New Hampshire

Snowshoe Hare Assessment

2015

Karen A. Bordeau
New Hampshire Fish and Game Department
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Introduction

The purpose of this assessment is to provide basic background information on snowshoe hare (*Lepus americanus*) in New Hampshire and to document historical records, describe present management and outline future goals and objectives for the next decade. The snowshoe hare is one of New Hampshire's common forest mammals and an important link in the food chain for many forest predators; particularly the federally protected Canada lynx (*Lynx canadensis*) and state threatened American marten (*Martes americana*). It is well adapted to the winter; its large hind feet "snowshoes" allow it to move easily over the snow. Its tracks and well-used trails become obvious when the ground is snow covered. Through their range, snowshoe hare depend on dense understories to avoid predators and hare are abundant where young forest habitats are common. The most important aspect of hare management is insuring the quality of forest cover to provide protection from predators and maintain snowshoe hare on the landscape. Currently, the Department does not have the information necessary to make an estimate on the number of hare we have in any part of the state for this assessment.

Natural History

Description

The snowshoe hare is also known as the varying hare because they molt from a brown in summer to mostly white in winter. The color change is stimulated by the change in day length and takes about 10 weeks to complete. The snowshoe hare is larger than the cottontail rabbit weighing 2 to 5 pounds and growing to be 13 to 18 inches in length. Males and females look similar except the female is slightly larger. The hind feet are large and flat, which distributes the hare's weight as snowshoes do, this enables it to travel on deep snow without sinking. Their large hind legs give the hare the ability to leap and bound from predators.

Distribution

Snowshoe hare are found throughout New England, across Canada, and south to the Appalachian and Rocky Mountains (DeGraaf and Rudis 1986). In New Hampshire they are most abundant in the northern three counties (Godin 1977).

Reproduction and Dispersal

Hare are sexually mature during the spring following their birth, typically breeding from March through July (Godin 1977). Males compete for females, and females may breed with several males. The gestation period is 37 days, young are born from May to August and the litter size is 1 to 6; the average is 3 with 1-3 litters per year (DeGraaf and Rudis 1986). Young hares, or leverets, are precocial, born fully furred, with eyes open and hopping around by their first day.

Food Habits

Snowshoe hares eat a variety of plant materials and the forage type varies with season. Their diet consists of green vegetation when available, shifting to woody browse during colder months. Hares consume about 2/3 of a pound of browse per day in the winter (Williamson and Langley 1993). Snowshoe hares typically feed at night and follow well-worn forest paths to feed on plants and trees.

Snowshoe hares produce two kinds of fecal material, hard pellets, and soft droppings. Hares re-ingest their soft droppings to extract additional protein and B vitamins (Ellsworth and Reynolds 2006).

Mortality and Disease

Hares do not hibernate and are active year-round; they spend most of the day in shallow depressions, called forms, scraped out under clumps of ferns, brush piles and downed timber. Snowshoe hares are prey items for both avian and mammalian predators. In the wild, hares do not generally live more than 3 years and most die within their first year of life (Burt 1976). Mortality rates of hares have been estimated from mark-recapture studies, and by directly monitoring radio-collared hares (Ellsworth 2006). Murray (2003) in (Ellsworth and Reynolds 2006) found that adult hares tended to have higher annual rates of survival (average = 28 percent: range = 2 to 60 percent) than juveniles in the first year of life (average = 15 percent; range = 1 to 36 percent).

Diseases associated with snowshoe hare include viruses, salmonella and tularemia (Hoff et al. 1970). Ticks, fleas and black flies are listed as the common external parasites (Burgdorfer et al. 1961) and internal parasites include intestinal tapeworms and roundworms, lungworms, and filarial worms (Bookhout et al. 1971).

Habitat and Home Range

It is well established that snowshoe hare density is highest in early to mid-successional softwood stands often created by even-aged forest management (Litvaitis et al. 1985) and are most abundant in the northern three counties in New Hampshire where lowland spruce/fir stands with dense understories are interspersed with hardwoods.

Snowshoe hares prefer young forests with abundant understories, the presence of cover is the primary determinant of habitat quality, and is more significant than food availability or species composition (Litvaitis et al. 1985). Species composition does influence population density; dense softwood understories support greater snowshoe hare density than hardwood because of cover quality (Litvaitis et al. 1985). In Maine, female snowshoe hares were observed to be more common on sites with less cover but more nutritious forage; males tend to be found on sites with heavier cover (Litvaitis 1990). According to Brocke (1975), low lateral visibility can be the most important attribute for the selection of a cover area by hare. Young softwoods provide this habitat component. Forest management that produces a balanced age class distribution of softwood combined with patches of early successional intolerant hardwoods will create snowshoe hare habitat (Williamson and Langley 1993).

Snowshoe hare occupy well-defined home ranges that may overlap with one another. They have an active core area of five to ten acres with 25 acres as the outer limits of their range (Vermont Fish and Wildlife). Cover is the most important habitat need for snowshoe hare. Cover has two basic components: base cover and travel cover. Base cover is the dense coniferous cover where the hare spends the day. The average tree height in good base cover is 11 feet (range is from 8 to 15 feet). High densities of softwood stems that result in low visibility provide the best base cover. Travel cover consists of softwood corridors that allow the hare to move from base cover to a food source. Tree heights for travel cover ranges from 15 to 45 feet.

Population Cycles

Snowshoe hares are one of the few species of wildlife that have cyclic populations. Snowshoe hare populations across northern Canada and Alaska fluctuate with peaks occurring every 8 to 11 years in much of the boreal forest of North America. However, population trends in southern Canada and the contiguous United States are either weakly cyclic, irruptive or largely stable (Murray 2000). The apparent variance in southern hare populations is believed to be due to higher and more consistent predation rates by a suite of generalist predators typically common at lower latitudes (Murray 2000). Scientists have speculated on the cause of these cycles with explanations involving everything from sunspots to stress. The direct cause of these cycles is unknown, but two hypotheses have received considerable attention. The "Keith hypothesis" (Keith 1990) proposes that cyclic declines in hare populations are caused by an interaction between the hares and their food supply (winter food shortage at the peak of the hare population resulting in poor nutrition and fewer hare being born) followed by a period of increased hare/predator interaction. As hares increase in number, the amount of available food decreases and over utilization of food supplies occurs (Williamson and Langley 1993). Decreased food supplies increase winter mortality and decrease reproductive success (smaller litter size, shorter breeding season and decreased pregnancy rates) (Williamson and Langley 1993). At the height of this cycle, research suggests that the interaction between the hare and its winter food supply is critical (Vermont Fish and Wildlife). The "predation hypothesis" (Krebs et al. 1995) proposes that predation, by itself, is sufficient to impact the hare populations. As populations decline, the impact of predation on the remaining hares increases in proportion so predation further extends the period of decline. During this low period, hare food supplies begin to rebound. Eventually predator populations decline and the hare population will begin to increase as a result of available food supplies and low predation. Deficiencies in our current knowledge of snowshoe hare population dynamics exists and few studies of hare population trends have been undertaken in southern Canada and the contiguous United States that have exceeded 4 years in duration (Keith 1990).

Historical Background, Regulation and Past Populations

Silver's History of New Hampshire Game and Furbearers (1957) reveals that snowshoe hare were noted by all historians who attempted to deal with local fauna, but the fact that some recorded them plentiful, while others considered them nearly extirpated, supports the theory that populations have fluctuated since the earliest historical times. The writings of Morton (1634) showed that both snowshoe hare and cottontail rabbits were present and numerous when the country was first occupied by Europeans (Silver 1957). Morton's visits dated from 1622, one year before the first New Hampshire township was settled; Wood (1634) arrived seven years later. Since the former wrote of an abundance of hare, while the latter seemed not greatly impressed, it may be that there were actually fewer hare in 1629 than there were in 1622, and that from earliest times hares have had their ups and downs (Silver 1957). Historical authors believed that reduction of the predators caused the hare increase during the first hundred years or more of civilization (Silver 1957). Silver (1957) reports that Stone and Cram (1920) state that hare were common is southeastern New Hampshire around 1850, but that within 20 years there was not one to be found. A general scarcity of hare around 1870 is substantiated by the action of the Legislature which in 1874 place a closed season on them (Silver 1957). Hunting was subsequently permitted between October 1 and March 1, this was the first time hares were protected and in 1915 a bag limit of five per day was established for the first time.

In 1918, with the cooperation of the Lone Pine Hunters' Club of Nashua, the Department began to stock hare and secured 100 hare from Maine, to be planted in Hillsboro County. The next year 1,000 from the same source were distributed in various parts of the state. The Department was still buying hares from Maine in 1923; most of these were released around Nashua and Manchester. To supplement the purchases from Maine an attempt was made to trap hare in the northern part of the state for release in the southern counties.   Up until 1932, hares were purchased from Maine, and according to Silver (1957) evidence of disease was noted in 1932 and more prevalent in 1933. In 1934, the hare population reached the bottom of its cycle, and the Department decided to make no purchases in 1935. The Department labeled the disease "tularemia", popularly called "rabbit fever". According to Silver, accuracy of the diagnosis is questionable because there are no pathology reports to confirm the disease. Between 1918-1954 a total of 31,536 hares were stocked, details have been lost and little is known of the effect of the stocking program. The stocking of hares was discontinued in 1954 when the price climbed to $4.00 per hare.

Early Research

In 1942, Federal-Aid Project No. 6-R, Varying Hare Restocking Investigation was implemented to determine the effectiveness of restocking hare in areas where they were scarce or had been extirpated by overshooting. The project was designed to obtain data on dispersal, mortality and reproduction of marked hares, but it proved impossible to get the hare to enter the box traps and no marked hare were caught. According to Silver (1957), this was the least productive project ever undertaken in New Hampshire. The project was interrupted by World War II because of war-time restrictions and shortage of personnel, the project was suspended with little information gained.

Current Regulations and Populations

Snowshoe hare are a game species that provide hunting opportunities and economic benefit during the winter months. Hunting seasons are established on a biennial basis through the administrative rule-making process. Short and long-term survey trends are evaluated and season recommendations are made by the project leader, reviewed by the Department Game Management Team as well as law enforcement staff and then presented at public hearings to develop the final recommendation by the Commission and Executive Director. Five small game management regions (Fig 1) are used to manage and assess trends of small game species. Each region represents an area that has broadly similar land use, habitat types and human density patterns. The snowshoe hare is managed through season setting and bag limits. The current hunting season for hare is from October 1-March 31, statewide, with a daily limit of 3 in WMU's A,B, C1, C2, D1, D2, E, F, G, and J1, and a daily limit of 2 in WMU's H1, H2, I1, I2, J2, K, L, and M. There is no season limit.

Currently the Department does not have a hare population index or information necessary to make an estimate on the number of hare in any part of the state. Deficiencies exist in our knowledge of snowshoe hare population for this assessment.

Current Surveys and Research

Since 1999 the Department has conducted an annual Small Game Survey to quantify hunter activity and observations to generate indices for key small game species. Small game hunters who return their

annual surveys provide information on small game hunting effort, hunter observation rates and species distribution. A total of 237 hunters responded to our 2013-2014 survey, which spans the period 09/1/13-03/31/14.   In 2013-2014 the central region reported 32% of the hare hunter effort and the north region reported 28% (Table 1 and Figure 2).

The annual Small Game Survey data provide an observation rate of hunters that allows us to compare small game species between years. Observation rates are expressed in terms of animals seen per 100 hunter hours and this method is viewed as a reliable index to species abundance.   The long term trend (1999-2013) showing the variability in snowshoe hare observation rates by survey year is listed in Table 2 and illustrated by regions and survey years in Figure 3. No distinction is made in Figure 3 between observation rates of hunters with or without dogs.

Currently a research study underway is expected to provide insight on the influence of stand and landscape composition on snowshoe hare density and population fluctuations in New Hampshire with a particular emphasis on high elevation and lowland matrix habitat.   The expected results of the study will provide relevant information to effectively manage snowshoe hares and habitat in New Hampshire in a variety of habitats known to support hares and marten and capable of supporting lynx (Siren 2014 Research Proposal).   Lynx prey almost exclusively on snowshoe hare and are currently is listed as federally threatened under the Endangered Species Act. Changes in snowshoe hare numbers could affect the habitat quality and the potential distribution of lynx in New Hampshire.

Conservation and Management Needs

Optimal habitat for snowshoe hare includes young softwood forest that provides low lateral visibility (Brocke 1975). The more difficult it is to see through a stand, the better the area for hare. Management that provides an interspersion of habitat types and diversity in age distribution and/or the species composition will improve hare habitat (Williamson and Langley 1993). Commercial timber harvest and other proactive habitat management practices must be implemented at regular intervals to ensure a continuous supply of quality snowshoe habitat on the landscape. Responsive Management (2014) conducted a scientific telephone survey of New Hampshire residents' opinions on the status and management of big game populations for planning purposes. In the survey, New Hampshire residents were asked if they approved or disapproved of forestry practices designed to create and maintain young forest to improve habitat for game species and other wildlife. The overwhelming majority of residents (91%) approve of forestry practices to create young forests for wildlife habitat; only 2% disapprove.

Snowshoe hares are an important food source for forest predators and as a prey species it is considered the universal target of many avian and mammalian predators. The effects that snowshoe hare have on population dynamics of lynx (*Lynx canadensis*), great horned owls (*Bubo virginianus*) and goshawk (*Accipiter gentilis*) has been well documented (Keith 1990).   Habitat management that promotes softwood regeneration while maintaining mature trees will improve habitat for snowshoe hare and other species. In 2014, the Fish and Game Region 1 wildlife staff prepared a guidance document that outlines priorities for spruce fir and implications to associated regional species of greatest conservation need and associated obligate species (Appendix 1). This document is used to guide the desired future management and research projects using GIS analysis combined with fieldwork to assess the current status of spruce fir habitat type and its impact to species of concern in northern New Hampshire.

Snowshoe hare management will influence the management of marten, lynx and other species in New Hampshire.

The most recent land cover assessment data and forest inventory data were summarized by Catherine Callahan, NHFG's GIS Coordinator to compare current snowshoe hare habitat (2011) to the previous ten years (2001) (Appendix 2)). In the ten year period there was a loss of 151,380 acres of snowshoe hare habitat statewide; this represents a -2.8 percent change in habitat (Appendix 3). The southeast small game region showed a higher loss of habitat than other small game regions.

In 1999, the Society for the Protection of New Hampshire Forests released its first edition of New Hampshire's Changing Landscape, a report that explored the relationships between population growth, land use change, and the loss of the state's natural resource base. The report was updated in 2005 and 2010. The 2010 executive summary highlights key findings from the latest analysis of the state's natural resources. New Hampshire remains the second-most forested state in the nation, after neighboring Maine, but the forest lands continue to decline from a high of 87% in 1960 to about 82% in 2010. Based on current trends and predictive models, New Hampshire's forested lands will continue to decline. Sunquist (2010) predicts forest loss of 225,000 acres in the years out to 2030 linked to population growth; dropping New Hampshire forest land to 78.5% of total land area.

Permanently protecting large blocks of spruce fir forest for management and the creation of young forest stands will provide an opportunity to manage for snowshoe hare and other wildlife species that depend on these habitats.

Summary

The opportunities to hunt or view snowshoe hare are good in most of the state, but they are most abundant in the northern three counties where spruce-fir stands with dense understories are mixed with hardwoods. The goals and objectives for hare management should be both habitat and outreach related. The current research project should help determine the amount of existing suitable snowshoe hare habitat in the northern part of the state. The expected results from the current research project will provide science based information on snowshoe hare populations, habitat use and distribution and help guide the Department's snowshoe hare management for the next decade. This information may give insight into the status of other animal populations that depend on hare for food. Proposed goals and objectives should be examined closely in the context of the habitat requirements for other species to ensure the greatest benefit to other big game species management programs and species with the greatest conservation need in New Hampshire.

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of New Hampshire Cooperative Ext. 41 pp.

Table 1. Small game hunter effort by species and region (2013-2014).

Region	Grouse	Hare	Rabbit	Squirrel	Woodcock
NORTH	2490.00	74.50	0.00	0.00	303.25
WHITE MOUNTAINS	419.50	17.00	0.00	8.00	264.70
CENTRAL	622.50	81.00	0.00	287.00	352.50
SOUTHWEST	308.50	24.00	15.00	93.00	313.00
SOUTHEAST	152.50	60.50	16.00	147.50	40.00

Table 2. Snowshoe hare observation rates per survey year (1999-2013).

Year	Sum of Hours Hunted	Sum of Hare Seen	Per 100 Hunter Hours
1999	521	178	34.17
2000	254	88	34.65
2001	512.5	241	47.02
2002	499.5	185	37.04
2003	754	317	42.04
2004	417.5	200	47.9
2005	715	200	27.9
2006	450	169	37.6
2007	498.5	243	48.7
2008	308	112	36.4
2009	550.5	231	41.96
2010	383.5	123	32.07
2011	382.5	105	27.49
2012	508	136	26.77
2013	257	54	21.01

Figure 1. Small Game Management Regions

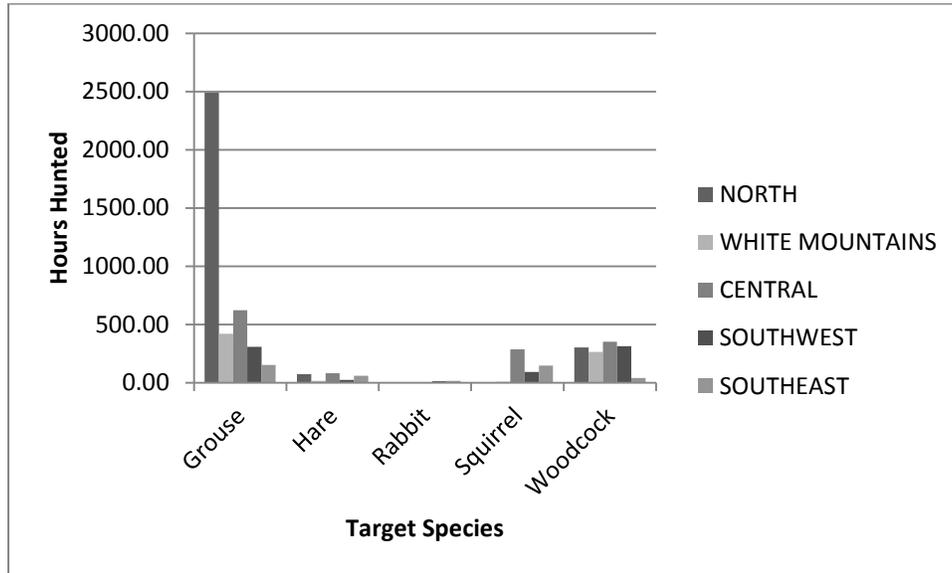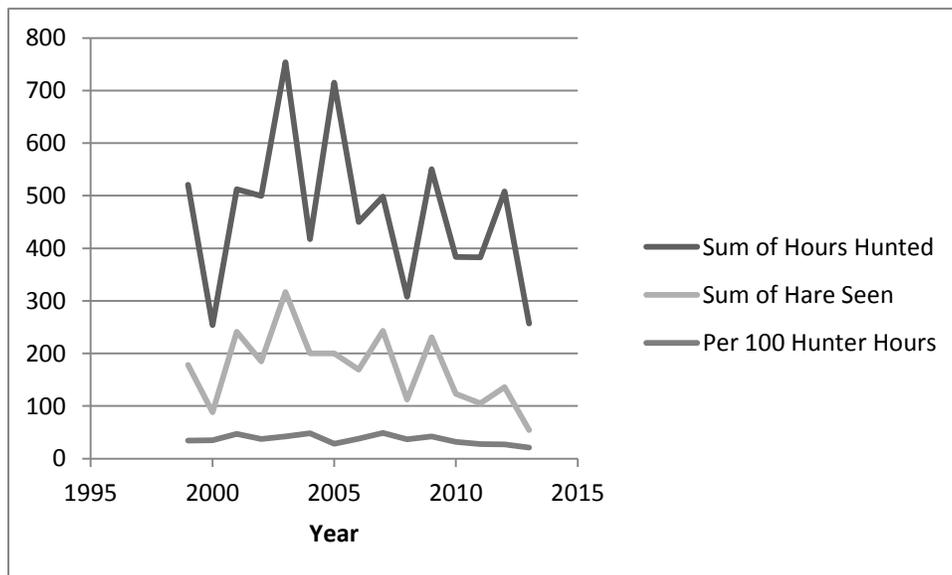Figure 2. Small game hunter effort per species and region (2013-2014)

Figure 3. Snowshoe hare observation rates (1999-2013).

Appendix 1.   NH Fish and Game, Region 1 Priorities for Spruce Fir and Implications to Associated Regional Species of Greatest Conservation Need and Associated Obligate Species. Prepared by Will Staats, Jillian Kilborn and Alexej Siren. May 29, 2014.

**Region 1 Priorities for Spruce Fir and
Implications to Associated Regional Species of Greatest Conservation Need and Associated Obligate Species
May 29, 2014**

_____   Preliminary GIS analysis
> GIS analysis through NHFG to answer some of the basic questions

_____   Technical assistance, land protection and evaluation of effectiveness
> NRCS funding to work with smaller private landowners on developing management plans, on the ground commercial and non commercial management
> Federal Aid for larger landowners
> NRCS grant to evaluate effectiveness of all
> NRCS funding to help protect identified important softwood
> TNC and staying connected initiative and identification of important connections between parcels

_____   Wildlife response
> NHFG match money to evaluate snowshoe hare response for ability of NH landscape to support lynx
> NHFG match money to evaluate balance of lynx and marten habitat a landscape scale
> NRCS money to help examine snowshoe hare response to management
> Forest Service money to examine snowshoe hare dynamics at high elevation

Evaluate current status

1. Evaluate the amount of spruce fir that has been converted to mixed or hardwood stands
    i.   Aerial photo analysis of "converted" acres
    ii. Important forest soils group analysis (soils that should grow softwood vs. soils that are currently softwood)

2. Identify older aged spruce fir stands
    i.   Distribution between high and low elevation
    ii. Ownership distribution

3. Identify and younger aged softwood stands
    i.   Distribution between high and low elevation
    ii. Ownership distribution

4. Evaluate how past harvest practices have influenced success of softwood regeneration

      i. Identify places to go back to and evaluate effectiveness of provided technical assistance

5. Evaluate how state, federal, private and NGO ownerships contribute to overall spruce and fir habitat within the region
      i. GIS analysis of distribution of softwood acres on each type of ownership

6. Identify ownerships of "significant blocks" of spruce fir (>2000 acres/<2000 acres) (Need to define what significant is)

<mark>Consider desired status</mark>

1. Identify areas that would be good to promote, restore or enhance spruce fir based on current status evaluation

<mark>Habitat Management</mark>

1. Identify methods to ensure long term sustainability of spruce fir
      i. Best Management Practices
      ii. Critical softwood management areas?

2. Examine ownership patterns that promote long term sustainability of spruce fir
      i. SMA use
      ii. Easements?

3. Find ways to promote older aged spruce fir stands
      i. Longer rotations, reserve areas, gap dynamic silviculture

4. Test innovative harvest techniques in spruce and fir

5. Test effectiveness of high elevation harvests;

      i. PD 6 zones in the Unincorporated places
      ii. High elevation SMAs

6. Test effectiveness of SMA harvests

7. Continue technical assistance on identified ownerships to test commercial and noncommercial harvest techniques including:
i. Encourage the development of forest management plans that promote sustainable spruce and fir management
ii. Employ Timber Stand Improvement techniques in spruce /fir stands
iii. Over story removal of hardwood competition
iv. Consider the use of post harvest scarification techniques

8. Establish demonstration forests/harvests on state and federal lands to test and export new techniques of management

    i. LMRD at Umbagog
    ii. CLNA in Pittsburg

Protection

1. Protect large blocks of un-fragmented high elevation spruce fir habitat
2. Protect large blocks of low land spruce fir habitat

Assessment of structure and function for associated species

1. Identify functional softwood cover in historical deer wintering areas
    i. UNH deer yard research project

2. Evaluate function of younger aged softwood stands as lynx habitat
    i. Analysis of identified areas from above

3. Assess how regional priorities for this habitat type relate to state wide Fish and Game priorities(Species of Special Concern)

4. Design long term monitoring program for spruce fir obligates specifically snowshoe hare

5. Landscape analysis of forest structure as marten and lynx habitat (shifting mosaic work out of Maine)

6. Examine future management direction of identified ownerships and how they relate to connectivity for identified species

Appendix 2. Landcover habitat assessment for snowshoe hare.

SNOWSHOE HARE HABITAT

Developed
      110 Residential, commercial, or industrial (NON-HABITAT)
      140 Transportation (NON-HABITAT)

Active Agricultural Land
      211 Row crops (NON-HABITAT)
      212 Hay/rotation/permanent pasture (HABITAT)
      221 Fruit orchards (HABITAT)

Forested
      412 Beech/oak (HABITAT)
      414 Paper birch/aspen (HABITAT)
      419 Other Hardwoods (HABITAT)
      421 White/red pine (HABITAT)
      422 Spruce/fir (HABITAT)
      423 Hemlock (HABITAT)
      424 Pitch pine (HABITAT)
      430 Mixed forest (HABITAT)
      440 Alpine (Krumholz) (HABITAT)

Water
      500 Open water (NON-HABITAT)

Wetlands
      610 Forested wetlands (HABITAT)
      620 Non-forested wetlands (HABITAT)
      630 Tidal wetlands (NON-HABITAT)

Barren Land
      710 Disturbed (NON-HABITAT)
      720 Bedrock/vegetated (HABITAT)
      730 Sand dunes (NON-HABITAT)
      790 Cleared/other open (HABITAT)
Tundra
      800 Tundra (NON-HABITAT)

Land Cover within the road buffer (300 ft buffer of Class I-V roads) is reported.

New Hampshire Land Cover Assessment

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Forested
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Wetlands
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    620 Non-forested wetlands
    630 Tidal wetlands
Barren Land
    710 Disturbed
    720 Bedrock/vegetated
    730 Sand dunes
    790 Cleared/other open
Tundra
    800 Tundra

The following rules were used to determine forest type:

Deciduous stands (41x) are forested stands comprising less than 25% coniferous basal area per acre. Coniferous stands (42x) are forested stands comprising greater than 65% coniferous basal area per acre. Mixed stands (430) are forested stands comprising greater than 25% and less than 65% coniferous basal area per acre. Alpine areas (440) contain stunted vegetation, either hardwood or softwood (usually paper birch or spruce/fir), and occur just below tree line in the White Mountains.

Beech/oak stands (412) are deciduous stands comprising at least 30% beech and oak. Paper birch/aspen stands (414) are deciduous stands comprising at least 20% paper birch and aspen. Other deciduous stands (419) are deciduous stands not meeting either the beech/oak or paper birch/aspen criteria.

White/red pine stands (421) are coniferous stands in which white and red pine constitute a plurality of the coniferous basal area. Spruce/fir stands (422) are coniferous stands in which spruce and fir constitute a plurality of the coniferous basal area. Hemlock stands (423) are coniferous stands in which hemlock constitutes a plurality of the coniferous basal area. Pitch pine stands (424) are coniferous stands in which pitch pine constitutes a plurality of the coniferous basal area.

Other class definitions are as follows:

Developed (110) - built-up areas.
Active agriculture (200) - hay fields, row crops, plowed fields, etc.
Water (500) - lakes, ponds, some rivers or any other open water feature. Wetlands (600) - areas dominated by wetland characteristics defined by the U. S. Fish and Wildlife Service National Wetlands Inventory. Basically hydric soils, hydrophytic vegetation and the hydrologic conditions that result in water at or near the surface for extended periods of the growing season.
Disturbed (710) - gravel pits, quarries or other areas where the earth and vegetation have been altered or exposed.
Bedrock/vegetated (720) - exposed bedrock or ledge (usually in the mountains) that may have some forms of stunted vegetation growing in cracks or lichens growing on the surface rock.
Sand dunes (730) - areas along the seacoast that are dominated by sand.
Cleared/other open (790) - clear cut forest, old agricultural fields that are reverting to forest, etc.
Tundra (800) - areas dominated by short vegetation that occurs above tree line in the White Mountains (only mapped on Mt Washington).

10-Year Update to the NH Land Cover Assessment Data:

The 2001 New Hampshire land cover was updated by establishing a crosswalk with the 2011 National Land Cover Data (combined the raster layers in ArcGIS 10 software) as follows:

2001 NH Land Cover	2011 National Land Cover	2011 NH Habitat Assessment
All classes	Developed	Developed
Developed or Transportation	All classes	Developed or Transportation
Agriculture	Agriculture or herbaceous	Retained 2001 ag class
Forest, Undeveloped classes	Wetland	Wetland
Forest, Undeveloped classes	Barren	Disturbed
Forest, Undeveloped classes	Scrub/Shrub	Cleared/Other open
Forest classes	Forest	Retained 2001 forest class

Appendix 3. Percent change in snowshoe hare habitat 2001-2011.

Snowshoe Hare REGION	ACRES	SQMILES	LAND ACRES	2001 Percent of Region's Land area that is habitat	2001 Habitat Acres total	2001 Percent of Habitat within road buffer	2001 Acres of Habitat Within 300ft Road Buffer	2011 Percent of Region's Land area that is habitat	2011 Habitat Acres total	2011 Percent of Habitat within road buffer	2011 Acres of Habitat Within 300ft Road Buffer	2011 Habitat Acres outside the road buffer	2011 Percent of region that is habitat and is outside the road buffer	Percent Change in Habitat
North	914863	1429.4	890250	97.9	871512	4.9	42273	96.7	861009	5.7	48702	812445	91.3	-1.2
White Mountains	1251719	1955.8	1239732	97.4	1208088	6.1	74115	96.4	1195039	7.0	84082	1102706	88.9	-1.1
Central	1585215	2476.9	1470996	94.1	1384831	14.8	205421	92.0	1352849	16.1	218402	1134784	77.1	-2.3
Southwest	1397530	2183.6	1352890	94.6	1279344	16.1	205870	92.9	1256231	17.0	213437	1043669	77.1	-1.8
Southeast	791220	1236.3	757870	82.0	621664	25.2	156853	72.4	548931	25.3	138775	410156	54.1	-11.7
State	5940547	9282.0	5711739	93.9	5365438	12.8	684532	91.3	5214058	13.5	703397	4503760	78.9	-2.8

1 acre = 0.0015625 square mile

			LAND SQMI		2001 Habitat SQMI				2011 Habitat SQMI			2011 Habitat SQMI outside road buffer		
North			1391.0		1361.7				1345.3			1269.4		
White Mountains			1937.1		1887.6				1867.2			1723.0		
Central			2298.4		2163.8				2113.8			1773.1		
Southwest			2113.9		1999.0				1962.9			1630.7		
Southeast			1184.2		971.3				857.7			640.9		
State			8924.6		8383.5				8147.0			7037.1		