



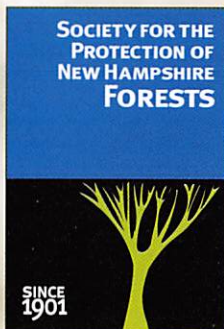
# New Hampshire's Changing Landscape

2005



*Population Growth and  
Land Use Changes:  
What They Mean  
for the Granite State*

Prepared by:





# Executive Summary

Whether native or newcomer, anyone who's lived in New Hampshire in recent years has seen it: A new housing development here. A new shopping center there. Towns that once seemed "safe" from change suddenly at the frontier of rapid growth.

Now, new research confirms what daily experience tells us — New Hampshire really *is* growing faster, and rapid development is affecting an ever-larger portion of the state. This Forest Society update of the *New Hampshire's Changing Landscape* report\* uses the latest data and research tools to show how recent growth trends are affecting the state's landscape.

Key findings include:

- State population is expected to grow by 358,000 from 2000 to 2025 — more than 28%. An estimated 80% of that growth will happen in the four southeastern counties — in other words, on just *one-third* of the land.
- New Hampshire's population grew 17.2% from 1990 to 2004 — twice the rate of the rest of New England.
- Residential development is expanding north and west along major highway corridors.
- Land prices have risen 61% statewide since 1998, with the greatest increases occurring in the fastest-developing regions.
- In 1970, 139 towns were classified as rural; by 2025, this number will have dropped by nearly half to 72.

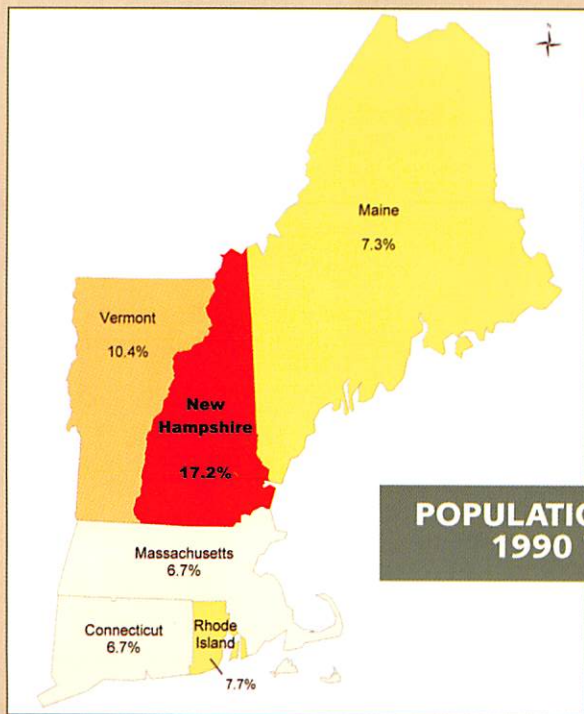
- New Hampshire is losing about 17,500 acres of forestland every year. The remaining large forests south of the White Mountains are getting smaller, and most of our best forest soils are in the direct path of development.
- Only 10% of the most critical lands around public water supply wells and aquifers are protected.
- New Hampshire is losing its high quality farmland. Rockingham County alone lost *one-third* of its productive cropland from 1997 to 2002. Most of the state's best remaining agricultural soils are unprotected.
- New Hampshire has conserved more than 291,000 acres in the past six years. Some 27.7% of the state is now protected, up from 22.3% in 1998. But 75% of all conservation land is in the northern half of the state.
- Many New Hampshire towns have increased their percentage of conservation land since 1998. But 110, or nearly half, still have less than 10% of their land conserved.

We believe the findings in this report are important to anyone concerned with the future of the New Hampshire landscape — a landscape that has supported our prosperity and unique way of life for 300 years. In short, this report should be important to all of us. As with the original *New Hampshire's Changing Landscape* report, we hope it will serve as a catalyst for informed, and cooperative, action by the people of the Granite State.

\*Based on a 1999 publication by the Forest Society and the New Hampshire Chapter of The Nature Conservancy.

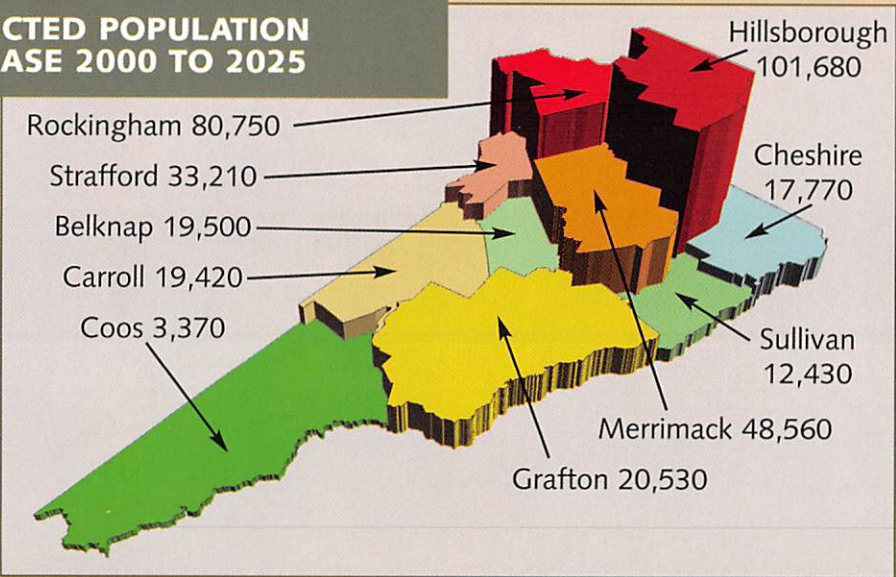


# Population Growth



**POPULATION INCREASE  
1990 TO 2004**

**WHERE IS NH GROWING?  
PROJECTED POPULATION  
INCREASE 2000 TO 2025**



New Hampshire's population is growing twice as fast as the rest of New England, and this rapid growth is projected to continue. Most of the state's population growth continues to be absorbed by the southeastern counties, but the fastest rates of population increases are along Interstates 89 and 93, in the Lakes Region and along the Route 16 corridor.

- For four straight decades, New Hampshire has been the fastest growing state in New England and the nine-state Northeast region.
- New Hampshire's population more than doubled from 1960 to 2000, from 606,400 to more than 1.2 million.
- From 1990 to 2004, New Hampshire's population grew by 17.2%, twice as fast as the average for the rest of New England. The state gained more than 13,000 people per year during the period, for a total of 190,248 new residents.
- New Hampshire is projected to add an additional 358,000 residents between 2000 and 2025, an increase of more than 28%.
- Four-fifths of this new population will be absorbed by the four southeastern counties — which comprise about one-third of the state's land base.
- The fastest rates of population change will continue to be largely in the Lakes Region and the Interstate 89 corridor.

• "Population Increase 1990 to 2004" statistics were generated from US Census Bureau data.  
 • "Where is NH Growing?" statistics were generated from NH Office of Energy and Planning, *Population Projections for State and Counties*, updated September 2004.







# Population Density

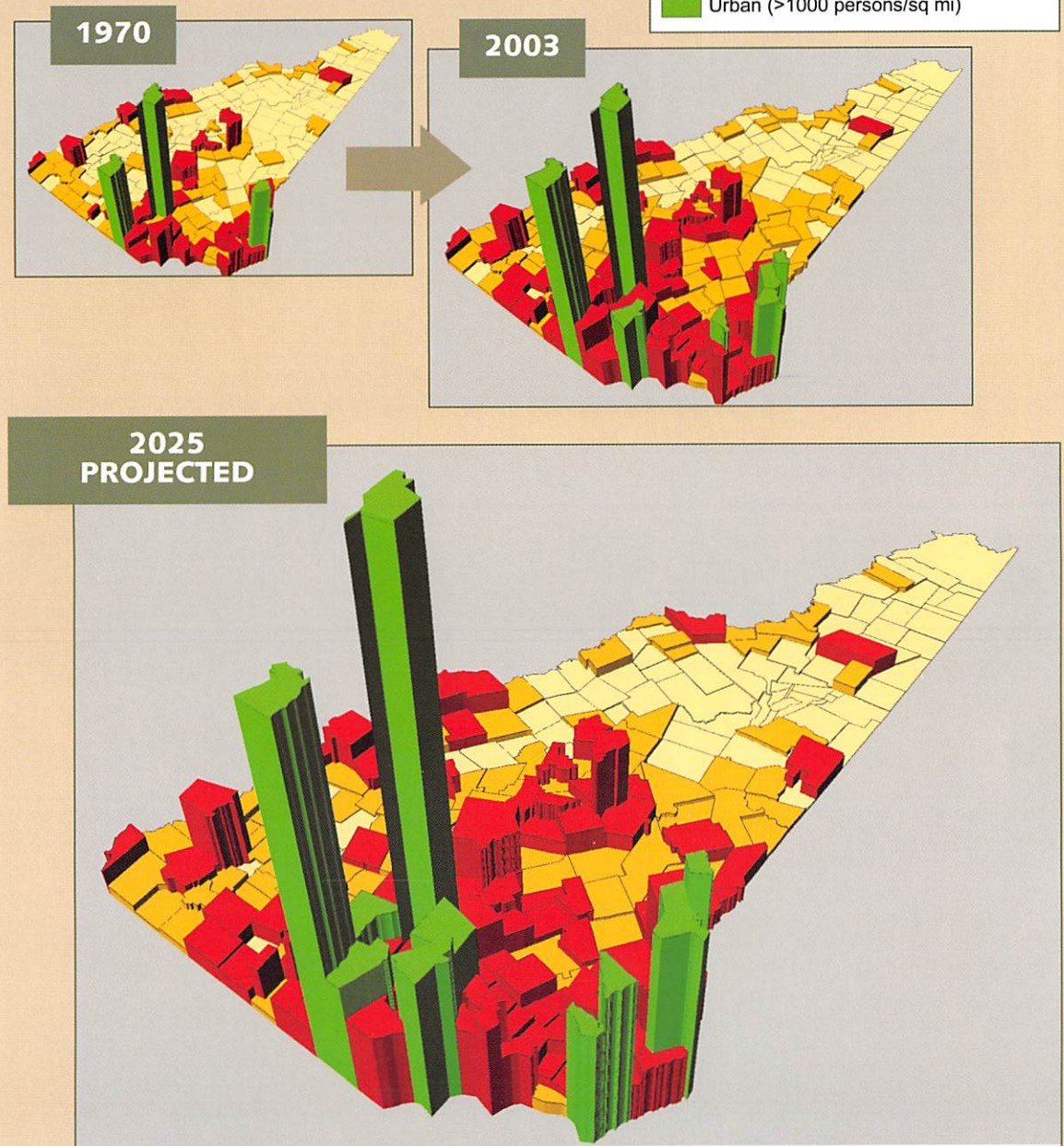
As population densities rise, New Hampshire is being transformed from a largely rural state to a predominantly urban and suburban one. By 2025, rural New Hampshire will be restricted to the North Country and isolated pockets in the west.

- These maps depict the population density of New Hampshire municipalities in 1970 and 2003, and projected densities in 2025. Population densities are categorized into four broad types of built landscape — *urban*, *suburban*, “*exurban*” (*communities in transition from rural to suburban*) and *rural*.
- In 1970, the population of the state was less than 740,000. Only **4** of New Hampshire’s **259** communities were densely populated enough to be categorized as urban, **39** were suburban, **77** were exurban and **139** were rural.
- By 2003, New Hampshire’s population had grown to more than 1.2 million, with densities increasing throughout the southern half of the state. Today New Hampshire has **8** municipalities classified as urban, **78** are suburban, **89** are exurban and **84** are rural.
- In 2025, the state’s population is projected to be almost 1.6 million. **12** municipalities will be classified as urban, **89** will be suburban, **86** will be exurban and **72** will be rural.

- Statistics were generated from NH Office of Energy and Planning and GRANIT data.
- Population density land classes are adapted from the work of Dr. David Theobald, CSU, 2003 and 2004.

Population Density by Land Class

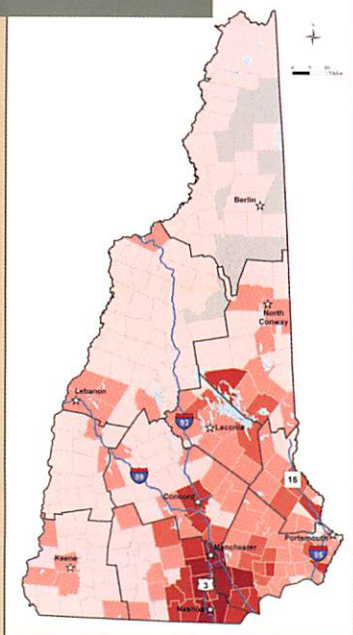
	Rural (<36 persons/sq mi)
	Exurban (36 to 144 persons/sq mi)
	Suburban (144 to 1000 persons/sq mi)
	Urban (>1000 persons/sq mi)



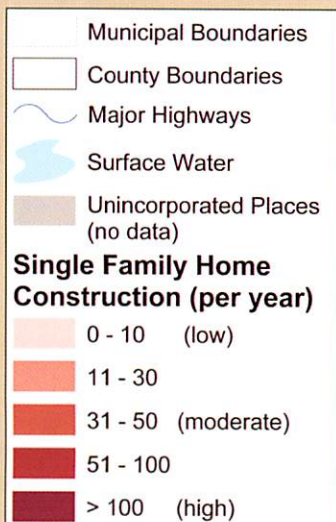
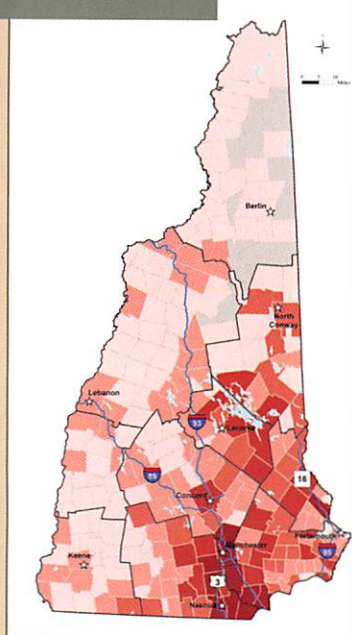


# Housing Construction

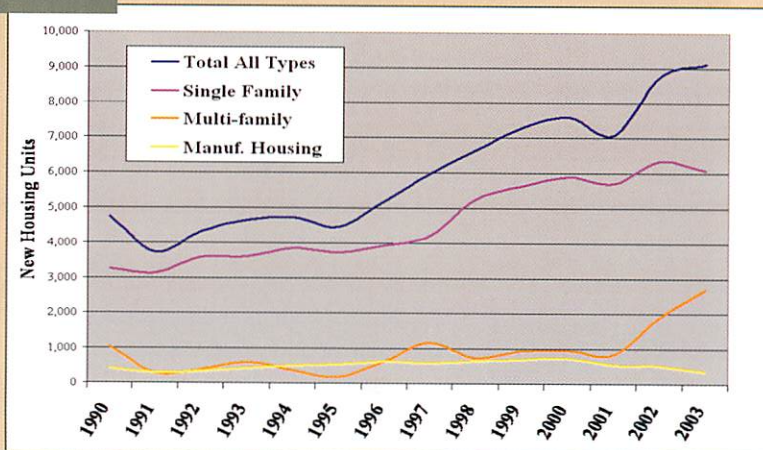
1990-1997



1998-2003



## HOUSING CONSTRUCTION 1990-2003



Since the mid-1990s, New Hampshire has experienced a boom in the construction of single family housing. Rapid residential development is no longer restricted to the Seacoast and lower Merrimack Valley, and has moved north and west along major highway corridors.

Single family housing is a concern because its low density affects more natural and cultural resources as land is developed.

- These maps show single family home construction in New Hampshire towns. Single family homes represent a large portion of land development in New Hampshire, and the lion's share of all housing built in the state.
- The number of single family homes in a town is the best predictor for total developed acres in that town — the combination of homes, industrial buildings, roads, parking lots, etc. Each single family home currently results in the total conversion of about 1.4 acres.
- For the 1990-97 period, the most intense home construction was concentrated in Rockingham County and the lower Merrimack River Valley.
- From 1998 to 2003, housing construction slowed to some extent in coastal Rockingham County and shifted inland and north, particularly to western Rockingham County and the Lakes Region. The rapid pace of development remained virtually unchanged in the lower Merrimack River Valley.

• Statistics were generated from NH Office of Energy and Planning data, Current Estimates and Trends in NH's Housing Supply for 2003, updated November 2004.



# Land Conversion & Land Values

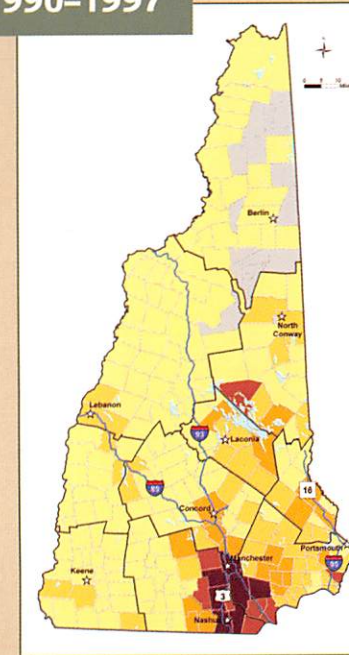
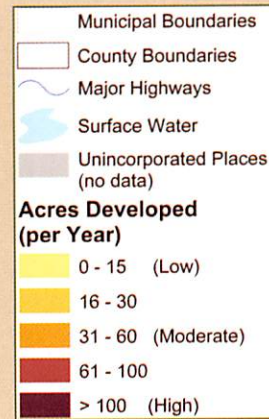
Another way to assess the pace of growth in New Hampshire is to look at how much forest and farmland is being “converted” to developed uses like buildings, roads and parking lots. Land conversion rates closely mirror the pattern of population growth and housing construction. Moderate to high rates of land conversion are now found throughout the southeastern third — if not half — of New Hampshire.

Since 1998, land values in New Hampshire have increased more than 60% statewide, with the increases again largely following population growth and development activity.

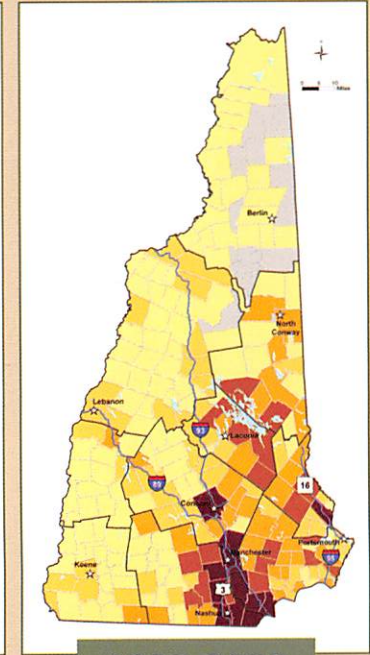
The maps at right display estimates of land conversion in New Hampshire towns. Land conversion is defined here as a change from undeveloped land cover (forests or farms) to developed land cover dominated by buildings and roads.

- 15 municipalities converted more than 60 acres per year to developed uses between 1990 and 1997. This number rose to 31 towns between 1998 and 2003.
- From 1998 to 2003, moderate to high rates of land conversion continued along the **Seacoast** and within the **lower Merrimack River Valley**, and expanded inland and north, particularly in the **Lakes Region**, and even in the **Mount Washington Valley**.
- Substantial land conversion is now occurring along and between all of the state’s **major transportation corridors** including Interstates 93 and 95 and NH Routes 101 and 16, and is also beginning to extend along Interstate 89.

1990–1997



1998–2003



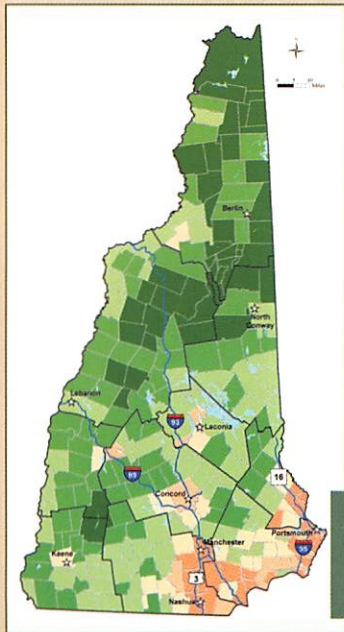
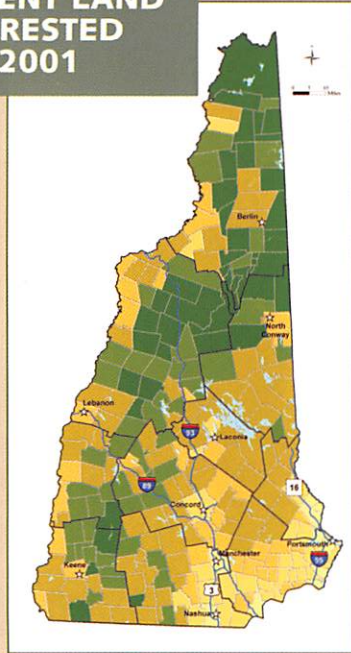
Change in NH Land Values, 1998–2003

	1998	2003	1998–2003
	Total Land Value	Total Land Value	Percent Changed
Belknap	\$1,475,464,430	\$2,788,124,785	89%
Carroll	2,072,558,651	3,509,199,647	69%
Cheshire	1,093,070,944	1,455,557,805	33%
Coos	389,433,285	449,315,221	15%
Grafton	1,829,157,191	2,460,358,790	35%
Hillsborough	5,711,824,289	7,697,574,165	35%
Merrimack	2,119,668,342	3,251,444,093	53%
Rockingham	4,920,856,537	10,175,758,121	107%
Strafford	1,276,787,141	2,241,920,007	76%
Sullivan	702,314,547	759,778,428	8%
<b>State Total</b>	<b>\$21,591,135,357</b>	<b>\$34,789,031,062</b>	<b>61%</b>

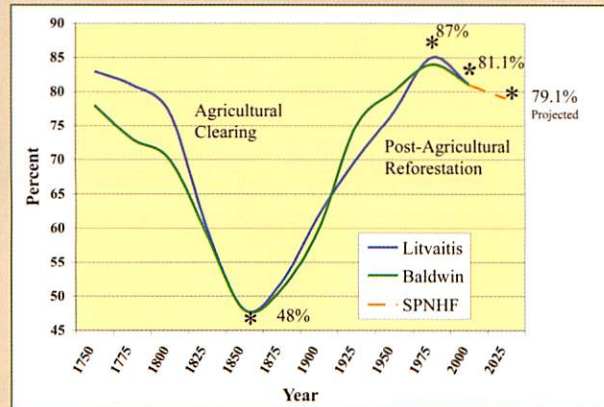
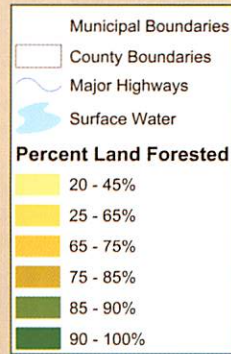
- Land conversion estimates are based on a statistical relationship between developed lands and single-family home data. Developed lands data from the *Integrating Technologies to Monitor and Predict Patterns of Urban Growth* study of Rockingham and Strafford Counties was related to concurrent housing construction data from the NH Office of Energy and Planning.
- Land value statistics were generated from NH Department of Revenue Administration data for 1997 through 2003.



## PERCENT LAND FORESTED 2001



## LAND IN BLOCKS OVER 500 ACRES 2001



# Forestland Today

New Hampshire remains the second-most forested state in the nation after Maine, but forest cover has been steadily diminishing since the early 1980s. This loss, which totals about 17,500 acres per year, is being largely driven by land development.

Large “forest blocks” are shrinking as development breaks up large forests into smaller ones. Our most productive forest soils are in the direct path of development, and are largely unprotected.

New Hampshire is gradually losing the values provided by extensive forests, including their contribution to water and air quality and quantity, wildlife habitat, scenic values, the forest products industry and recreation opportunities.

## FOREST COVER

The current extent of forest cover in New Hampshire and predicted loss of forest cover through 2025 is shown on the maps to the left.

- In 1983 New Hampshire was 87% forested, the largest extent of forest cover since European settlement began in the 1700s.
- By 1997, the U.S. Forest Service estimated forest cover in New Hampshire had dropped to 84% of the state's area, a loss of **163,400** acres in 14 years. Estimates based on 2001 satellite data indicate New Hampshire had dropped to 81.1% forested.
- The 13 municipalities that currently have less than 50% of their land area forested fall along major transportation corridors.

- “Percent Land Forested” statistics are generated from the NH 2001 Land Cover Assessment Study data (GRANIT).
- “Land in Blocks Over 500 Acres” statistics generated from NH 2001 Land Cover Assessment Study (GRANIT), National Land Cover Dataset (USGS) and NH Department of Transportation data.



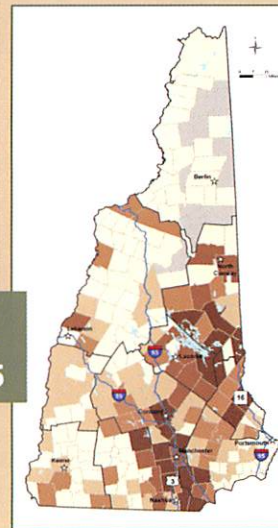
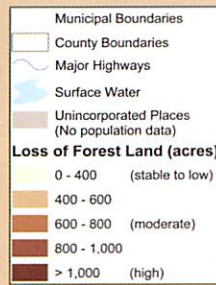
- It is predicted that New Hampshire's forest cover will drop to 79.1% by 2025. This translates to approximately 112,000 acres or 175 square miles.
- 85 towns will lose more than 500 acres of forestland by 2025, while 20 towns — all in the southeast and the Lakes Region — will lose more than 1,000 acres.
- While we have regained forest cover for 150 years, today's conversion is largely a one-way process as land is cleared for new roads and buildings.

## FOREST BLOCK SIZE

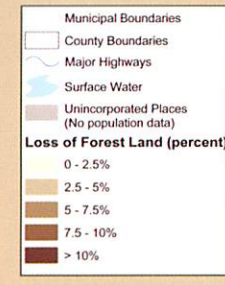
A "forest block" is an area of forest that is not broken up by roads, other land uses or water. The current extent and size of forest blocks in New Hampshire are shown in the maps at the lower right.

- A 500-acre block is big enough to support significant wildlife habitat, protect water quality and allow some economic forest management. Blocks of this size are still widespread in New Hampshire, but are already sparse in the Seacoast and lower Merrimack Valley, and are becoming so in the Lakes Region.
- Sustainable forest management and ecological significance requires blocks of at least 5,000 acres, and these values increase with block size. A few large blocks remain in the Monadnock Highlands, but most are in the White Mountains and Coos County.

## PROJECTED CHANGES TO FORESTED LAND: 2001–2025



**ACRES CHANGE  
2001–2025**

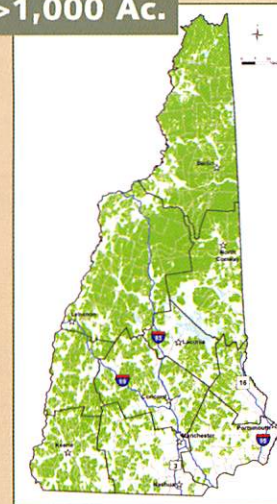


**% CHANGE  
2001–2025**

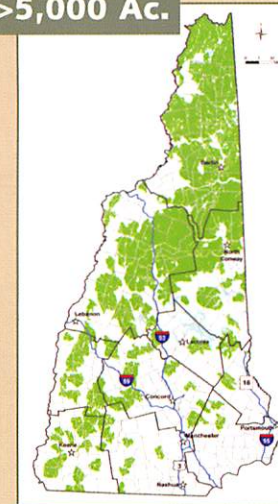
**>500 Ac.**



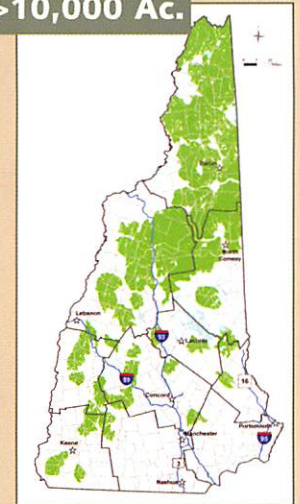
**>1,000 Ac.**



**>5,000 Ac.**



**>10,000 Ac.**

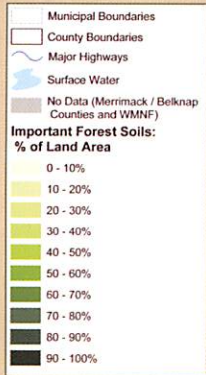


## DISTRIBUTION OF FOREST BLOCKS STATEWIDE

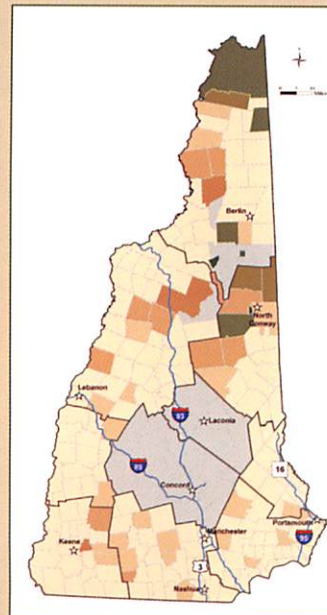
- Forest blocks generated from NH 2001 Land Cover Assessment Study (GRANIT) and NH Department of Transportation data.
- 2025 forested land projections are based on a statistical modeling relationship between a town's population density and its percent forested area. Forested area is determined from NH 2001 Land Cover Assessment Study data and population density projection data (US Census Bureau).



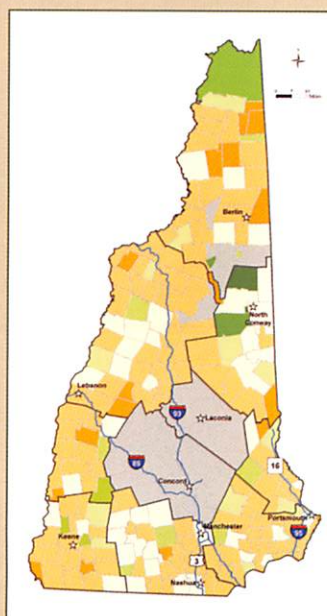
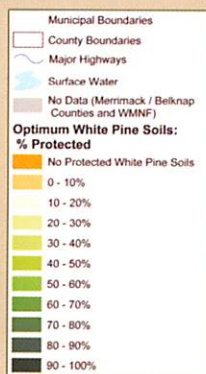
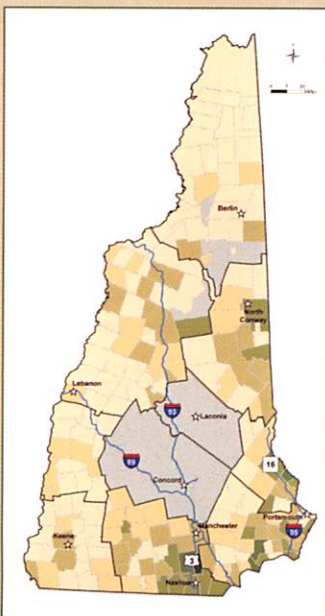
## LAND AREA IN IMPORTANT FOREST SOILS



## LEVEL OF PROTECTION



## WHITE PINE SITES AND STATUS OF PROTECTION



## IMPORTANT FOREST SOILS

Soil productivity is a key factor in the economic value and ecological diversity of New Hampshire's forested landscape.

The first map to the left shows how much land area in each community is classified as "most productive forest soils." The second map shows the amount of soil protected from development in each community.

- Our best soils are largely unprotected in all regions of the state.
- Most of New Hampshire's best forest soils are found in the southeastern part of the state, specifically in the lower Merrimack River Valley, the Seacoast and along the Route 16 corridor.
- Our best forest soils are located in the most rapidly urbanizing parts of the state, and are the most threatened by development.

Half the sawlogs harvested each year are white pine, worth roughly \$20 million. The best high-volume white pine growing sites are on sandy/gravelly soils, and:

- These soils are only 5% of the state's land area.
- 17% of these soils are already developed.
- Only 10% are protected.
- 50% are located in the three southeastern counties, and 20% of those are already developed.

- Soils statistics generated from National Resource Conservation Service Soils data (provided by GRANIT).
- Conservation lands data provided by GRANIT and SPNHF.
- Data unavailable for Merrimack and Belknap counties.



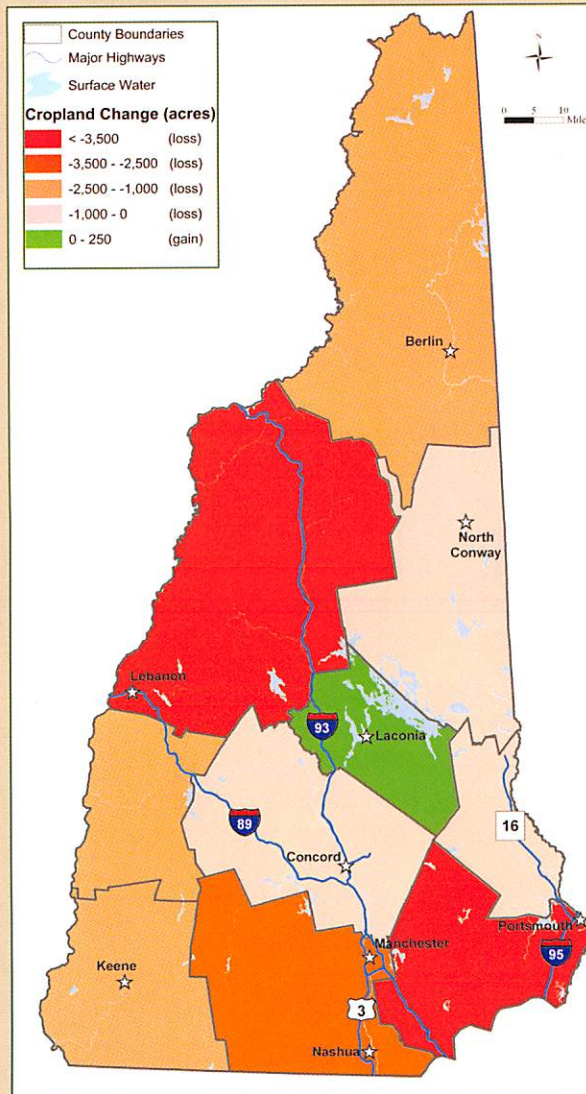
# Farmland Today

New Hampshire continues to rapidly lose farmland to development. In just five years (1997–2002), Rockingham County lost one-third of its productive cropland. Most of New Hampshire's best farmland is unprotected.

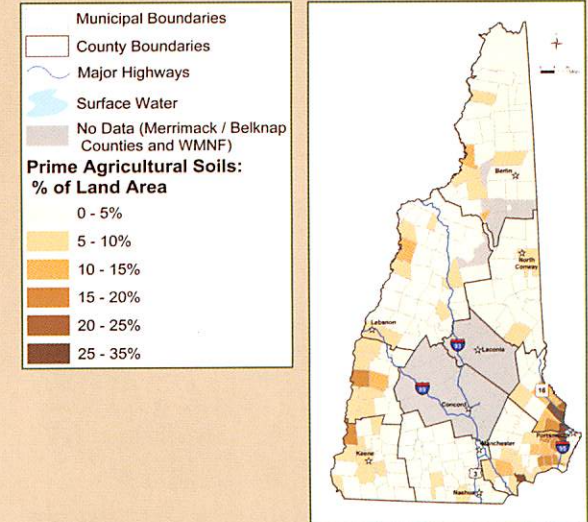
- Almost 445,000 acres, or 8% of the state's land base was in farmland as of 2002.
- Between 1997 and 2002, the number of farms in the state dropped by 14% to 3,363.
- The state lost farmland at a rate of five square miles per year.
- Productive cropland amounts to only 2% of the state land base, and declined by 18,300 acres from 1997 to 2002, a 12.4% decrease (see map).
- Cropland losses have been highest in Rockingham County (34%) and also significant in Cheshire, Hillsborough and Sullivan Counties (all at 19%), totaling almost 11,000 acres in five years.
- Prime agricultural soils\* are a precious commodity in New Hampshire, comprising only about 5.6% of the state, and are mostly limited to the Connecticut and Merrimack River Valleys and the Seacoast.
- In most cases, areas with the best agricultural soils have the *least* farmland protection.

\*Includes prime agricultural soils and soils of statewide importance.

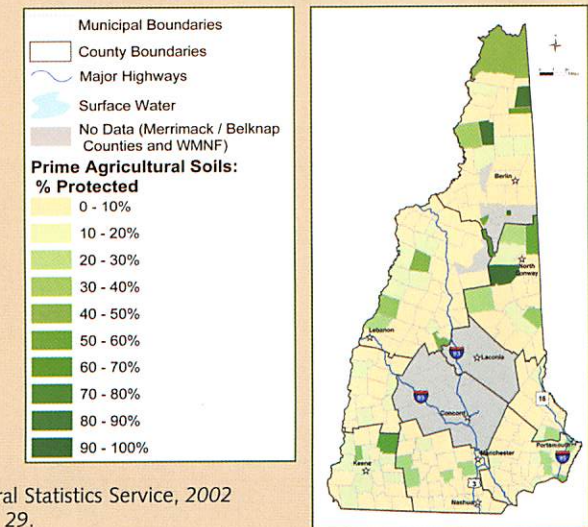
## CROPLAND CHANGE, 1997–2002



## IMPORTANT AGRICULTURAL SOILS



## PROTECTION STATUS

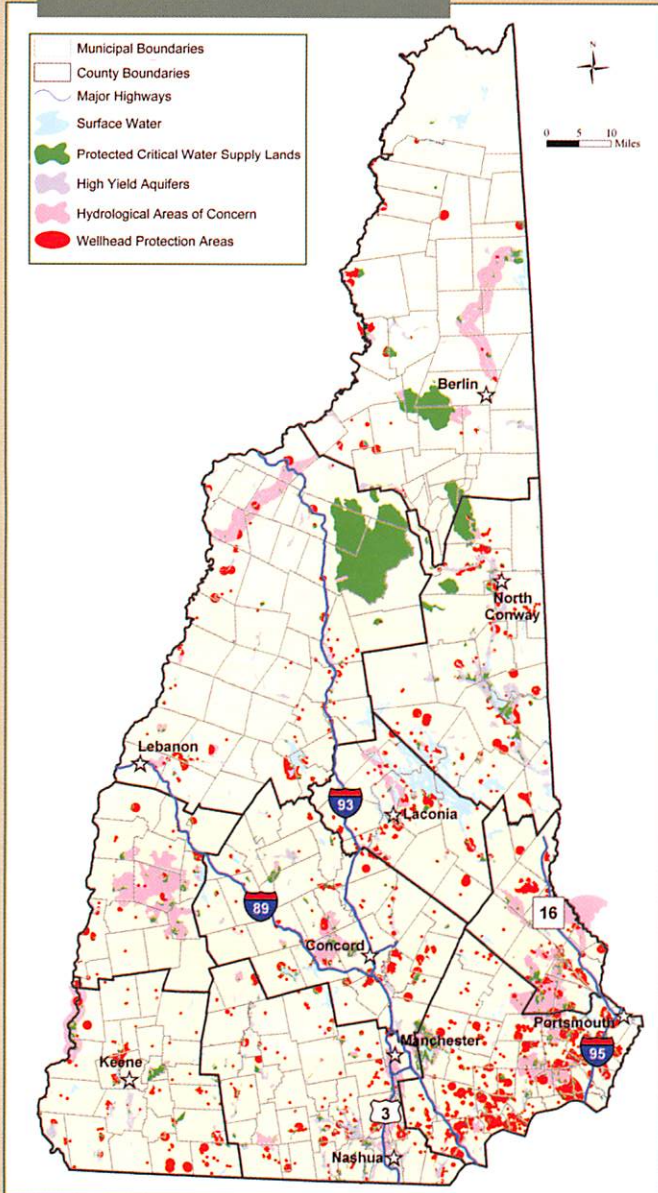


- Farm and cropland statistics provided by the National Agricultural Statistics Service, 2002 *Census of Agriculture, N.H. State and County Data, Vol 1, Part 29*.
- Soils statistics generated from National Resource Conservation Service county soils map data (provided by GRANIT).

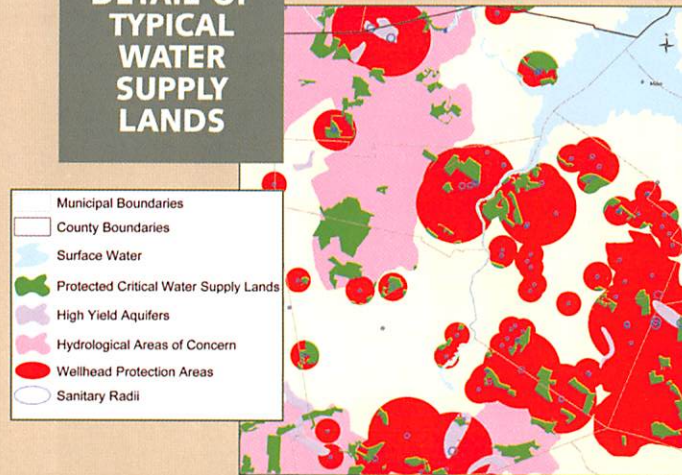


# Water Supply Lands Today

## WATER SUPPLY LANDS



## DETAIL OF TYPICAL WATER SUPPLY LANDS



New Hampshire's public drinking water supply lands continue to be seriously under-protected, leaving them vulnerable to contamination.

The maps on this page show the location of New Hampshire's critical water supply lands, which are defined as all high-yield aquifers, and public wellhead and surface water protection areas.

- There are nearly 460,000 acres of critical water supply lands statewide, comprising about 8% of the total state land area.
- 12.5% of these acres of critical water supply lands are already developed for roads or other urban land uses.
- 11.6% are protected from development.
- Nearly 800,000 people depend on public water supplies statewide, but only 11% of their wellhead and reservoir areas are protected.

County	Total Acres CWS*	% of Statewide CWS	Total Acres CWS Protected	% CWS Protected
Belknap	24,593	5.4%	1,841	7.5%
Carroll	77,031	16.8%	11,813	15.3%
Cheshire	35,263	7.7%	2,470	7.0%
Coos	29,671	6.4%	5,227	17.6%
Grafton	44,103	9.6%	4,701	10.7%
Hillsborough	66,127	14.4%	8,275	12.5%
Merrimack	47,110	10.2%	6,979	14.8%
Rockingham	99,876	21.7%	9,050	9.1%
Strafford	24,612	5.4%	1,966	8.0%
Sullivan	11,292	2.5%	932	8.3%
<b>TOTALS</b>	<b>459,682</b>		<b>53,257</b>	<b>11.6%</b>

\*CWS = Critical water supplies

• Water supply data provided by NH Department of Environmental Services, Water Division.



# Wetland Habitats Today

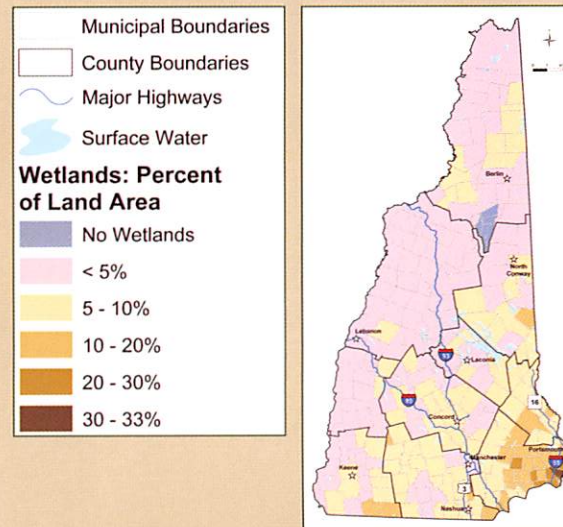
Wetlands are one of New Hampshire's most important ecosystems. They provide critical wildlife habitat and flood control protection and ensure water quality. Between 1998 and 2004, New Hampshire made progress in protecting these areas, but much remains to be done.

About 5% of the state's land area, or 282,850 acres, are identified as wetlands. The maps to the right compare the extent of wetlands in each municipality to current levels of wetlands protection.

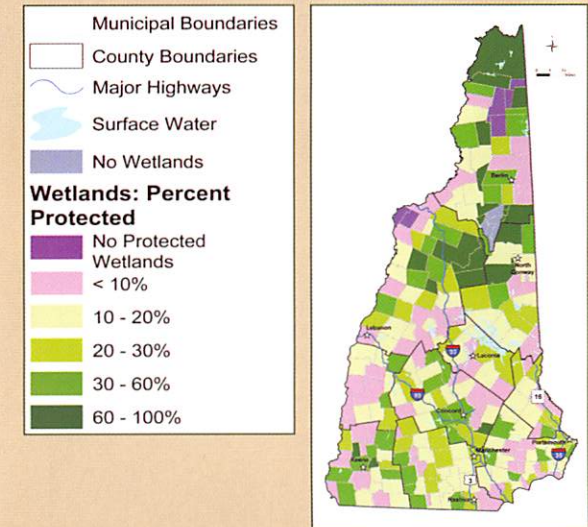
- Towns with the highest area of wetlands are most concentrated in the rapidly urbanizing Seacoast region.
- The 8 towns that have more than 20% of their land area in wetlands — all in Rockingham County — have, on average, protected only about 13% of those wetlands.
- 153 communities have protected fewer than 20% of their wetlands; 77 have protected fewer than 10% of their wetlands.
- Freshwater marshes and swamps, which account for 95% of all wetlands in New Hampshire and are important habitat for many species, are only 21% protected statewide.
- Estuaries, which are among the most critical and sensitive wetlands, total only about 2% of the state's land area and are only 23% protected.

- Wetlands statistics generated from National Wetlands Inventory data (US Fish and Wildlife Service; data provided by GRANIT).
- Conservation lands data provided by GRANIT and SPNHF.

## LAND AREA IN WETLANDS



## WETLANDS PROTECTED — 2004



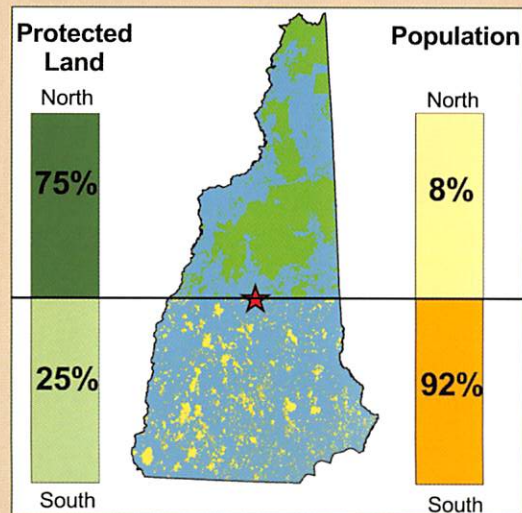
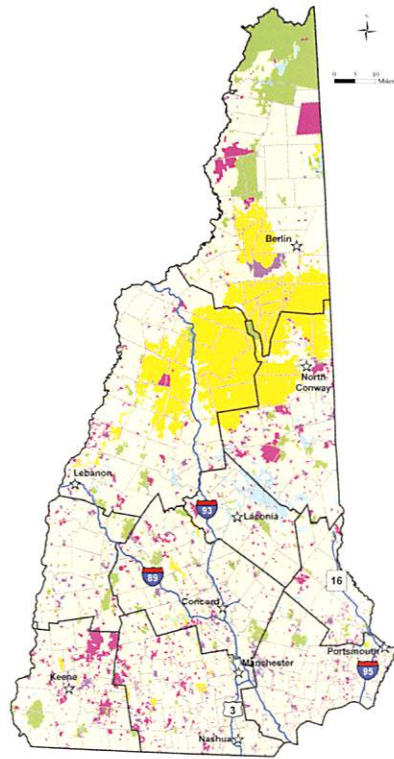
Wetlands	Acres	% of Total	Acres Protected 1998	% Protected 1998	Acres Protected 2004	% Protected 2004
Estuaries	6,100.8	2.2%	1,248.2	20.5%	1,398.1	22.9%
Lake wetlands	5,840.8	2.1%	1,555.4	26.6%	1,704.5	29.2%
Marine wetlands	157.6	0.1%	52.0	33.0%	80.2	50.9%
Freshwater marshes and swamps	267,763.5	94.7%	46,109.6	17.2%	57,124.5	21.3%
River wetlands	2,989.9	1.1%	535.1	17.9%	572.3	19.1%
<b>TOTAL</b>	<b>282,852.6</b>	<b>100.0%</b>	<b>49,500.4</b>	<b>17.5%</b>	<b>60,879.6</b>	<b>21.5%</b>



## CONSERVATION & PUBLIC LANDS IN NEW HAMPSHIRE — 2004



*Note: Protected land on this map are parcels of two or more acres in size that are mostly undeveloped and are set aside for conservation and/or recreation purposes. More than 94% of these parcels are permanently protected from development through conservation easements, deed restrictions or outright ownership.*



# Current Status of Land Protection

New Hampshire has made significant progress on land protection since 1998, conserving nearly 300,000 acres. State, municipal and nonprofit protected lands have all increased, while federal holdings have remained essentially the same. Most land protection has been, and continues to be, focused on the northern half of the state.

## THE STATEWIDE PICTURE

- 1,568,033 acres of land are protected in the state, up from 1,278,004 acres in 1998. This represents an increase of 290,029 protected acres from 1998 to 2004.
- 27.7% of the state's land area is now protected, up from 22.3% in 1998.
- 171,326 acres, or about 62% of the increased protected acreage, is from one project: the Connecticut Headwaters in Coos County.
- About 56,285 acres were protected in the southern half of the state since 1998.
- 46% of all protected land in the state — 727,621 acres — is found within the White Mountain National Forest.
- 75% of all protected land in the state — 1.16 million acres — is located in the northern half of the state; 36% of that is non-federal, up from 18% in 1998.

## CHANGE IN PROTECTED LANDS — 1998–2004

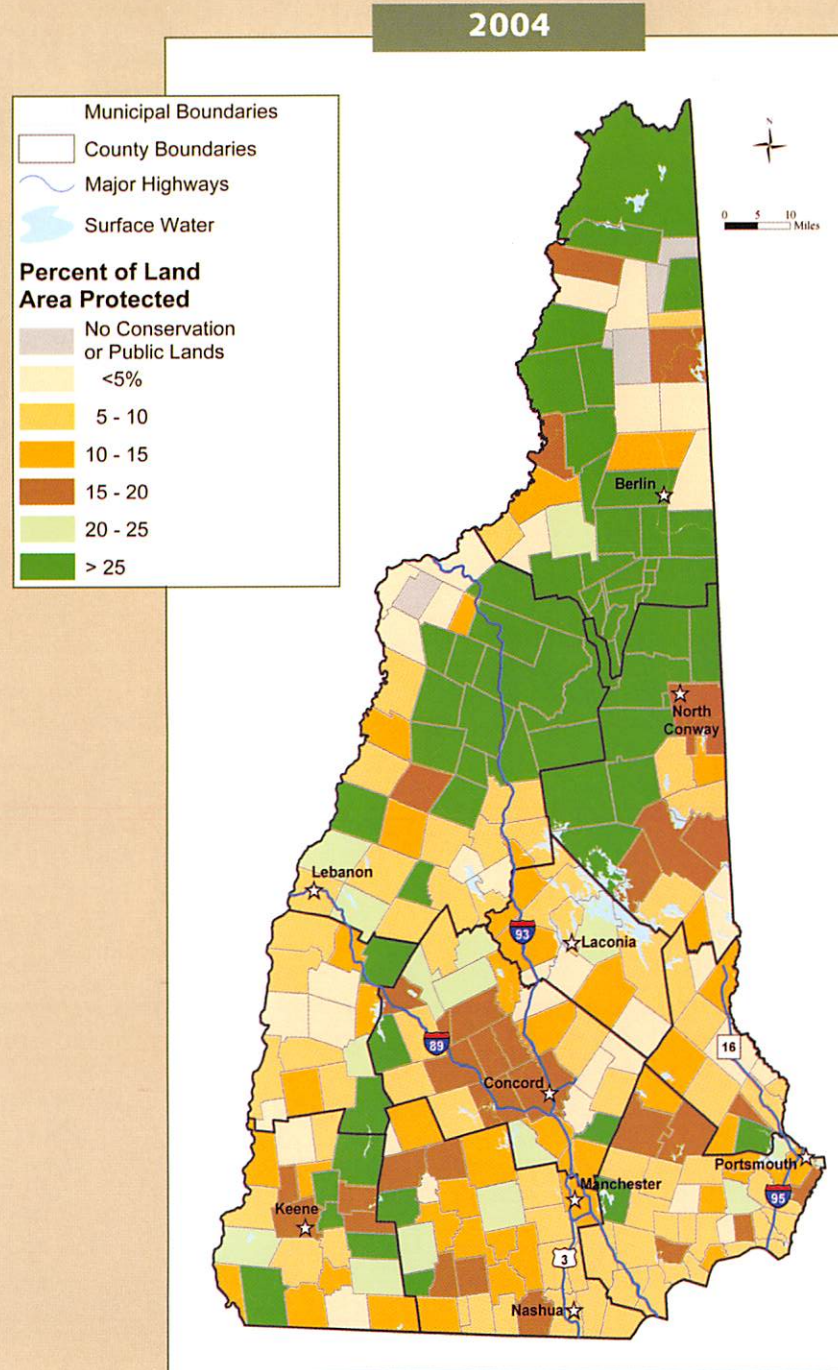
	1998		2004		% Increase
	Acres	% of Total	Acres	% of Total	
Municipal	132,816	10.4%	156,905	10.0%	18.1%
Federal	758,184	59.3%	765,192	48.8%	0.9%
State	217,397	17.0%	398,002	25.4%	83.1%
Other Public	6,661	0.5%	6,785	0.4%	1.9%
Private, Non-profit	162,946	12.8%	241,150	15.4%	48.0%
<b>TOTAL</b>	<b>1,278,004</b>	<b>100.0%</b>	<b>1,568,033</b>	<b>100.0%</b>	<b>22.7%</b>



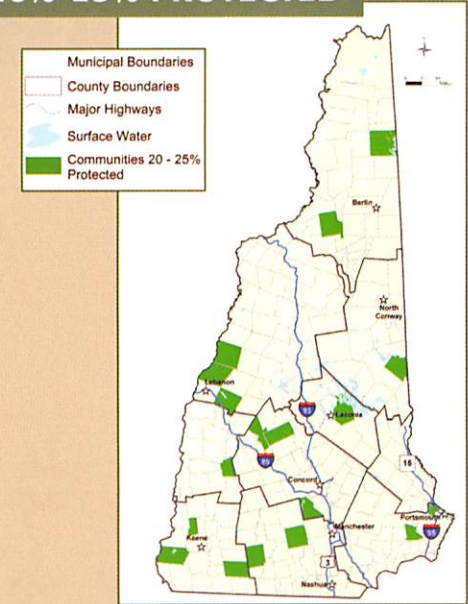
## THE LOCAL PICTURE

The map to the right displays the current level of land protection within individual municipalities. Many towns have increased their percentage of protected land since 1998, but three-quarters of New Hampshire towns continue to have less than 25% of their land protected. This is the goal proposed by the Forest Society for towns to protect essential ecosystems, wildlife habitat, working landscapes and quality of life.

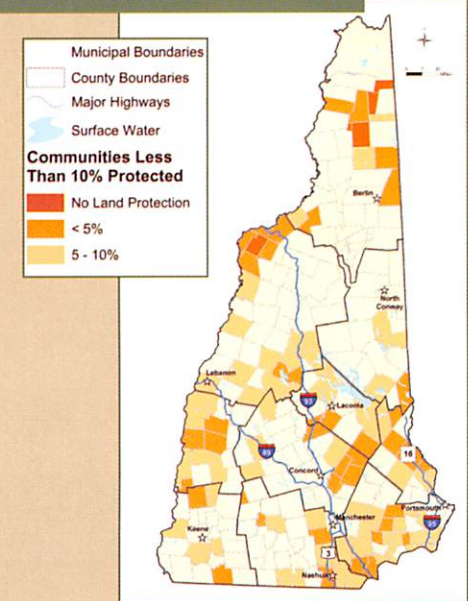
- 62 of New Hampshire's 259 communities have 25% or more of their land permanently protected, up from 51 in 1998.
- 16 have protected 20–25% of their land, up from 51 in 1998. 74 have protected 10–20% of their land, up from 67 in 1998.
- 110 have protected fewer than 10%, down from 129 in 1998.
- 45 towns have protected fewer than 5%, down from 60 in 1998.



## COMMUNITIES 20%–25% PROTECTED

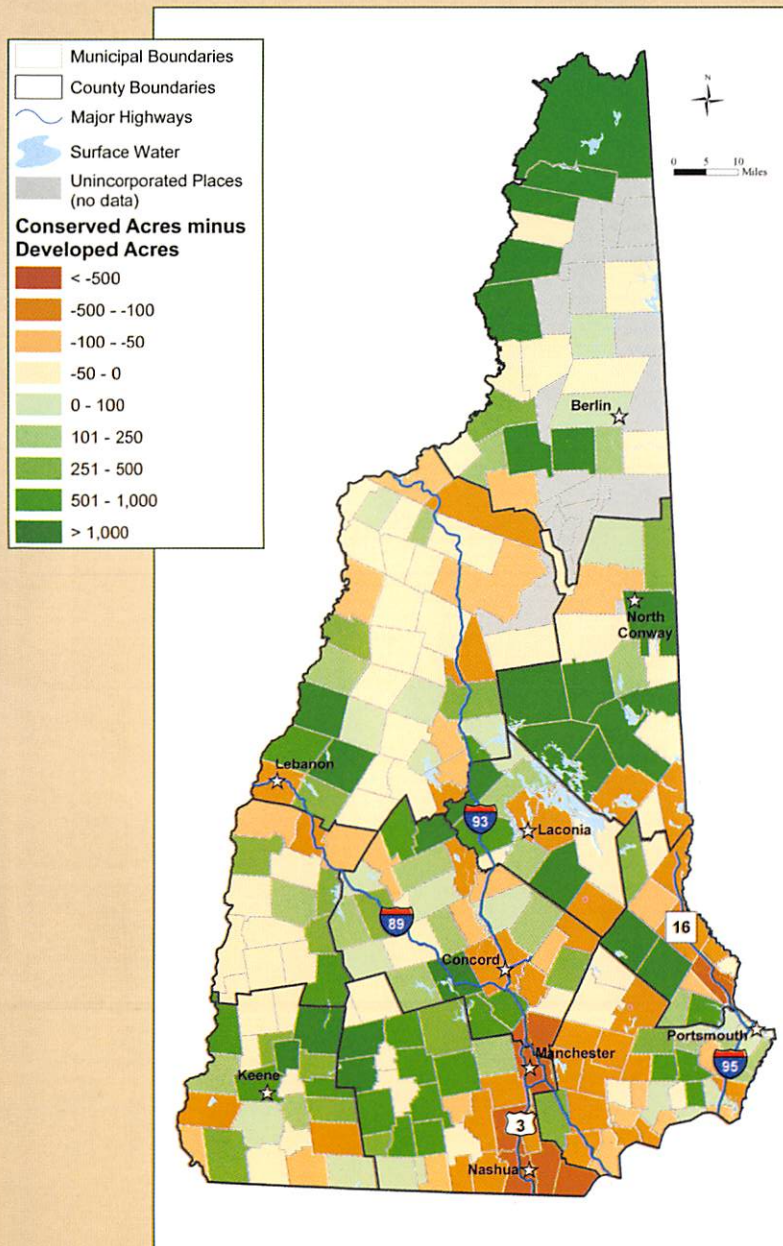


## COMMUNITIES LESS THAN 10% PROTECTED





## NET ACRES CONSERVED/DEVELOPED BY TOWN, 1998-2004



## COMPARING THE PACE OF LAND PROTECTION TO DEVELOPMENT

Statewide, New Hampshire has conserved nearly 291,000 acres between 1998 and 2004, and developed about 33,000 acres, a net gain of roughly 258,000 protected acres. Every New Hampshire county, except Rockingham County, has also seen a net gain in conserved versus developed land. At the local level, however, a majority of towns have developed more acres than they have conserved.

The map to the left displays a comparison of net acreage conserved or developed between 1998 and 2004. Shades of green indicate towns where more land was conserved than developed, while shades of brown indicate those where more land was developed than conserved.

- Many towns in the **Lakes Region** (particularly north of Lake Winnepesaukee), the southern **Monadnock Highlands**, parts of the **Connecticut River Valley**, large parts of **Coos County** and a large area of the **Seacoast** all saw substantial conservation efforts which protected more land than was developed.
- In many areas of the state with the most development and land conversion, including the lower **Merrimack River Valley**, **western Rockingham County** and the **Route 16 corridor**, land conservation lagged behind land development.
- Land development has outpaced land conservation in 130 communities, or 56% of all cities and towns.

County	Estimated Developed (acres)	Conserved (acres)	Ratio	Acreage Difference
Belknap	2,853	5,520	1.9	2,667
Carroll	3,113	22,401	7.2	19,288
Cheshire	1,638	10,048	6.1	8,410
Coos	658	205,151	311.8	204,493
Grafton	2,540	10,108	4.0	7,568
Hillsborough	10,209	12,339	1.2	2,130
Merrimack	4,802	9,040	1.9	4,238
Rockingham	9,616	8,775	0.9	-841
Strafford	3,250	4,833	1.5	1,583
Sullivan	1,034	2,422	2.3	1,388





This report was produced by the Research Department of the Society for the Protection of New Hampshire Forests, in collaboration with conservation partners throughout New Hampshire and state and federal agencies. For further details on-line, visit [www.forestsociety.org](http://www.forestsociety.org).

Founded in 1901, the Society for the Protection of New Hampshire Forests is a 10,000-member, nonprofit organization that has helped protect more than one million acres. Guided by the principles of its New Hampshire Everlasting initiative, the Forest Society seeks to protect the state's most valuable forestlands, water supplies, farmlands, wildlife habitat and outdoor recreation lands.

**SOCIETY FOR THE PROTECTION  
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