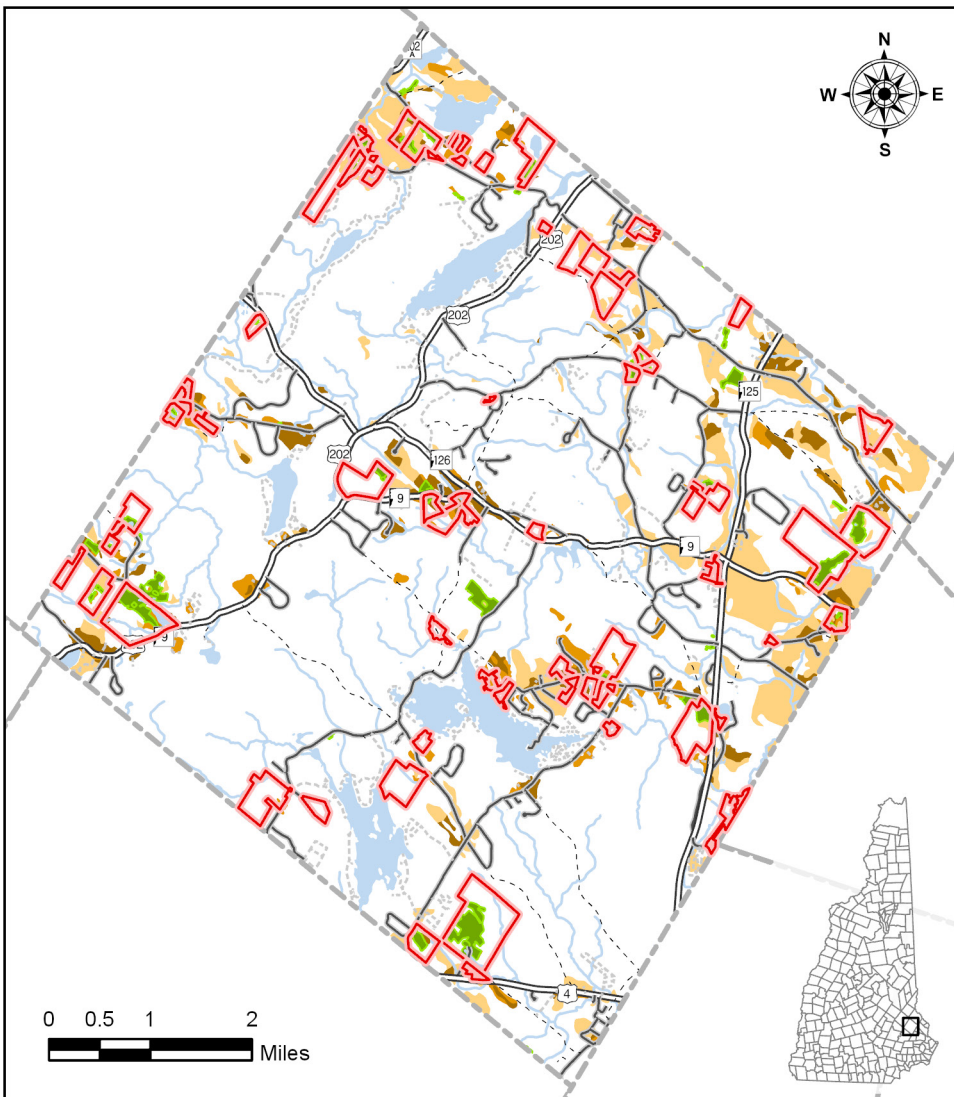
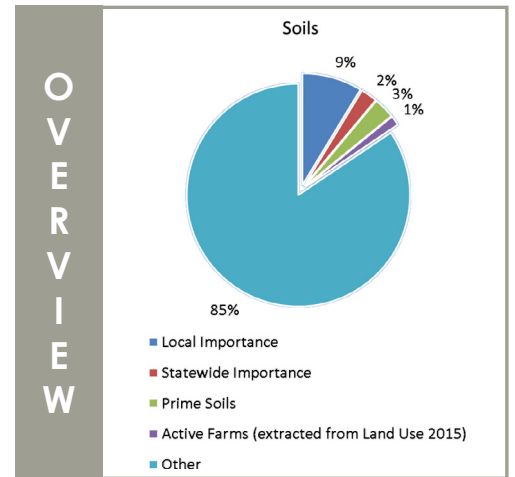
Map 1: Soils



The Natural Resource Conservation Service (NRCS) Strafford County Soil Survey (1973) and regional land use data (2015) were used to identify agricultural uses in Barrington – see pie chart to the right for statistical information.

Due to its geological makeup, the town does not have many large areas identified with agricultural soils. At the time this report was prepared, Brasen Hill Farm off Warren Road was the only significant active farm known within Barrington; however, according to data collected from the tax assessor office, the town has 69 parcels with land in current use that is designated as farmland. Those properties total 528.8 acres which is approximately 1% of Barrington's total acreage.

Given the limited amount of agricultural soils, the evaluation criteria scores for prime soils, statewide importance, and local importance did not change from 2009; however, the Conservation Commission decided to add existing active farms into the analysis with the highest maximum value score.



Soils

Farmland Soils

- All areas are prime farmland
- Farmland of statewide importance
- Farmland of local importance

Agricultural Lands (Land Use)

- Agricultural Lands (Land Use)
- Parcels with current use (Ag)

Political

- Municipalities NH
- Impervious Surface

Water Resources

- Lake Pond
- Streams and Rivers

Transportation

- State
- Local
- Private
- Not Maintained
- Recreation

Data sources: Base features are from GRANIT database (<http://www.granit.unh.edu/>). Land use (2015) Earth Systems Research Center, University of New Hampshire. Soils U.S. Department of Agriculture, Natural Resources Conservation Service. Data were derived from various sources and were updated at different timeframes, with varying levels of accuracy.

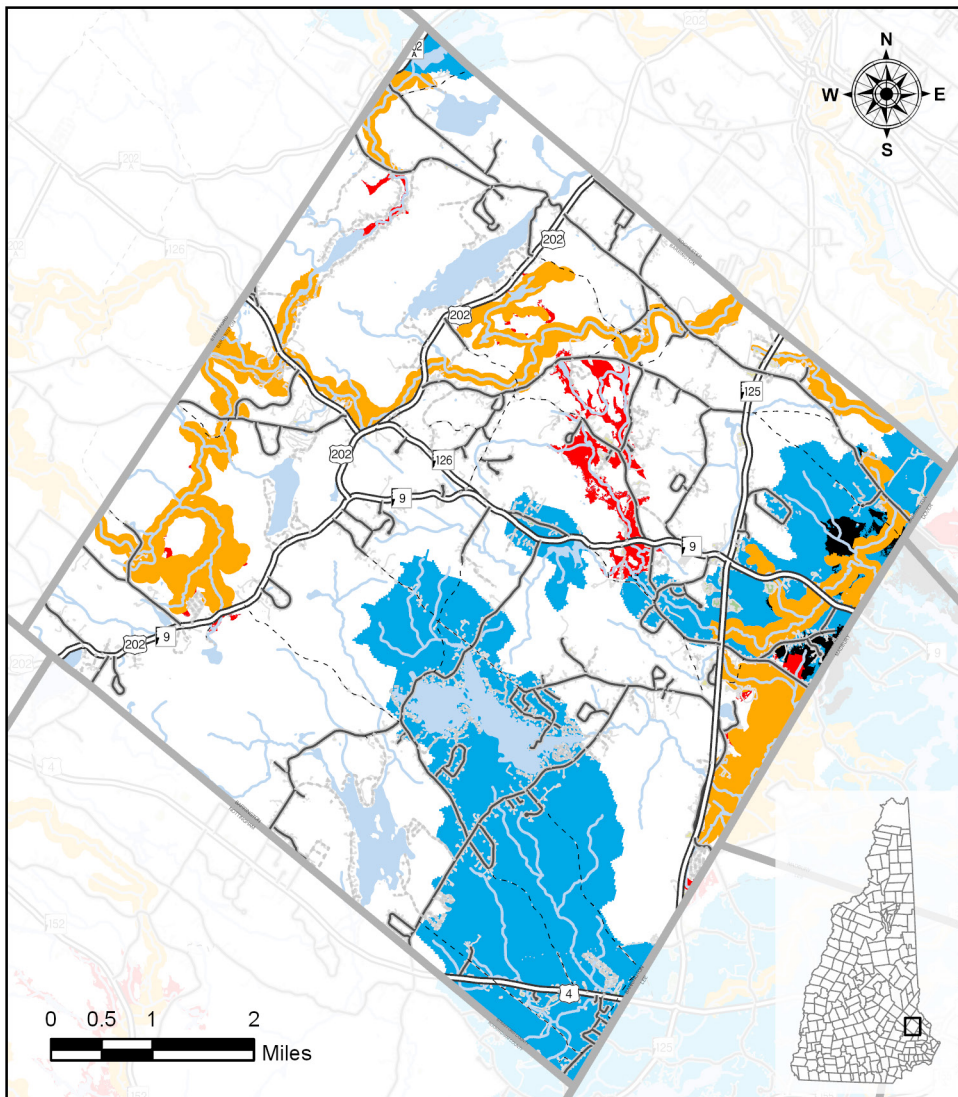
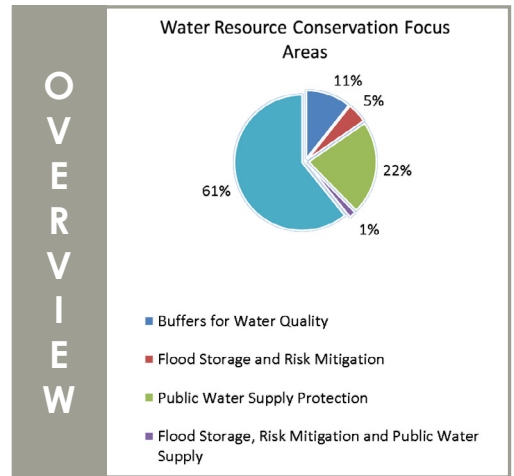
Map 2: Water Resource Conservation Focus Areas



The Land Conservation Priorities for the Protection of Coastal Water Resource (2016) was used to identify land areas that provide benefits for water quality, flood risk reduction, and public water supply protection in Barrington – see pie chart to the right for statistical information.

Public water supply areas were identified as the predominate focus area; however, much of the area south of Swains Lake is already protected as part of the SATWaSR conservation easement, leaving a few additional areas adjacent to Route 9, east of Route 125, and north of Swains Lake. There are water quality protection opportunities along the Isinglass River; Berrys River; Nippo, Spruce, Hall, and Stonehouse Brooks; and tributaries flowing to the Bellamy Reservoir. Flood risk reduction areas are located along portions of Mallego Brook and the tributary draining from Scruton Pond to the Isinglass River.

This dataset was not available during the development of the previous 2009 NRI and was not used to create the prior co-occurrence map. The Conservation Commission was tasked with associating new criteria scores for each of the layers. The Commission decided to give equal weight for water quality, flood risk reduction, and public water supply, and placed the highest value on areas where flood risk reduction overlapped with public water supply.



Water Resources Conservation Focus Areas

Water Resource Overlays

- Riparian Buffer Areas
 - Public Water Supply
 - Flood Storage and Risk Mitigation
 - Flood Storage and Public Water Supply
- | | |
|---|--|
| <p>Political</p> <ul style="list-style-type: none"> Municipalities NH Impervious Surface <p>Transportation</p> <ul style="list-style-type: none"> State Local Private Not Maintained Recreation | <p>Water Resources</p> <ul style="list-style-type: none"> Lake Pond Streams and Rivers |
|---|--|

Data sources: From Land Conservation Priorities for the Protection of Coastal Water Resources (TNC 2016). Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

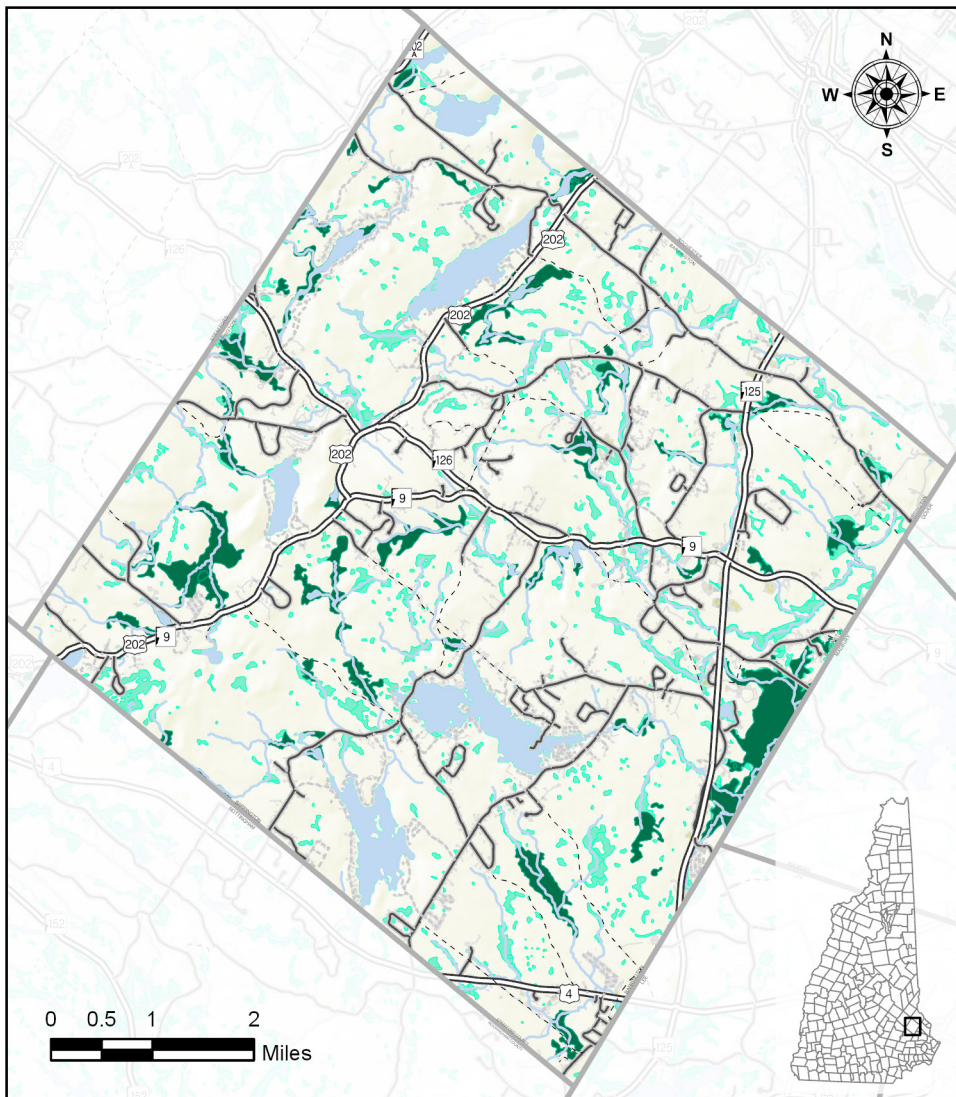
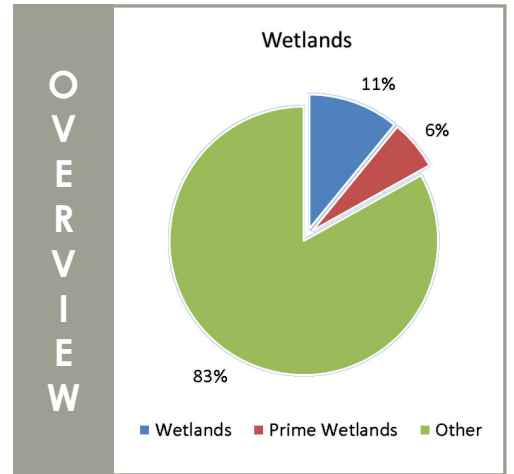
Map 3: Wetlands



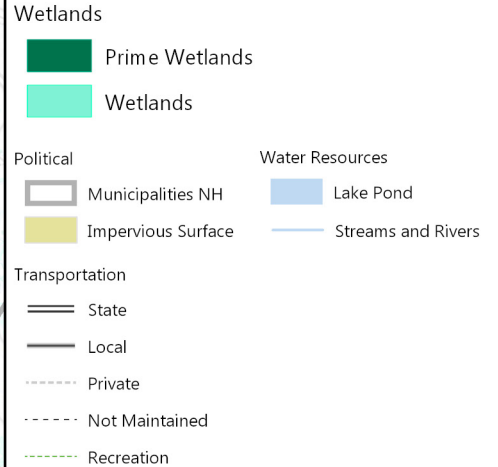
National wetland inventory (NWI) digital data contains records of wetlands location and classification as defined by the U.S. Fish & Wildlife Service, as well as locally defined prime wetlands were used to identify wetlands in Barrington – see pie chart to the right for statistical information.

There is a diversity of wetland types scattered throughout Barrington, including freshwater emergent, forested/shrub and pond types, and riverine (associated with rivers and streams) and lacustrine (associated with lakes and ponds) types. According to the most recent NWI, the town has roughly 3,400 acres of wetlands, excluding open waters. This is roughly 300 acres less than what was calculated in the 2009 NRI. This net loss could be attributed to land use conversion associated with development, more accurate data, beaver activity, or any combination of the three. A more in-depth analysis is needed to determine what the leading cause is.

While the source of data didn't change, an updated NWI layer was used for this analysis; the prime wetlands layer did not change. The Conservation Commission decided to not change the evaluation criteria scores for wetlands or prime wetlands from 2009, with the maximum value for prime wetlands.



Wetlands (Riparian Habitat)



Data sources: From Water Quality Planning Section at NH Dept. of Environmental Services, Watershed Management Bureau. Prime Wetlands were designated by municipalities. Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

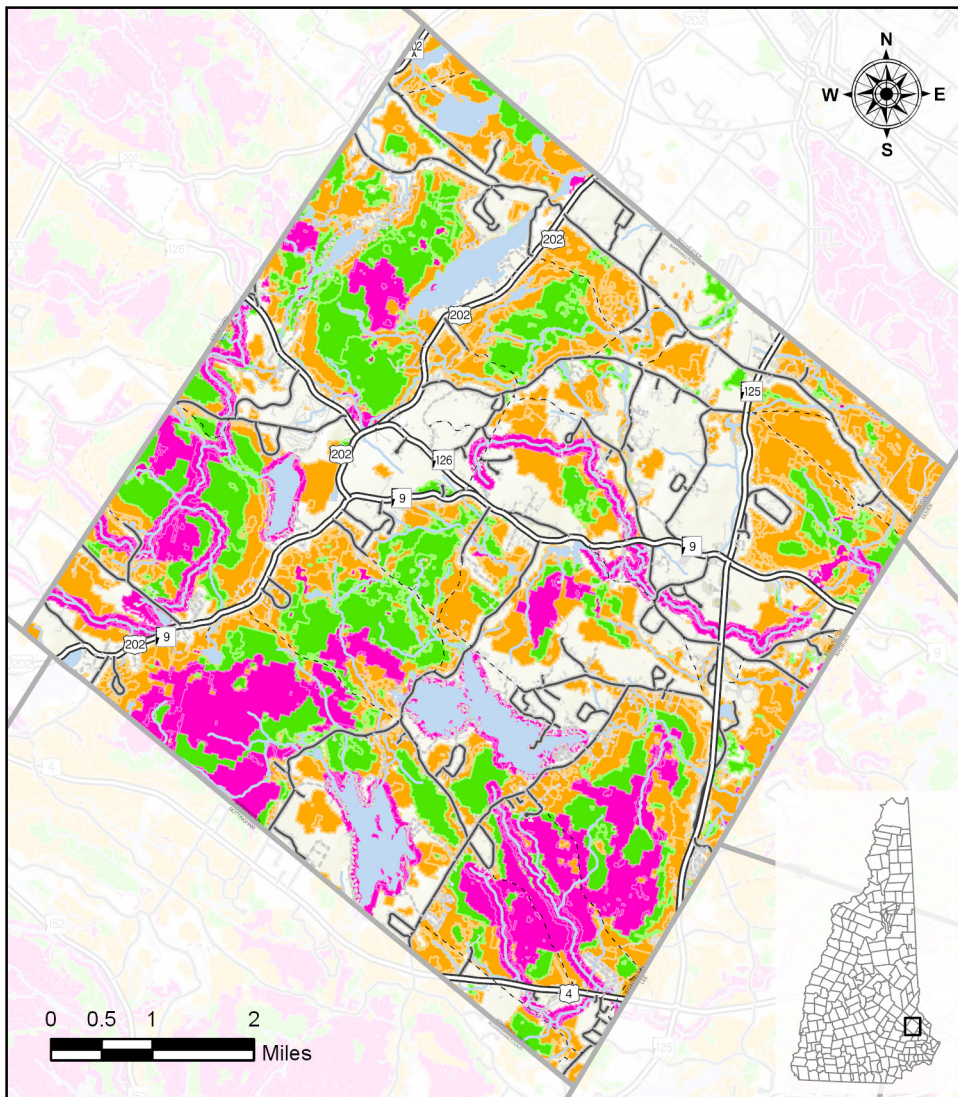
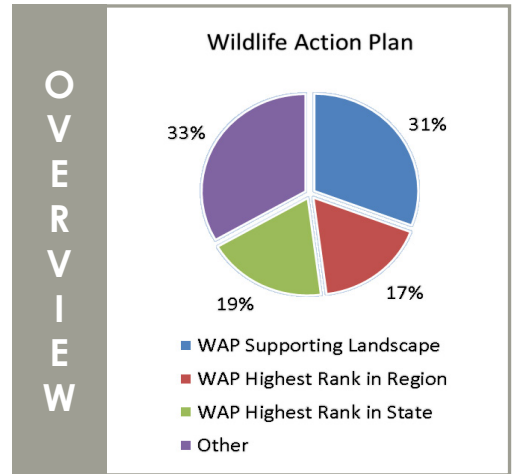
Map 4: Wildlife



Data on species locations, landscape setting, and human influences that affect the ability of habitats to be used by wildlife, referenced in the NH Wildlife Action Plan (2015), was used to identify where wildlife habitat is in the best relative condition in Barrington – see pie chart to the right for statistical information.

The two largest areas identified as the highest ranked habitat in New Hampshire are protected by the SATWaSR, Stonehouse Forest, and Stonehouse Pond conservation easements. Additional opportunities include areas west of Nippo Pond and along portions of Mallego Brook. Areas identified as highest ranked habitat in a biological region include west of Nippo Pond and between Long Pond and Ayers Pond are future opportunities for land protection efforts that would likely provide wildlife benefits.

The source of data didn't change from what was used during the development of the 2009 NRI. The Conservation Commission decided to not change the evaluation criteria scores for highest ranked habitat in the state, highest ranked habitat in a biological region, or supporting landscapes; the highest ranked habitat in the state received the maximum value.



Data sources: From Wildlife Action Plan. Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

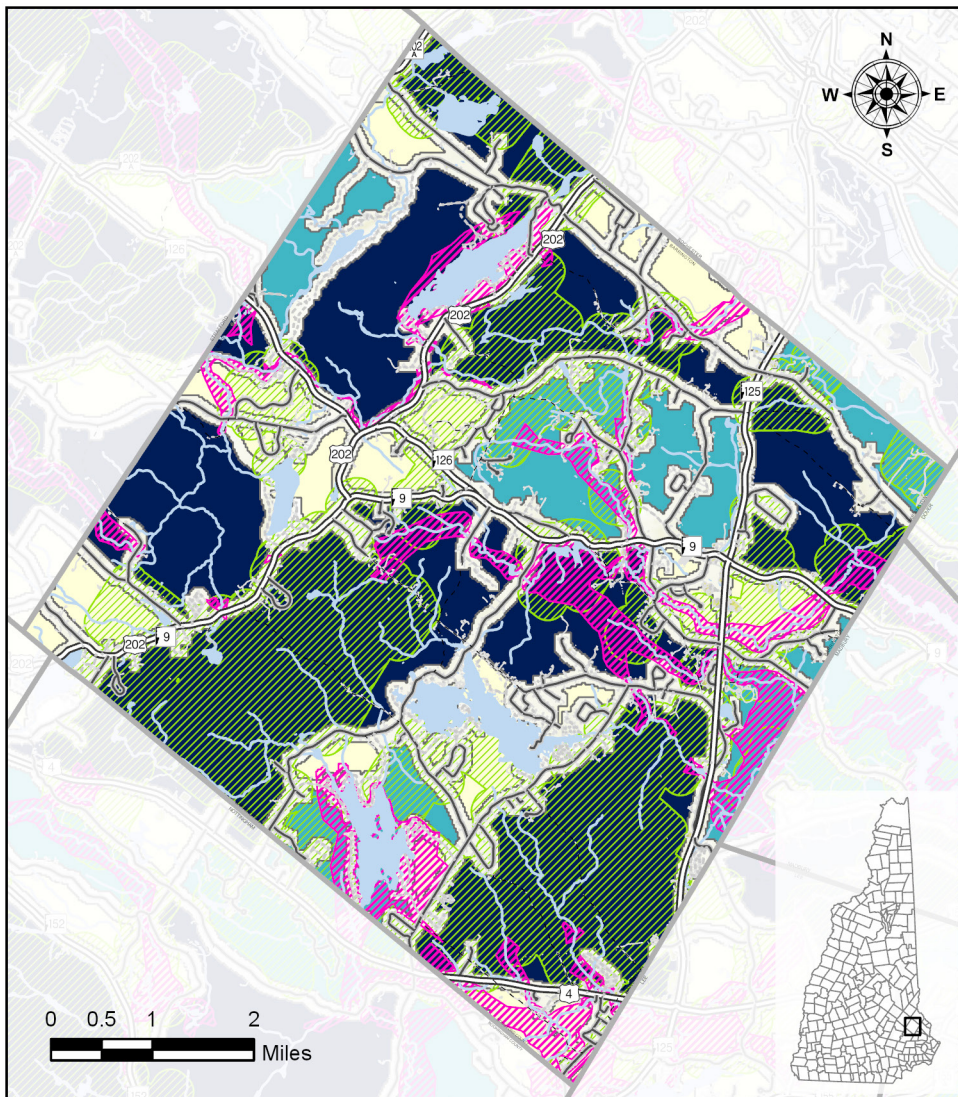
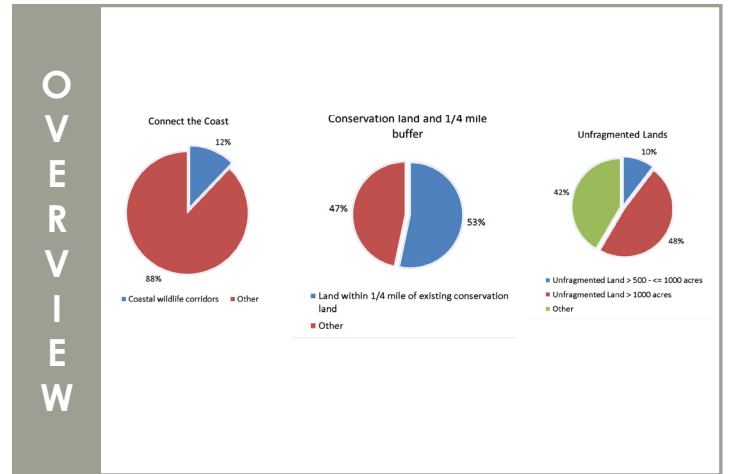
Map 5: Connectivity



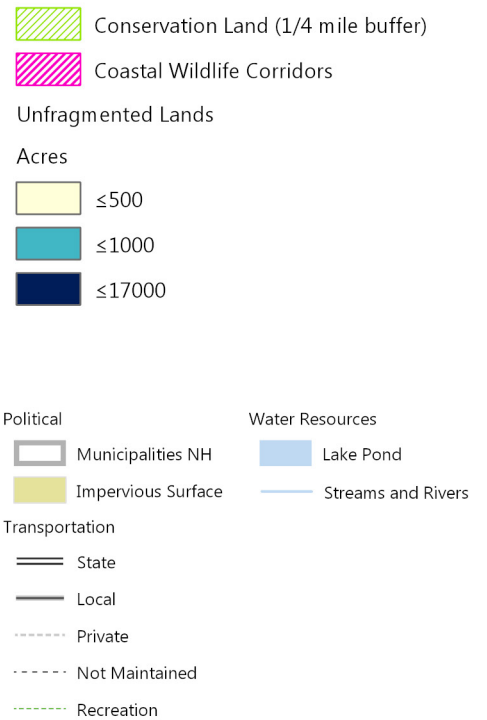
Large unfragmented open space blocks referenced in the NH Wildlife Action Plan (2005), land within a quarter mile of existing conservation land, and coastal wildlife corridors referenced in the Connect the Coast project was used to identify wildlife connectivity opportunities in Barrington – see pie chart(s) to the right for statistical information.

The largest block of unfragmented lands for future protection include areas west of Nippo Pond, between Long Pond and Ayers Pond, and east of Route 125 near the headwaters of Calef Brook. Coastal wildlife corridors to consider for protection include areas from Mendums Pond southeast of Route 4 along the headwaters of the Oyster River; small tributary systems flowing east through the Goodwin Easement towards the Bellamy Reservoir; Mallego Brook; portions of the Isinglass River; and Ayers Pond.

The unfragmented open space blocks data has not been updated since the development of the 2009 NRI; however, the Conservation Commission decided to adjust its evaluation criteria scoring by placing a higher value on larger blocks. The Commission lowered the score for lands within a quarter mile of existing conservation land. The coastal wildlife corridors dataset was a new layer and received a high score.



Connectivity



Data sources: From Connect The Coast, TNC. Unfragmented Lands from Conservation Focus, TNC. Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

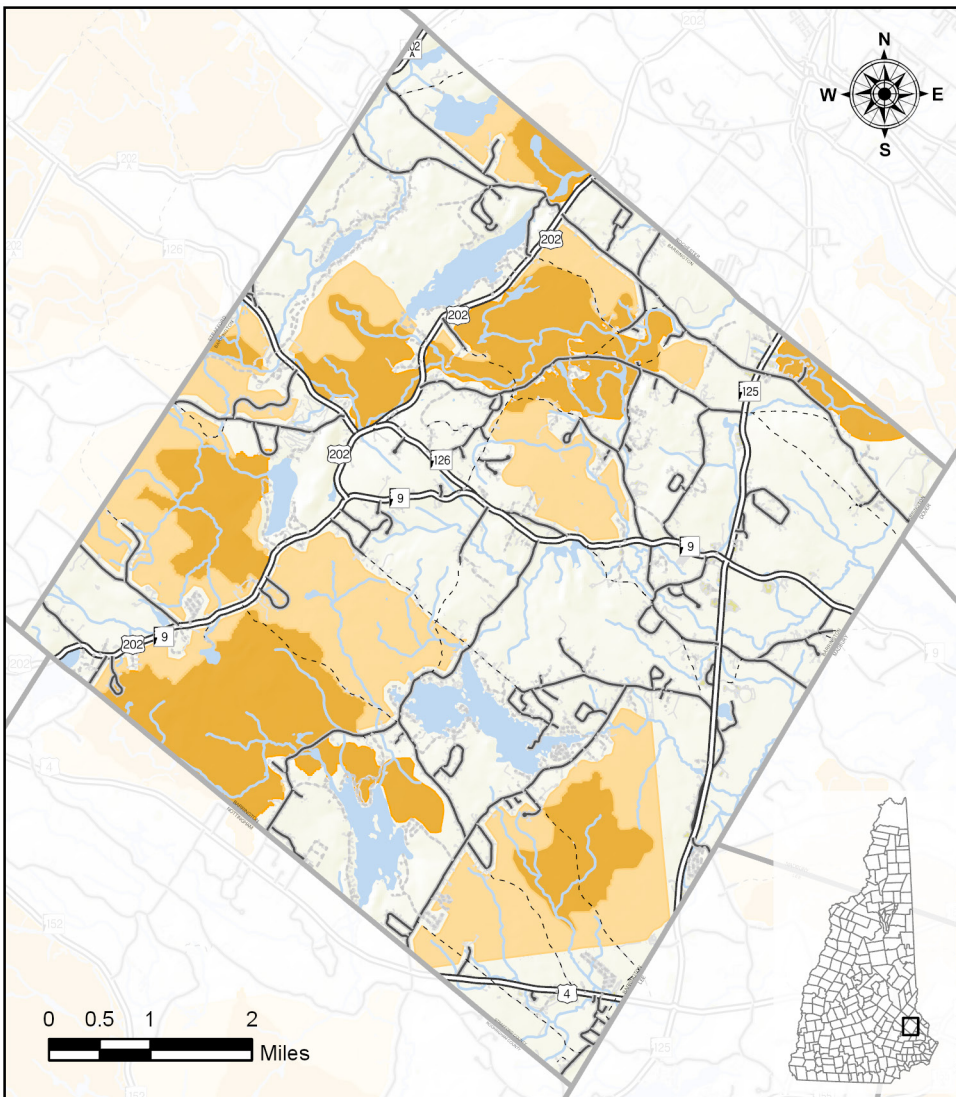
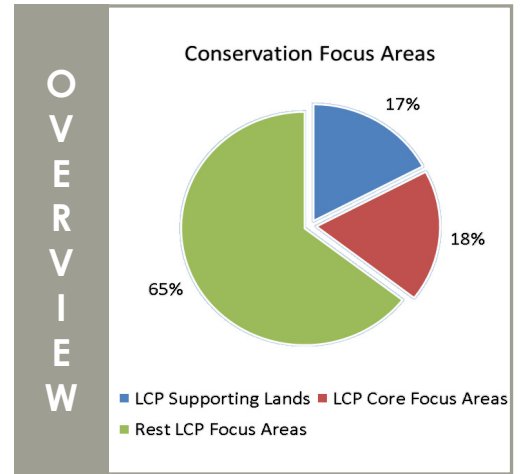
Map 6: Conservation Focus Areas



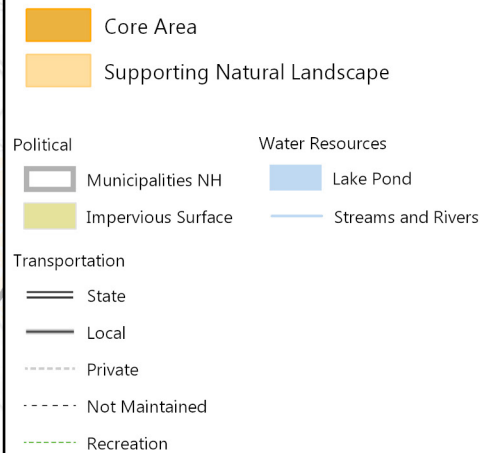
Core areas and supporting natural landscapes referenced in the Land Conservation Plan for New Hampshire's Coastal Watersheds (2006), was used to identify areas important for conserving native plants, animals, and natural communities in Barrington – see pie chart(s) to the right for statistical information.

As with some of the previous maps, three of the largest core areas are protected by the SATWaSR, Stonehouse Forest, Stonehouse Pond, and the Calef conservation easements. The two largest core areas that remain for land protection efforts include areas west of Nippo Lake and just south of Ayers Pond. Additional smaller areas between Preston Pond and Little Long Pond; Scruton Pond and the tributary flowing to the Isinglass River; and along the Isinglass River north of Tolend Road. There are also supporting landscapes that surround many of these identified areas.

The source of data didn't change from what was used during the development of the 2009 NRI and is nearly thirteen years old. As a result of the outdated information, the Conservation Commission decided to lower their evaluation criteria scores for both core focus areas and supporting landscapes, with the maximum value remaining for the core focus areas.



Conservation Focus Areas (TNC 2006)



Data sources: From Conservation Focus Areas TNC (2006). Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

Map 7: Other Surface and Groundwater Resources

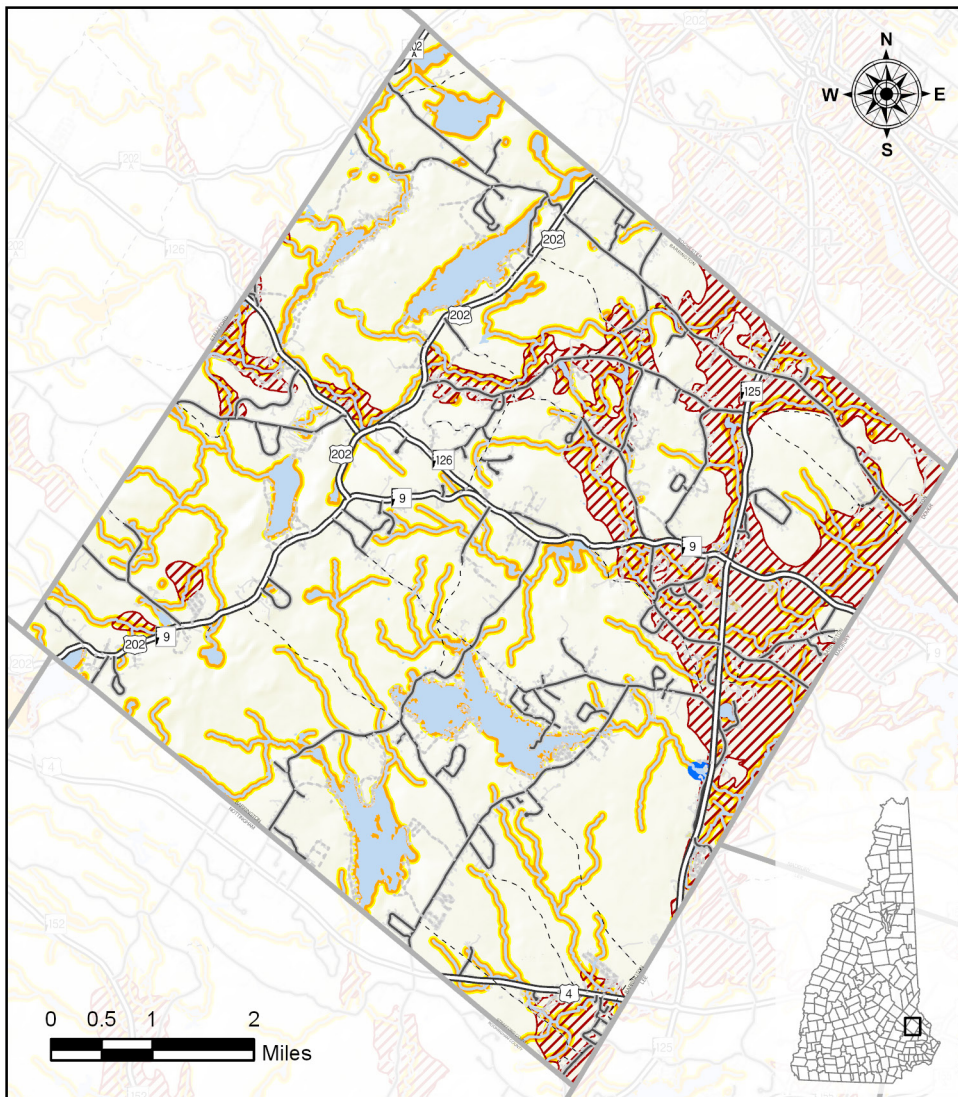
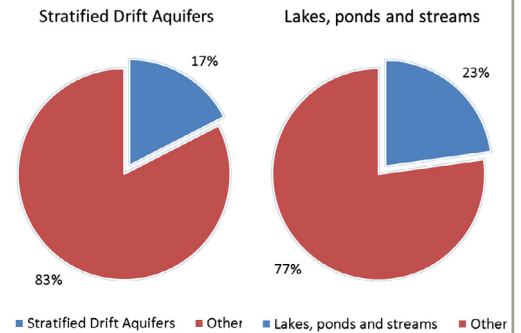


Land within 300' of lakes and ponds and 4th order streams, land within 300' of 1st, 2nd, 3rd order streams, the Pierce Road dam impoundment, and all stratified drift aquifers were used to identify areas with surface and groundwater resources in Barrington – see pie chart(s) to the right for statistical information.

In conjunction with the state protected Isinglass River, there are a significant amount of headwater and small feeder streams throughout the town. These areas contain important natural resources and provide important habitat for a variety of wildlife species. The Pierce Road dam impoundment has been locally recognized as a potential area for a future public drinking water supply. Stratified drift aquifers along the Isinglass River and Mallego Brook, as well as east of Route 125 are opportunity areas for protection.

The stratified drift aquifer data didn't change from what was used during the development of the 2009 NRI. As a result, the Conservation Commission decided to not change the evaluation criteria score for aquifers. The 2009 NRI only considered lakes, ponds, and 4th order streams; this analysis included 1st, 2nd, and 3rd order streams. All surface waters kept the same evaluation criteria score. The Pierce Road impoundment stayed the same as it was in 2009.

OVERVIEW



Other Surface and Groundwater Resources

- Pierce Rd Dam impoundment
 - Land 300' of lakes, ponds and streams
 - Stratified Drift Aquifers
- | | |
|--|--|
| <p>Political</p> <ul style="list-style-type: none"> Municipalities NH Impervious Surface <p>Transportation</p> <ul style="list-style-type: none"> State Local Private Not Maintained Recreation | <p>Water Resources</p> <ul style="list-style-type: none"> Lake Pond Streams and Rivers |
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Data sources: From US Geological Survey. Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

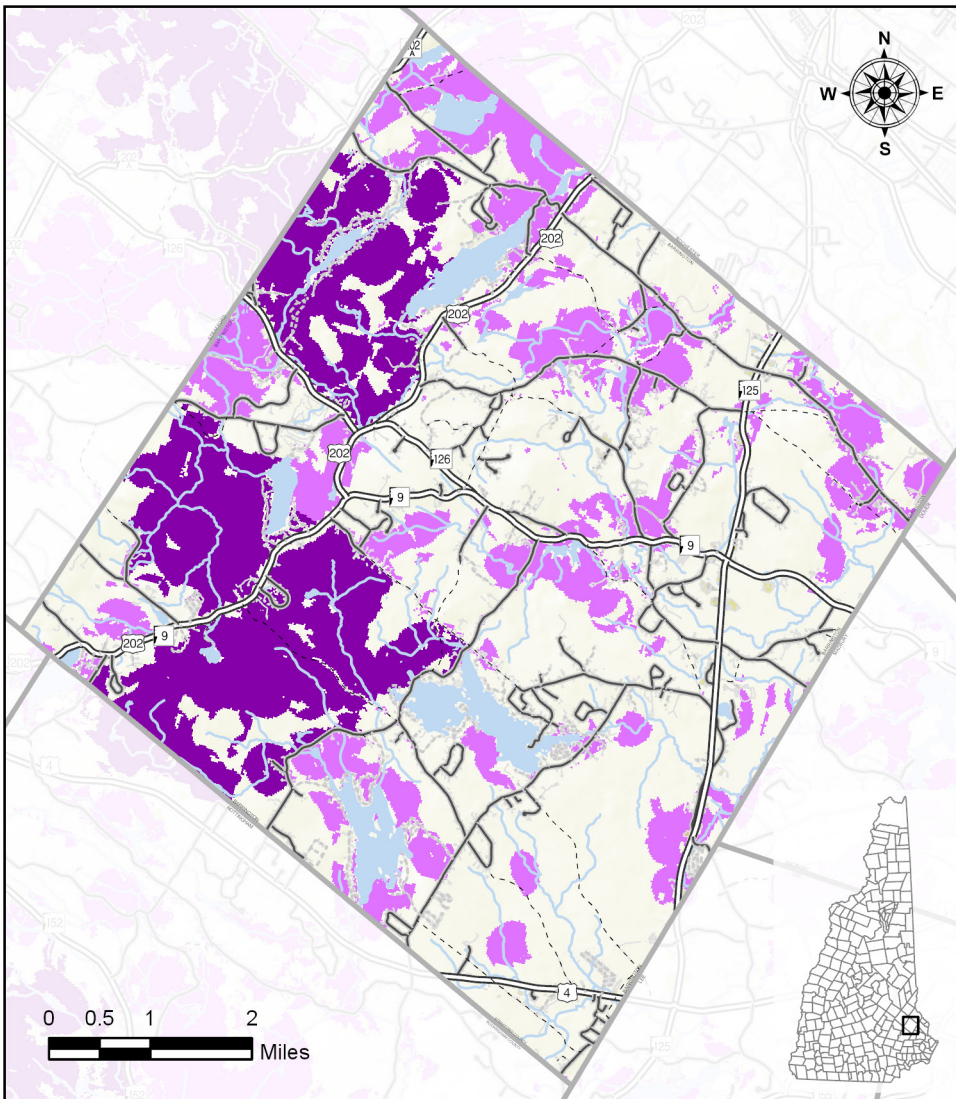
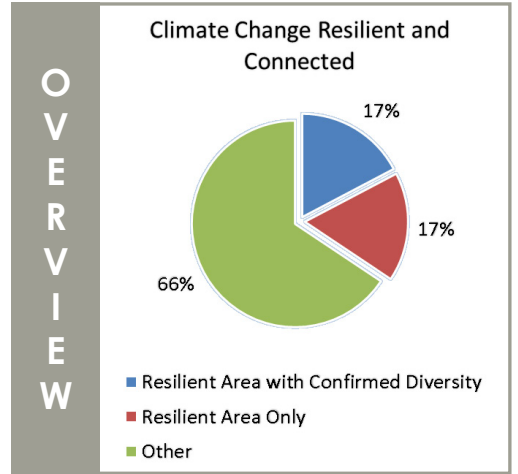
Map 8: Climate Change Resilient and Connected



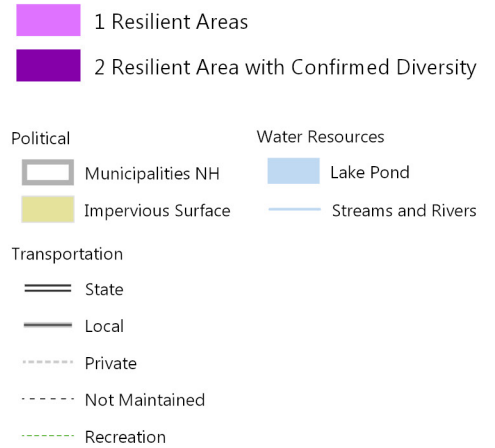
Climate-resilient sites, confirmed biodiversity locations, and species movement areas, referenced in the Resilient and Connected Landscapes for Terrestrial Conservation (2016), was used to identify areas best able to support plants and animals in a changing climate in Barrington – see pie chart(s) to the right for statistical information.

Two future conservation locations identified as resilient areas with confirmed diversity include areas west of Nippo Pond, and between Long Pond and Ayers Pond. Other resilient areas are scattered throughout town.

This dataset was not available during the development of the previous 2009 NRI and was not used to create the prior co-occurrence map. The Conservation Commission was tasked with associating new criteria scores for resilient areas and resilient areas with confirmed diversity. The Commission decided to give the maximum value for resilient areas with confirmed diversity, with a slightly lower score for resilient areas.



Climate Change Resilient and Connected

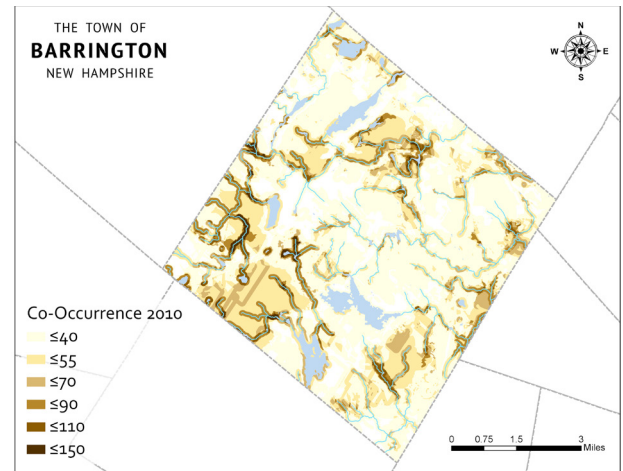


Data sources: From New Hampshire Department of Environmental Services Drinking Water & Groundwater Bureau. Base features are from GRANIT database (<http://www.granit.unh.edu/>). Digital data in NH represent the efforts of the contributing agencies to record information from the cited source materials.

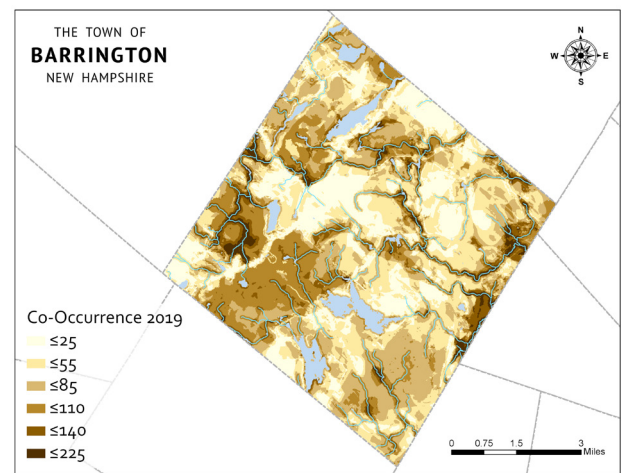
Co-occurrence Mapping Results



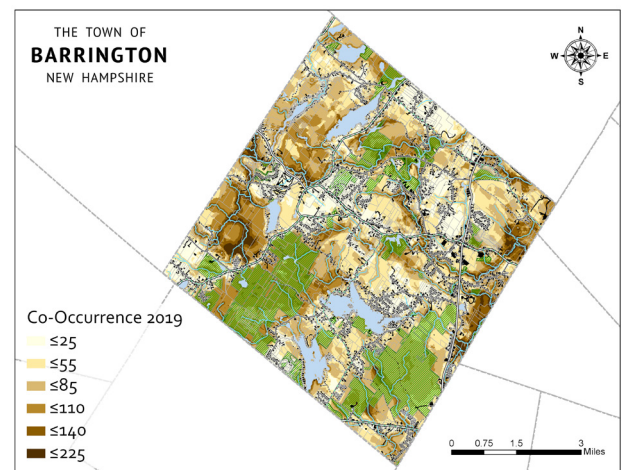
The co-occurrence map for 2010 was created for the use of the Barrington Conservation Commission, to act as an aid in prioritizing land to be actively targeted for conservation and/or protected from intensive development. This exercise included the participation of the conservation commission through a process of defining the criteria and assigning weight to each one of them. The data availability was limited however, it was possible to identify those areas with high priority on conservation (darker shade).



In 2019, this process was repeated however, we were able to include more criteria given the availability of data. Also, some of these criteria utilized layers of information that were a result of an optimization analysis with focus on identifying conservation and protection priorities. Our results highlighted several areas within the town of Barrington that coincided with the previous exercise done in 2010 but the detail provided in the 2019, improves the identification of what characteristics and criteria impacted the analysis.



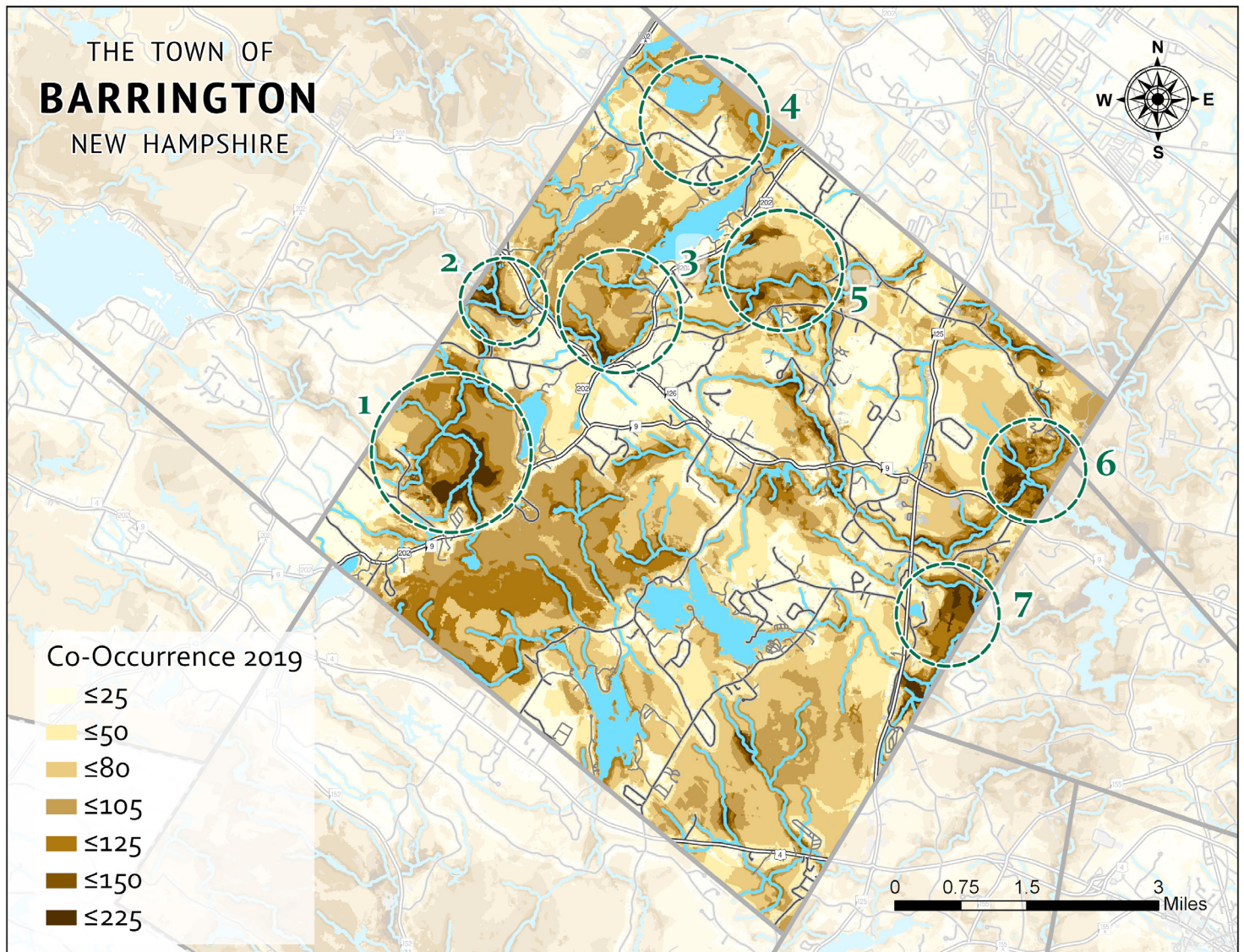
Permanent conservation lands and impervious surfaces were superimposed over the co-occurrence map in order to identify what areas are already protected but also, what other opportunities or regulation tools might help on protecting the areas with high co-occurrence value.



Opportunities and Recommendations



The high value is characterized by the presence and overlap of most or all criteria used for the analysis.



1. West of Nippo Lake

This area is mostly undeveloped and undisturbed where the Lake Nippo and other streams such as the Stonehouse Brook and the Spruce Brook dictated the high conservation value and connectivity. This area has a highest co-occurrence map of 190 points. The mean area of the parcels surrounding the highest value are ~50 acres, which provides an opportunity to strategically plan for its conservation.

2. Confluence of Nippo Brook and Isinglass River

A portion of this area located on the east-south side is the Olson conservation area, which is considered a permanent conservation land close to the public. The surroundings of the Isinglass River are highlighted with co-occurrence values between 140 – 190. The mean area of the parcels located in this area are 8 acres however, prime wetlands are present in a large portion of the area providing an opportunity for protection.

3. South of Ayers and Long Ponds

This area's co-occurrence values range from 65 – 175; however, most of the land is undeveloped with high potential for connecting landscapes,



habitat and providing a great opportunity for conservation. The center of the that area is contained in ~25 acres' parcels. Also, this area is characterized by its high connectivity given the lack of fragmentation due to roads or another impervious surface.

4. Area around Round Pond

This area's co-occurrence values range mostly between 10 – 120 points however, the potential for this area is to connect different permanent conservation lands located around Round Pond, Preston Pond and Little Long Pond. Farmlands of local, prime and statewide importance surround Road pond which represents an opportunity for conservation. The City of Rochester may be interested in conserving additional land in this area to protect the City's drinking water supplies. They City has already conducted several environmental studies in this area, which they may be willing to share with the Barrington Conservation Commission upon request.

5. Scruton Pond and along the Isinglass River west of the Calef easement

This area constitutes a connectivity system that surrounds the Isinglass River and potentially connects with the area #3. The highest co-occurrence value in this area is 185 points. It is also part of a system of several permanent conservation lands that are protected with no or undefined public access. Its high value comes mostly from its water resources, connectivity, the presence of prime wetlands and conservation focus areas.

6. Confluence of Mallego Brook and Wentworth Brook

The highest co-occurrence value in this area is 185 points. The Calef, Mallego and Wentworth Brooks are all present, making this an area with high connectivity potential. The area is mostly comprised by farmland soils with presence of prime wetlands. Developed land is mostly comprise by residential development and farms. The presence of stratified drift aquifer makes this location, along with #7, as a strong candidate to protect groundwater recharge and preserve future groundwater drinking water supplies.

7. Tributaries flowing into the Bellamy River

This area, east of the Swains Lake, is where the Bellamy River starts and contains co-occurrence values as high as 185 points. The north-west part of this high co-occurrence values area is already protected by permanent conservation lands. Some of these conservation lands are close to the public but others are public and use for recreation activities. The Pierce Road Pond Impoundment, one of the local sites with a high conservation value for its water resource, is located there. Commercial and industrial development is present in the area but at the same time, prime wetlands and the aquifer comprise a large portion of it, which represents an opportunity for protecting the land.

