

# Southwest Region Natural Resources Inventory

**First Edition**

**October 2003**



**SWRPC**

Southwest Region Planning Commission

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# Southwest Region NRI

First Edition  
October 2003

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## Acknowledgements

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## The Southwest Region



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## About the Southwest Region

The Southwest Region is 36 municipalities consisting of the 23 towns of Cheshire County, twelve towns of western Hillsborough County and one Sullivan County town. Planning commissions in New Hampshire are municipal membership organizations wherein annual financial support is voluntary. SWRPC is one of nine regional planning commissions in New Hampshire.

The landscape of the Southwest Region is mostly forested with rural and suburban residential development dispersed between village centers. More than 98,000 people lived in 42,066 households in the 1,031-square-mile Region in 2000. Town populations ranged from 22,563 in Keene to 201 in Windsor; with the regional average being 2,171 excluding Keene. Population density Region-wide has grown from 64 persons per square mile in 1970 to 95 persons per square mile in 2000. For comparison, Hillsborough County's population density in 2000 was 422 persons per square mile, Cheshire County was 100, and Sullivan County was 73.

The vast majority of the Region's land area has one house for every ten or more acres. Between 1990 and 2000 there was a very small increase in the percentage of land in the Region with household densities ranging from 2 to 10 households per acre and a small decrease in the percentage of U.S. Census Blocks with high densities, less than 1 acre per household. Map 1. depicts Census Blocks shaded by household densities. The variations in the size of Census Blocks makes further analysis difficult – the distribution of densities from low to high is informative in and of itself. The trend in housing densities observed during recent decades is slight but consistent: no increase in density in the existing high-density areas; a slow expansion of the edges of the existing high density areas; increasing densities in the medium-density areas; and little change in the existing low-density areas. This dynamic may have three basic causes: 1) new residents and residents whose changing economic status allows them to relocate to larger properties choose new homes on moderate lot sizes (more than 1 acre, less than 10 acres); 2) our traditional development centers may be approaching development capacity given existing zoning and infrastructure; and 3) new development in the lower density areas tends to be within 1,000 feet of existing municipal and state roads.

The Region's natural and historic rural landscape is prized by residents and considered an asset to be guarded and managed. About 15% of the Region's land area is encumbered against development through deed restrictions, conservation easements and public ownership for protection - including Mount Monadnock and New Hampshire's largest State Park, 13,000-acre Pisgah State Park. There is a strong ethic in the Southwest Region for environmental protection and preservation of the visual community character. Pressure to exercise public or private control over the rates and kinds of growth the Region might experience is persistent.

Most of the land area in the Region is zoned for low density residential use, with a variety of agricultural and commercial uses allowed by right or special exception, and typically requires from two to five acres as a minimum lot size (Map 2). A relatively small proportion of the land in Southwest Region towns is zoned for medium or high density (smaller than 2-acre lots) residential, commercial or mixed uses and these areas are usually existing village centers and downtowns. There are few and small areas zoned exclusively for commercial or industrial use.

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Historic development patterns in the Ashuelot and Contoocook River valleys (separated by the Monadnock Highlands), create a socio-economic geography of two sub-regions: one dominated by Keene as an employment, commercial, and population center at the intersection of NH routes 9, 10, 12, and 101, and the other being a more linear configuration of Contoocook Valley population centers of Rindge, Jaffrey, and Peterborough on the US 202 corridor (Map 3.) The Region's commerce and employment is dominated by light manufacturing, business and service industries. While seven businesses employ more than 500 workers (1,196 maximum), few of the approximately 4,400 businesses in the Region employ more than 50.<sup>1</sup> Tourism, retail and resource extraction are also important sectors of the economy. There are about 40,000 workers employed in the Region. Almost half of these employees work in Keene (18,000+), 4,700 in Peterborough, 2,700 in Jaffrey, and the average number of jobs in the remaining towns is about 300. The Region has recently experienced two periods of rapid growth: in the early 1970's and again in the late 1980's. Both episodes brought substantial increases in population, commerce and demand for housing and public services.

While a strong sense of local identity defined by town boundaries prevails, there is great variety in the "personal geography" of residents. That is, the map people carry in their minds determined by where they work and shop, where they have social connections, and where they spend leisure time. The Region is as connected with Vermont and Massachusetts, socio-economically, as it is with the rest of New Hampshire. And the Region's population is as highly mobile as any in the U.S. Most residents work and shop outside their towns of residence. Sixty-four percent of the Region's households owned two or more cars in 2000. Southwest Region residents travel for an average of 27 minutes one way for work each day with most (79%) driving alone. Nationwide, the average commute time is 25.5 minutes with a 76% drive alone rate.

While development within the Southwest Region is effected by local regulations, services and infrastructure, it is driven by the central New England economy and strongly influenced by the Merrimack Valley and central and eastern Massachusetts. Map 4. depicts household densities for the Region and neighboring counties in New Hampshire and Massachusetts. Our community planning will be strengthened by acknowledging this larger regional dynamic.

The Region's residents and visitors have reasonable access to interstate highways and major airports. Interstates 89, 91 and 93 can be reached from most parts of the Region within an hour. Three international airports are also within convenient driving range: Manchester International Airport: 55 miles from the center of the Region; Logan International Airport (Boston): 95 miles; and Bradley International Airport (Hartford): 95 miles.

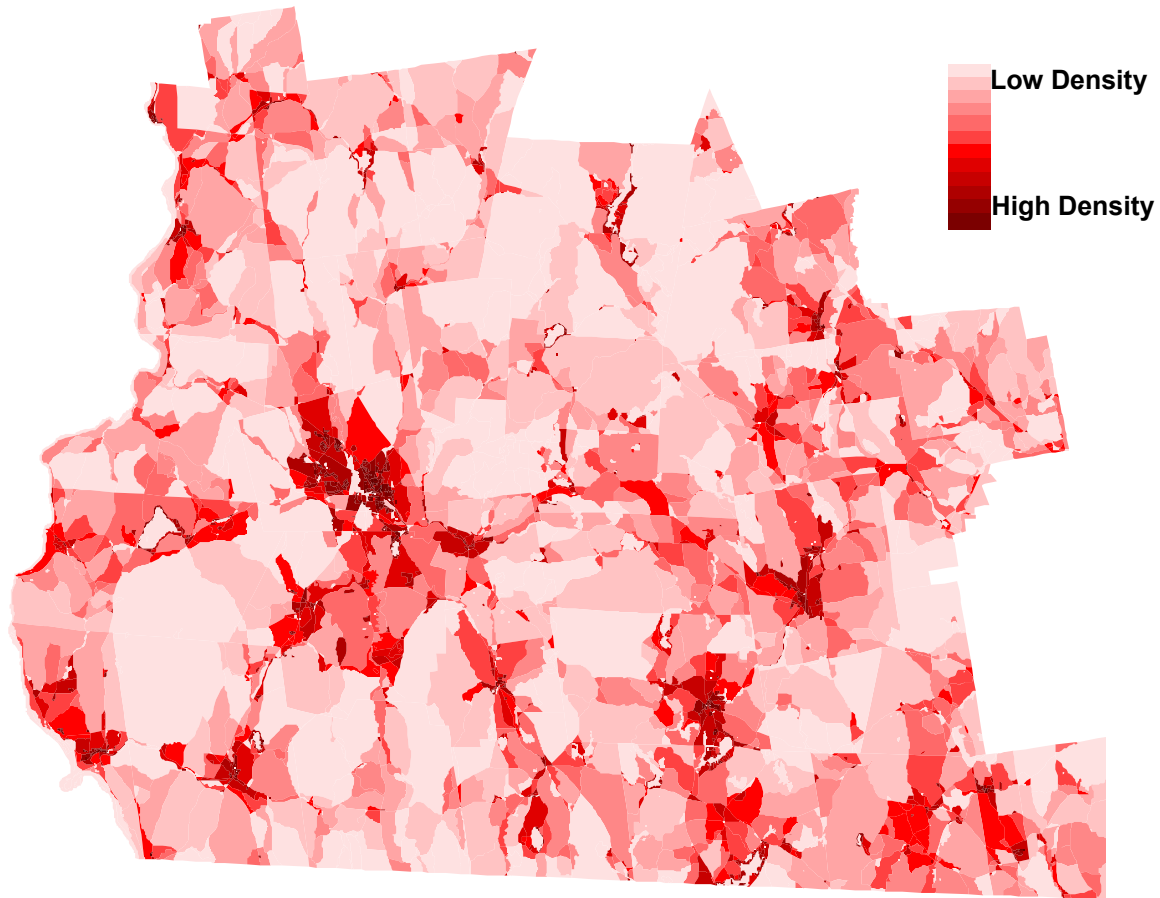
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<sup>1</sup> The total number of businesses is difficult to specify due to the absence of a definitive centralized inventory and the dynamic nature of business starts, failures and changes. The figure used is based on a 1998 Dun and Bradstreet Business Inventory.

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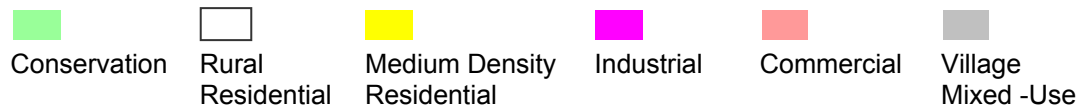
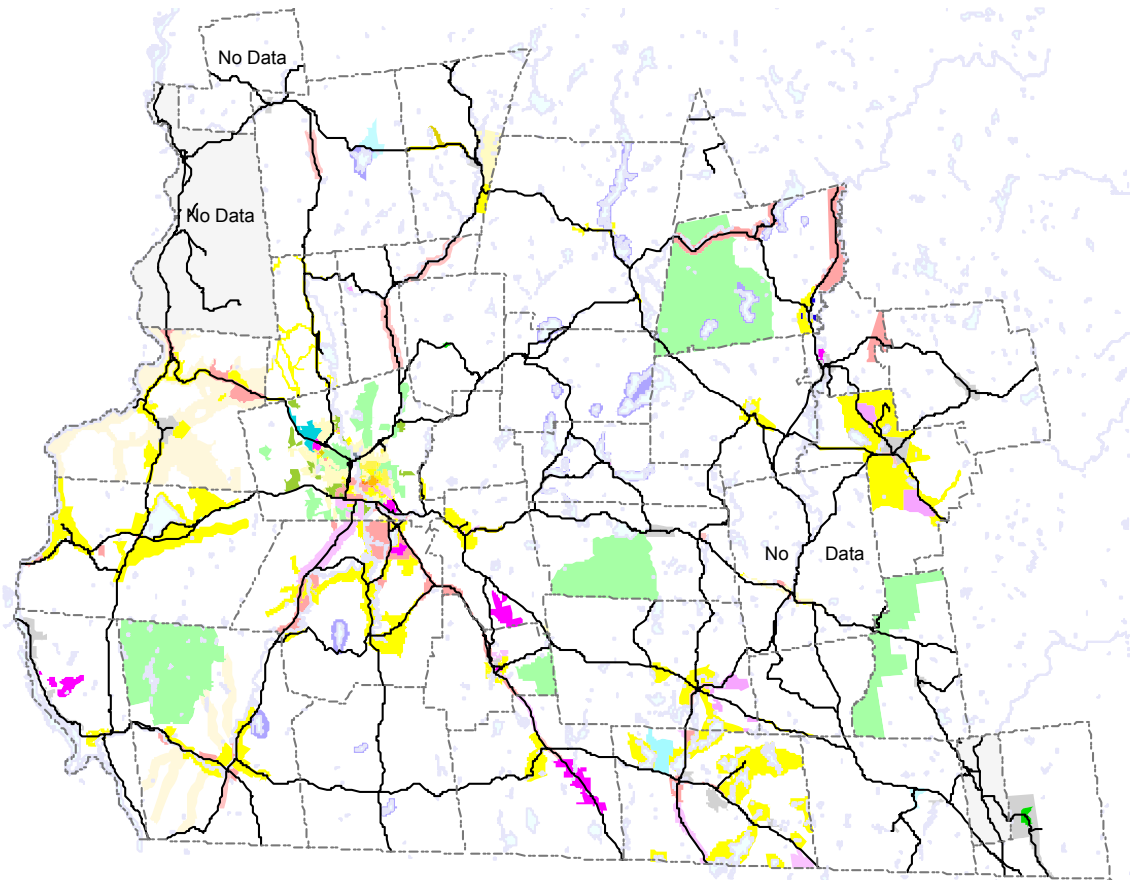
**Map 1. Southwest Region Housing Density, by Census Block (U.S. Census 2000)**



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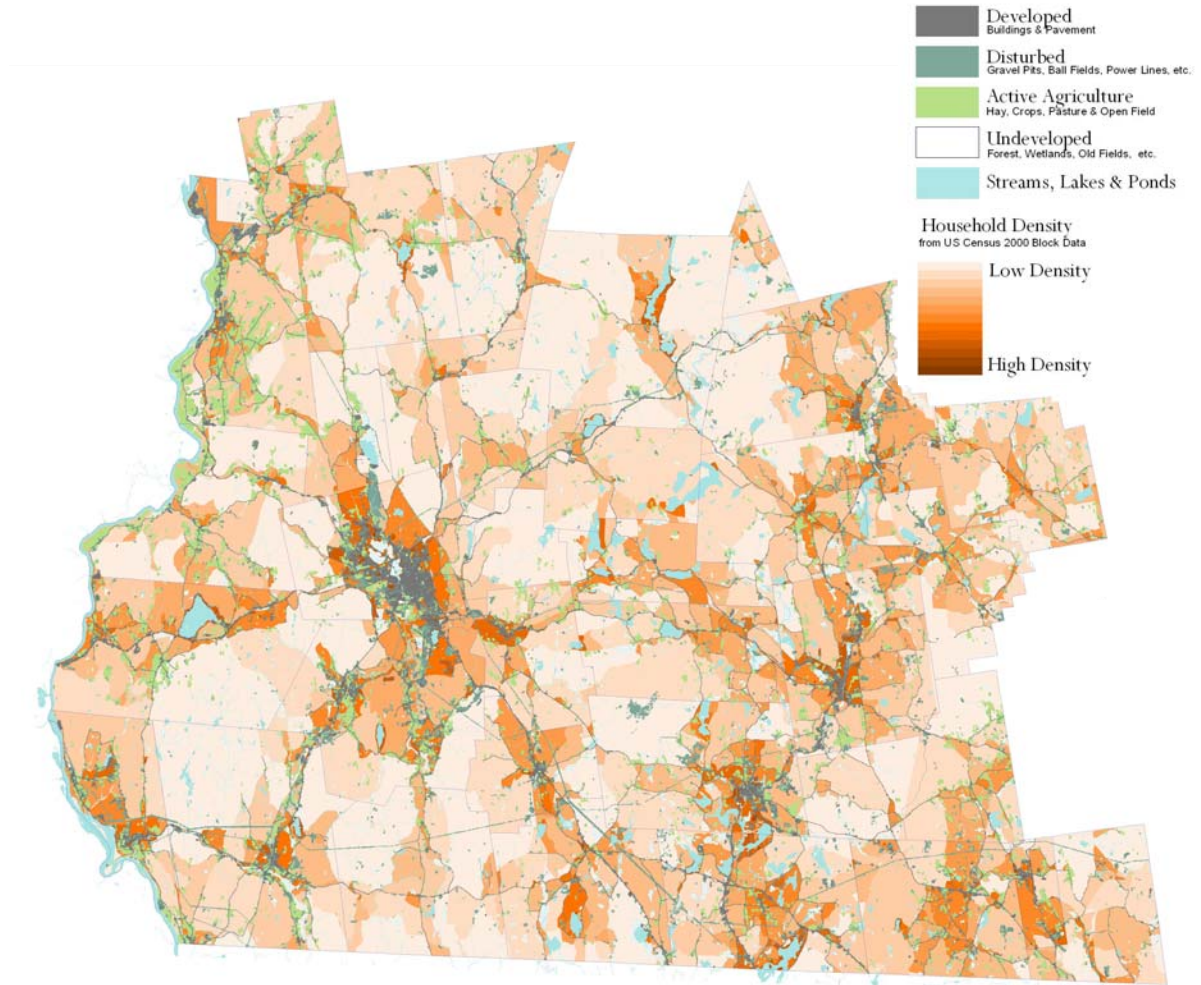
Map 2. Southwest Region Municipal Zoning



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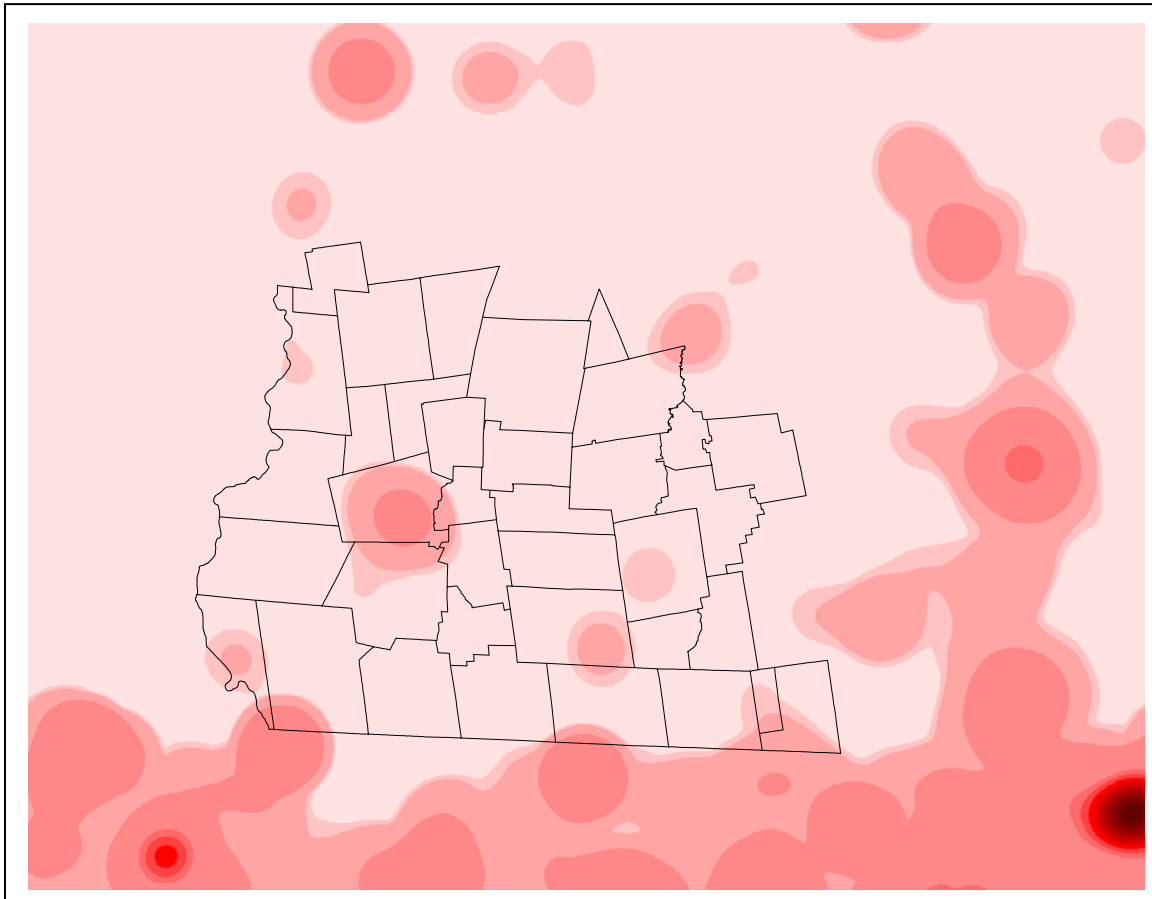
**Map 3. Southwest Region Development Patterns and Household Density (by Census Block)**



**Map 4. Household Densities in Central New England**

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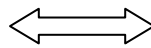
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HOUSEHOLD DENSITY



Higher  
Density



Lower  
Density

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## Southwest Region NRI

### Introduction

The landscape is a unified system. The patchwork of soils, forest, swamps, ponds and streams that blanket the Southwest Region and the life that inhabits it all are together parts of a larger ecosystem. The Monadnock Region, our towns and neighborhoods are unique from other places, but, continuous with them.

We know a great deal about the parts of the landscape and have worked to protect particular places or kinds of places during recent decades. Our conservation efforts have included a great deal of discussion (not without acrimony) about how much conservation is enough. Conservation has also been routinely compartmentalized in community planning and community development as “something to also do” while we plan for development. But, understanding that where we live, each backyard, pond, and mountain, is ultimately part of one ecosystem, we have to question our ability to protect the well-being of any parts without protecting the whole. We may be doing ourselves a disservice by not approaching conservation as a matter of stewardship of the natural systems on which we depend for every drop of water, the air we breathe, the genetic diversity that drives life on the planet, and even the turning of seasons that grow our food.

This notion of stewardship requires protecting natural conditions by setting community-wide conservation goals and managing how land uses interact with our natural systems as a way of doing business or as a way of life, rather than relying solely on protecting undeveloped properties as occasion allows or deliberating conservation needs one subdivision at a time.

While stewardship involves a daunting mix of ethics, politics, economics, and technologies, we should not overlook community planning as a grassroots tool for stewardship. To be effective, community planning must have the benefit of a foundation of sound information about our natural landscape, the nature of change resulting from both natural processes and manmade development, and the effects of development on the ecological and social values of our landscape. For this reason, the planning and conservation communities promote the development of municipal Natural Resource Inventories.

A Natural Resources Inventory should first and foremost provide an objective description of the landscape, including human land uses. That description can be qualitative or quantitative. Secondly, to make this information meaningful to community planning, analysis of the relationships and processes of the so-described landscape is essential. Analysis will explain the ecological and social values of the parts of our landscape and the relationships among the parts – and again, should include human land uses.

The NRI can inform choices about where, how much, and what kinds of development can be allowed or encouraged while minimizing or preventing damage to the natural landscape – to our ecosystem. The inventory and analyses can also be the basis for public and private choices about conservation planning and land conservation. The implications of the findings of an NRI for community development are ultimately a matter of public choice and policy.

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## PURPOSES

The Planning Commission developed this first edition of the Southwest Region Natural Resources Inventory for three immediate purposes:

- Provide basic information about the natural landscape for municipalities and others with an interest in conservation;
- Propose a resource inventory model based on landscape fragmentation as an indicator of ecological integrity – in addition to or in lieu of “hard to find” higher resolution data about ecological communities or plant and animal species; and
- Provide a regional-scale product that can be enhanced at local level, using original research and local knowledge.

## APPROACH

Twenty-six Southwest Region Conservation Commissions and/or Planning Boards responded to a 1997 survey conducted by the Planning Commission about local conservation priorities, goals, and needs. The most frequent response to the question “What is your town’s top conservation planning goal?” was to complete a municipal NRI. The most frequently cited need for assistance for conservation planning was accurate information about the natural landscape.

In keeping with the Planning Commission’s role as information provider and facilitator, the Commission and NH Association of Conservation Commissions co-sponsored a workshop in March of 2000: “Creating and Using the Municipal Natural Resources Inventory”. The workshop included checklists and sample work plans to help local volunteers begin and complete a NRI, as well as the discussion of the applications of the NRI in community planning. Participants in that event received a set of maps for their town, created using the Planning Commission’s Geographic Information System (GIS). The maps depicted water resources including aquifers, major watersheds, and surface waters; a simple GIS analysis of forest fragmentation based on highways and low-resolution satellite land use data; extractive resource potential, e.g. prime farmland soils and soils with high timber production potential; and “sensitive resource areas”, e.g. streams corridors, floodplains and areas prone to rock outcrops.

While the information and discussions of that day were well-spoken of afterward, in the coming months Conservation Commission members continued to express concern about the level of effort required to compile and analyze information for the NRI.

The Planning Commission undertook the development of this first regional NRI to further assist member towns. This regional NRI is intended to provide basic analysis of natural resources and landscape fragmentation on a regional scale that can be used “as is” by municipalities as their first edition NRI, or used as a template to be enhanced with original local research and local knowledge.

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While a set of topographic maps annotated with information by residents about the character of the forests and ponds, movement of wildlife and viewscapes that define their town is a perfectly acceptable starting point for conservation planning, the Planning Commission offers this analysis of available GIS information. It is hoped that this project can provide a common point of departure for the development of municipal NRI's in the Southwest Region.

This regional GIS analysis cannot replace local knowledge. There is undoubtedly a need for refinement or even correction of some of the GIS data used here. This is not intended to be the final, definitive presentation on the matter. Rather, it is hoped that subsequent editions of the Southwest Region NRI will be made better using refinements and additions provided by subsequent local NRI work.

The Planning Commission is confronted with the same challenges that confound local conservation planning, principally, a lack of current, accurate information about plant and animal communities. But, the Commission does have reasonable confidence in our GIS data about the location of surface water and wetlands, stratified drift aquifers, roads and highways, soil types, and major developments and village centers; and to a lesser extent, dispersed residential development.

This regional NRI uses available GIS data to describe the extent to which existing development patterns fragment the natural landscape mosaic of plant and animal communities and natural hydrology, as well as the distribution of basic resources such as important soil types and water resources. A simplification of this approach is: if it isn't currently developed, it's important to conservation.

This approach is also supported by the findings of the 1997 NH Comparative Risk Project. That project convened 55 professionals, scientists and policy-makers to identify and rank environmental risks. The project report represents a substantial compendium of expert understanding of the linkage among Ecological Integrity, Economic Well-Being and Public Health as the three building blocks of "quality of life." Five of the top ten risks identified by that group are direct results of the destruction of natural land and water habitat by development.

Accordingly, the Planning Commission's first edition regional NRI is largely a fragmentation analysis. Despite the pervasive canopy of forest cover across the Region, fragmentation of natural communities is a critical dynamic for the Southwest Region. Any development activity creates fragmentation on some scale: drainage ditches, yards, farm fields, dams, highways, shopping malls, and villages. We also need to understand that a home in the woods or a road through the forest is not innocuous to the ecology and hydrology of the landscape.

Fragmentation is not only a static, spatial problem. It's more than the displacement of forest with a building and a driveway. Fragmentation also effects essential natural processes, ranging from the recharge of ground water and natural succession following natural disturbances (e.g. hurricanes and fire) to migratory patterns and nutrient cycling, and even the evolutionary process of the origin of new species. As a society we are only beginning to appreciate the long-term effects of our alteration of the natural landscape.

There's another, more abstract kind of fragmentation: parcel-ization. Parcel-ization refers to the increasing numbers of increasingly small properties created by subdivision. Two aspects of this

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trend challenge conservation efforts: 1) with or without development, parcelization increases the number of owners in a given area who are making independent land use choices based on lifestyle or economics which makes it more difficult to achieve coordinated conservation practices across the landscape, and 2) parcelization is almost always an irreversible loss of large properties suitable for habitat protection or rural economic activities such as farming and timber management.

There are several conservation approaches by which to respond to a fragmented landscape:

- 1) protect large undeveloped areas that exist today;
- 2) protect small remnants of undeveloped land isolated or threatened by development; and
- 3) arrest degradation or restore ecological health of developed areas.

There are roles for municipal government in all three of these approaches, and a place for partnerships between government and non-governmental organizations and institutions.

By design, this regional NRI encourages planners and conservationists to understand and account for regional conditions in local planning and land use regulation. As an alternative to the municipal geography, the Southwest Region NRI analyses were carried out in three different perspectives, not mutually exclusive, to offer context for local planning: Southwest Region, River Watersheds and Municipalities.

The Study Area for this project is the 36 municipalities comprising the Southwest Region Planning Commission plus the land area from which surface water drains into any of those 36 municipalities. The resulting land area is about 765,621 acres (Map 5).

## FRAGMENTATION ANALYSIS

The Planning Commission estimated the effects of development on the landscape mosaic using existing GIS data. While the analysis is a sophisticated GIS application, the results can only estimate real physical conditions. This analysis is intended to promote an understanding of the fragmenting effects of rural development, provide a graphic representation of existing fragmentation, and provide basic quantitative analysis of fragmentation of specific kinds of resources, such as soil types and hydrology.

The analysis combines GIS data for roads and development using some simple rules based on assumptions about the impacts of development. The road data were provided by New Hampshire's statewide GIS, named GRANIT, by way of NH Department of Transportation. These are the same road data used for almost all of the GIS mapping in NH. The road data base includes information about the classifications and physical characteristics of State, municipal and some private roads.

There are several GIS data sources available for development – paved areas, buildings, highly disturbed terrain, etc.<sup>2</sup> The development data used for this project were provided by the State's

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<sup>2</sup> Note: Original land cover data could be digitized from high-resolution aerial photography which would be very accurate. This approach is also very cost- and labor-intensive to develop and therefore was not feasible for this project. However, developing original land cover data for individual municipalities as a municipal project is an option worth considering.

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GRANIT GIS data base that interpreted satellite imagery acquired in the 1990's, called LandSat TM (Thematic Mapper). The LandSat TM project classified land cover as forest types, wetlands, surface water, disturbed areas (e.g. gravel pits and playing fields), agricultural uses, or developed areas (i.e. with a preponderance of roof tops, pavement, landscaping or other highly disturbed terrain). The "developed" data was isolated from the data base for this project.

That land cover data base was the most reliable to-date, but, not without some limitations. There is a very small percentage of classification errors (e.g. some exposed bedrock is classified as "developed") and the original satellite images can not distinguish isolated houses surrounded or covered by tree canopy. Mis-classification was corrected using aerial photographs. The omission of isolated houses in the woods was compensated for to some extent by 1) adding GIS data for the location of new or re-drilled water wells from the NH Department of Environmental Services and 2) using household density calculations from the 2000 U.S. Census.

Since 1984, well drillers are required to report the location of new and re-drilled wells, along with basic hydrogeologic data. Many of these data coincide with the satellite data, but, many do not and provide some insight into the distribution of isolated homes or other development.

The U.S. Census reports data at several geographic scales, the smallest being Census Block. The Census Bureau attempts to delineate Blocks in such a way that the numbers of people in each block are similar. The result is that a Census Block in downtown Keene may be one city block while in more remote areas, e.g. Pisgah State Park, a Census Block can be tens of thousands of acres. This project uses household densities calculated for each Census Block in the Southwest Region as an additional way to understand the distribution of homes on the landscape.

These data were combined to create new GIS data depicting areas under the influence of development and potentially having diminished, degraded or lost natural resource values. The resulting GIS data creates a fragmentation map of the Study Area – that is, the patchwork of less impacted or natural areas separated from one another by development.

The fragmentation analysis used the following rules<sup>3</sup>:

- Roads were buffered at distances determined by State Classification, surface type and pavement width. Buffers range from 500 feet for major state routes to 200 feet for unpaved municipal roads. Roads were buffered to 1) account for the edge effect of severing the first continuum (the effects of sunlight, noise, vehicle exhaust, road salt and road kill on forest communities are well-documented) and 2) capture most land uses within the buffer since it is known that most residential and commercial development in the Southwest Region is within 1,000 feet of paved public roads.
- A buffer equivalent to two acres was added to each well location point and the buffered well location data were combined with the LandSat development data and buffered road data. This combined data set became the "developed area".
- Patches of developed area were assigned scores based on size and closeness to other developed areas. Buffers were assigned to developed areas based on that score – the bigger

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<sup>3</sup> Please contact the Planning Commission for a more detailed description.

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and closer together, the greater the buffer. The developed areas were buffered to account for 1) possible under-representation of the actual extent of developed areas in the LandSat data due to tree cover and 2) the “edge effect” associated particularly with homes in the woods.

- The buffered developed areas were combined with buffered road data. Gravel roads that did not intersect the developed data were eliminated from the analysis at this point.
- From this point forward, the analysis is about the landscape fragments, or undeveloped patches isolated by the combined road and developed area data.
- The fragments were ranked to value large fragments near other large fragments and de-value smaller isolated fragments. The ranking indicates those fragments that are likely to host intact plant and animal communities, support natural processes such as ecological succession and hydrology, and provide societal values including water supply, timber management and outdoor recreation.
- Each fragment was compared to all other fragments by size (acres), perimeter-to-area ratio, proximity to other fragments, density of isolated developed areas within the fragment, total number of isolated developed areas within the fragment, density of discontinuous roads penetrating the fragment (dead end roads), and household density within the fragment.
- For mapping and analysis of the fragmentation of natural resources, only patches greater than 1,000 acres were used. There is a great deal of inconclusive dialogue in the conservation community about “how big is big enough” to create refuges of natural conditions. “The bigger the better” may be the safest answer. For this project 1,000 acres was used to both simplify subsequent GIS analysis and to match the level of confidence in the accuracy and completeness of the data used.

The rankings are relative only to the conditions within the Study Area. A high-value fragment in the Southwest Region may be of little consequence in the vastness of the Yukon Territory, and likewise, a low-value patch here might be very important inside the I-495 corridor of eastern Massachusetts.

The results of the fragmentation analysis are shown in Map 6.

## **WATER RESOURCES**

Perennial streams, ponds, lakes, wetlands, floodplains, and stratified drift aquifers are some of our most sensitive natural resource areas - susceptible to loss due to small size, fragile conditions, poor prospects for regeneration once disturbed, vulnerability for water contamination, and areas with a high potential for special communities or species. We are familiar with the legacy of degraded water quality and aquatic habitats, the loss of riparian habitat, the diversion of rain water and snow melt from natural courses of meandering through low lands or recharging ground water. Just as the ubiquity of trees along country roads in subdivisions throughout our Region may belie the degradation of natural forest communities, so the abundance of water may perpetuate a false sense of security about the well-being of the aquatic patches of our landscape mosaic.

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This analysis addresses **perennial lakes, ponds, impounded streams, and other streams** that are wide enough to appear as more than a single line in the Digital Line Graph GIS data from U.S. Geologic Survey (essentially the hydrography depicted on the USGS topographic maps) – the standard source for New Hampshire’s GRANIT GIS. Fragmentation analysis was conducted regarding miles of perennial shoreline and acres of surface water.

**Wetland** data from the USGS was combined with data from the U.S. Fish & Wildlife Service National Wetlands Inventory (a 23-class system developed from aerial photography in the 1980’s) for one fragmentation analysis of wetlands, and a second analysis was conducted using hydric soils from the USDA Soil Surveys. The USGS and USF&WS wetlands data may tend to under-represent the extent of identified wetlands and some forested wetlands may be overlooked all together. The hydric soils data, on the other hand, may over-represent the extent of wetlands due to a matter of resolution affecting all soils data – the boundaries of soil types in the soil survey are very accurate, but, there may be small patches within any mapped soil type that are different soils.

While **floodplains** are important as ecological communities, as part of the river ecology and for natural flood mitigation features, the GIS floodplain data available for the Southwest Region today is not consistent with other water resources data, soils data or data used in the fragmentation analysis. Accordingly, floodplains are not part of this analysis.

**Stratified Drift Aquifers** are geological formations of sand and gravel deposited by the melting glaciers 10,000 years ago. Some are vast and extend through several towns. Having been sorted by running water, the deposits can be made up of stones or particles of sand that have very uniform size and therefore a great deal of open space. Stratified Drift can store and yield vast volumes of ground water. These aquifers are also highly susceptible to pollution due to the ease with which contaminants can spread through the porous formations. The data used here is from a thorough study conducted by the USGS and NH Department of Environmental Services.

A **watershed** is a land area from which all the surface run-off drains at a single point. Watersheds can be any size, from a parking lot to half a continent. Watersheds are meaningful units for conservation planning because of the pervasive nature of water – it continuously moves through the natural and manmade environments and our water quality is the net product of everything it encounters - air, soil, pavement, forests – and in the event that a water quality problem is identified, the cause is probably within the same watershed.

Southwest Region watersheds for this project were delineated at three levels of hierarchy: River Basins, Rivers and Tributaries. The Study area is drained by two River Basins: the Merrimack River east of the Monadnock Highlands, and the Connecticut to the west. At the next level, the Study Area is drained by nine River watersheds: Ashuelot, Cold, Connecticut Tributaries, and Millers Rivers in the Connecticut Basin and the Contoocook, North Branch, Nashua, Piscataquog, and Souhegan Rivers in the Merrimack Basins (Map 5.) For information on Tributaries contact the Planning Commission.

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## SOIL-BASED RESOURCE ANALYSIS

Soil is a complex and irreplaceable resource. Soil is not an inert medium, but, a complex ecological system that may have been taken for granted until recently. Our land-use decisions in the past may not have fully accounted for the economic importance of soil potential for agriculture, timber production and water protection, let alone the ecological importance of soil ecosystems to biodiversity.

The USDA Soil Surveys developed by county provide a great deal of information about natural landscape conditions (e.g. hydrology and predominant forest types), suitability for different kinds of resource management (e.g. farming, timber management and gravel mining) and development (e.g. buildings, roads, and septic systems). This fragmentation analysis addressed two facets of soil potential: suitability for farming and forest types. The USDA classifies soils relative to suitability for farming in three levels:

- 1) **Prime Farmland Soils** are recognized nationally for their fertility and ease of management for grazing, forage crops or till crops.
- 2) **Farmland Soils of Statewide Importance** are designated by individual states by virtue of their fertility and ease of management and importance to, or suitability for the predominant agricultural activities in that state.
- 3) **Farmland Soils of Local Importance** are designated by individual County Conservation Districts by virtue of their fertility and ease of management and importance to, or suitability for the predominant agricultural activities in that county.

The USDA classifies soils relative to the predominant forest types likely to be found there<sup>4</sup> and suitability for timber management/harvest activities as follows:

- **Forest Soil Groups IA, IB and IC** tend to be well-drained upland situations, with A and B supporting a preponderance of mixed hardwoods, and C supporting mixed forest dominated by white pine and hemlock. These three groups are considered suitable for a range of timber management regimens and mechanized harvest. They are also more suitable for development, having fewer limitations such as steep slopes or wetness.
- **Groups IIA and IIB** tend to indicate wetter settings, erodible soils and forest communities dominated by pine, hemlock, spruce and fir. These groups are considered not suitable for timber management, or for limited management and harvest activity.
- Some soils are “Not Classified” due to patent unsuitability for timber harvest due to steepness, rockiness, erodibility, or wetness – or due to highly variable conditions within the soil unit.

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<sup>4</sup> Forest Soil Group data may be used as an indication of probable natural forest communities.

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## DEALING WITH LANDSCAPE FRAGMENTATION

How do we arrest or avoid fragmentation? The Environmental Law Institute<sup>5</sup> published in 2003 a review of scientific literature on the subject to help planners deal with the effects of fragmentation. An excerpt of that report is reprinted here by permission.

### CONSERVATION THRESHOLDS: A STARTING POINT

The following summarizes findings from a select sample of scientific papers pertinent to species and ecosystems in the United States on critical thresholds related to minimum habitat patch area, proportion of suitable habitat, edge influence, and riparian buffer width. Recommendations are based on the goal of capturing 75 percent of the requirements found for species, communities, and habitats surveyed; thus, the third quartile was used by calculating the value for which 75 percent of the threshold values lie below this value (after numerical ranking). These guidelines should be interpreted very cautiously because they are based on a small sample, and may not be applicable for specific species, habitats, and geographic settings of concern. Land use planners and land managers should consider these results as a baseline from which to launch more tailored and in-depth assessments.

#### Habitat Patch Area

In general, land use planners should strive to maintain and protect habitat patches greater than 55 hectares (137.5 acres). The goal should be to maintain larger parcels greater than 2,500 hectares (or about 6,175 acres) to protect more area-sensitive species.

#### Proportion of Suitable Habitat

In general, land use planners should strive to conserve at least 20 percent up to 50 percent of the total landscape for wildlife habitat, where possible.\* The conservation of greater proportions of habitat—such as a minimum of 60 percent—may be needed to sustain long-term populations of area-sensitive species and rare species.

#### Edge Influence

In general, to avoid the negative effects of edges on habitats land use planners should consider establishing buffer zones to at least 230 to 300 meters from the periphery of edges.

#### Riparian Buffer Width

In general, land use planners should plan for riparian buffer strips that are a minimum of 25 meters in width to provide for nutrient and pollutant removal; a minimum of 30 meters to provide temperature and microclimate regulation and sediment removal; a minimum of 50 meters to provide detrital input and bank stabilization; and over 100 meters to provide

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<sup>5</sup> Environmental Law Institute. 2003. "Conservation Thresholds for Land Use Planners". Washington, D.C.

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for wildlife habitat functions. To provide water quality and wildlife protection, buffers of at least 100 meters are recommended.

## **Landscape Connectivity**

Land use planners should strive to reduce the distances between habitat patches and to optimize the natural connectivity of the landscape. This may be done by establishing habitat corridors that connect previously isolated patches; by maintaining the natural, structural conditions within the landscape; or by setting aside stepping stone patches. Simultaneously, land use planners should minimize the connectivity of artificial habitats like clearcuts, agricultural fields, and roadsides.

The Ecological Society of America proposes eight “Guidelines for Land Use Planning and Management” to avoid or minimize fragmentation<sup>6</sup>:

### **GUIDELINES FOR LAND USE PLANNING AND MANAGEMENT**

In the face of rapid land use change, the Ecological Society of America’s Land Use Committee recommends that land use planners and developers take into consideration the following eight guidelines to evaluate the potential impact of their decisions on our natural systems (see Dale et al. 2000 for full discussion):

#### **Examine the impacts of local decisions in a regional context.**

The persistence of species and the sustainability of ecosystems are determined not only by immediate surroundings but also by larger landscape factors, such as how habitats are interspersed across the landscape. Thus, local land alterations may have broad-scale regional impacts. Land use planners should both identify the surrounding region that is likely to affect and be affected by a local project and examine how adjoining jurisdictions are using and managing their lands. Regional environmental data (e.g., land cover classes, hydrologic patterns, and habitats for species of concern) should be incorporated into the decision-making process to facilitate a regional assessment of impacts.

#### **Plan for long-term change and unexpected events.**

Ecological processes, such as nutrient cycling, energy flow patterns, and disturbance regimes, may function over lengthy and variable time scales. In addition, ecosystems change over time. As a result, impacts posed by land use decisions are often long-term and unpredictable. Impacts may be delayed and not fully realized until years or decades later, or they may be cumulative such that a “unique trajectory of events” results that could not have been predicted from any single event. The complexity and variability of ecosystem responses dictate that land use decisions consider potential occurrences and implications of unanticipated and long-term events (e.g. variations in weather and disturbance patterns).

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<sup>6</sup> Dale, V., *et al.*. 2000. Ecological Society of America report: Ecological principles and guidelines for managing the use of land. Ecological Applications 10: 639-670. reprinted here by permission of the Environmental Law Institute, *ibid.*

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## **Preserve rare landscape elements and associated species.**

Rare landscape elements, such as wetlands, riparian and mountain zones, and old-growth forests, often provide critical habitats for rare and endangered species. To protect a region's biological diversity, the natural diversity within a landscape must be preserved. Land use planners should identify the location of rare and unique landscape elements, by methods such as inventory and analysis of vegetation types, geology, hydrology, and physical features, and by their associated species. Once such landscape elements are identified, development should be guided away from such areas and toward more common landscape features.

## **Avoid land uses that deplete natural resources over a broad area.**

Depletion of natural resources over time will lead to the irreversible disruption of ecosystems and associated processes. Consequently, land use planning and development should strive to prevent the diminishment of natural resources (e.g., soil, water, and habitat types such as wetlands) in any given area by identifying vital or at-risk resources and by taking the necessary precautions to avoid actions that threaten resource sustainability. Certain land uses or land activities may be deemed altogether incompatible in particular settings.

## **Retain large contiguous or connected areas that contain critical habitats.**

Large habitat patches typically support a greater diversity and abundance of plants and animals and can maintain more ecosystem processes than small patches. Large intact habitats provide more resources, allowing larger populations of a species to persist, thus, increasing the chance of survival over time. Parcelization of large habitats often decreases the connectivity of systems, negatively affecting the movement of species necessary for fulfilling nutritional or reproductive requirements. To counter such effects, large intact areas and small areas that are well connected to other critical habitats should be protected.

## **Minimize the introduction and spread of non-native species.**

Non-native species often negatively affect the survival of native species and disrupt the functioning of ecosystems. The spread of non-natives is facilitated by the development of transportation infrastructure and by the creation of edge environments and artificial landscapes. Land use professionals should strive to minimize the potential introduction and spread of non-native species into natural environments.

## **Avoid or compensate for effects of development on ecological processes.**

Development may not only cause site-specific impacts, but may also disturb regional ecological processes. Ecological processes, such as fire, grazing, dispersal patterns, and hydrological cycles, help to sustain plant and animal populations across a landscape. Thus, land uses that could negatively affect other systems or lands through the disruption of these processes should be avoided while those that benefit or enhance ecological attributes should be encouraged.

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**Implement land use and land management practices that are compatible with the natural potential of the area.**

The natural potential of a site, as determined in part by local physical and biologic conditions, should be factored into how land is used and managed. Land uses that do not take advantage of a site's natural potential or consider its limitations, will likely result in unnecessary resource loss and high economic costs.

**The Bottom Line:** It is inescapable that our existing and planned development patterns affect the ability of our natural systems to sustain us. A municipal NRI can inform communities' plans for the future development of infrastructure and land use through their zoning, site plan and subdivision review regulations and public participation in land conservation.

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## Findings

Following are descriptions of the effects of fragmentation across the Study Area. Also, following are tables and graphics presenting the effects by Study Area, nine River Watersheds and 36 Municipalities.

### Landscape Fragmentation

Seventy-nine percent of the Study Area falls within fragments or patches 1,000 acres in size or larger and 20.8% is not. Meaning that about 49,044 acres are developed, altered or under the influence of development and probably not available for the full range of natural processes, plant and animal species, soil properties and hydrologic conditions. Another 8.9% of the Study Area falls within patches less than 1,000 acres and greater than 100 acres in size.

A total of 975 patches were created by the Planning Commission's GIS analysis as described under **Approach**. Of the 975 patches, 328 are greater than 100 acres, and 127 are greater than 1,000 acres in size. The minimum patch size resulting from the analysis is 0.03 acres, the two largest fragments are 15,000 (the area including Pisgah State Park Winchester, Chesterfield and Swanzey) and 16,000 acres (in Windsor, Stoddard, Washington, and Marlow), and the average patch size is 1,295 acres. The material quoted under "Conservation Thresholds: A Starting Point" on page 9, includes guidance suggesting minimum patch size to protect general animal habitat values: 137 acres; and a minimum of 6,175 acres "to protect more area sensitive species". This analysis created 229 patches greater than 137 acres and 39 patches greater than 6,175 acres.

Map 6. shows patches larger than 1,000 acres, shaded to represent the relative rankings with the darker colors indicating lower rankings, or lower values for natural communities and processes. In general, fragmentation is more severe in the southeast areas of the Region and the Contoocook Valley than in the Franconia highlands of Richmond, the northern Monadnock Highlands and the upper and lower Ashuelot River Valley. It also appears that the higher value patches are predominantly upland settings, with high stream densities and wetlands densities, and typified by varied topography, steep slopes, steep-gradient, high energy streams, lakes and ponds with very small watersheds, and upland forest communities. And conversely, the Region's river valleys tend to have lower value patches and more extensive developed areas lacking patches larger than 1,000 acres.

### Water Resources

About 2.8% of the Study Area, or 21,791 acres is surface water (lakes, ponds and perennial streams). Of that, 14,415 acres (66.3%) were found to lie within patches greater than 1,000 acres and the remaining 7,340 acres does not. There are more than 3,000 perennial waterbodies in the study area, ranging in size from less than an acre to 715 acres (Nubanusit Lake in Hancock and Nelson) and 714 acres (Highland Lake in Stoddard and Washington), and include 194 great ponds (10 acres or larger), in Southwest Region towns. (Map 5.)

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There are 6,149 miles of shoreland calculated for all perennial streams and waterbodies in the Study Area. Not surprisingly, given the attractiveness of shoreland for housing, recreation and early industrial settlements, 39% of the Region's shoreland is not within patches over 1,000 acres, leaving 61% in large intact patches.

The Study Area includes 57,886 acres of wetlands, as indicated by the USGS and the U.S. Fish and Wildlife Service National Wetlands Inventory. About 70% of those wetlands (40,682 acres) lie within patches over 1,000 acres. As previously described, these data sources tend to under-represent palustrine wetlands – those not associated with rivers, streams, lakes and ponds – and in central New England, forested wetlands may be the most under-represented in these data sources. As an alternative estimate, the data from USDA soil survey indicates that there are 78,801 acres of hydric soils in the Study area, with 72% (56,670 acres) within patches larger than 1,000 acres. However, these data tend to over-represent wetlands area due to the resolution of the survey, whereby any soil unit delineated in the survey may contain patches of up to 3 acres of different soils. (Map 7.)

The water resources described thus far are fairly evenly distributed throughout the Study Area, with the exception of the concentrations of waterbodies in the Monadnock Highlands, from Fitzwilliam through Washington. Stratified drift aquifers are also an exception. Those geological deposits are sporadic, mostly restricted to the valley floors of major rivers and tend to be large, irregularly-shaped formations (Map 5.). About 95,589 acres of the Study Area (12.5%) is underlain by stratified drift deposits that could potentially support public water supplies. However, nearly half of that land area falls outside of patches larger than 1,000 acres in areas that are developed, disturbed or impacted by adjacent development. This is not unexpected due to the co-occurrence of the aquifers with level, easily developed land.

## Forest Soils and Forest Communities

The USDA soil survey qualifies soils by the suitability for a variety of uses, including forest management for timber harvest. The resulting "Forest Soil Groups" provide insight into both the natural tendencies of forest community composition (mix of tree species) and effective timber management strategies.

Forest Soil Groups IA, IB and IC tend to be well-drained upland situations, with A and B supporting a preponderance of mixed hardwoods, and C supporting mixed forest dominated by pine and hemlock. These three groups are considered suitable for a range of timber management regimens and mechanized harvest. Groups IA and IB are the most common groups soils here, with 392,957 acres comprising 51% of the Study Area. About 40% of those fall within patches larger than 1,000 acres. Group IC soils make up only 5.6% of the Study area (42,997 acres) and less than half of the total area of those soils, 48%, fall within patches larger than 1,000 acres as this group tends to occur in level sandy areas. (Map 8.)

Groups IIA and IIB tend to indicate wetter settings, erodable soils and forest communities dominated by pine, hemlock, spruce and fir. These groups are considered not suitable for timber management, or for limited management and harvest activity. These groups combined cover 34% of the Study Area (258,678 acres).

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Some soils are not classified as being in any of these groups due to patent unsuitability for timber harvest due to steepness, rockiness, erodibility, or wetness – or due to highly variable conditions within the soil unit. More than 7% of the Study Area (56,129 acres) is not classified.

## Farmland Soils

The USDA soil survey also qualifies soils by their suitability for agricultural uses. The qualifications are based on fertility, hydrologic conditions, physical characteristics of the soil (such as whether or not it compacts under pressure from machinery), and ultimately it's ability to produce crops or pasture with minimal inputs of time, material and cost. Prime Farmland Soils are nationally recognized; State's also designate soils in addition to the Prime soils as important for the State; and counties also designate soils in addition to the Prime and Statewide soils as important within the county.

A total of 221,640 acres of the Study Area (29%) are qualified as one of these three farmland soil groups, with 157,802 acres (71%) of those areas falling within patches larger than 1,000 acres. Soils of Statewide importance make up 25,129 acres and county designated soils make up another 166,474 acres (3.3% and 22%, respectively). (Map 9.)

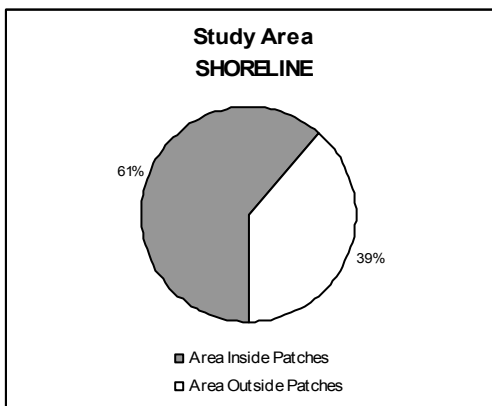
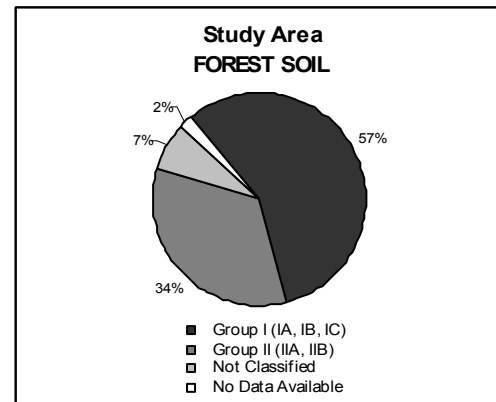
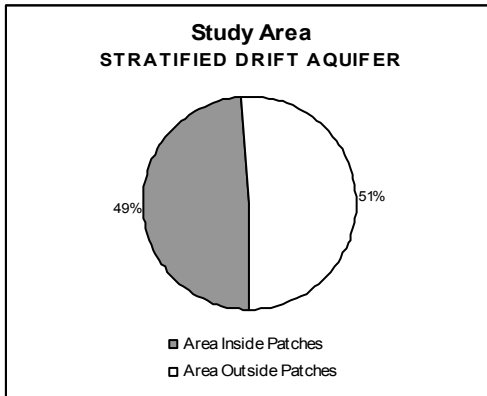
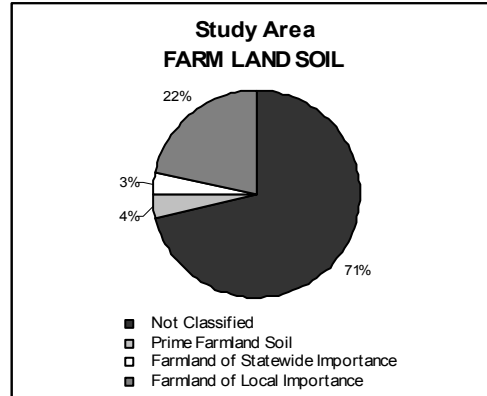
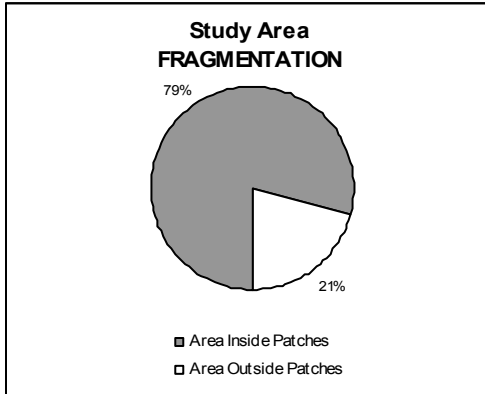
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>STUDY AREA</b>	765,620	ac	100%	606,108	ac	159,512	ac	79%
Total Area in Square Miles	1,196	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	95,589	ac	12%	46,545	ac	49,044	ac	49%
	149	sq.mi.						
<b>SHORELINE</b>	6,149	mi	N/A	3,781	mi	2,368	mi	61%
<b>WATERBODY</b>	21,791	ac	3%	14,451	ac	7,340	ac	66%
	34	sq.mi.						
<b>FARM LAND SOIL</b>	221,640	ac	29%					
	346	sq.mi.						
Prime Farmland Soil	30,038	ac	4%	17,088	ac	12,950	ac	57%
Farmland of Statewide Importance	25,129	ac	3%	16,396	ac	8,733	ac	65%
Farmland of Local Importance	166,474	ac	22%	124,318	ac	42,156	ac	75%
<b>HYDRIC SOIL</b>	78,801	ac	10%	56,670	ac	22,131	ac	72%
	123	sq.mi.						
<b>WETLAND</b>	57,886	ac	8%	40,682	ac	17,204	ac	70%
From USGS & NWI	90	sq.mi.						
<b>CONSERVATION LAND</b>	132,871	ac	17%	119,251	ac	13,620	ac	90%
	208	sq.mi.						
<b>FOREST SOIL</b>								
Group I (IA, IB, IC)	435,948	ac	57%	332,861	ac	103,087	ac	76%
IA	270,827	ac	35%	214,205	ac	56,622	ac	79%
IB	122,124	ac	16%	98,128	ac	23,996	ac	80%
IC	42,727	ac	6%	20,258	ac	22,469	ac	47%
Group II (IIA, IIB)	258,678	ac	34%	223,386	ac	35,292	ac	86%
IIA	211,973	ac	28%	190,293	ac	21,680	ac	90%
IIB	46,705	ac	6%	33,093	ac	13,612	ac	71%
<b>Not Classified</b>	56,129	ac	7%	39,272	ac	16,857	ac	70%
<b>No Data Available</b>	14,867	ac	2%					

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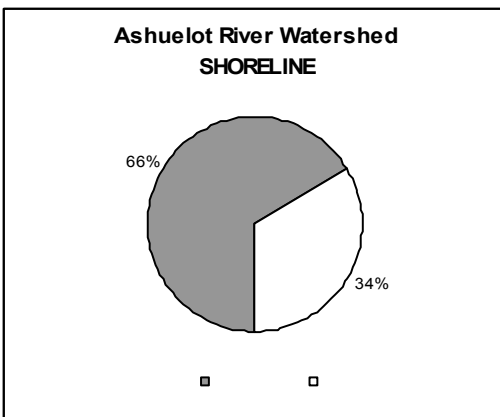
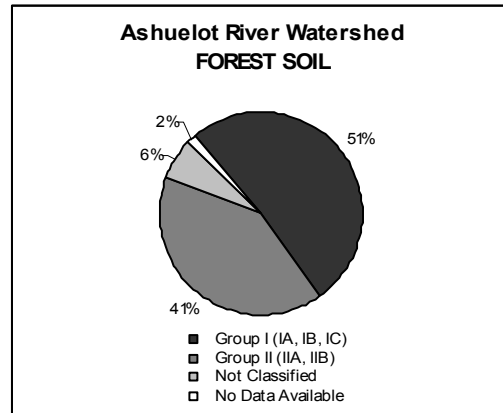
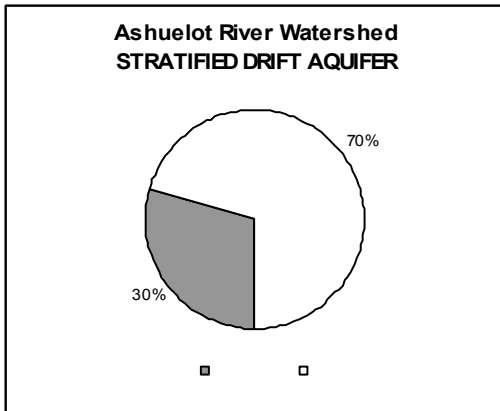
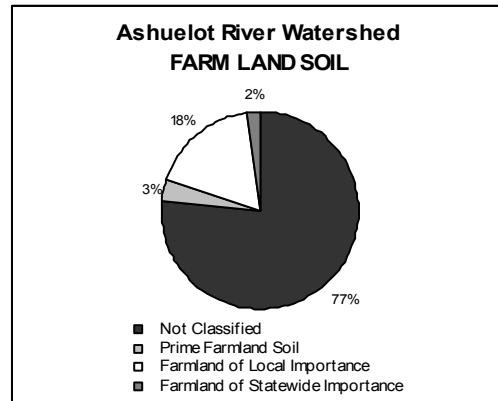
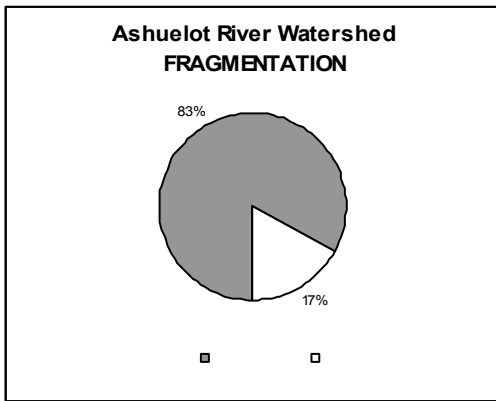
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	Total Area	Percent of Study Area	Area Inside Patches	Area Outside Patches	Percent Unfragmented
<b>ASHUELOT RIVER WATERSHED</b>	270,302 ac	100%	224,160 ac	46,142 ac	83%
Total Area in Square Miles	422 sq.mi.				
<b>STRATIFIED DRIFT AQUIFER</b>	26,353 ac	10%	7,776 ac	18,577 ac	30%
	41 sq.mi.				
<b>SHORELINE</b>	2,068 mi	N/A	1,374 mi	694 mi	66%
<b>WATERBODY</b>	6,222 ac	2%	4,585 ac	1,637 ac	74%
	10 sq.mi.				
<b>FARM LAND SOIL</b>	63,246 ac	23%			
	99 sq.mi.				
Prime Farmland Soil	9,085 ac	3%	5,058 ac	4,027 ac	56%
Farmland of Local Importance	48,402 ac	18%	35,988 ac	12,414 ac	74%
Farmland of Statewide Importance	6,032 ac	2%	4,074 ac	1,958 ac	68%
<b>HYDRIC SOIL</b>	25,958 ac	10%	19,028 ac	6,929 ac	73%
	41 sq.mi.				
<b>WETLAND</b>	16,938 ac	6%	12,497 ac	4,441 ac	74%
From USGS & NWI	26 sq.mi.				
<b>CONSERVATION LAND</b>	63,351 ac	23%	57,996 ac	5,355 ac	92%
	99 sq.mi.				
<b>FOREST SOIL</b>					
<b>Group I (IA, IB, IC)</b>	138,931 ac	51%	110,616 ac	28,315 ac	80%
IA	96,505 ac	36%	82,658 ac	13,847 ac	86%
IB	28,392 ac	11%	23,083 ac	5,309 ac	81%
IC	14,034 ac	5%	4,875 ac	9,159 ac	35%
<b>Group II (IIA, IIB)</b>	109,511 ac	41%	97,213 ac	12,298 ac	89%
IIA	93,430 ac	35%	85,831 ac	7,599 ac	92%
IIB	16,081 ac	6%	11,382 ac	4,699 ac	71%
<b>Not Classified</b>	17,351 ac	6%	12,817 ac	4,534 ac	74%
<b>No Data Available</b>	4,508 ac	2%			

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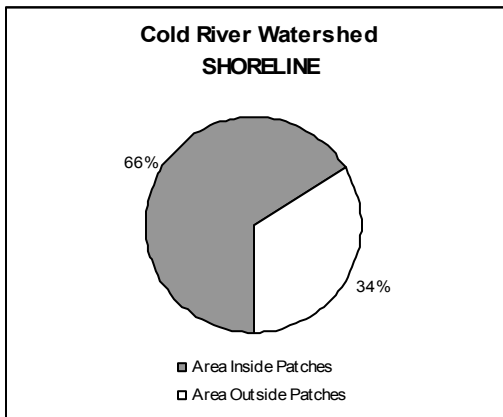
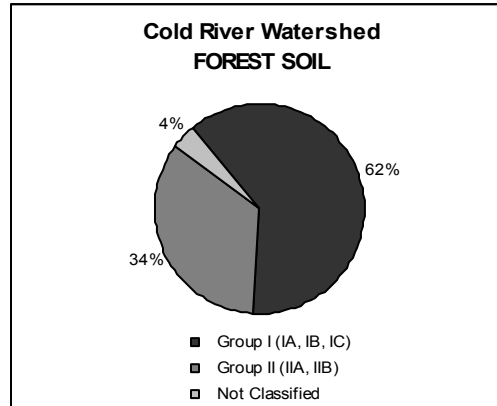
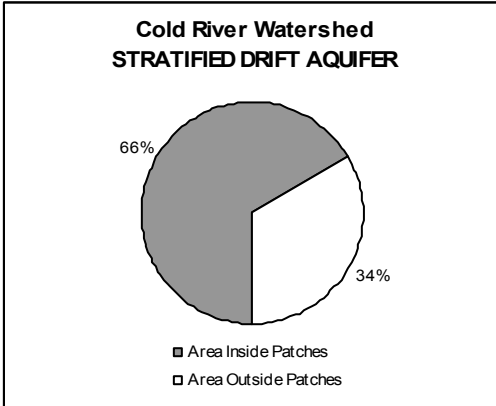
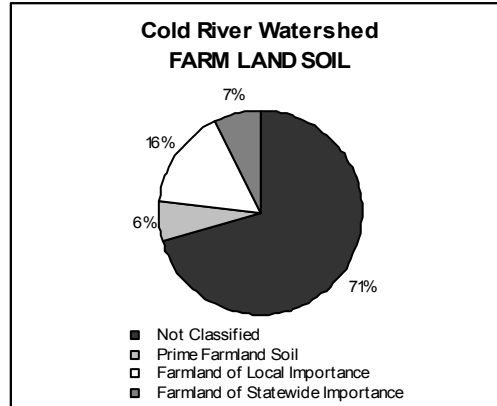
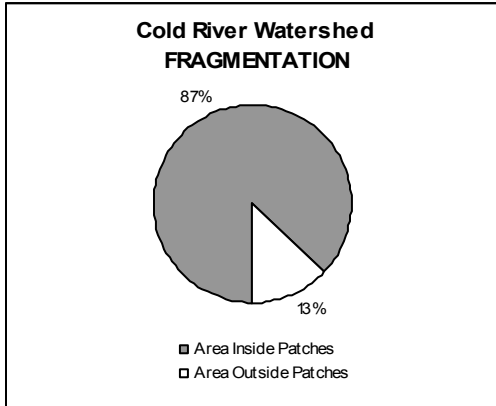
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>COLD RIVER</b>	64,705 ac		100%	56,318 ac		8,387 ac		87%
Total Area in Square Miles	101 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	5,558 ac		9%	3,694 ac		1,867 ac		66%
	9 sq.mi.							
<b>SHORELINE</b>	387 mi		N/A	256 mi		131 mi		66%
<b>WATERBODY</b>	660 ac		1%	434 ac		226 ac		66%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	18,763 ac		29%					
	29 sq.mi.							
Prime Farmland Soil	4,111 ac		6%	3,280 ac		831 ac		80%
Farmland of Local Importance	10,410 ac		16%	8,764 ac		1,646 ac		84%
Farmland of Statewide Importance	4,692 ac		7%	3,945 ac		747 ac		84%
<b>HYDRIC SOIL</b>	5,428 ac		8%	4,499 ac		929 ac		83%
	8 sq.mi.							
<b>WETLAND</b>	2,063 ac		3%	1,557 ac		506 ac		75%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	4,354 ac		7%	3,847 ac		507 ac		88%
	7 sq.mi.							
<b>FOREST SOIL</b>								
Group I (IA, IB, IC)	40,327 ac		62%	34,754 ac		5,573 ac		86%
IA	23,356 ac		36%	20,654 ac		2,702 ac		88%
IB	14,140 ac		22%	12,322 ac		1,818 ac		87%
IC	2,831 ac		4%	1,778 ac		1,053 ac		63%
Group II (IIA, IIB)	22,085 ac		34%	19,883 ac		2,202 ac		90%
IIA	18,158 ac		28%	16,515 ac		1,643 ac		91%
IIB	3,927 ac		6%	3,368 ac		559 ac		86%
<b>Not Classified</b>	2,293 ac		4%	1,680 ac		613 ac		73%
<b>No Data Available</b>								

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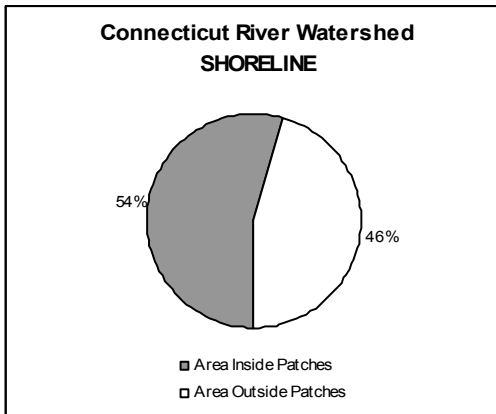
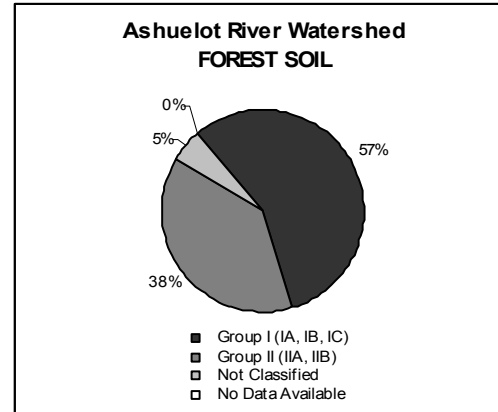
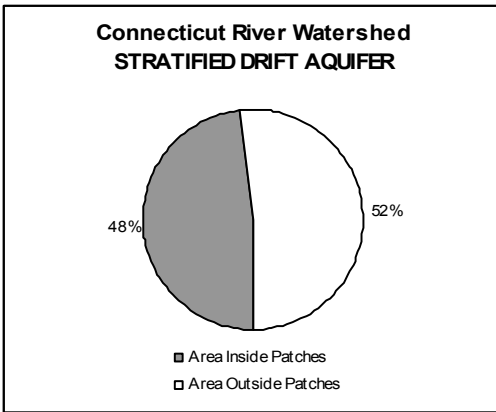
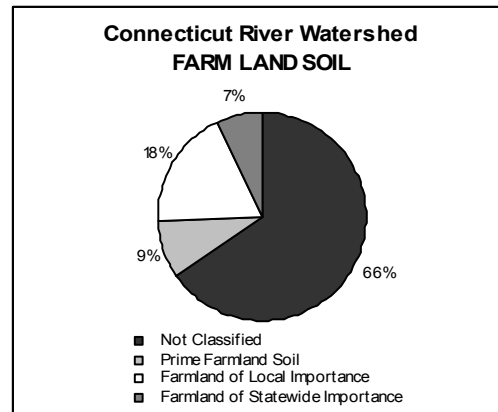
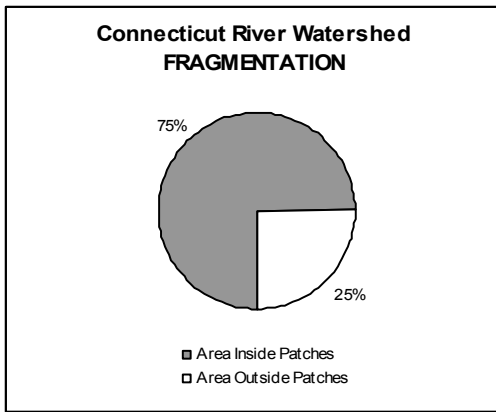
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>CONNECTICUT RIVER WATERSHED</b>	80,963 ac		100%	60,563 ac		20,400 ac		75%
Total Area in Square Miles	127 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	13,276 ac		16%	6,383 ac		6,893 ac		48%
	21 sq.mi.							
<b>SHORELINE</b>	735 mi		N/A	400 mi		335 mi		54%
<b>WATERBODY</b>	2,958 ac		4%	257 ac		2,701 ac		9%
	5 sq.mi.							
<b>FARM LAND SOIL</b>	28,220 ac		35%					
	44 sq.mi.							
Prime Farmland Soil	7,638 ac		9%	4,169 ac		3,469 ac		55%
Farmland of Local Importance	14,725 ac		18%	10,827 ac		3,898 ac		74%
Farmland of Statewide Importance	5,857 ac		7%	3,965 ac		1,892 ac		68%
<b>HYDRIC SOIL</b>	4,887 ac		6%	3,451 ac		1,436 ac		71%
	8 sq.mi.							
<b>WETLAND</b>	4,169 ac		5%	1,115 ac		3,054 ac		27%
From USGS & NWI	7 sq.mi.							
<b>CONSERVATION LAND</b>	6,580 ac		8%	5,263 ac		1,317 ac		80%
	10 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	45,619 ac		56%	33,533 ac		12,086 ac		74%
IA	31,368 ac		39%	22,811 ac		8,557 ac		73%
IB	10,622 ac		13%	8,702 ac		1,920 ac		82%
IC	3,629 ac		4%	2,020 ac		1,609 ac		56%
<b>Group II (IIA, IIB)</b>	31,119 ac		38%	25,899 ac		5,220 ac		83%
IIA	27,367 ac		34%	23,263 ac		4,104 ac		85%
IIB	3,752 ac		5%	2,636 ac		1,116 ac		70%
<b>Not Classified</b>	4,155 ac		5%	1,129 ac		3,026 ac		27%
<b>No Data Available</b>	70 ac		0%					

# Southwest Region NRI

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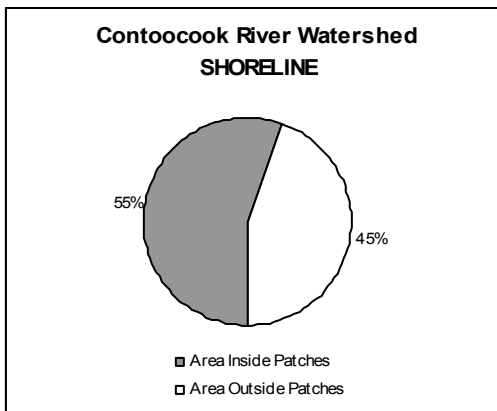
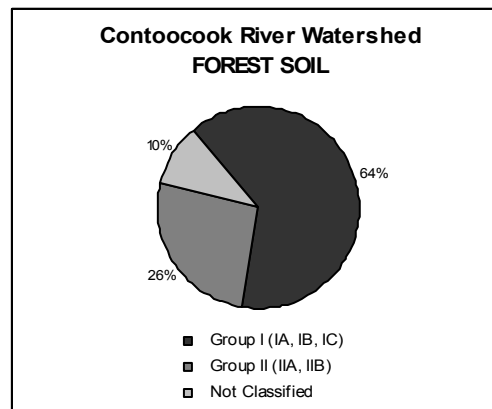
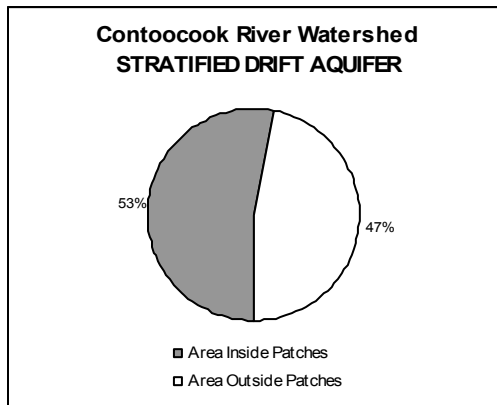
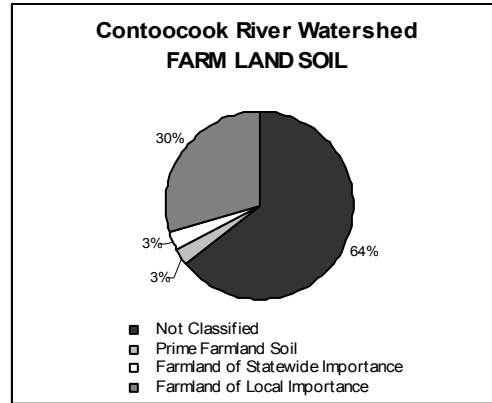
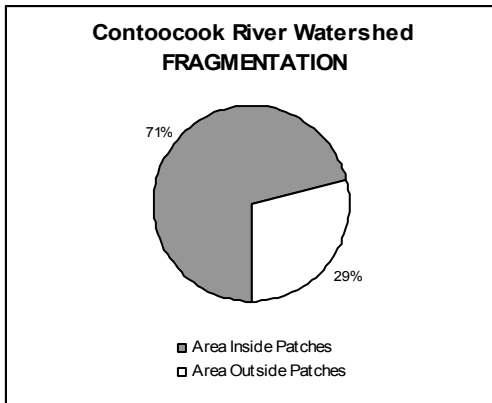
# Southwest Region NRI

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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>CONTOOCOOK RIVER WATERSHED</b>	137,742	ac	100%	97,815	ac	39,927	ac	71%
Total Area in Square Miles	215	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	29,610	ac	21%	15,713	ac	13,897	ac	53%
	46	sq.mi.						
<b>SHORELINE</b>	1,117	mi	N/A	617	mi	500	mi	55%
<b>WATERBODY</b>	5,576	ac	4%	4,236	ac	1,340	ac	76%
	9	sq.mi.						
<b>FARM LAND SOIL</b>	49,285	ac	36%					
	77	sq.mi.						
Prime Farmland Soil	4,291	ac	3%	2,018	ac	2,273	ac	47%
Farmland of Statewide Importance	4,030	ac	3%	1,977	ac	2,053	ac	49%
Farmland of Local Importance	40,964	ac	30%	29,395	ac	11,569	ac	72%
<b>HYDRIC SOIL</b>	18,021	ac	13%	11,439	ac	6,582	ac	63%
	28	sq.mi.						
<b>WETLAND</b>	14,754	ac	11%	10,392	ac	4,362	ac	70%
From USGS & NWI	23	sq.mi.						
<b>CONSERVATION LAND</b>	30,032	ac	22%	25,991	ac	4,041	ac	87%
	47	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	87,448	ac	63%	60,503	ac	26,945	ac	69%
IA	50,519	ac	37%	36,620	ac	13,899	ac	72%
IB	23,131	ac	17%	16,863	ac	6,268	ac	73%
IC	13,798	ac	10%	7,020	ac	6,778	ac	51%
<b>Group II (IIA, IIB)</b>	36,420	ac	26%	27,815	ac	8,605	ac	76%
IIA	25,860	ac	19%	21,119	ac	4,741	ac	82%
IIB	10,560	ac	8%	6,696	ac	3,864	ac	63%
<b>Not Classified</b>	13,874	ac	10%	9,498	ac	4,376	ac	68%
<b>No Data Available</b>								

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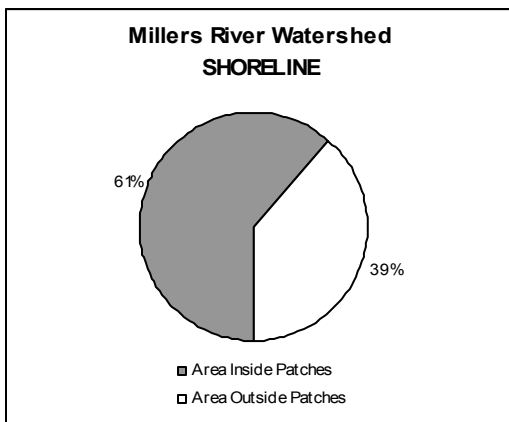
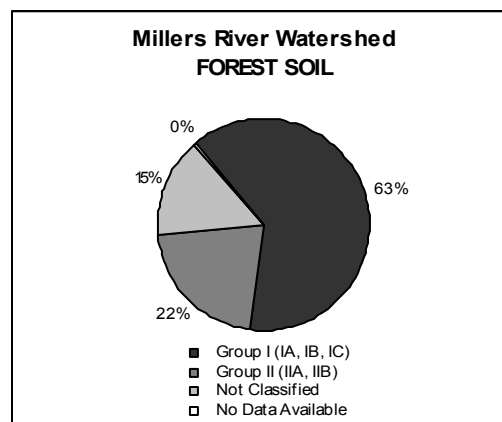
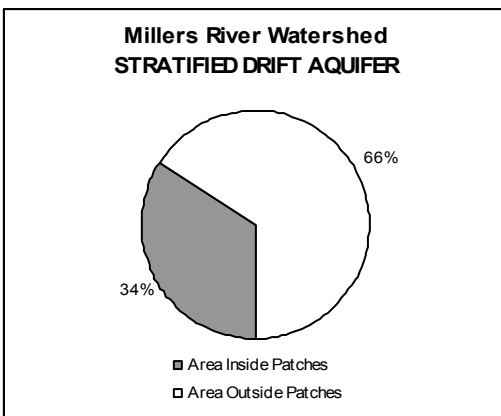
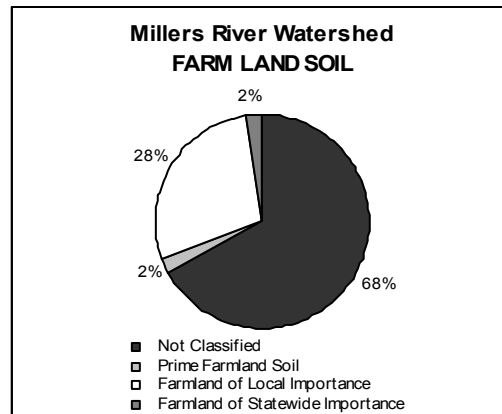
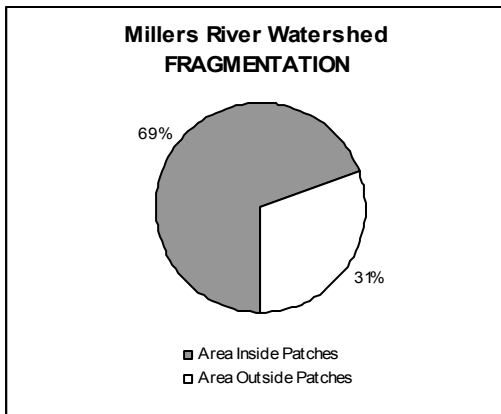
# Southwest Region NRI

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	Total Area	Percent of Study Area	Area Inside Patches	Area Outside Patches	Percent Unfragmented
<b>MILLERS RIVER WATERSHED</b>	50,825 ac	100%	35,252 ac	15,573 ac	69%
Total Area in Square Miles	79 sq.mi.				
<b>STRATIFIED DRIFT AQUIFER</b>	3,184 ac	6%	1,084 ac	2,100 ac	34%
	5 sq.mi.				
<b>SHORELINE</b>	492 mi	N/A	302 mi	190 mi	61%
<b>WATERBODY</b>	1,965 ac	4%	1,181 ac	784 ac	60%
	3 sq.mi.				
<b>FARM LAND SOIL</b>	16,792 ac	33%			
	26 sq.mi.				
<b>Prime Farmland Soil</b>	1,228 ac	2%	534 ac	694 ac	43%
<b>Farmland of Local Importance</b>	14,295 ac	28%	9,661 ac	4,634 ac	68%
<b>Farmland of Statewide Importance</b>	1,269 ac	2%	730 ac	539 ac	58%
<b>HYDRIC SOIL</b>	9,729 ac	19%	6,479 ac	3,250 ac	67%
	15 sq.mi.				
<b>WETLAND</b>	7,233 ac	14%	4,715 ac	2,518 ac	65%
From USGS & NWI	11 sq.mi.				
<b>CONSERVATION LAND</b>	4,211 ac	8%	4,070 ac	141 ac	97%
	7 sq.mi.				
<b>FOREST SOIL</b>					
<b>Group I (IA, IB, IC)</b>	32,020 ac	63%	20,966 ac	11,054 ac	65%
IA	22,271 ac	44%	14,805 ac	7,466 ac	66%
IB	7,699 ac	15%	5,434 ac	2,265 ac	71%
IC	2,050 ac	4%	727 ac	1,323 ac	35%
<b>Group II (IIA, IIB)</b>	10,934 ac	22%	9,208 ac	1,726 ac	84%
IIA	6,900 ac	14%	6,491 ac	409 ac	94%
IIB	4,034 ac	8%	2,717 ac	1,317 ac	67%
<b>Not Classified</b>	7,697 ac	15%	4,940 ac	2,757 ac	64%
<b>No Data Available</b>	174 ac	0%			

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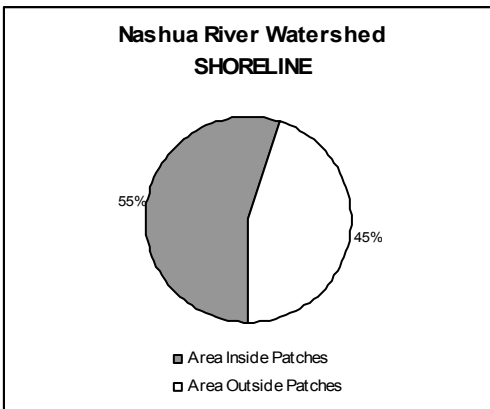
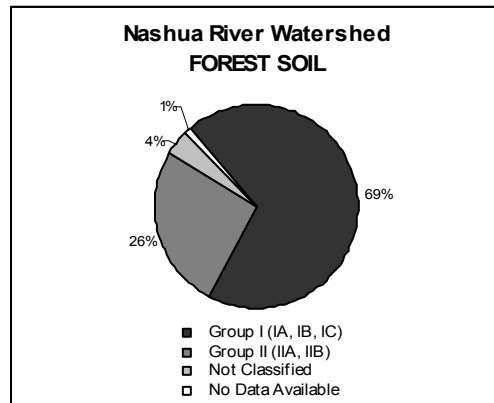
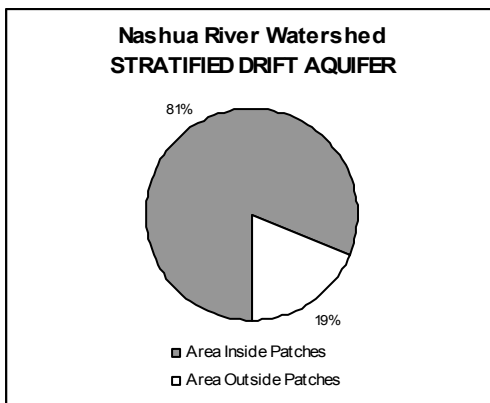
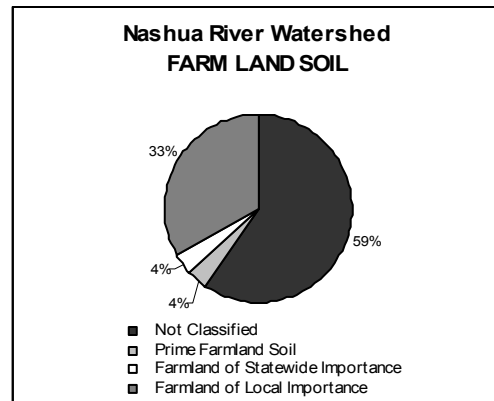
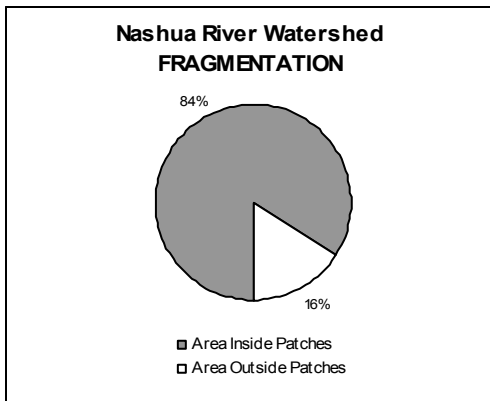
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>NASHUA RIVER WATERSHED</b>	19,540 ac		100%	16,468 ac		3,072 ac		84%
Total Area in Square Miles	31 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,350 ac		12%	1,909 ac		441 ac		81%
	4 sq.mi.							
<b>SHORELINE</b>	325 mi		N/A	179 mi		146 mi		55%
<b>WATERBODY</b>	107 ac		1%	97 ac		10 ac		91%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	7,943 ac		41%					
	12 sq.mi.							
Prime Farmland Soil	749 ac		4%	401 ac		348 ac		54%
Farmland of Statewide Importance	751 ac		4%	452 ac		299 ac		60%
Farmland of Local Importance	6,443 ac		33%	5,596 ac		847 ac		87%
<b>HYDRIC SOIL</b>	1,912 ac		10%	1,664 ac		248 ac		87%
	3 sq.mi.							
<b>WETLAND</b>	813 ac		4%	723 ac		90 ac		89%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	1,555 ac		8%	1,513 ac		42 ac		97%
	2 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	13,441 ac		69%	11,069 ac		2,372 ac		82%
IA	3,026 ac		15%	2,109 ac		917 ac		70%
IB	9,443 ac		48%	8,240 ac		1,203 ac		87%
IC	972 ac		5%	720 ac		252 ac		74%
<b>Group II (IIA, IIB)</b>	5,061 ac		26%	4,459 ac		602 ac		88%
IIA	3,785 ac		19%	3,372 ac		413 ac		89%
IIB	1,276 ac		7%	1,087 ac		189 ac		85%
<b>Not Classified</b>	814 ac		4%	720 ac		94 ac		88%
<b>No Data Available</b>	224 ac		1%					

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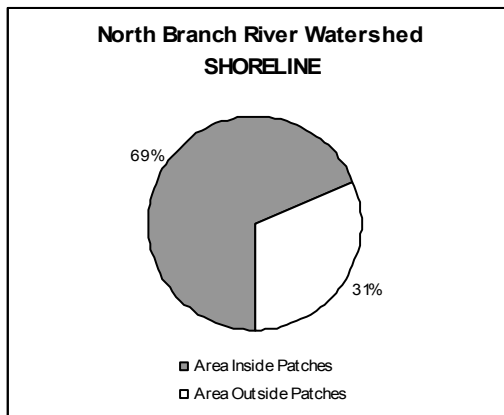
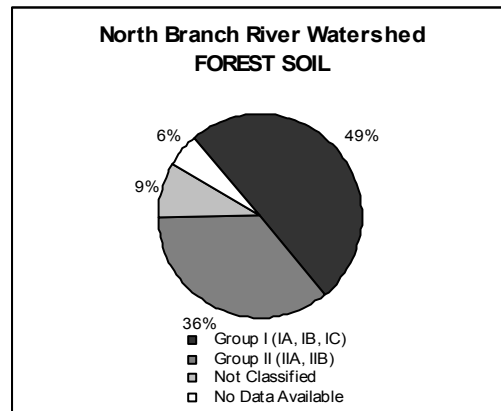
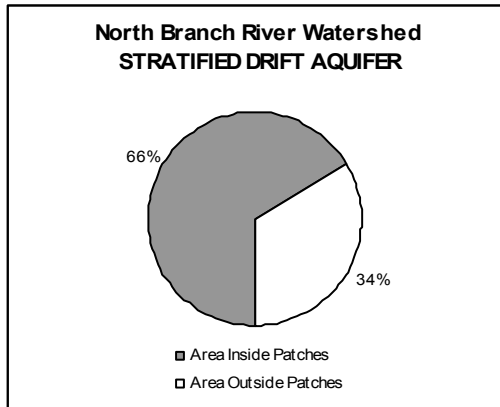
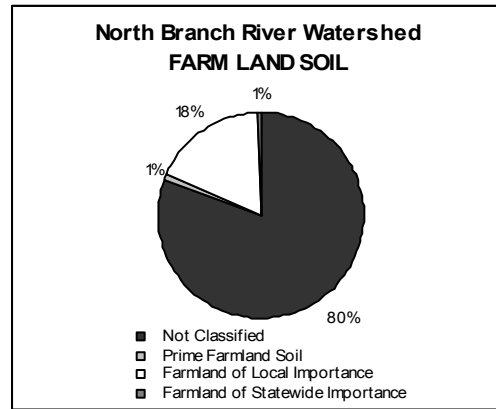
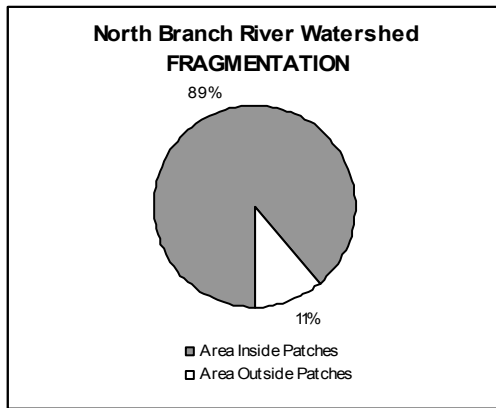
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>NORTH BRANCH RIVER WATERSHED</b>	77,239 ac		100%	68,585 ac		8,654 ac		89%
Total Area in Square Miles	121 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	5,040 ac		7%	3,344 ac		1,696 ac		66%
	8 sq.mi.							
<b>SHORELINE</b>	518 mi		N/A	355 mi		163 mi		69%
<b>WATERBODY</b>	3,084 ac		4%	2,779 ac		305 ac		90%
	5 sq.mi.							
<b>FARM LAND SOIL</b>	14,990 ac		19%					
	23 sq.mi.							
<b>Prime Farmland Soil</b>	749 ac		1%	451 ac		298 ac		60%
<b>Farmland of Local Importance</b>	13,735 ac		18%	11,542 ac		2,193 ac		84%
<b>Farmland of Statewide Importance</b>	506 ac		1%	347 ac		159 ac		69%
<b>HYDRIC SOIL</b>	6,642 ac		9%	5,634 ac		1,008 ac		85%
	10 sq.mi.							
<b>WETLAND</b>	7,737 ac		10%	6,690 ac		1,047 ac		86%
From USGS & NWI	12 sq.mi.							
<b>CONSERVATION LAND</b>	15,471 ac		20%	14,783 ac		688 ac		96%
	24 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	38,820 ac		50%	33,453 ac		5,367 ac		86%
IA	23,046 ac		30%	20,506 ac		2,540 ac		89%
IB	13,656 ac		18%	11,649 ac		2,007 ac		85%
IC	2,118 ac		3%	1,298 ac		820 ac		61%
<b>Group II (IIA, IIB)</b>	27,427 ac		36%	25,293 ac		2,134 ac		92%
IIA	24,499 ac		32%	22,948 ac		1,551 ac		94%
IIB	2,928 ac		4%	2,345 ac		583 ac		80%
<b>Not Classified</b>	6,721 ac		9%	5,960 ac		761 ac		89%
<b>No Data Available</b>	4,270 ac		6%					

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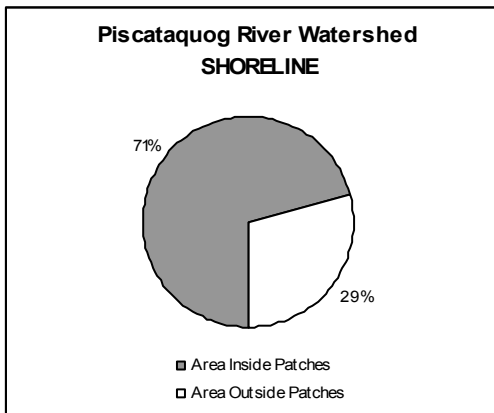
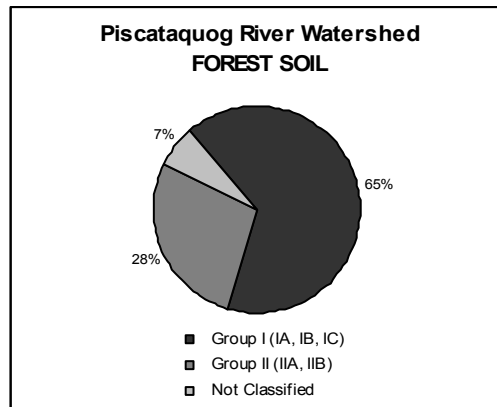
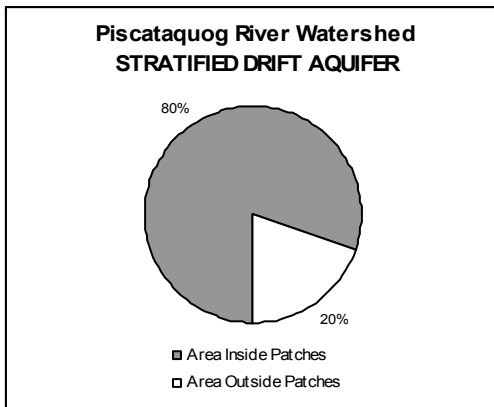
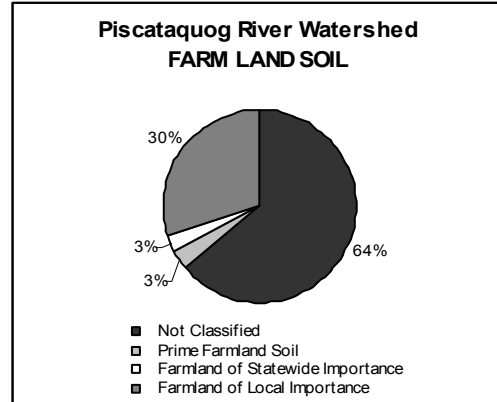
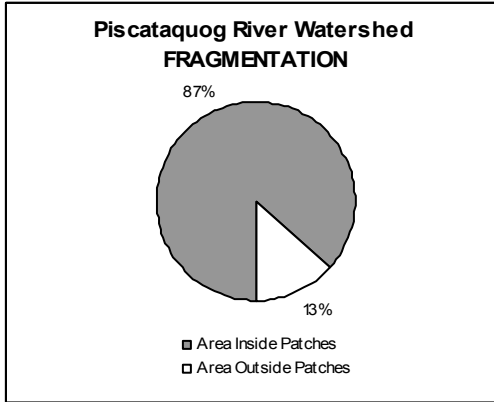
# Southwest Region NRI

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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>PISCATAQUOG RIVER WATERSHED</b>	23,419 ac		100%	20,288 ac		3,131 ac		87%
Total Area in Square Miles	37 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	4,001 ac		17%	3,217 ac		784 ac		80%
	6 sq.mi.							
<b>SHORELINE</b>	155 mi		N/A	110 mi		45 mi		71%
<b>WATERBODY</b>	520 ac		2%	502 ac		18 ac		97%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	8,464 ac		36%					
	13 sq.mi.							
Prime Farmland Soil	793 ac		3%	540 ac		253 ac		68%
Farmland of Statewide Importance	654 ac		3%	517 ac		137 ac		79%
Farmland of Local Importance	7,017 ac		30%	5,780 ac		1,237 ac		82%
<b>HYDRIC SOIL</b>	3,099 ac		13%	2,675 ac		424 ac		86%
	5 sq.mi.							
<b>WETLAND</b>	1,913 ac		8%	1,717 ac		196 ac		90%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	1,851 ac		8%	1,738 ac		113 ac		94%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	15,326 ac		65%	12,972 ac		2,354 ac		85%
IA	7,831 ac		33%	7,078 ac		753 ac		90%
IB	5,988 ac		26%	4,822 ac		1,166 ac		81%
IC	1,507 ac		6%	1,072 ac		435 ac		71%
<b>Group II (IIA, IIB)</b>	6,549 ac		28%	5,946 ac		603 ac		91%
IIA	4,606 ac		20%	4,270 ac		336 ac		93%
IIB	1,943 ac		8%	1,676 ac		267 ac		86%
<b>Not Classified</b>	1,544 ac		7%	1,370 ac		174 ac		89%
<b>No Data Available</b>								

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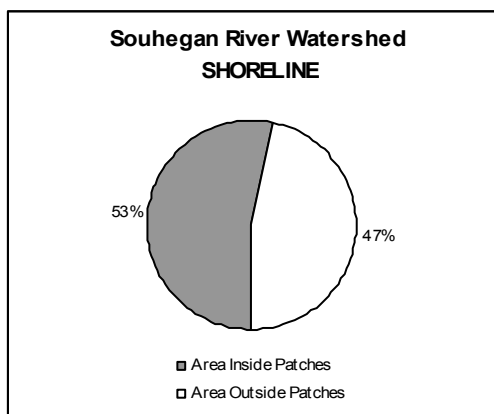
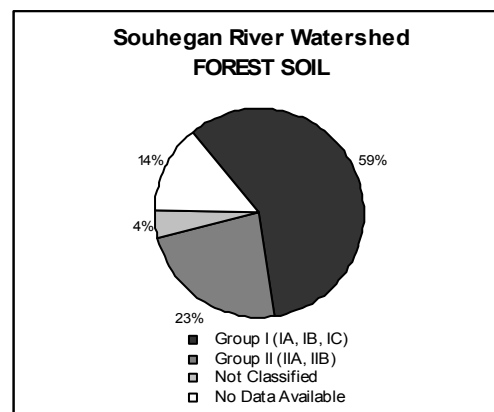
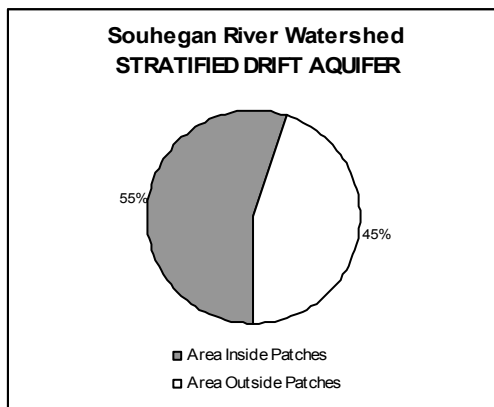
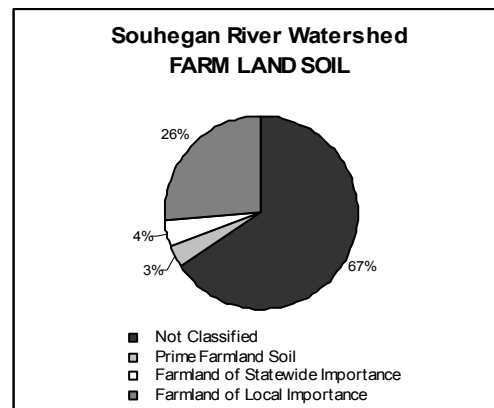
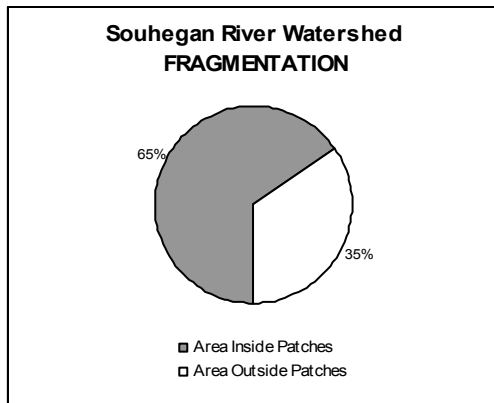
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	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>SOUHEGAN RIVER WATERSHED</b>	40,887 ac		100%	26,658 ac		14,229 ac		65%
Total Area in Square Miles	64 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	6,217 ac		15%	3,427 ac		2,790 ac		55%
	10 sq.mi.							
<b>SHORELINE</b>	350 mi		N/A	187 mi		163 mi		53%
<b>WATERBODY</b>	698 ac		2%	379 ac		319 ac		54%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	13,937 ac		34%					
	22 sq.mi.							
Prime Farmland Soil	1,395 ac		3%	639 ac		756 ac		46%
Farmland of Statewide Importance	1,788 ac		4%	838 ac		950 ac		47%
Farmland of Local Importance	10,754 ac		26%	6,764 ac		3,990 ac		63%
<b>HYDRIC SOIL</b>	3,124 ac		8%	1,799 ac		1,325 ac		58%
	5 sq.mi.							
<b>WETLAND</b>	2,264 ac		6%	1,275 ac		989 ac		56%
From USGS & NWI	4 sq.mi.							
<b>CONSERVATION LAND</b>	6,465 ac		16%	4,049 ac		1,416 ac		63%
	10 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	24,018 ac		59%	14,996 ac		9,022 ac		62%
IA	12,907 ac		32%	6,965 ac		5,942 ac		54%
IB	9,053 ac		22%	7,012 ac		2,041 ac		77%
IC	2,058 ac		5%	1,019 ac		1,039 ac		50%
<b>Group II (IIA, IIB)</b>	9,569 ac		23%	7,668 ac		1,901 ac		80%
IIA	7,366 ac		18%	6,483 ac		883 ac		88%
IIB	2,203 ac		5%	1,185 ac		1,018 ac		54%
<b>Not Classified</b>	1,681 ac		4%	1,158 ac		523 ac		69%
<b>No Data Available</b>	5,619 ac		14%					

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## Town of Alstead

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF ALSTEAD</b>	25,215	ac	100%	22,813	ac	2,401	ac	90%
Total Area in Square Miles	39	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	864	ac	3%	594	ac	270	ac	69%
	1	sq.mi.						
<b>SHORELINE</b>	165	mi	1%	116	mi	49	mi	70%
<b>WATERBODY</b>	418	ac	2%	384	ac	34	ac	92%
	1	sq.mi.						
<b>FARM LAND SOIL</b>	8,238	ac	33%					
	13	sq.mi.						
<b>Prime Farmland Soil</b>	1,163	ac	5%	838	ac	326	ac	72%
<b>Farmland of Statewide Importance</b>	1,574	ac	6%	1,303	ac	271	ac	83%
<b>Farmland of Local Importance</b>	5,500	ac	22%	2,750	ac	2,750	ac	50%
<b>HYDRIC SOIL</b>	2,021	ac	8%	1,834	ac	187	ac	91%
	3	sq.mi.						
<b>WETLAND</b>	958	ac	4%	898	ac	60	ac	94%
From USGS & NWI	1	sq.mi.						
<b>CONSERVATION LAND</b>	883	ac	4%	880	ac	3	ac	100%
	1	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	13,073	ac	52%	11,589	ac	1,484	ac	89%
IA	9,228	ac	37%	8,230	ac	998	ac	89%
IB	3,225	ac	13%	3,014	ac	210	ac	93%
IC	620	ac	2%	345	ac	275	ac	56%
<b>Group II (IIA, IIB)</b>	11,008	ac	44%	10,153	ac	855	ac	92%
IIA	9,760	ac	39%	9,050	ac	710	ac	93%
IIB	1,248	ac	5%	1,103	ac	145	ac	88%
<b>Not Classified</b>	1,134	ac	4%	1,072	ac	62	ac	95%

# Southwest Region NRI

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## Town of Antrim

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF ANTRIM</b>	23,368 ac		100%	19,252 ac		4,116 ac		82%
Total Area in Square Miles	37 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,332 ac		10%	1,112 ac		1,220 ac		48%
	4 sq.mi.							
<b>SHORELINE</b>	245 mi		N/A	125 mi		120 mi		51%
<b>WATERBODY</b>	718 ac		3%	595 ac		123 ac		83%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	8,119 ac		35%					
	13 sq.mi.							
<b>Prime Farmland Soil</b>	760 ac		3%	429 ac		331 ac		56%
<b>Farmland of Statewide Importance</b>	573 ac		2%	276 ac		298 ac		48%
<b>Farmland of Local Importance</b>	6,785 ac		29%	5,396 ac		1,390 ac		80%
<b>HYDRIC SOIL</b>	2,373 ac		10%	1,654 ac		719 ac		70%
	4 sq.mi.							
<b>WETLAND</b>	1,835 ac		8%	1,450 ac		385 ac		79%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	3,708 ac		16%	3,442 ac		267 ac		93%
	6 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	15,465 ac		66%	12,587 ac		2,879 ac		81%
IA	9,344 ac		40%	8,083 ac		1,262 ac		86%
IB	4,945 ac		21%	3,726 ac		1,219 ac		75%
IC	1,176 ac		5%	778 ac		398 ac		66%
<b>Group II (IIA, IIB)</b>	5,746 ac		25%	4,882 ac		864 ac		85%
IIA	4,558 ac		20%	4,162 ac		396 ac		91%
IIB	1,188 ac		5%	720 ac		468 ac		61%
<b>Not Classified</b>	2,156 ac		9%	1,783 ac		374 ac		83%

# Southwest Region NRI

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## Town of Bennington

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF BENNINGTON</b>	7,409 ac		100%	4,901 ac		2,507 ac		66%
Total Area in Square Miles	12 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,815 ac		38%	1,145 ac		1,670 ac		41%
	4 sq.mi.							
<b>SHORELINE</b>	105 mi		N/A	53 mi		52 mi		51%
<b>WATERBODY</b>	249 ac		3%	163 ac		86 ac		65%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	2,238 ac		30%					
	3 sq.mi.							
<b>Prime Farmland Soil</b>	161 ac		2%	100 ac		61 ac		62%
<b>Farmland of Statewide Importance</b>	73 ac		1%	45 ac		28 ac		61%
<b>Farmland of Local Importance</b>	2,004 ac		27%	1,430 ac		574 ac		71%
<b>HYDRIC SOIL</b>	751 ac		10%	432 ac		318 ac		58%
	1 sq.mi.							
<b>WETLAND</b>	649 ac		9%	436 ac		213 ac		67%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	96 ac		1%	28 ac		68 ac		29%
	0 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	4,256 ac		57%	2,768 ac		1,488 ac		65%
IA	1,714 ac		23%	1,426 ac		288 ac		83%
IB	1,039 ac		14%	728 ac		311 ac		70%
IC	1,503 ac		20%	614 ac		889 ac		41%
<b>Group II (IIA, IIB)</b>	2,645 ac		36%	1,848 ac		798 ac		70%
IIA	2,111 ac		28%	1,537 ac		574 ac		73%
IIB	534 ac		7%	311 ac		223 ac		58%
<b>Not Classified</b>	507 ac		7%	285 ac		222 ac		56%

# Southwest Region NRI

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October 2003

## Town of Chesterfield

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF CHESTERFIELD</b>	30,406 ac		100%	23,823 ac		6,583 ac		78%
Total Area in Square Miles	48 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	1,455 ac		5%	571 ac		883 ac		39%
	2 sq.mi.							
<b>SHORELINE</b>	232 mi		N/A	166 mi		66 mi		72%
<b>WATERBODY</b>	1,299 ac		4%	267 ac		1,032 ac		21%
	2 sq.mi.							
<b>FARM LAND SOIL</b>	4,965 ac		16%					
	8 sq.mi.							
Prime Farmland Soil	1,055 ac		3%	486 ac		569 ac		46%
Farmland of Statewide Importance	1,297 ac		4%	737 ac		560 ac		57%
Farmland of Local Importance	2,613 ac		9%	1,543 ac		1,070 ac		59%
<b>HYDRIC SOIL</b>	2,403 ac		8%	1,848 ac		555 ac		77%
	4 sq.mi.							
<b>WETLAND</b>	1,808 ac		6%	815 ac		993 ac		45%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	6,040 ac		20%	5,810 ac		230 ac		96%
	9 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	9,884 ac		33%	6,433 ac		3,451 ac		65%
IA	8,646 ac		28%	5,686 ac		2,960 ac		66%
IB	999 ac		3%	686 ac		313 ac		69%
IC	239 ac		1%	61 ac		178 ac		25%
<b>Group II (IIA, IIB)</b>	18,856 ac		62%	16,850 ac		2,007 ac		89%
IIA	16,951 ac		56%	15,394 ac		1,557 ac		91%
IIB	1,906 ac		6%	1,456 ac		449 ac		76%
<b>Not Classified</b>	1,491 ac		5%	496 ac		995 ac		33%

# Southwest Region NRI

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October 2003

## Town of Dublin

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF DUBLIN</b>	18,553 ac		100%	13,791 ac		4,762 ac		74%
Total Area in Square Miles	29 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	984 ac		5%	297 ac		688 ac		30%
	2 sq.mi.							
<b>SHORELINE</b>	113 mi		N/A	71 mi		41 mi		63%
<b>WATERBODY</b>	651 ac		4%	259 ac		392 ac		40%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	6,306 ac		34%					
	10 sq.mi.							
Prime Farmland Soil	678 ac		4%	343 ac		335 ac		51%
Farmland of Statewide Importance	470 ac		3%	268 ac		202 ac		57%
Farmland of Local Importance	5,158 ac		28%	3,862 ac		1,296 ac		75%
<b>HYDRIC SOIL</b>	2,458 ac		13%	1,688 ac		770 ac		69%
	4 sq.mi.							
<b>WETLAND</b>	1,735 ac		9%	966 ac		769 ac		56%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	4,492 ac		24%	3,667 ac		824 ac		82%
	7 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	12,014 ac		65%	8,976 ac		3,039 ac		75%
IA	10,752 ac		58%	8,299 ac		2,453 ac		77%
IB	855 ac		5%	497 ac		358 ac		58%
IC	407 ac		2%	180 ac		227 ac		44%
<b>Group II (IIA, IIB)</b>	4,587 ac		25%	3,702 ac		885 ac		81%
IIA	3,355 ac		18%	2,823 ac		532 ac		84%
IIB	1,232 ac		7%	879 ac		353 ac		71%
<b>Not Classified</b>	1,952 ac		11%	1,114 ac		838 ac		57%

# Southwest Region NRI

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## Town of Fitzwilliam

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF FITZWILLIAM</b>	23,044 ac		100%	15,951 ac		7,093 ac		69%
Total Area in Square Miles	36 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	1,741 ac		8%	951 ac		789 ac		55%
	3 sq.mi.							
<b>SHORELINE</b>	197 mi		N/A	132 mi		65 mi		67%
<b>WATERBODY</b>	919 ac		4%	602 ac		317 ac		66%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	8,120 ac		35%					
	13 sq.mi.							
Prime Farmland Soil	478 ac		2%	184 ac		295 ac		38%
Farmland of Statewide Importance	238 ac		1%	100 ac		138 ac		42%
Farmland of Local Importance	7,404 ac		32%	5,204 ac		2,200 ac		70%
<b>HYDRIC SOIL</b>	5,511 ac		24%	3,489 ac		2,022 ac		63%
	9 sq.mi.							
<b>WETLAND</b>	3,528 ac		15%	2,309 ac		1,218 ac		65%
From USGS & NWI	6 sq.mi.							
<b>CONSERVATION LAND</b>	1,051 ac		5%	999 ac		52 ac		95%
	2 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	15,520 ac		67%	10,492 ac		5,028 ac		68%
IA	11,292 ac		49%	7,565 ac		3,727 ac		67%
IB	3,465 ac		15%	2,532 ac		933 ac		73%
IC	763 ac		3%	396 ac		368 ac		52%
<b>Group II (IIA, IIB)</b>	3,703 ac		16%	2,949 ac		754 ac		80%
IIA	1,727 ac		7%	1,553 ac		175 ac		90%
IIB	1,976 ac		9%	1,396 ac		579 ac		71%
<b>Not Classified</b>	3,798 ac		16%	2,493 ac		1,305 ac		66%

# Southwest Region NRI

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October 2003

## Town of Francestown

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF FRANCESTOWN</b>	19,472 ac		100%	16,777 ac		2,695 ac		86%
Total Area in Square Miles	30 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,856 ac		15%	2,173 ac		683 ac		76%
	4 sq.mi.							
<b>SHORELINE</b>	139 mi		N/A	100 mi		39 mi		72%
<b>WATERBODY</b>	490 ac		3%	477 ac		13 ac		97%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	7,153 ac		37%					
	11 sq.mi.							
Prime Farmland Soil	682 ac		4%	454 ac		228 ac		67%
Farmland of Statewide Importance	431 ac		2%	320 ac		112 ac		74%
Farmland of Local Importance	6,040 ac		31%	4,902 ac		1,138 ac		81%
<b>HYDRIC SOIL</b>	2,783 ac		14%	2,396 ac		388 ac		86%
	4 sq.mi.							
<b>WETLAND</b>	1,591 ac		8%	1,422 ac		170 ac		89%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	1,734 ac		9%	1,618 ac		116 ac		93%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	12,451 ac		64%	10,442 ac		2,010 ac		84%
IA	6,147 ac		32%	5,522 ac		625 ac		90%
IB	5,277 ac		27%	4,243 ac		1,034 ac		80%
IC	1,027 ac		5%	676 ac		351 ac		66%
<b>Group II (IIA, IIB)</b>	5,741 ac		29%	5,184 ac		557 ac		90%
IIA	4,135 ac		21%	3,833 ac		302 ac		93%
IIB	1,606 ac		8%	1,351 ac		255 ac		84%
<b>Not Classified</b>	1,280 ac		7%	1,152 ac		129 ac		90%

# Southwest Region NRI

First Edition

October 2003

## Town of Gilsum

	Total Area		Percent of Study Area	Area Inside Patches	Area Outside Patches	Percent Unfragmented
<b>TOWN OF GILSUM</b>	10,678 ac		100%	9,172 ac	1,507 ac	86%
Total Area in Square Miles	17 sq.mi.					
<b>STRATIFIED DRIFT AQUIFER</b>	731 ac		7%	379 ac	352 ac	52%
	1 sq.mi.					
<b>SHORELINE</b>	71 mi		N/A	37 mi	34 mi	52%
<b>WATERBODY</b>	92 ac		1%	43 ac	49 ac	47%
	0 sq.mi.					
<b>FARM LAND SOIL</b>	1,587 ac		15%			
	2 sq.mi.					
Prime Farmland Soil	141 ac		1%	102 ac	39 ac	72%
Farmland of Statewide Importance	309 ac		3%	264 ac	45 ac	86%
Farmland of Local Importance	1,137 ac		11%	1,025 ac	112 ac	90%
<b>HYDRIC SOIL</b>	943 ac		9%	785 ac	158 ac	83%
	1 sq.mi.					
<b>WETLAND</b>	311 ac		3%	248 ac	63 ac	80%
From USGS & NWI	0 sq.mi.					
<b>CONSERVATION LAND</b>	1,075 ac		10%	952 ac	123 ac	89%
	2 sq.mi.					
<b>FOREST SOIL</b>						
<b>Group I (IA, IB, IC)</b>	6,054 ac		57%	5,334 ac	720 ac	88%
IA	4,761 ac		45%	4,404 ac	357 ac	93%
IB	664 ac		6%	610 ac	54 ac	92%
IC	629 ac		6%	319 ac	310 ac	51%
<b>Group II (IIA, IIB)</b>	4,194 ac		39%	3,519 ac	674 ac	84%
IIA	3,645 ac		34%	3,053 ac	592 ac	84%
IIB	549 ac		5%	466 ac	82 ac	85%
<b>Not Classified</b>	431 ac		4%	319 ac	112 ac	74%

# Southwest Region NRI

First Edition

October 2003

## Town of Greenfield

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF GREENFIELD</b>	17,304 ac		100%	14,017 ac		3,287 ac		81%
Total Area in Square Miles	27 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	5,365 ac		31%	3,712 ac		1,654 ac		69%
	8 sq.mi.							
<b>SHORELINE</b>	96 mi		N/A	65 mi		30 mi		68%
<b>WATERBODY</b>	414 ac		2%	358 ac		56 ac		86%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	5,853 ac		34%					
	9 sq.mi.							
Prime Farmland Soil	377 ac		2%	303 ac		74 ac		80%
Farmland of Statewide Importance	417 ac		2%	366 ac		51 ac		88%
Farmland of Local Importance	5,059 ac		29%	4,143 ac		916 ac		82%
<b>HYDRIC SOIL</b>	2,702 ac		16%	1,918 ac		784 ac		71%
	4 sq.mi.							
<b>WETLAND</b>	1,779 ac		10%	1,420 ac		360 ac		80%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	2,099 ac		12%	1,941 ac		158 ac		92%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	10,961 ac		63%	8,774 ac		2,187 ac		80%
IA	4,958 ac		29%	4,233 ac		725 ac		85%
IB	3,481 ac		20%	2,980 ac		500 ac		86%
IC	2,522 ac		15%	1,560 ac		962 ac		62%
<b>Group II (IIA, IIB)</b>	4,829 ac		28%	4,096 ac		734 ac		85%
IIA	3,293 ac		19%	2,935 ac		358 ac		89%
IIB	1,536 ac		9%	1,160 ac		375 ac		76%
<b>Not Classified</b>	1,514 ac		9%	1,148 ac		366 ac		76%

# Southwest Region NRI

First Edition

October 2003

## Town of Greenville

	Total Area	Percent of Study Area	Area Inside Patches	Area Outside Patches	Percent Unfragmented
<b>TOWN OF GREENVILLE</b>	4,394 ac	100%	2,248 ac	2,146 ac	51%
Total Area in Square Miles	7 sq.mi.				
<b>STRATIFIED DRIFT AQUIFER</b>	168 ac	4%	18 ac	149 ac	11%
	0 sq.mi.				
<b>SHORELINE</b>	60 mi	N/A	29 mi	31 mi	48%
<b>WATERBODY</b>	13 ac	0%	0 ac	13 ac	4%
	0 sq.mi.				
<b>FARM LAND SOIL</b>	1,957 ac	45%			
	3 sq.mi.				
Prime Farmland Soil	317 ac	7%	72 ac	245 ac	23%
Farmland of Statewide Importance	352 ac	8%	126 ac	227 ac	36%
Farmland of Local Importance	1,287 ac	29%	697 ac	590 ac	54%
<b>HYDRIC SOIL</b>	469 ac	11%	274 ac	195 ac	58%
	1 sq.mi.				
<b>WETLAND</b>	145 ac	3%	64 ac	81 ac	44%
From USGS & NWI	0 sq.mi.				
<b>CONSERVATION LAND</b>	243 ac	6%	135 ac	108 ac	56%
	0 sq.mi.				
<b>FOREST SOIL</b>					
<b>Group I (IA, IB, IC)</b>	3,176 ac	72%	1,560 ac	1,616 ac	49%
IA	2,258 ac	51%	950 ac	1,308 ac	42%
IB	877 ac	20%	610 ac	267 ac	70%
IC	42 ac	1%	0 ac	41 ac	1%
<b>Group II (IIA, IIB)</b>	1,094 ac	25%	688 ac	405 ac	63%
IIA	632 ac	14%	366 ac	265 ac	58%
IIB	371 ac	8%	231 ac	140 ac	62%
<b>Not Classified</b>	215 ac	5%	91 ac	124 ac	42%

# Southwest Region NRI

First Edition

October 2003

## Town of Hancock

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF HANCOCK</b>	20,000	ac	100%	14,827	ac	5,173	ac	74%
Total Area in Square Miles	31	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	2,527	ac	13%	1,302	ac	1,226	ac	51%
	4	sq.mi.						
<b>SHORELINE</b>	169	mi	N/A	109	mi	60	mi	64%
<b>WATERBODY</b>	925	ac	5%	894	ac	30	ac	97%
	1	sq.mi.						
<b>FARM LAND SOIL</b>	6,396	ac	32%					
	10	sq.mi.						
Prime Farmland Soil	427	ac	2%	168	ac	259	ac	39%
Farmland of Statewide Importance	190	ac	1%	91	ac	99	ac	48%
Farmland of Local Importance	5,778	ac	29%	3,763	ac	2,015	ac	65%
<b>HYDRIC SOIL</b>	2,484	ac	12%	1,566	ac	918	ac	63%
	4	sq.mi.						
<b>WETLAND</b>	2,196	ac	11%	1,663	ac	532	ac	76%
From USGS & NWI	3	sq.mi.						
<b>CONSERVATION LAND</b>	7,236	ac	36%	6,394	ac	841	ac	88%
	11	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	10,851	ac	54%	7,128	ac	3,723	ac	66%
IA	6,592	ac	33%	4,432	ac	2,160	ac	67%
IB	2,459	ac	12%	1,868	ac	591	ac	76%
IC	1,800	ac	9%	828	ac	972	ac	46%
<b>Group II (IIA, IIB)</b>	7,309	ac	37%	6,171	ac	1,138	ac	84%
IIA	5,751	ac	29%	5,230	ac	521	ac	91%
IIB	1,559	ac	8%	941	ac	618	ac	60%
<b>Not Classified</b>	1,839	ac	9%	1,528	ac	311	ac	83%

# Southwest Region NRI

First Edition

October 2003

## Town of Harrisville

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF HARRISVILLE</b>	12,940 ac		100%	11,008 ac		1,933 ac		85%
Total Area in Square Miles	20 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	842 ac		7%	589 ac		253 ac		70%
	1 sq.mi.							
<b>SHORELINE</b>	98 mi		N/A	60 mi		38 mi		61%
<b>WATERBODY</b>	967 ac		7%	803 ac		163 ac		83%
	2 sq.mi.							
<b>FARM LAND SOIL</b>	4,515 ac		35%					
	7 sq.mi.							
Prime Farmland Soil	329 ac		3%	261 ac		68 ac		79%
Farmland of Statewide Importance	375 ac		3%	280 ac		95 ac		75%
Farmland of Local Importance	3,811 ac		29%	3,258 ac		553 ac		85%
<b>HYDRIC SOIL</b>	1,102 ac		9%	813 ac		289 ac		74%
	2 sq.mi.							
<b>WETLAND</b>	2,612 ac		20%	1,328 ac		1,284 ac		51%
From USGS & NWI	4 sq.mi.							
<b>CONSERVATION LAND</b>	1,898 ac		15%	1,739 ac		158 ac		92%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	8,866 ac		69%	7,577 ac		1,289 ac		85%
IA	7,122 ac		55%	6,149 ac		973 ac		86%
IB	1,366 ac		11%	1,234 ac		132 ac		90%
IC	378 ac		3%	194 ac		185 ac		51%
<b>Group II (IIA, IIB)</b>	2,552 ac		20%	2,164 ac		388 ac		85%
IIA	2,110 ac		16%	1,840 ac		269 ac		87%
IIB	443 ac		3%	324 ac		119 ac		73%
<b>Not Classified</b>	1,522 ac		12%	1,267 ac		256 ac		83%

# Southwest Region NRI

First Edition  
October 2003

## Town of Hinsdale

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF HINSDALE</b>	14,503 ac		100%	9,437 ac		5,066 ac		65%
Total Area in Square Miles	23 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	4,685 ac		32%	2,128 ac		2,557 ac		45%
	7 sq.mi.							
<b>SHORELINE</b>	211 mi		N/A	83 mi		128 mi		39%
<b>WATERBODY</b>	1,372 ac		9%	128 ac		1,244 ac		9%
	2 sq.mi.							
<b>FARM LAND SOIL</b>	4,926 ac		34%					
	8 sq.mi.							
Prime Farmland Soil	1,113 ac		8%	347 ac		766 ac		31%
Farmland of Statewide Importance	584 ac		4%	262 ac		322 ac		45%
Farmland of Local Importance	3,229 ac		22%	2,187 ac		1,042 ac		68%
<b>HYDRIC SOIL</b>	790 ac		5%	493 ac		296 ac		62%
	1 sq.mi.							
<b>WETLAND</b>	1,375 ac		9%	319 ac		1,055 ac		23%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	1,358 ac		9%	1,253 ac		105 ac		92%
	2 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	6,512 ac		45%	4,311 ac		2,200 ac		66%
IA	3,204 ac		22%	1,951 ac		1,253 ac		61%
IB	1,248 ac		9%	1,098 ac		149 ac		88%
IC	2,060 ac		14%	1,262 ac		798 ac		61%
<b>Group II (IIA, IIB)</b>	6,144 ac		42%	4,732 ac		1,412 ac		77%
IIA	5,705 ac		39%	4,490 ac		1,215 ac		79%
IIB	439 ac		3%	242 ac		197 ac		55%
<b>Not Classified</b>	1,415 ac		10%	378 ac		1,037 ac		27%

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## Town of Jaffrey

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF JAFFREY</b>	25,709 ac		100%	16,762 ac		8,946 ac		65%
Total Area in Square Miles	40 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	4,440 ac		17%	1,634 ac		2,806 ac		37%
	7 sq.mi.							
<b>SHORELINE</b>	165 mi		N/A	88 mi		77 mi		53%
<b>WATERBODY</b>	1,196 ac		5%	725 ac		472 ac		61%
	2 sq.mi.							
<b>FARM LAND SOIL</b>	7,116 ac		28%					
	11 sq.mi.							
Prime Farmland Soil	1,100 ac		4%	480 ac		620 ac		44%
Farmland of Statewide Importance	2,035 ac		8%	979 ac		1,056 ac		48%
Farmland of Local Importance	3,980 ac		15%	2,633 ac		1,348 ac		66%
<b>HYDRIC SOIL</b>	3,884 ac		15%	2,396 ac		1,489 ac		62%
	6 sq.mi.							
<b>WETLAND</b>	2,810 ac		11%	1,693 ac		1,117 ac		60%
From USGS & NWI	4 sq.mi.							
<b>CONSERVATION LAND</b>	5,477 ac		21%	4,891 ac		587 ac		89%
	9 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	13,994 ac		54%	8,033 ac		5,961 ac		57%
IA	10,664 ac		41%	6,625 ac		4,040 ac		62%
IB	1,452 ac		6%	875 ac		577 ac		60%
IC	1,878 ac		7%	534 ac		1,344 ac		28%
<b>Group II (IIA, IIB)</b>	7,869 ac		31%	6,185 ac		1,684 ac		79%
IIA	5,995 ac		23%	5,013 ac		982 ac		84%
IIB	1,875 ac		7%	1,172 ac		702 ac		63%
<b>Not Classified</b>	3,845 ac		15%	2,543 ac		1,302 ac		66%

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## City of Keene

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>CITY OF KEENE</b>	23,865	ac	100%	13,904	ac	9,961	ac	58%
Total Area in Square Miles	37	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	6,876	ac	29%	1,051	ac	5,825	ac	15%
	11	sq.mi.						
<b>SHORELINE</b>	241	mi	N/A	115	mi	126	mi	48%
<b>WATERBODY</b>	296	ac	1%	176	ac	120	ac	60%
	0	sq.mi.						
<b>FARM LAND SOIL</b>	8,588	ac	36%					
	13	sq.mi.						
<b>Prime Farmland Soil</b>	1,676	ac	7%	516	ac	1,160	ac	31%
<b>Farmland of Statewide Importance</b>	524	ac	2%	299	ac	225	ac	57%
<b>Farmland of Local Importance</b>	6,388	ac	27%	2,772	ac	3,616	ac	43%
<b>HYDRIC SOIL</b>	3,064	ac	13%	821	ac	2,243	ac	27%
	5	sq.mi.						
<b>WETLAND</b>	1,668	ac	7%	591	ac	1,077	ac	35%
From USGS & NWI	3	sq.mi.						
<b>CONSERVATION LAND</b>	4,333	ac	18%	3,274	ac	1,059	ac	76%
	7	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	14,095	ac	59%	7,809	ac	6,285	ac	55%
IA	5,431	ac	23%	3,673	ac	1,759	ac	68%
IB	5,630	ac	24%	3,706	ac	1,924	ac	66%
IC	3,034	ac	13%	431	ac	2,603	ac	14%
<b>Group II (IIA, IIB)</b>	8,363	ac	35%	5,607	ac	2,756	ac	67%
IIA	6,321	ac	26%	5,092	ac	1,229	ac	81%
IIB	2,043	ac	9%	515	ac	1,528	ac	25%
<b>Not Classified</b>	1,407	ac	6%	488	ac	919	ac	35%

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## Town of Langdon

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF LANGDON</b>	10,446 ac		100%	9,358 ac		1,088 ac		90%
Total Area in Square Miles	16 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	1,903 ac		18%	1,281 ac		621 ac		67%
	3 sq.mi.							
<b>SHORELINE</b>	83 mi		N/A	60 mi		23 mi		73%
<b>WATERBODY</b>	82 ac		1%	69 ac		13 ac		84%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	3,572 ac		34%					
	6 sq.mi.							
<b>Prime Farmland Soil</b>	1,022 ac		10%	867 ac		156 ac		85%
<b>Farmland of Statewide Importance</b>	886 ac		8%	736 ac		151 ac		83%
<b>Farmland of Local Importance</b>	1,663 ac		16%	1,397 ac		266 ac		84%
<b>HYDRIC SOIL</b>	554 ac		5%	495 ac		58 ac		89%
	1 sq.mi.							
<b>WETLAND</b>	212 ac		2%	183 ac		29 ac		86%
From USGS & NWI	0 sq.mi.							
<b>CONSERVATION LAND</b>	349 ac		3%	349 ac		0 ac		100%
	1 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	7,063 ac		68%	6,201 ac		862 ac		88%
IA	3,574 ac		34%	3,270 ac		303 ac		92%
IB	2,551 ac		24%	2,329 ac		222 ac		91%
IC	938 ac		9%	602 ac		337 ac		64%
<b>Group II (IIA, IIB)</b>	3,107 ac		30%	2,922 ac		185 ac		94%
IIA	2,687 ac		26%	2,542 ac		144 ac		95%
IIB	420 ac		4%	379 ac		41 ac		90%
<b>Not Classified</b>	276 ac		3%	235 ac		41 ac		85%

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## Town of Marlborough

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF MARLBOROUGH</b>	13,212 ac		100%	11,296 ac		1,916 ac		85%
Total Area in Square Miles	21 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	340 ac		3%	73 ac		267 ac		22%
	1 sq.mi.							
<b>SHORELINE</b>	116 mi		N/A	62 mi		54 mi		53%
<b>WATERBODY</b>	166 ac		1%	165 ac		1 ac		99%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	3,758 ac		28%					
	6 sq.mi.							
Prime Farmland Soil	680 ac		5%	476 ac		204 ac		70%
Farmland of Statewide Importance	470 ac		4%	309 ac		161 ac		66%
Farmland of Local Importance	2,608 ac		20%	2,310 ac		298 ac		89%
<b>HYDRIC SOIL</b>	1,362 ac		10%	1,139 ac		223 ac		84%
	2 sq.mi.							
<b>WETLAND</b>	656 ac		5%	606 ac		50 ac		92%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	880 ac		7%	850 ac		30 ac		97%
	1 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	8,138 ac		62%	6,847 ac		1,291 ac		84%
IA	6,543 ac		50%	5,740 ac		803 ac		88%
IB	1,354 ac		10%	1,014 ac		339 ac		75%
IC	241 ac		2%	92 ac		149 ac		38%
<b>Group II (IIA, IIB)</b>	4,102 ac		31%	3,562 ac		540 ac		87%
IIA	3,505 ac		27%	3,114 ac		391 ac		89%
IIB	597 ac		5%	448 ac		149 ac		75%
<b>Not Classified</b>	972 ac		7%	887 ac		85 ac		91%

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## Town of Marlow

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF MARLOW</b>	16,918	ac	100%	15,738	ac	1,180	ac	93%
Total Area in Square Miles	26	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	1,039	ac	6%	543	ac	497	ac	52%
	2	sq.mi.						
<b>SHORELINE</b>	135	mi	N/A	102	mi	33	mi	76%
<b>WATERBODY</b>	470	ac	3%	389	ac	81	ac	83%
	1	sq.mi.						
<b>FARM LAND SOIL</b>	2,788	ac	16%					
	4	sq.mi.						
Prime Farmland Soil	1,130	ac	7%	1,104	ac	26	ac	98%
Farmland of Statewide Importance	544	ac	3%	527	ac	17	ac	97%
Farmland of Local Importance	1,113	ac	7%	984	ac	130	ac	88%
<b>HYDRIC SOIL</b>	2,561	ac	15%	2,354	ac	206	ac	92%
	4	sq.mi.						
<b>WETLAND</b>	1,297	ac	8%	1,120	ac	177	ac	86%
From USGS & NWI	2	sq.mi.						
<b>CONSERVATION LAND</b>	1,523	ac	9%	1,379	ac	145	ac	91%
	2	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	6,092	ac	36%	5,604	ac	488	ac	92%
IA	5,323	ac	31%	5,106	ac	218	ac	96%
IB	275	ac	2%	255	ac	20	ac	93%
IC	494	ac	3%	243	ac	251	ac	49%
<b>Group II (IIA, IIB)</b>	9,380	ac	55%	8,916	ac	464	ac	95%
IIA	7,897	ac	47%	7,512	ac	385	ac	95%
IIB	1,483	ac	9%	1,404	ac	79	ac	95%
<b>Not Classified</b>	1,446	ac	9%	1,218	ac	228	ac	84%

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## Town of Mason

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF MASON</b>	15,360 ac		100%	2,026 ac		13,334 ac		13%
Total Area in Square Miles	24 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,249 ac		15%	1,814 ac		435 ac		81%
	4 sq.mi.							
<b>SHORELINE</b>	280 mi		N/A	157 mi		122 mi		56%
<b>WATERBODY</b>	95 ac		1%	87 ac		8 ac		92%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	5,915 ac		39%					
	9 sq.mi.							
Prime Farmland Soil	494 ac		3%	317 ac		177 ac		64%
Farmland of Statewide Importance	470 ac		3%	275 ac		195 ac		58%
Farmland of Local Importance	4,951 ac		32%	4,451 ac		499 ac		90%
<b>HYDRIC SOIL</b>	1,525 ac		10%	1,359 ac		166 ac		89%
	2 sq.mi.							
<b>WETLAND</b>	668 ac		4%	590 ac		78 ac		88%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	983 ac		6%	952 ac		31 ac		97%
	2 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	10,348 ac		67%	8,794 ac		1,554 ac		85%
IA	1,593 ac		10%	1,142 ac		451 ac		72%
IB	7,796 ac		51%	6,937 ac		859 ac		89%
IC	959 ac		6%	715 ac		245 ac		75%
<b>Group II (IIA, IIB)</b>	4,368 ac		28%	3,962 ac		406 ac		91%
IIA	3,373 ac		22%	3,078 ac		295 ac		91%
IIB	995 ac		6%	884 ac		111 ac		89%
<b>Not Classified</b>	624 ac		4%	560 ac		63 ac		90%

# Southwest Region NRI

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## Town of Nelson

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF NELSON</b>	14,910 ac		100%	13,393 ac		1,517 ac		90%
Total Area in Square Miles	23 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	474 ac		3%	368 ac		106 ac		78%
	1 sq.mi.							
<b>SHORELINE</b>	169 mi		N/A	152 mi		17 mi		90%
<b>WATERBODY</b>	858 ac		6%	819 ac		39 ac		95%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	3,654 ac		25%					
	6 sq.mi.							
Prime Farmland Soil	225 ac		2%	167 ac		58 ac		74%
Farmland of Statewide Importance	309 ac		2%	241 ac		68 ac		78%
Farmland of Local Importance	3,119 ac		21%	2,661 ac		458 ac		85%
<b>HYDRIC SOIL</b>	1,170 ac		8%	869 ac		302 ac		74%
	2 sq.mi.							
<b>WETLAND</b>	1,289 ac		9%	1,162 ac		127 ac		90%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	2,681 ac		18%	2,546 ac		135 ac		95%
	4 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	8,967 ac		60%	8,084 ac		883 ac		90%
IA	7,559 ac		51%	6,793 ac		765 ac		90%
IB	1,153 ac		8%	1,059 ac		94 ac		92%
IC	255 ac		2%	232 ac		23 ac		91%
<b>Group II (IIA, IIB)</b>	4,786 ac		32%	4,266 ac		519 ac		89%
IIA	4,039 ac		27%	3,727 ac		312 ac		92%
IIB	747 ac		5%	539 ac		208 ac		72%
<b>Not Classified</b>	1,157 ac		8%	1,043 ac		114 ac		90%

# Southwest Region NRI

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## Town of New Ipswich

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF NEW IPSWICH</b>	21,150 ac		100%	13,985 ac		7,165 ac		66%
Total Area in Square Miles	33 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	3,983 ac		19%	2,133 ac		1,850 ac		54%
	6 sq.mi.							
<b>SHORELINE</b>	226 mi		N/A	135 mi		91 mi		60%
<b>WATERBODY</b>	304 ac		1%	219 ac		86 ac		72%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	8,000 ac		38%					
	13 sq.mi.							
Prime Farmland Soil	734 ac		3%	274 ac		461 ac		37%
Farmland of Statewide Importance	1,045 ac		5%	469 ac		576 ac		45%
Farmland of Local Importance	6,221 ac		29%	3,667 ac		2,555 ac		59%
<b>HYDRIC SOIL</b>	2,339 ac		11%	1,448 ac		892 ac		62%
	4 sq.mi.							
<b>WETLAND</b>	1,433 ac		7%	1,038 ac		394 ac		72%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	2,514 ac		12%	1,937 ac		577 ac		77%
	4 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	14,587 ac		69%	9,049 ac		5,539 ac		62%
IA	7,621 ac		36%	3,876 ac		3,745 ac		51%
IB	5,826 ac		28%	4,669 ac		1,158 ac		80%
IC	1,140 ac		5%	504 ac		637 ac		44%
<b>Group II (IIA, IIB)</b>	5,157 ac		24%	3,841 ac		1,316 ac		74%
IIA	3,753 ac		18%	3,159 ac		593 ac		84%
IIB	1,404 ac		7%	682 ac		722 ac		49%
<b>Not Classified</b>	1,388 ac		7%	1,079 ac		309 ac		78%

# Southwest Region NRI

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## Town of Peterborough

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF PETERBOROUGH</b>	24,592 ac		100%	9,034 ac		15,558 ac		37%
Total Area in Square Miles	38 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	6,634 ac		27%	3,085 ac		3,548 ac		47%
	10 sq.mi.							
<b>SHORELINE</b>	245 mi		N/A	133 mi		112 mi		54%
<b>WATERBODY</b>	481 ac		2%	326 ac		155 ac		68%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	11,733 ac		48%					
	18 sq.mi.							
Prime Farmland Soil	1,141 ac		5%	451 ac		690 ac		40%
Farmland of Statewide Importance	552 ac		2%	283 ac		268 ac		51%
Farmland of Local Importance	10,040 ac		41%	7,062 ac		2,978 ac		70%
<b>HYDRIC SOIL</b>	3,818 ac		16%	2,236 ac		1,581 ac		59%
	6 sq.mi.							
<b>WETLAND</b>	2,181 ac		9%	1,440 ac		741 ac		66%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	5,588 ac		23%	4,339 ac		1,249 ac		78%
	9 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	17,308 ac		70%	11,484 ac		5,824 ac		66%
IA	9,387 ac		38%	6,939 ac		2,448 ac		74%
IB	5,188 ac		21%	3,272 ac		1,915 ac		63%
IC	2,734 ac		11%	1,273 ac		1,461 ac		47%
<b>Group II (IIA, IIB)</b>	5,601 ac		23%	3,087 ac		2,514 ac		55%
IIA	3,029 ac		12%	1,525 ac		1,504 ac		50%
IIB	2,572 ac		10%	1,562 ac		1,010 ac		61%
<b>Not Classified</b>	1,683 ac		7%	987 ac		696 ac		59%

# Southwest Region NRI

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## Town of Richmond

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF RICHMOND</b>	24,158 ac		100%	21,288 ac		2,870 ac		88%
Total Area in Square Miles	38 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	680 ac		3%	376 ac		304 ac		55%
	1 sq.mi.							
<b>SHORELINE</b>	258 mi		N/A	215 mi		43 mi		83%
<b>WATERBODY</b>	134 ac		1%	130 ac		4 ac		97%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	5,727 ac		24%					
	9 sq.mi.							
<b>Prime Farmland Soil</b>	226 ac		1%	148 ac		78 ac		66%
<b>Farmland of Statewide Importance</b>	537 ac		2%	345 ac		192 ac		64%
<b>Farmland of Local Importance</b>	4,964 ac		21%	4,276 ac		688 ac		86%
<b>HYDRIC SOIL</b>	2,264 ac		9%	1,926 ac		338 ac		85%
	4 sq.mi.							
<b>WETLAND</b>	1,085 ac		4%	1,030 ac		55 ac		95%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	2,606 ac		11%	2,425 ac		181 ac		93%
	4 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	10,474 ac		43%	8,993 ac		1,480 ac		86%
IA	8,944 ac		37%	7,754 ac		1,190 ac		87%
IB	806 ac		3%	729 ac		76 ac		91%
IC	724 ac		3%	510 ac		214 ac		70%
<b>Group II (IIA, IIB)</b>	12,929 ac		54%	11,575 ac		1,354 ac		90%
IIA	11,251 ac		47%	10,197 ac		1,054 ac		91%
IIB	1,679 ac		7%	1,378 ac		301 ac		82%
<b>Not Classified</b>	639 ac		3%	604 ac		35 ac		94%

# Southwest Region NRI

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## Town of Rindge

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF RINDGE</b>	25,468 ac		100%	11,751 ac		13,717 ac		46%
Total Area in Square Miles	40 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	3,829 ac		15%	1,705 ac		2,125 ac		45%
	6 sq.mi.							
<b>SHORELINE</b>	290 mi		N/A	139 mi		152 mi		48%
<b>WATERBODY</b>	1,810 ac		7%	897 ac		914 ac		50%
	3 sq.mi.							
<b>FARM LAND SOIL</b>	9,543 ac		37%					
	15 sq.mi.							
Prime Farmland Soil	877 ac		3%	355 ac		522 ac		41%
Farmland of Statewide Importance	999 ac		4%	458 ac		542 ac		46%
Farmland of Local Importance	7,667 ac		30%	4,319 ac		3,347 ac		56%
<b>HYDRIC SOIL</b>	5,289 ac		21%	2,819 ac		2,469 ac		53%
	8 sq.mi.							
<b>WETLAND</b>	4,364 ac		17%	2,369 ac		1,995 ac		54%
From USGS & NWI	7 sq.mi.							
<b>CONSERVATION LAND</b>	3,212 ac		13%	2,850 ac		362 ac		89%
	5 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	17,497 ac		69%	9,249 ac		8,248 ac		53%
IA	11,356 ac		45%	6,389 ac		4,967 ac		56%
IB	3,872 ac		15%	2,040 ac		1,833 ac		53%
IC	2,268 ac		9%	819 ac		1,449 ac		36%
<b>Group II (IIA, IIB)</b>	3,053 ac		12%	1,834 ac		1,219 ac		60%
IIA	1,082 ac		4%	830 ac		252 ac		77%
IIB	1,971 ac		8%	1,004 ac		967 ac		51%
<b>Not Classified</b>	4,875 ac		19%	2,601 ac		2,274 ac		53%

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## Town of Roxbury

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF ROXBURY</b>	7,845 ac		100%	7,413 ac		432 ac		94%
Total Area in Square Miles	12 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	62 ac		1%	0 ac		62 ac		0%
	0 sq.mi.							
<b>SHORELINE</b>	48 mi		N/A	25 mi		23 mi		52%
<b>WATERBODY</b>	181 ac		2%	181 ac		0 ac		100%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	1,762 ac		22%					
	3 sq.mi.							
Prime Farmland Soil	122 ac		2%	75 ac		47 ac		62%
Farmland of Statewide Importance	173 ac		2%	169 ac		3 ac		98%
Farmland of Local Importance	1,468 ac		19%	1,417 ac		51 ac		97%
<b>HYDRIC SOIL</b>	461 ac		6%	446 ac		15 ac		97%
	1 sq.mi.							
<b>WETLAND</b>	268 ac		3%	261 ac		8 ac		97%
From USGS & NWI	0 sq.mi.							
<b>CONSERVATION LAND</b>	3,667 ac		47%	3,562 ac		105 ac		97%
	6 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	5,722 ac		73%	5,422 ac		299 ac		95%
IA	5,496 ac		70%	5,278 ac		218 ac		96%
IB	150 ac		2%	109 ac		41 ac		73%
IC	76 ac		1%	36 ac		40 ac		47%
<b>Group II (IIA, IIB)</b>	1,790 ac		23%	1,679 ac		110 ac		94%
IIA	1,439 ac		18%	1,343 ac		95 ac		93%
IIB	351 ac		4%	336 ac		15 ac		96%
<b>Not Classified</b>	333 ac		4%	311 ac		22 ac		93%

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## Town of Sharon

	<b>Total Area</b>	<b>Percent of Study Area</b>	<b>Area Inside Patches</b>	<b>Area Outside Patches</b>	<b>Percent Unfragmented</b>
<b>TOWN OF SHARON</b> Total Area in Square Miles	10,022 ac 16 sq.mi.	100%	8,577 ac	1,445 ac	86%
<b>STRATIFIED DRIFT AQUIFER</b>	2,719 ac 4 sq.mi.	27%	2,347 ac	372 ac	86%
<b>SHORELINE</b>	79 mi	N/A	54 mi	25 mi	69%
<b>WATERBODY</b>	22 ac	0%	20 ac	2 ac	92%
<b>FARM LAND SOIL</b>	4,340 ac 7 sq.mi.	43%			
<b>Prime Farmland Soil</b>	63 ac	1%	31 ac	32 ac	50%
<b>Farmland of Statewide Importance</b>	117 ac	1%	94 ac	23 ac	80%
<b>Farmland of Local Importance</b>	4,160 ac	42%	3,372 ac	788 ac	81%
<b>HYDRIC SOIL</b>	1,117 ac 2 sq.mi.	11%	935 ac	182 ac	84%
<b>WETLAND</b> From USGS & NWI	874 ac 1 sq.mi.	9%	767 ac	107 ac	88%
<b>CONSERVATION LAND</b>	3,771 ac 6 sq.mi.	38%	3,508 ac	262 ac	93%
<b>FOREST SOIL</b>					
<b>Group I (IA, IB, IC)</b>	7,444 ac	74%	6,251 ac	1,193 ac	84%
IA	2,236 ac	22%	1,827 ac	409 ac	82%
IB	3,723 ac	37%	3,157 ac	566 ac	85%
IC	1,485 ac	15%	1,267 ac	218 ac	85%
<b>Group II (IIA, IIB)</b>	2,090 ac	21%	1,942 ac	148 ac	93%
IIA	1,393 ac	14%	1,327 ac	66 ac	95%
IIB	697 ac	7%	615 ac	82 ac	88%
<b>Not Classified</b>	488 ac	5%	384 ac	104 ac	79%

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## Town of Stoddard

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF STODDARD</b>	33,949 ac		100%	31,789 ac		2,161 ac		94%
Total Area in Square Miles	53 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	436 ac		1%	362 ac		74 ac		83%
	1 sq.mi.							
<b>SHORELINE</b>	227 mi		N/A	181 mi		47 mi		80%
<b>WATERBODY</b>	1,535 ac		5%	1,453 ac		82 ac		95%
	2 sq.mi.							
<b>FARM LAND SOIL</b>	4,214 ac		12%					
	7 sq.mi.							
Prime Farmland Soil	142 ac		0%	90 ac		52 ac		63%
Farmland of Statewide Importance	254 ac		1%	177 ac		77 ac		70%
Farmland of Local Importance	3,818 ac		11%	3,534 ac		284 ac		93%
<b>HYDRIC SOIL</b>	3,245 ac		10%	2,879 ac		367 ac		89%
	5 sq.mi.							
<b>WETLAND</b>	3,518 ac		10%	3,242 ac		276 ac		92%
From USGS & NWI	5 sq.mi.							
<b>CONSERVATION LAND</b>	19,793 ac		58%	19,090 ac		702 ac		96%
	31 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	13,672 ac		40%	12,600 ac		1,071 ac		92%
IA	11,045 ac		33%	10,246 ac		799 ac		93%
IB	2,504 ac		7%	2,269 ac		234 ac		91%
IC	123 ac		0%	85 ac		38 ac		69%
<b>Group II (IIA, IIB)</b>	17,322 ac		51%	16,506 ac		816 ac		95%
IIA	15,831 ac		47%	15,174 ac		657 ac		96%
IIB	1,491 ac		4%	1,332 ac		159 ac		89%
<b>Not Classified</b>	2,955 ac		9%	2,682 ac		273 ac		91%

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## Town of Sullivan

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF SULLIVAN</b>	11,980	ac	100%	10,896	ac	1,084	ac	91%
Total Area in Square Miles	19	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	82	ac	1%	34	ac	49	ac	41%
	0	sq.mi.						
<b>SHORELINE</b>	64	mi	N/A	45	mi	19	mi	70%
<b>WATERBODY</b>	123	ac	1%	120	ac	3	ac	97%
	0	sq.mi.						
<b>FARM LAND SOIL</b>	2,061	ac	17%					
	3	sq.mi.						
Prime Farmland Soil	346	ac	3%	234	ac	111	ac	68%
Farmland of Statewide Importance	312	ac	3%	244	ac	68	ac	78%
Farmland of Local Importance	1,403	ac	12%	1,238	ac	165	ac	88%
<b>HYDRIC SOIL</b>	1,282	ac	11%	1,159	ac	122	ac	90%
	2	sq.mi.						
<b>WETLAND</b>	489	ac	4%	458	ac	31	ac	94%
From USGS & NWI	1	sq.mi.						
<b>CONSERVATION LAND</b>	3,157	ac	26%	3,069	ac	88	ac	97%
	5	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	4,905	ac	41%	4,276	ac	629	ac	87%
IA	4,526	ac	38%	3,988	ac	537	ac	88%
IB	252	ac	2%	191	ac	61	ac	76%
IC	128	ac	1%	97	ac	31	ac	76%
<b>Group II (IIA, IIB)</b>	6,422	ac	54%	6,017	ac	405	ac	94%
IIA	5,653	ac	47%	5,333	ac	320	ac	94%
IIB	769	ac	6%	684	ac	85	ac	89%
<b>Not Classified</b>	653	ac	5%	603	ac	50	ac	92%

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## Town of Surry

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF SURRY</b>	10,245 ac		100%	8,976 ac		1,269 ac		88%
Total Area in Square Miles	16 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	1,427 ac		14%	992 ac		435 ac		70%
	2 sq.mi.							
<b>SHORELINE</b>	71 mi		N/A	51 mi		20 mi		72%
<b>WATERBODY</b>	343 ac		3%	296 ac		47 ac		86%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	1,921 ac		19%					
	3 sq.mi.							
Prime Farmland Soil	555 ac		5%	411 ac		145 ac		74%
Farmland of Statewide Importance	220 ac		2%	204 ac		16 ac		93%
Farmland of Local Importance	1,146 ac		11%	1,012 ac		134 ac		88%
<b>HYDRIC SOIL</b>	734 ac		7%	660 ac		74 ac		90%
	1 sq.mi.							
<b>WETLAND</b>	669 ac		7%	614 ac		55 ac		92%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	2,138 ac		21%	1,922 ac		216 ac		90%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	3,641 ac		36%	2,913 ac		728 ac		80%
IA	2,207 ac		22%	1,836 ac		372 ac		83%
IB	844 ac		8%	792 ac		53 ac		94%
IC	589 ac		6%	286 ac		303 ac		49%
<b>Group II (IIA, IIB)</b>	5,950 ac		58%	5,480 ac		470 ac		92%
IIA	5,471 ac		53%	5,061 ac		410 ac		93%
IIB	479 ac		5%	419 ac		60 ac		88%
<b>Not Classified</b>	654 ac		6%	583 ac		71 ac		89%

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## Town of Swanzey

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF SWANZEY</b>	29,033	ac	100%	19,198	ac	9,835	ac	66%
Total Area in Square Miles	45	sq.mi.						
<b>STRATIFIED DRIFT AQUIFER</b>	7,994	ac	28%	1,517	ac	6,477	ac	19%
	12	sq.mi.						
<b>SHORELINE</b>	300	mi	N/A	152	mi	148	mi	51%
<b>WATERBODY</b>	501	ac	2%	150	ac	351	ac	30%
	1	sq.mi.						
<b>FARM LAND SOIL</b>	9,798	ac	34%					
	15	sq.mi.						
Prime Farmland Soil	1,600	ac	6%	598	ac	1,003	ac	37%
Farmland of Statewide Importance	7,459	ac	26%	4,131	ac	3,328	ac	55%
Farmland of Local Importance	740	ac	3%	295	ac	445	ac	40%
<b>HYDRIC SOIL</b>	3,323	ac	11%	1,462	ac	1,861	ac	44%
	5	sq.mi.						
<b>WETLAND</b>	1,819	ac	6%	535	ac	1,284	ac	29%
From USGS & NWI	3	sq.mi.						
<b>CONSERVATION LAND</b>	2,341	ac	8%	915	ac	1,426	ac	39%
	4	sq.mi.						
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	17,029	ac	59%	10,291	ac	6,738	ac	60%
IA	9,082	ac	31%	6,891	ac	2,191	ac	76%
IB	3,308	ac	11%	2,062	ac	1,246	ac	62%
IC	4,639	ac	16%	1,338	ac	3,301	ac	29%
<b>Group II (IIA, IIB)</b>	9,958	ac	34%	8,237	ac	1,721	ac	83%
IIA	7,838	ac	27%	7,234	ac	604	ac	92%
IIB	2,120	ac	7%	1,003	ac	1,117	ac	47%
<b>Not Classified</b>	2,046	ac	7%	669	ac	1,377	ac	33%

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## Town of Temple

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF TEMPLE</b>	14,377 ac		100%	11,155 ac		3,222 ac		78%
Total Area in Square Miles	22 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,239 ac		16%	1,612 ac		627 ac		72%
	3 sq.mi.							
<b>SHORELINE</b>	98 mi		N/A	61 mi		38 mi		62%
<b>WATERBODY</b>	204 ac		1%	177 ac		27 ac		87%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	5,556 ac		39%					
	9 sq.mi.							
Prime Farmland Soil	531 ac		4%	339 ac		192 ac		64%
Farmland of Statewide Importance	598 ac		4%	362 ac		236 ac		61%
Farmland of Local Importance	4,428 ac		31%	3,264 ac		1,164 ac		74%
<b>HYDRIC SOIL</b>	1,005 ac		7%	656 ac		349 ac		65%
	2 sq.mi.							
<b>WETLAND</b>	526 ac		4%	418 ac		109 ac		79%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	2,338 ac		16%	2,089 ac		248 ac		89%
	4 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	9,488 ac		66%	6,873 ac		2,615 ac		72%
IA	4,590 ac		32%	3,152 ac		1,438 ac		69%
IB	4,193 ac		29%	3,342 ac		850 ac		80%
IC	706 ac		5%	379 ac		327 ac		54%
<b>Group II (IIA, IIB)</b>	4,368 ac		30%	3,881 ac		487 ac		89%
IIA	3,643 ac		25%	3,417 ac		226 ac		94%
IIB	726 ac		5%	465 ac		261 ac		64%
<b>Not Classified</b>	521 ac		4%	400 ac		121 ac		77%

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## Town of Troy

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF TROY</b>	11,274 ac		100%	9,056 ac		2,218 ac		80%
Total Area in Square Miles	18 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	697 ac		6%	245 ac		452 ac		35%
	1 sq.mi.							
<b>SHORELINE</b>	76 mi		N/A	40 mi		36 mi		52%
<b>WATERBODY</b>	105 ac		1%	56 ac		49 ac		53%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	3,359 ac		30%					
	5 sq.mi.							
Prime Farmland Soil	291 ac		3%	124 ac		167 ac		43%
Farmland of Statewide Importance	324 ac		3%	155 ac		169 ac		48%
Farmland of Local Importance	2,744 ac		24%	2,311 ac		432 ac		84%
<b>HYDRIC SOIL</b>	1,307 ac		12%	1,051 ac		255 ac		80%
	2 sq.mi.							
<b>WETLAND</b>	1,819 ac		16%	535 ac		1,284 ac		29%
From USGS & NWI	3 sq.mi.							
<b>CONSERVATION LAND</b>	1,596 ac		14%	1,573 ac		23 ac		99%
	2 sq.mi.							
<b>FOREST SOIL</b>								
Group I (IA, IB, IC)	7,688 ac		68%	6,059 ac		1,629 ac		79%
IA	5,897 ac		52%	4,599 ac		1,298 ac		78%
IB	1,394 ac		12%	1,307 ac		87 ac		94%
IC	397 ac		4%	153 ac		244 ac		39%
Group II (IIA, IIB)	3,056 ac		27%	2,616 ac		441 ac		86%
IIA	2,097 ac		19%	1,850 ac		247 ac		88%
IIB	959 ac		9%	765 ac		194 ac		80%
<b>Not Classified</b>	530 ac		5%	381 ac		148 ac		72%

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## Town of Walpole

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF WALPOLE</b>	23,469 ac		100%	16,391 ac		7,078 ac		70%
Total Area in Square Miles	37 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	5,249 ac		22%	2,714 ac		2,535 ac		52%
	8 sq.mi.							
<b>SHORELINE</b>	231 mi		N/A	127 mi		105 mi		55%
<b>WATERBODY</b>	949 ac		4%	76 ac		873 ac		8%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	11,059 ac		47%					
	17 sq.mi.							
<b>Prime Farmland Soil</b>	3,745 ac		16%	2,098 ac		1,647 ac		56%
<b>Farmland of Statewide Importance</b>	1,709 ac		7%	1,149 ac		561 ac		67%
<b>Farmland of Local Importance</b>	5,605 ac		24%	4,091 ac		1,514 ac		73%
<b>HYDRIC SOIL</b>	1,263 ac		5%	916 ac		348 ac		72%
	2 sq.mi.							
<b>WETLAND</b>	974 ac		4%	299 ac		675 ac		31%
From USGS & NWI	2 sq.mi.							
<b>CONSERVATION LAND</b>	2,751 ac		12%	2,098 ac		653 ac		76%
	4 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	15,549 ac		66%	10,809 ac		4,740 ac		70%
IA	9,163 ac		39%	6,148 ac		3,015 ac		67%
IB	5,392 ac		23%	4,200 ac		1,192 ac		78%
IC	994 ac		4%	461 ac		533 ac		46%
<b>Group II (IIA, IIB)</b>	6,405 ac		27%	5,125 ac		1,281 ac		80%
IIA	5,477 ac		23%	4,472 ac		1,005 ac		82%
IIB	928 ac		4%	652 ac		275 ac		70%
<b>Not Classified</b>	1,192 ac		5%	457 ac		735 ac		38%

# Southwest Region NRI

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## Town of Westmoreland

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF WESTMORELAND</b>	23,562 ac		100%	19,859 ac		3,703 ac		84%
Total Area in Square Miles	37 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	2,512 ac		11%	1,311 ac		1,202 ac		52%
	4 sq.mi.							
<b>SHORELINE</b>	184 mi		N/A	121 mi		63 mi		66%
<b>WATERBODY</b>	636 ac		3%	12 ac		624 ac		2%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	7,600 ac		32%					
	12 sq.mi.							
<b>Prime Farmland Soil</b>	1,933 ac		8%	1,293 ac		639 ac		67%
<b>Farmland of Statewide Importance</b>	2,400 ac		10%	1,848 ac		553 ac		77%
<b>Farmland of Local Importance</b>	3,267 ac		14%	2,791 ac		476 ac		85%
<b>HYDRIC SOIL</b>	1,272 ac		5%	1,025 ac		247 ac		81%
	2 sq.mi.							
<b>WETLAND</b>	555 ac		2%	218 ac		337 ac		39%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	1,666 ac		7%	1,334 ac		332 ac		80%
	3 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	13,533 ac		57%	11,423 ac		2,111 ac		84%
IA	10,117 ac		43%	8,499 ac		1,618 ac		84%
IB	2,907 ac		12%	2,570 ac		337 ac		88%
IC	510 ac		2%	354 ac		156 ac		69%
<b>Group II (IIA, IIB)</b>	9,189 ac		39%	8,217 ac		972 ac		89%
IIA	8,166 ac		35%	7,408 ac		758 ac		91%
IIB	1,022 ac		4%	809 ac		213 ac		79%
<b>Not Classified</b>	534 ac		2%	219 ac		315 ac		41%

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## Town of Winchester

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF WINCHESTER</b>	35,551 ac		100%	29,792 ac		5,759 ac		84%
Total Area in Square Miles	56 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	6,035 ac		17%	2,350 ac		3,685 ac		39%
	9 sq.mi.							
<b>SHORELINE</b>	440 mi		N/A	298 mi		142 mi		68%
<b>WATERBODY</b>	595 ac		2%	311 ac		284 ac		52%
	1 sq.mi.							
<b>FARM LAND SOIL</b>	7,514 ac		21%					
	12 sq.mi.							
<b>Prime Farmland Soil</b>	1,152 ac		3%	580 ac		572 ac		50%
<b>Farmland of Statewide Importance</b>	588 ac		2%	378 ac		209 ac		64%
<b>Farmland of Local Importance</b>	5,774 ac		16%	4,248 ac		1,526 ac		74%
<b>HYDRIC SOIL</b>	3,303 ac		9%	2,636 ac		668 ac		80%
	5 sq.mi.							
<b>WETLAND</b>	2,264 ac		6%	1,716 ac		548 ac		76%
From USGS & NWI	4 sq.mi.							
<b>CONSERVATION LAND</b>	9,433 ac		27%	9,071 ac		361 ac		96%
	15 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	20,350 ac		57%	16,387 ac		3,962 ac		81%
IA	12,690 ac		36%	11,087 ac		1,603 ac		87%
IB	4,802 ac		14%	4,035 ac		767 ac		84%
IC	2,857 ac		8%	1,266 ac		1,592 ac		44%
<b>Group II (IIA, IIB)</b>	12,990 ac		37%	11,758 ac		1,232 ac		91%
IIA	11,355 ac		32%	10,563 ac		793 ac		93%
IIB	1,635 ac		5%	1,196 ac		439 ac		73%
<b>Not Classified</b>	2,196 ac		6%	1,635 ac		561 ac		74%

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## Town of Windsor

	Total Area		Percent of Study Area	Area Inside Patches		Area Outside Patches		Percent Unfragmented
<b>TOWN OF WINDSOR</b>	5,451 ac		100%	5,098 ac		353 ac		94%
Total Area in Square Miles	9 sq.mi.							
<b>STRATIFIED DRIFT AQUIFER</b>	879 ac		16%	809 ac		70 ac		92%
	1 sq.mi.							
<b>SHORELINE</b>	29 mi		N/A	23 mi		6 mi		78%
<b>WATERBODY</b>	201 ac		4%	189 ac		12 ac		94%
	0 sq.mi.							
<b>FARM LAND SOIL</b>	1,327 ac		24%					
	2 sq.mi.							
<b>Prime Farmland Soil</b>	63 ac		1%	14 ac		50 ac		21%
<b>Farmland of Statewide Importance</b>	18 ac		0%	18 ac		0 ac		100%
<b>Farmland of Local Importance</b>	1,246 ac		23%	1,124 ac		122 ac		90%
<b>HYDRIC SOIL</b>	816 ac		15%	762 ac		54 ac		93%
	1 sq.mi.							
<b>WETLAND</b>	874 ac		16%	819 ac		55 ac		94%
From USGS & NWI	1 sq.mi.							
<b>CONSERVATION LAND</b>	194 ac		4%	160 ac		34 ac		83%
	0 sq.mi.							
<b>FOREST SOIL</b>								
<b>Group I (IA, IB, IC)</b>	3,345 ac		61%	3,064 ac		281 ac		92%
IA	2,590 ac		48%	2,353 ac		237 ac		91%
IB	637 ac		12%	616 ac		21 ac		97%
IC	118 ac		2%	96 ac		23 ac		81%
<b>Group II (IIA, IIB)</b>	1,275 ac		23%	1,252 ac		23 ac		98%
IIA	1,123 ac		21%	1,103 ac		20 ac		98%
IIB	152 ac		3%	149 ac		3 ac		98%
<b>Not Classified</b>	831 ac		15%	782 ac		50 ac		94%

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## **CONSERVATION THRESHOLDS FOR LAND USE PLANNERS**

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## APPENDIX B. MINIMUM PATCH AREA

Minimum patch area requirements (in hectares) found within the scientific literature (as of December 2001) to maintain populations or communities of animal or plant species in the United States. One hectare is about 2.5 acres.

TAXA	PATCH AREA	FINDING	STATE	CITATION
<b>Birds</b>				
	≥ 1 ha	Minimum area requirement for breeding wood thrushes is 1 ha, although nesting success on fragments of that size would be extremely low.	MD, PA, VA, WV	Robbins et al. 1989
	> 1	Five species of chaparral-requiring birds were supported by census plots larger than 1 ha.	CA	Soulé et al. 1992
	≥ 2 ha (seed-eating birds) ≥ 40 ha (insect-eating birds)	The minimum area point <sup>1</sup> for insect-eating birds was estimated to be at least 40 ha, in contrast to 2 ha for seed-eating birds. This is interpreted as the habitat size needed to support a representative bird community.	NJ	Forman et al. 1976 <sup>2</sup> Galli et al. 1976 <sup>2</sup>
	≥ 5 ha (marsh)	Ten of the 25 species did not occur in marshes less than 5 ha.	IA	Brown and Dinsmore 1986
	≥ 5, ≥ 30, ≥ 40, ≥ 50, ≥ 55 ha	Estimates of minimal area requirements for five area-sensitive species ranged from 5 to 55 ha.	IL	Herkert 1994
	≥ 6.5 ha, 15.4 - 32.6 ha	Black tern required 6.5 ha in heterogeneous landscapes, but required 15.4 - 32.6 ha in homogeneous landscapes.	SD	Naugle et al. 1999
	≥ 10 ha (forest)	Forest patches ≥ 10 ha had much greater bird diversity than patches < 3.25 ha	GA	McIntyre 1995
	> 80 ha	In fragments < 80 ha, nesting success was low (43%), and nest predation was high (56%).	PA	Hoover et al. 1995
	< 20 ha, > 2500 ha	Based on a study of cowbird parasitism and nest predation on 3 large forest tracts (1100 - 2200 ha) in southern Illinois, maintaining wood thrush populations in the midwest might require > 2500 ha reserves. In the east even a small woodlot (< 20ha) may sustain a population.	IL	Trine 1998
<b>Mammals</b>				
	> 1 ha	Control plots larger than 1 ha supported most species of rodents.	CA	Soulé et al. 1992
	≥ 5 ha	Cottontails may become vulnerable to extinction if large patches ≥ 5.0 ha are not maintained.	NH	Barbour and Litvaitis 1993
	≥ 10 ha	Fragments < 10 ha did not support populations of native rodents.	CA	Boiger et al. 1997

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TAXA	PATCH AREA	FINDING	STATE	CITATION
	≥ 900 ha (9 km <sup>2</sup> )	More than 80% of bear sitings occurred in blocks of undisturbed habitat ≥ 9 km <sup>2</sup> .	MT	Mace et al. 1996 <sup>2</sup>
	≥ 2800 ha (28 km <sup>2</sup> )	Grizzly bears in the Yellowstone ecosystem should have security blocks 28 km <sup>2</sup> in size.	MT, ID, WY	Mattson 1990 <sup>3</sup>
	≥ 220,000 ha (2200 km <sup>2</sup> )	Model predicts low extinction risk for cougars in areas as small as 2200 km <sup>2</sup> , but w/ increasing risk with little immigration.	CA	Beier 1993
<b>Fishes</b>				
	> 2500	Found support that suitable patch size (as defined by watersheds above 1600 m elevation) influences the occurrence of bull trout. Predicted probability of occurrence is 0.5 for patches larger than 2500 ha.	ID	Rieman and McIntyre 1995
<b>Invertebrates</b>				
	≥ .0004 ha (4m <sup>2</sup> )	Vegetation patches ≥ 4m <sup>2</sup> , as well as open areas, were important to the distribution and abundance of carabid beetles.	OH	Crist and Ahern 1999
	≥ 1 ha	Observed minimum patch size for occupancy by populations of 3 butterfly species is 1 ha.	model	Hanski 1994
<b>Plants</b>				
	≥ 2 ha (5 acres)	Minimum area point <sup>1</sup> for tree communities was estimated to be about 2 ha.	NJ	Elfstrom 1974 <sup>2</sup>
	≥ 10, ≥ 100 ha	Conserving an old-growth forest might require 10 ha if surrounded by comparable forest, but 100 ha if surrounded by a clearcut.	—	Harris 1984 <sup>4</sup>

— Indicates that the geographic location was not determined because the recommendation was cited secondarily from another review article  
 model indicates that the research was conducted through modeling and therefore is not specific to any geographic area.

<sup>1</sup> Minimum area point is the point on a species-area curve, which shows the relationship between species number and habitat area, where there is an abrupt change in the slope. The minimum area point has been considered an index of how large a community must be to representative of the community type. (Forman 1995)

<sup>2</sup>As cited in Forman 1995

<sup>3</sup>As cited in Weaver et al. 1996

<sup>4</sup>As cited in Franklin 1993

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## APPENDIX C. PROPORTION OF SUITABLE HABITAT

Recommended minimum proportions of suitable habitat found within the scientific literature (as of December 2001) to maintain long-term persistence of viable populations or communities of species or to minimize the negative consequences of habitat fragmentation in the United States.

TAXA	PROPORTION OF SUITABLE HABITAT	FINDING	STATE	CITATION
<b>Birds</b>				
	≥ 5%	When < 5% of area was covered by habitat, there was an effect on bird density.	WI	Ambuel and Temple 1983 <sup>1</sup>
	≥ 5%	When < 5% of area was covered by habitat, there was an effect on bird community.	—	Howe 1984 <sup>1</sup>
	> 8%	When 8% of area was covered by habitat, there was an effect on land bird community.	—	Nilsson 1978 <sup>2</sup> Nilsson 1986 <sup>1</sup>
	≥ 10%	When < 10% of area was covered by habitat, there was an effect on species richness.	—	Soulé et al. 1988 <sup>3</sup> Boiger et al. 1991 <sup>1</sup>
	>10-30%	The negative effects of patch size and isolation on native species may not occur until the landscape consists of only 10-30% of the original habitat.	review	Andrén 1994
	> 15%	When 15% of area was covered by habitat, there was an effect on bird density.	—	Askins et al. 1987 <sup>1</sup>
	> 20%	When 20% of area was covered by habitat, there was an effect on bird community.	MD	Lynch and Whigham 1984 <sup>1</sup>
	> 22%	When 22% of area was covered by habitat, there was an effect on land bird community.	—	Whitcomb et al. 1981 <sup>1</sup>
	> 50%	Numerous species were more likely to inhabit wetlands in landscapes where less than 50% of the upland matrix was tilled.	SD	Naugle et al. 2001
	≥ 60%	A model assuming 60% suitable habitat suggests a high likelihood for the longterm persistence of Northern spotted owls.	model	Lamberson et al. 1994
	> 80%	Metapopulation model predicted that the Northern spotted owl population would go extinct if the proportion of old-growth forest was reduced to less than 20% of landscape.	model	Lande 1988 <sup>4</sup> Lamberson et al. 1992 <sup>1</sup>
<b>Mammals</b>				
	> 6%	When 6% of area was covered by habitat, there was an effect on chipmunk density.	—	Henderson et al. 1985 <sup>1</sup>
	> 6%	When 6% of area was covered by habitat, there was an effect on pika abundance.	—	Smith 1974 <sup>1</sup> Smith 1980 <sup>1</sup>
	≥ 10%	When < 10% of area was covered by habitat, there was an effect on mammal species richness.	—	Soulé et al. 1992 <sup>3</sup>
	> 10%	When 10% of area was covered by habitat, there was an effect on Columbian ground squirrel presence/absence.	—	Weddell 1991 <sup>1</sup>
	> 10-30%	The negative effects of patch size and isolation on the native species may not occur until the landscape consists of only 10-30% of the original habitat.	review	Andrén 1994
	> 15%	When 15% of area was covered by habitat, there was an effect on small mammal presence.	—	Lomolino et al. 1989 <sup>1</sup>

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TAXA	PROPORTION OF SUITABLE HABITAT	FINDING	STATE	CITATION
<b>Invertebrates</b>				
	≥ 20%	The threshold for changes in movement patterns of beetles occurred at 20% coverage of cells.	CO	Wiens et al. 1997
	≥ 20%	Clover patches became significantly more isolated below 20% habitat, which disrupted the predator foraging behavior of ladybird beetles, decreasing their ability to serve as biocontrol agents of aphids.	model	Wrth et al. 2002
	≥ 40%	Habitat specialists of grasshoppers exhibited limited movement and disjunct populations—which can affect population persistence—when preferred habitat occupied less than 40% of the landscape.	model	With and Crist 1995
	≥ 40, ≥ 60%	Rare species were disproportionately affected by fragmentation and did not occur in patches with less than 40% habitat. Over half of the species were never observed in plots with less than 60% habitat remaining.	OH	Summerville and Crist 2001
<b>Hypothetical Species</b>				
	> 10-30%	As habitat loss continues beyond the threshold (occurring somewhere in the range of 70-90% habitat loss) decline in population performance should become much more severe. But model predicts that habitat fragmentation begins to occur when about 60% of original vegetation remains.	model	Gardner et al. 1987
	≥ 20%	The threshold value of habitat amount is 20% habitat, below which the effects of habitat fragmentation on population persistence may become evident.	—	Andrén 1994 <sup>1</sup> Fahrig 1998 <sup>3</sup>
	> 70%	Models of forest landscapes forecast that patches of old-growth forest can become fragmented even when about 70% of the landscape cover remains.	model	Franklin and Forman 1987
	> 80%	Terrestrial species with low demographic potential could not persist in landscape even with 80% of suitable habitat in landscape.	model	Lande 1987 <sup>4</sup>

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**model** indicates that the research was conducted through modeling and therefore is not specific to any geographic area.

**review** indicates papers that base recommendation on a survey of the literature.

<sup>1</sup> As cited in Andrén 1994

<sup>2</sup> As cited in Dooley and Bowers 1998

<sup>3</sup> As cited in Fahrig 2001

<sup>4</sup> As cited in Wrth and Crist 1995

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## APPENDIX D. EDGE INFLUENCE

Distances (in meters) that edge effects penetrate into habitats in the United States as found within the scientific literature (as of December 2001), according to abiotic, bird, mammal, and plant response.

TAXA/SUBJECT	EDGE INFLUENCE	FINDING	STATE	CITATION
<b>Abiotic</b>				
	8 m	Microclimatic differences ceased to exist beyond 8 m into forest fragments.	IN	Brothers and Spingarn 1992
	13.3 m	Model indicated that elevated soil temperatures may extend up to 13.3 m from edge.	model	Laurance and Yensen 1991
	≥ 15 m	In deciduous forest patches, microclimate changes were estimated to extend at least 15 m from the forest edge to the interior.	WI	Ranney et al. 1981 <sup>2</sup>
	50 m	Significant edge effects were detected in light, temperature, litter moisture, vapor pressure deficit, humidity, and shrub cover, affecting the forest microenvironment up to 50 m from the edge.	PA, DE	Matlack 1993
	15-60 m (solar radiation) > 240 m (humidity and wind speed)	Solar radiation gradients extend 15-60 m into upland old-growth forest and humidity and wind speed gradients at > 240 m.	—	Chen et al. 1995 <sup>9</sup>
<b>Birds</b>				
	16.27 m, 16.95 m, 37.73 m	Maximum flushing* distance in response to pedestrians and dogs was 16.27 m (American robin), 16.95 m (vesper sparrow), and 37.73 m (western meadowlark).	CO	Miller et al. 2001
	50 m	Predation and parasitism rates are often significantly greater within 50 m of an edge.	—	Paton 1994 <sup>3</sup>
	50 m	Murrelet nest success was higher when nests were more than 50 m from the forest edge.	—	Nelson and Hamer 1995 <sup>4</sup>
	75 m	Estimated that edge-related nest predation extended 75 m into forested buffer strip.	ME	Vander Haegen and Degraaf 1996
	75 m, 100 m	For the majority of species found to have reduced numbers near trails due to nest predation and brood parasitism by brown-headed cowbirds, the zone of influence of trails appears to be around 75 m; however, Townsend's Solitaires exhibited reduced numbers as far as 100 m away from trail.	CO	Miller et al. 1998
	75 m, 125 m, 140 m, 160 m, 210 m, 300 m	Buffer zones that would prevent flushing by approximately 90% of the wintering individuals of a species are: American kestrel, 75 m; merlin, 125 m; prairie falcon, 160 m; rough-legged hawk, 210 m; ferruginous hawk, 140 m; and golden eagle, 300 m.	CO	Holmes et al. 1993
	100 m	Flushing distances of waterbirds in response to pedestrians, all-terrain vehicles, automobiles, and boats, indicate that human disturbance extends up to 100 m.	FL	Rodgers and Smith 1997

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TAXA/SUBJECT	EDGE INFLUENCE	FINDING	STATE	CITATION
	180 m	Avian densities were altered up to 180 m away from homes on the perimeter of ex-urban developments.	CO	Odell and Knight 2001
	200-500 m	The abundance of interior habitat bird species was reduced within 200 to 500 m of an edge.	CA	Boiger et al. 1997b <sup>2</sup>
	≥ 300 m	Nest parasitism by brown-headed cowbirds decreased with distance away from forest edge but extended ≥ 300 m into the forest.	—	Brittingham and Temple 1983 <sup>3</sup>
	511 m, 687 m	Most Cooper hawk nests occurred 511 m from paved roads and 687 m from human habitation.	Northeast	Bosakowski et al. 1992
	600 m	Effect of increased predation extends 600 m into habitat.	—	Wilcove et al. 1986 <sup>4</sup>
<b>Mammals</b>				
	≥ 45 m	The influence of a clearcut on small mammals (California red-backed vole and deer mouse) extends at least 45 m into the forest from its edge.	—	Mills 1996 <sup>5</sup>
	81.92 m	Maximum flushing distance of mule deer in response to pedestrians and dogs was 81.92 meters.	CO	Miller et al. 2001
	100-900 m	Human traffic along open roads displaces most grizzly bears from 100-900 meters.	—	Mattson et al. 1987 <sup>6</sup> McLellan and Shackleton 1988 <sup>7</sup> Aune and Kasworm 1989 <sup>7</sup> Kasworm and Manley 1990 <sup>7</sup> Mace et al. 1996 <sup>7</sup>
<b>Plants</b>				
	65 m	Populations in forest remnants within 65 m of forest clear-cut edges have almost no recruitment of young plants.	OR	Jules 1998
<b>General</b>				
	5000 m	In different habitats and for different taxa, edge effects may penetrate up to 5 km.	—	Janzen, 1986 <sup>8</sup>

\* Flushing distance is the distance that an animal may flee in response to a disturbance, such as in response to pedestrian or pets on a trail or vehicular traffic on roads.

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model indicates that the research was conducted through modeling and therefore is not specific to any geographic area.

<sup>1</sup> As cited in Metro 2001.

<sup>2</sup> As cited in Collinge 1996.

<sup>3</sup> As cited in Hartley and Hunter 1998.

<sup>4</sup> As cited in Meyer and Miller 2002.

<sup>5</sup> As cited in Robbins et al. 1989.

<sup>6</sup> As cited in Lidicker 1999.

<sup>7</sup> As cited in Weaver et al. 1996.

<sup>8</sup> As cited in Laurance and Yensen 1991.

<sup>9</sup> As cited in Broszofski et al. 1997.

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FUNCTION	TAXA/SUBJECT	BUFFER WIDTH	CITATION
	Plants (minimize non-native vegetation)	≥ 198 m	Hennings 2001 <sup>2</sup>
	Birds (Rufous-sided towhee)	≥ 200 m	Knutson and Naef 1997 <sup>3</sup>
	Reptiles (Blanding's turtles nesting habitat)	≥ 410 m (wetland buffer)	Joyal et al. 2001
	Reptiles (False map turtles, slider turtles, lotic turtles dispersal)	≥ 449 m	Bodie and Semlitsch 2000
	Birds (complete assemblages)	≥ 500 m	Kilgo et al. 1998 <sup>4</sup>
<b>General Protection of Aquatic Systems</b>			
	Multiple functions	1-90 m	Todd 2000
	Multiple functions	≥ 10 m	Fischer and Fischenich 2000
	Multiple functions	≥ 15 m	Fischer, Martin, and Fischenich 2000
	Multiple functions	30 m	Furfey et al. 1997
	Sediment/contaminant control, general water quality maintenance	30.5 m (+0.61 m per 1% slope)	Wenger 1999
	Wetland and river integrity	≥ 335 m	Schaefer et al. 1991 <sup>5</sup>

**SPTH** or site potential tree height, is used as a standard measurement to allow for multiple riparian functions. SPTH is measured in various ways. (EMAP 1993) defines SPTH the height of a site potential tree as the average maximum height of the tallest dominant trees of 200 years or more of age for a given site class. (For further discussion refer to Metro 2001)

<sup>1</sup> As cited in Fischer and Fischenich 2000

<sup>2</sup> As cited in Fischer 2000

<sup>3</sup> As cited in Metro 2001

<sup>4</sup> As cited in Furfey et al. 1997

<sup>5</sup> As cited in Johnson and Ryba 1992

<sup>6</sup> As cited in Burke and Gobons 1995

<sup>7</sup> As cited in Fischer, Martin, and Fischenich 2000

<sup>8</sup> As cited in Hagar 1999

<sup>9</sup> As cited in Allen 1983

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TAXA/SUBJECT	EDGE INFLUENCE	FINDING	STATE	CITATION
	180 m	Avian densities were altered up to 180 m away from homes on the perimeter of ex-urban developments.	CO	Odell and Knight 2001 <sup>1</sup>
	200–500 m	The abundance of interior habitat bird species was reduced within 200 to 500 m of an edge.	CA	Boiger et al. 1997b <sup>2</sup>
	≥ 300 m	Nest parasitism by brown-headed cowbirds decreased with distance away from forest edge but extended ≥ 300 m into the forest.	—	Brittingham and Temple 1983 <sup>3</sup>
	511 m, 687 m	Most Cooper hawk nests occurred 511 m from paved roads and 687 m from human habitation.	Northeast	Bosakowski et al. 1992
	600 m	Effect of increased predation extends 600 m into habitat.	—	Wilcove et al. 1986 <sup>4</sup>
<b>Mammals</b>				
	≥ 45 m	The influence of a clearcut on small mammals (California red-backed vole and deer mouse) extends at least 45 m into the forest from its edge.	—	Mills 1996 <sup>5</sup>
	81.92 m	Maximum flushing distance of mule deer in response to pedestrians and dogs was 81.92 meters.	CO	Miller et al. 2001
	100–900 m	Human traffic along open roads displaces most grizzly bears from 100–900 meters.	—	Mattson et al. 1987 <sup>6</sup> McLellan and Shackleton 1988 <sup>7</sup> Aune and Kasworm 1989 <sup>8</sup> Kasworm and Manley 1990 <sup>9</sup> Mace et al. 1996 <sup>9</sup>
<b>Plants</b>				
	65 m	Populations in forest remnants within 65 m of forest clear-cut edges have almost no recruitment of young plants.	OR	Jules 1998
<b>General</b>				
	5000 m	In different habitats and for different taxa, edge effects may penetrate up to 5 km.	—	Janzen, 1986 <sup>4</sup>

\* Flushing distance is the distance that an animal may flee in response to a disturbance, such as in response to pedestrian or pets on a trail or vehicular traffic on roads.

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<sup>1</sup> As cited in Metro 2001.

<sup>2</sup> As cited in Collinge 1996.

<sup>3</sup> As cited in Hartley and Hunter 1998.

<sup>4</sup> As cited in Meyer and Miller 2002.

<sup>5</sup> As cited in Robbins et al. 1989.

<sup>6</sup> As cited in Lidicker 1999.

<sup>7</sup> As cited in Weaver et al. 1996.

<sup>8</sup> As cited in Laurance and Yensen 1991.

<sup>9</sup> As cited in Brosnoff et al. 1997.

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## APPENDIX E. RIPARIAN BUFFER WIDTH

Recommended minimum riparian and wetland buffer widths (in meters) to maintain water quality and wildlife functions within ecoregions of the United States, as found within the scientific literature (as of December 2001).

FUNCTION	TAXA/SUBJECT	BUFFER WIDTH	CITATION
<b>Miscellaneous</b>	Noise	≥ 6 m (mature evergreen)	Harris 1985 <sup>1</sup>
	Wind damage prevention	≥ 23 m	Pollock and Kennard 1998 <sup>3</sup>
	Noise	≥ 32 m (heavily forested)	Groffman et al. 1990 <sup>1</sup>
<b>Detrital Input</b>	Organic litterfall	1/2 SPTH	FEMAT 1993 <sup>3</sup>
	Large Woody Debris	1 SPTH	FEMAT 1993 <sup>3</sup>
	Large Woody Debris	1 SPTH	Spence et al. 1996 <sup>3</sup>
	Woody Debris	3–10 m	Fischer and Fischelich 2000
	Woody Debris	10–30 m	Wenger 1999
	Organic litterfall	≥ 30 m	Erman et al. 1977 <sup>1</sup>
	Woody Debris	≥ 30 m (forested watersheds)	Pollock and Kennard 1998 <sup>3</sup>
	Woody Debris	≥ 31 m	Bottom et al. 1983 <sup>4</sup>
	Woody Debris	≥ 46 m	McDade et al. 1990 <sup>3</sup>
	Organic litterfall	≥ 52 m	Spence et al. 1996 <sup>3</sup>
	Woody Debris	≥ 80 m	May 2000 <sup>3</sup>
<b>Temperature and microclimate regulation</b>	Microclimate	3 SPTH	FEMAT 1993 <sup>3</sup>
	Shade	10–30 m	Osborne and Kovacic 1993 <sup>3</sup>
	Temperature control	10–30 m	Wenger 1999
	Water temperature	10–30 m	Castelle et al. 1994
	Shade	11–24 m	Brazier and Brown 1973 <sup>5</sup>
	Water temperature	≥ 12 m	Corbett and Lynch 1985 <sup>4</sup>
	Water temperature	15–30 m	Hewlett and Fortson 1982 <sup>4</sup>
	Shade	23–38 m	Steinbiums et al. 1984 <sup>5</sup>
	Shade	≥ 30 m	Spence et al. 1996 <sup>3</sup>
	Shade	≥ 30 m	FEMAT 1993 <sup>3</sup>
	Shade	≥ 30 m	May 2000 <sup>3</sup>
	Maintenance of water temperature within 1°C of former mean	≥ 30 m	Lynch, Corbett, and Mussalem 1985 <sup>4</sup>
	Water temperature	30–43 m	Jones et al. 1988 <sup>6</sup>
	Air temperature, solar radiation, wind, humidity	≥ 45–300 m	Brosofske et al. 1997
Microclimate regulation	≥ 100 m	May 2000 <sup>3</sup>	
Microclimate regulation	61–160 m	Knutson and Naeff 1997 <sup>7</sup>	
<b>Bank Stabilization</b>	Bank Stabilization	1/2 SPTH	FEMAT 1993 <sup>3</sup>
	Bank Stabilization	10–20 m	Fischer and Fischelich 2000

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FUNCTION	TAXA/SUBJECT	BUFFER WIDTH	CITATION
	Stream/channel stabilization	20–30 m	Corbett and Lynch 1985 <sup>4</sup>
	Stream stabilization/sediment control	≥ 38 m	Cederholm 1994 <sup>2</sup>
	Bank Stabilization	≥ 52 m	Spence et al. 1996 <sup>3</sup>
<b>Flood Attenuation</b>			
	Floodplain storage	20–150 m	Fischer and Fischenich 2000
<b>Sediment Removal</b>			
	Sediment removal	≥ 3m (sand), ≥ 15 m (silt), ≥ 122m (clay)	Wilson 1967 <sup>5</sup>
	Sediment removal	5–30 m	Fischer and Fischenich 2000
	Sediment removal	8–46 m (depending on slope)	SCS 1982 <sup>4</sup>
	Sediment (85% removal)	≥ 9 m (grass filter strips, 7%, 12% slopes)	Ghaffarzadeh et al. 1992 <sup>4</sup>
	Suspended solids (84% removal)	≥ 9 m (vegetated filter strip)	Dillaha et al. 1989 <sup>3</sup>
	Sediment removal	9–30 m	Wenger 1999
	Sediment removal	10–60 m	Castelle et al. 1994
	Sediment removal	≥ 15 m	Budd et al. 1987 <sup>4</sup>
	Sediment removal	≥ 15.6 m	Broderson 1973 <sup>4</sup>
	Sediment removal	≥ 23 m	Schellinger and Clausen 1992 <sup>4</sup>
	Suspended sediment (92% removal)	≥ 24.4 m (vegetated buffer)	Young et al. 1980 <sup>4</sup>
	Sediment removal	≥ 25 m	Desbonnet et al. 1994 <sup>4</sup>
	Sediment removal	≥ 30 m	Erman et al. 1977 <sup>3</sup>
	Sediment removal	≥ 30m	Moring 1982 <sup>3</sup>
	Sediment removal	≥ 30 m	May 2000 <sup>3</sup>
	Sediment (75% removal)	30–38 m	Karr and Schollosser 1977 <sup>4</sup>
	Sediment (75–80% removal)	≥ 30 m	Lynch, Corbett, and Mussalem 1985 <sup>2</sup>
	Sediment (80% removal)	≥ 61 m (grass filter strip and vegeated buffers)	Horner and Mar 1982 <sup>3</sup>
	Sediment (50% removal)	≥ 88 m	Gilliam 1988 <sup>4</sup>
<b>Nutrient/Pollutant Removal</b>			
	Nitrogen, Phosphorus, Potassium, and Fecal Bacteria	≥ 4 m (grass filter strip and forested buffers)	Doyle et al. 1997 <sup>2</sup>
	Nitrates and Phosphates (90% removal)	≥ 5 (grass filter strip)	Madison et al. 1992 <sup>2</sup>
	Nutrient removal	5–30 m	Fischer and Fischenich 2000
	Nitrates (almost complete removal)	≥ 7 m	Lowrance 1992 <sup>2</sup>
	Removal of Phosphorus (79%) and Nitrogen (73%)	≥ 9 m (vegetated filter strip)	Dillaha et al. 1989 <sup>3</sup>
	Nitrogen and Phosphorus	≥ 10 m	Corley et al 1999 <sup>2</sup>
	Nutrient and Metal	≥ 10 m	Petersen et al. 1992 <sup>4</sup>
	Nutrient removal	10–90 m	Castelle et al. 1994
	Nitrate Concentrations	15–30 m	Wenger 1999

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FUNCTION	TAXA/SUBJECT	BUFFER WIDTH	CITATION
	Nutrient and metal	≥ 15 m	Castelle et al. 1992 <sup>4</sup>
	Phosphorus	≥ 15 m (hardwood buffer)	Woodard and Rock 1995 <sup>3</sup>
	Nutrient and metal	≥ 16 m	Jacobs and Gilliam 1985 <sup>4</sup>
	Estradiol (98% decrease)	≥ 18 m (grass filter strip)	Nichols et al. 1998 <sup>1</sup>
	Nitrogen and Phosphorus (80 and 89% removal, respectively)	≥ 19 m (riparian forest buffer)	Shisler, Jordan, and Wargo 1987 <sup>1</sup>
	Nitrates (up to 100%)	20–30 m	Fennessy and Cronk 1997 <sup>3</sup>
	Fecal coliform reduction	23–92 m	SCS 1982 <sup>5</sup>
	Pollutant removal	≥ 30 m	May 2000 <sup>3</sup>
	Fecal coliform reduction	≥ 30 m	Grismer 1981 <sup>5</sup>
	Nutrient reduction to acceptable levels	≥ 30 m	Lynch, Corbett, and Mussaiem 1985 <sup>4</sup>
	Nutrient and metal removal	30–43 m	Jones et al. 1988 <sup>4</sup>
	Nutrient and metal removal	≥ 36 m	Young et al. 1980 <sup>4</sup>
<b>Wildlife and Plant Species</b>			
	General wildlife	3–183 m	FEMAT 1993 <sup>3</sup>
	General wildlife habitat	≥ 10 m	Petersen et al. 1992 <sup>5</sup>
	General species diversity	10–100 m	Castelle et al. 1994
	General bird habitat	≥ 15 m	Milligan 1985 <sup>5</sup>
	Fish (Cutthroat trout, rainbow trout, and steelhead)	15–61 m	Knutson and Naeff 1997 <sup>3</sup>
	Birds	≥ 15–200 m	Stauffer and Best 1980
	Aquatic wildlife habitat	20–150 m	Fischer and Fischenich 2000
	General wildlife habitat	≥ 23 m	Mudd 1975 <sup>5</sup>
	General wildlife habitat	≥ 27 m	WDOE 1981 <sup>5</sup>
	Invertebrates (aquatic insects)	≥ 30 m	Erman et al. 1977 <sup>3</sup>
	Invertebrates (macroinvertebrate diversity)	≥ 30 m	Gregory et al. 1987 <sup>3</sup>
	Fish (cutthroat trout)	≥ 30 m	Hickman and Raleigh 1982 <sup>3</sup>
	Invertebrates (benthic communities)	≥ 30 m	Newbold et al. 1980 <sup>5</sup>
	Amphibians (frogs and salamanders)	≥ 30 m (riparian forest buffer)	NRCS 1995 <sup>3</sup>
	Fish (brook trout)	≥ 30 m	Raleigh 1982 <sup>5</sup>
	Fish (rainbow trout)	≥ 30 m	Raleigh et al. 1984 <sup>3</sup>
	Fish (chinook salmon)	≥ 30 m	Raleigh et al. 1986 <sup>5</sup>
	Invertebrates (benthic communities)	≥ 30 m	Roby et al. 1977 <sup>5</sup>
	Amphibians, Reptiles, Vertebrates	≥ 30 m (riparian forest buffer)	Rudolph and Dickson 1990 <sup>1</sup>
	Fish (salmonid egg development)	≥ 30 m	Spackman and Hughes 1995 <sup>1</sup>
	Plants (vascular plant diversity)	≥ 30 m	Spackman and Hughes 1995 <sup>1</sup>
	Fish (fish diversity and densities)	≥ 30 m	Stewart et al. 2000
	Mammals (beavers)	30–100 m	Jenkins 1980 <sup>4</sup>
	General wildlife habitat	≥ 32 m	Groffman et al. 1990 <sup>5</sup>
	Birds (Willow flycatcher nesting)	≥ 37.5 m	Knutson and Naeff 1997 <sup>3</sup>

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FUNCTION	TAXA/SUBJECT	BUFFER WIDTH	CITATION
	Birds (diversity and assemblages)	≥ 40 m	Hagar 1999
	Birds (assemblages and persistence)	≥ 45 m	Pearson and Manuwal 2001
	Mammal (gray squirrel)	≥ 50 m	Dickson 1989 <sup>1</sup>
	Birds (neotropical migrants, interior species)	≥ 50 m	Tassone 1981 <sup>3</sup>
	Birds (raptors)	50–1600 m	Richardson and Miller 1997 <sup>1</sup>
	Fish (trout, salmon)	≥ 61 m	Castelle et al. 1992 <sup>3</sup>
	Mammals (deer)	≥ 61 m	NRCS 1995 <sup>3</sup>
	General wildlife	≥ 61 m	Zeigler 1988 <sup>3</sup>
	Mammals (small)	67–93 m	Jones et al. 1988 <sup>3</sup>
	Reptiles (gravid mud turtles, Florida cooters, slider turtles)	≥ 73 m (90% protection)	Burke and Gibbons 1995
	Birds	75–200 m	Jones et al. 1988 <sup>1</sup>
	Mammal (beaver)	≥ 91 m	NRCS 1995 <sup>3</sup>
	Mammals (large)	≥ 100 m	Jones et al. 1988 <sup>3</sup>
	Birds (neotropical migrants)	≥ 100 m	Fischer 2000
	Wildlife habitat	≥ 100 m	Fischer, Martin, and Fischenich 2000; and Fischer and Fischenich 2000
	Birds (yellow-billed cuckoo breeding habitat)	≥ 100 m	Gaines 1974 <sup>2</sup>
	Birds (neotropical migrant diversity and functional assemblages)	≥ 100 m	Hodges and Kremenetz 1996
	Birds (forest bird nesting habitat)	≥ 100 m	Keller et al. 1993
	Reptiles (Western pond turtle nesting habitat)	≥ 100 m (stream buffer)	Knutson and Naef 1997 <sup>3</sup>
	Aquatic wildlife	≥ 100 m	May 2000 <sup>3</sup>
	Birds (red-shouldered hawk and forest bird breeding habitat)	≥ 100 m	Mitchell 1996 <sup>2</sup>
	Birds (pileated woodpecker nesting habitat)	≥ 100 m	Small 1982 <sup>3</sup>
	Birds (neotropical migrant abundance)	≥ 100 m	Triquet, McPeck, and McComb 1990 <sup>2</sup>
	Terrestrial riparian wildlife communities	100–300 m (300 m for forest interior species)	Wenger 1999
	Reptiles (spotted turtles nesting habitat)	120 m (wetland buffer)	Joyal et al. 2001
	Reptiles (turtles)	≥ 135 m (wetland buffer)	Buhlmann 1998 <sup>1</sup>
	Birds (Pileated woodpecker)	≥ 137 m	Castelle et al. 1992 <sup>3</sup>
	Birds (species diversity)	≥ 150 m	Spackman and Hughes 1995 <sup>2</sup>
	Birds (reduce edge-related nest predation)	≥ 150 m	Vander Haegen and DeGraaf 1996
	Amphibians (salamanders)	≥ 165 m	Semlitsch 1998
	Birds (Bald eagle, nesting ducks, herons, sandhill cranes)	≥ 183 m	Knutson and Naef 1997 <sup>3</sup>
	Mammals (fawning of mule deer)	≥ 183 m	Knutson and Naef 1997 <sup>3</sup>

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## REFERENCES AND FURTHER ASSISTANCE

### **American Planning Association**

312-431-9100      [www.planning.org](http://www.planning.org)

The American Planning Association is a non-profit public interest and research organization dedicated to urban and regional planning. The Association is an excellent source for best planning practices, information on “hot-topics”, and current legislation of importance to municipalities. Planning related publications authored by the Association and planning professionals and experts are available for purchase through the on-line bookstore.

### **Colleges & Universities**

Antioch New England Graduate School - 357-3122 - [www.antiochne.edu](http://www.antiochne.edu)

Franklin Pierce College - 899-4000 - [www.fpc.edu](http://www.fpc.edu)

Keene State College - 352-1909 - [www.keene.edu](http://www.keene.edu)

The Region's centers for higher learning offer a variety of social, economic and environmental undergraduate and graduate programs. The institutions require internships and practical term-projects for some majors – which can provide student assistance to municipal projects. Franklin Pierce and Keene State also offer continuing education courses.

### **Connecticut River Joint Commissions (CRJC)**

[www.crjc.org](http://www.crjc.org)

The Connecticut River Joint Commissions comprises New Hampshire's Connecticut River Valley Resource Commission and Vermont's Connecticut River Watershed Advisory Commission. CRJC works to preserve and protect the resources of the Connecticut River Valley, including agricultural marketing, river bank restoration and supporting five local river advisory subcommittees established under NH's River Management and Protection Program.

### **County Soil & Water Conservation Districts**

Cheshire County Conservation District - 756-2970

Hillsborough County Conservation District - 673-2409 - [www.hillsboroughccd.org](http://www.hillsboroughccd.org)

Sullivan County Conservation District - 863-4297

The County Soil & Water Conservation Districts promote the use, protection, and conservation of natural resources on both private and public land in their respective counties. The Districts in partnership with the National Resource Conservation Service, offer technical assistance and information regarding Best Management Practices and conservation funding programs.

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## Harris Center for Conservation Education

525-3394 [www.mv.com/ipusers/bobcat/](http://www.mv.com/ipusers/bobcat/)

The Harris Center is a private, non-profit organization dedicated to environmental and outdoor education, land protection, and wildlife preservation in the Southwest Region. The Center conducts public education programs both at the Harris Center in Hancock and in area schools. The Harris Center is a land trust and is an excellent resource for conservation and preservation activities.

## Historical Societies

Historical Society of Cheshire County - 352-1895

New Hampshire Historical Society - 228-6688 - [www.nhhistory.org](http://www.nhhistory.org)

Inquire with Town Offices about local Historical Societies, Commissions and Archives. Thirty-eight local historical societies, commissions and archives preserve and protect the Region's social, cultural and political history. The organizations maintain historical exhibits and collections and offer a variety of community education programs. The Cheshire County Historical Society located in Keene, is the only county historical society in the State. The Society maintains an extensive permanent exhibit, library and archive. The New Hampshire Historical Society offers technical assistance to local libraries and historical organizations, provides educational services for school children, and maintains a museum and library collection.

## International City/County Management Association

202-289-4262 [www.icma.org](http://www.icma.org)

Home of the "Smart Growth Network", the ICMA is a membership organization which supports research, training and publications in all aspects of municipal and county governance.

## Lincoln Land Institute

617-661-3016 [www.lincolninst.edu](http://www.lincolninst.edu)

The Lincoln Land Institute's goals are to integrate theory and practice to better shape land policy and to share understanding about the multidisciplinary forces that influence public land economics and policy. The Institute hosts forums and provides courses and seminars in land policy at the Institute's Cambridge, MA headquarters, as well as publishing scholarly, technical and policy documents.

## Local Government Center (formerly NH Municipal Association)

224-7447 [www.nhmunicipal.org](http://www.nhmunicipal.org)

The Local Governmnet Center provides information, legal advice, legislative policy updates, professional seminars and training programs, and reference publications to member municipalities of New Hampshire regarding municipal governance and land use regulation.

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## Local River Advisory Committees (LAC)

A Local River Advisory Committee is convened by the Commissioner of the Department of Environmental Services for each river designated in the NH Rivers Management and Protection Program. LACs comprise representatives from the municipalities through which the designated rivers flow. LACs are responsible for developing and disseminating a River Corridor Management Plan and also have the opportunity to comment on applications for environmental permits within the river corridor. LACs also take on a number of environmental monitoring, public education and environmental advocacy activities at the discretion of the members.

### **Ashuelot River LAC** [www.swrpc.org/nat\\_res/lac/](http://www.swrpc.org/nat_res/lac/)

From the dam at Butterfield Pond in Washington to the confluence with the Connecticut River in Hinsdale. Southwest Region municipalities include: Marlow, Gilsum, Sullivan, Surry, Keene, Swanzey, Winchester, and Hinsdale.

### **Cold River LAC** [www.des.state.nh.us/rivers/cold1.htm](http://www.des.state.nh.us/rivers/cold1.htm)

From the outlet of Crescent Lake Dam in Acworth to its confluence with the Connecticut River in Walpole. Southwest Region municipalities include: Langdon, Alstead, and Walpole.

### **Connecticut River Local Advisory Committee** [www.crjc.org](http://www.crjc.org)

From the outlet of Fourth Connecticut Lake to the New Hampshire/ Massachusetts state line. Divided into four subcommittees with the **Wantastiquet Local River Subcommittee** including the Southwest Region municipalities of Walpole, Westmoreland, Chesterfield, and Hinsdale.

### **Contoocook & N. Branch Rivers LAC** [www.des.state.nh.us/rivers/cont1.htm](http://www.des.state.nh.us/rivers/cont1.htm)

Mainstem - From the outlet of Poole Pond in Rindge to the confluence with the Merrimack River at the Boscawen/Concord municipal boundary. North Branch - From the outlet of Rye Pond in Nelson to the confluence of the Contoocook River in Hillsborough. Southwest Region municipalities include: Rindge, Jaffrey, Peterborough, Hancock, Greenfield, Bennington, Nelson, Stoddard, and Antrim.

### **Piscataquog River LAC** [www.des.state.nh.us/rivers/piscat1.htm](http://www.des.state.nh.us/rivers/piscat1.htm)

South Branch--From the outlet of Pleasant Pond in Frankestown to the river's mouth at Bass Island in Manchester. Middle Branch--From the outlet of Scobie Pond in Frankestown to the confluence with the South Branch in New Boston. Southwest Region municipalities include: Frankestown.

### **Souhegan River LAC** [www.des.state.nh.us/rivers/souhegan.htm](http://www.des.state.nh.us/rivers/souhegan.htm)

From the confluence of the south and west branches in New Ipswich to the confluence with the Merrimack River in Merrimack. Southwest Region municipalities include: New Ipswich, and Greenville

## Monadnock Conservancy

357-0600 [www.monadnockconservancy.org](http://www.monadnockconservancy.org)

The Monadnock Conservancy is a regional private non-profit land trust whose purposes are to identify, promote and actively seek protection of lands with natural, aesthetic and historic significance in the Monadnock Region, and to monitor and enforce the protection of lands in the Trust.

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## National Trust for Historic Preservation

202-588-6000      [www.nationaltrust.org](http://www.nationaltrust.org)

The National Trust for Historic Preservation is dedicated to preserving historic buildings, neighborhoods, and landscapes through education and advocacy. The National Trust for Historic Preservation hosts a number of forums on historic preservation, staffs regional offices located across the country, and supports the **Main Street** program which strives to preserve and restore historic commercial districts.

## NH Association of Conservation Commissions

224-7867      [www.nhacc.org](http://www.nhacc.org)

The New Hampshire Association of Conservation Commissions provides information and assistance to help municipal conservation commissions carry out their duties and other activities.

## NH Department of Cultural Resources

Main Office: 271-2540      [webster.state.nh.us/nhculture](http://webster.state.nh.us/nhculture)  
Division of Historic Resources: 271-3483      [webster.state.nh.us/nhdhr](http://webster.state.nh.us/nhdhr)  
State Library:      271-2144      [webster.state.nh.us/nhsl](http://webster.state.nh.us/nhsl)

The Department of Cultural Resources serves New Hampshire by working with citizens to broaden minds and spirits, preserve history and culture for future generations, and to recognize and promote cultural resources as an essential element of New Hampshire's economic and social well-being. The Division of Cultural Resources also oversees the Division of Historic Resources and the NH State Library.

## NH Department of Environmental Services (NH DES)

**Air Resources Division** - 271-1370 - [www.des.state.nh.us/ard\\_intro.htm](http://www.des.state.nh.us/ard_intro.htm)

Promotes cost-effective, sensible strategies and control measures to address today's complex and inter-related air quality issues. These issues include, but are not limited to, ground-level ozone, particulate matter, regional haze (visibility), mercury emissions, increasing concentrations of greenhouse gases, acid deposition, and air-borne toxics. New Hampshire's Air Quality Program is a blueprint for the State's efforts to achieve and maintain air quality that is protective of public health and our natural environment.

**River Management and Protection Program** - 271-3503 - [www.des.state.nh.us/rivers/](http://www.des.state.nh.us/rivers/)

The New Hampshire Rivers Management and Protection Program was established in 1988 with the passage of RSA 483 to recognize and designate rivers to be protected for their outstanding natural and cultural resources. The program is administered by the New Hampshire Department of Environmental Services.

**Watershed Management Bureau** - 271-3503 - [www.des.state.nh.us/wmb/](http://www.des.state.nh.us/wmb/)

Watershed management programs link people and water resources through science, planning, and education to achieve clean water goals to ensure that New Hampshire's lakes and ponds, rivers and streams, coastal waters, groundwater and wetlands are clean and support healthy ecosystems, provide habitats for a diversity of plant and animal life, and support appropriate uses.

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**Wetlands Bureau** - 271-2147 - [www.des.state.nh.us/wetlands](http://www.des.state.nh.us/wetlands)

The mission of the Wetlands Bureau is to protect, maintain and enhance the environmental quality in New Hampshire through the powers set forth in RSA 482-A to regulate impacts to those areas "wherever the tide ebbs and flows" or "freshwater flows or stands."

## ***NH Department of Fish and Game***

271-3211      [www.wildlife.state.nh.us](http://www.wildlife.state.nh.us)

The New Hampshire Department of Fish and Game has been conserving New Hampshire's wildlife and their habitats for more than a century. As the guardian of the State's fish, wildlife, and marine resources, the Department works with the public to manage and protect these resources; inform and educate the public about these resources; and provide the public with opportunities to use and appreciate these resources.

## NH Department of Resources and Economic Development (NH DRED)

**Division of Forests and Lands** - 271-2214 - [www.nhdf.com](http://www.nhdf.com)

As stewards of New Hampshire's forests and related resources, the Division of Forests and Lands protects and promotes the values provided by trees and forests. This is accomplished through responsible management of the State's forested resources; by providing forest resource information and education to the public; and the protection of these resources for the continuing benefit of the State's citizens, visitors, and forest industry.

**NH Natural Heritage Inventory** - 271-3623 - [www.nhdf.com/formgt/nhiweb](http://www.nhdf.com/formgt/nhiweb)

A bureau within the Division of Forest and Lands, NHNHI locates, tracks, and provides information about rare plant species and ecosystems in the state. NHNHI is not regulatory. NHNHI works with landowners, land managers, and natural resource professionals to help them understand and protect the State's natural heritage and meet their land use needs. The program maintains a database of nearly 4,000 rare plant, animal, and ecosystem occurrences, and responds to over 1,300 information requests each year.

**Division of Parks and Recreation** - 271-3556 - [www.nhparks.state.nh.us](http://www.nhparks.state.nh.us)

The Division of Parks and Recreation operates 43 state parks and campgrounds, 12 historic sites, 7 recreational trails, 39 islands, 4 state fishing piers and marinas, 14 natural areas and numerous wayside and miscellaneous areas.

## **NH Division of Historical Resources (DHR)**

271-3558      [www.state.nh.us/nhdhr](http://www.state.nh.us/nhdhr)

The Division of Historical Resources is a state agency supported by the State of New Hampshire, the Federal Historic Preservation Fund (through a matching grant administered by the National Park Service), and by donated funds and services. The DHR is also responsible for administering the Federal Preservation Program within New Hampshire.

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## NH Land & Community Heritage Investment Program (LCHIP)

224-4113      [www.lchip.org](http://www.lchip.org)

Established with State funds as a private authority, LCHIP is a grant making organization that works in partnership with the State's municipalities and the private sector to conserve and preserve the state's most important natural, cultural, and historical resources through the acquisition of lands, and cultural and historical resources, or interests therein, of local, regional, and statewide significance.

## ***NH Office of Energy and Planning (OEP – formerly NH Office of State Planning)***

271-2155      [www.nh.gov/oep](http://www.nh.gov/oep)

The “Planning” part of OEP is required by RSA 4-C to: plan for the orderly development of the state and the wise management of the state's resources; compile, analyze, and disseminate data, information, and research services as necessary to advance the welfare of the state; and participates and advises in matters of land use planning regarding lakes and rivers management programs.

## ***New Hampshire Preservation Alliance***

224-2281      [www.nhpreservation.org](http://www.nhpreservation.org)

NHPA is the State's non-profit historic preservation organization dedicated to preserving historic buildings, landscapes, and communities through leadership, advocacy and education. NHPA works with community-based groups, businesses, state agencies, and local groups on issues related to housing, tourism and community development.

## ***Society for the Protection of NH Forests (SPNHF)***

224-9945      [www.spnhf.org](http://www.spnhf.org)

A statewide land trust and land manager with goals of preserving merchantable timber stands, wild areas and rural community character, SPNHF also promotes stewardship by example and through education and advocates public policy that supports wise conservation of natural resources. SPNHF sponsors educational programs and offers a variety of publications

## ***Southwest Region Planning Commission (SWRPC)***

357-0557      [www.swrpc.org](http://www.swrpc.org)

SWRPC is one of nine regional planning commissions in New Hampshire established by State law to assist municipalities with planning issues and facilitate coordinated development in the region. SWRPC provides information, research, planning, and facilitation services to member towns, non-profit organizations, State Agencies and others with an interest in the Southwest Region. Planning staff implements a work program comprising local planning assistance, community and economic development, environmental planning, geographic information systems (mapping and information services), and transportation planning. SWRPC is a municipal membership organization.

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## Town Offices

Town	Phone	Website	Town	Phone	Website
Alstead	835-2986	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Mason	878-2070	- na -
Antrim	588-6785	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Nelson	847-0047	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Bennington	588-2189	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	New Ipswich	878-2772	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Chesterfield	363-4624	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Peterborough	924-8001	<a href="http://www.ci.peterborough.nh.us">www.ci.peterborough.nh.us</a>
Dublin	563-8544	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Richmond	239-4232	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Fitzwilliam	585-7723	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Rindge	899-5181	<a href="http://www.town.rindge.nh.us">www.town.rindge.nh.us</a>
Francestown	547-3469	- na -	Roxbury	352-4903	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Gilsum	357-0320	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Sharon	924-9250	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Greenfield	547-3442	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Stoddard	446-3326	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Greenville	878-2084	- na -	Sullivan	847-3316	<a href="http://www.keene.nh.com/towns">www.keene.nh.com/towns</a>
Hancock	525-4441	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Surry	352-3075	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>
Harrisville	827-3431	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Swanzy	352-7411	<a href="http://www.town.swanzy.nh.us">www.town.swanzy.nh.us</a>
Hinsdale	336-5710	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Temple	878-3873	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>
Jaffrey	532-7445	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Troy	242-7722	<a href="http://www.town.troy.nh.us">www.town.troy.nh.us</a>
Keene	352-0133	<a href="http://www.keenenh.com">www.keenenh.com</a>	Walpole	756-3672	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>
Langdon	835-2389	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Westmoreland	399-4471	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>
Marlborough	876-3751	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Winchester	239-4951	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>
Marlow	446-2245	<a href="http://www.keenenh.com/towns">www.keenenh.com/towns</a>	Windsor	478-3292	- na -

## USDA Natural Resources Conservation Service

Cheshire & Sullivan Counties 756-2970

Hillsborough & Merrimack Counties 863-4297

NRCS provides informational, technical and financial assistance to landowners to fulfill the agency's mission of providing leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. Formerly the Soil Conservation Service, NRCS is the definitive resource for information about soil and its management.

## US Environmental Protection Agency (EPA)

Region 1, EPA [www.epa.gov](http://www.epa.gov)

Team New Hampshire [www.epa.gov/region1/eco/nh/index.html](http://www.epa.gov/region1/eco/nh/index.html)

# Southwest Region NRI

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October 2003

The EPA's mission is to protect human health and safeguard the natural environment. The EPA carries out a wide variety of programs that include research and monitoring, planning and remediation, education and publishing, grant-making, policy analysis and development, and environmental regulation. EPA is deployed by Region (e.g. New England) and by state.

## US Fish and Wildlife Service

New England                      413-253-8200                      [www.fws.gov](http://www.fws.gov)

The federal agency responsible for protecting land, aquatic and marine species and habitats. The Service manages federal wildlife refuge across the country, conducts research and education, and administers grant-making programs.

Silvio O. Conte Refuge                      413-863-0209

Implements research, habitat management , public education, and land conservation in the Connecticut River Watershed, including in-stream habitat protection and propagation of migratory fish.

## US National Park Service

226-3240                      [www.ncrc.nps.gov](http://www.ncrc.nps.gov)

Administers the Rivers, Trails and Conservation Assistance Program and the Land and Water Conservation Fund which provide grant funds to grass roots and municipal projects that enhance outdoor recreation and conservation, including trail construction, river habitat restoration, land acquisition, and organizational development.

## UNH Cooperative Extension Service

Cheshire County - 352-4551  
Hillsborough County: Milford - 673-2510; Goffstown - 621-1478  
Sullivan County                      - 863-9200  
State Offices, UHN, Durham - 862-1520 - [www.ceinfo.unh.edu](http://www.ceinfo.unh.edu)

Primarily research and education organization, Cooperative Extension Service links academic resources with federal, municipal and private non-profit partners and clients in a variety of program areas: Agricultural Support, 4-H Youth Services, Community Development, Family Development, Forest and Wildlife Conservation, and Water Resources Management.