Forest Management Plan
Town of Amherst, NH
2020-2040

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Purpose

The Amherst Conservation Commission (ACC) serves as the forest management authority for Amherst's town forests and forested conservation lands, comprising 11 major areas and totaling almost 1,800 acres.

ACC will manage these forests, to the extent feasible, to achieve three objectives.

Objective 1: Conserve native biodiversity

Amherst's forest lands are large and well conserved relative to the more fragmented surrounding landscape to the east, south, and southwest. ACC recognizes the importance of conserving forests and forest-dependent species. In some cases, targeted forestry operations may improve habitat conditions for certain species and alter the structure and composition of the forest in ways that may enhance its ecological function and resilience over time.

Objective 2: Maintain or improve recreational access, natural aesthetics, and wildlife viewing opportunities

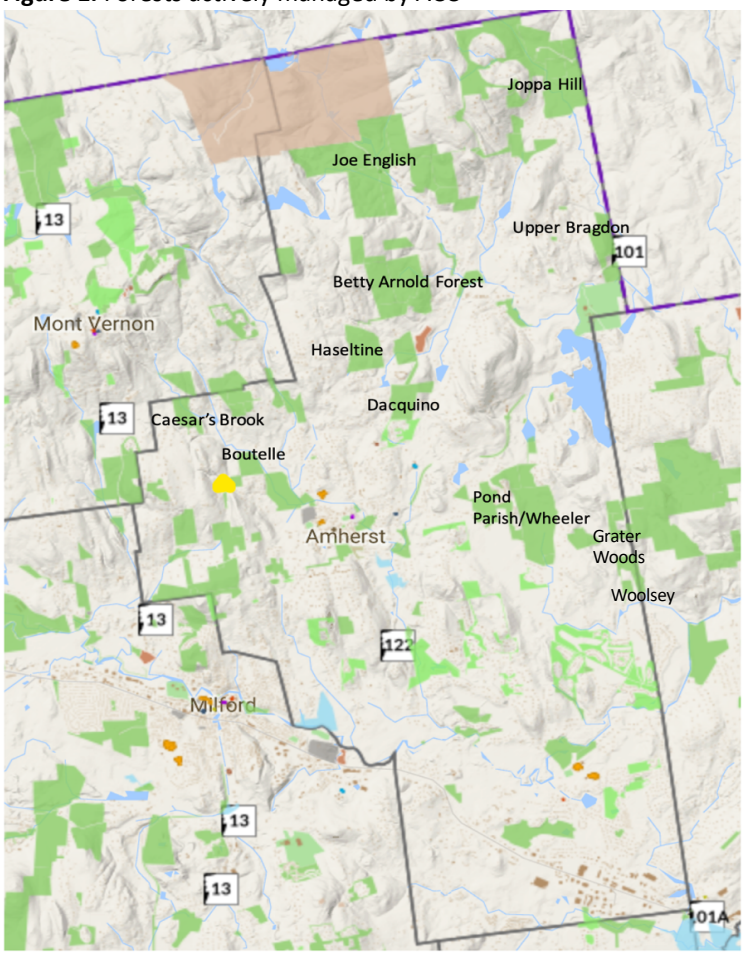
The most common form of public recreation in Amherst's town forests is trail use by hikers, mountain bikers, runners, snow shoers and Nordic skiers. The public's enjoyment of trails is generally a function of accessibility to well-constructed and maintained trails, forest aesthetics, and the opportunity to view wildlife. Forest management practices that support public recreation will seek to maintain or improve recreational access, natural aesthetics, and wildlife viewing opportunities.

Objective 3: Generate revenue

The economic value of the commercial timber in Amherst's town forests is significant, however ACC does not choose to maximize profitability as a goal, but rather prioritizes biodiversity conservation. Revenue generation from timber harvests is important though, as it pays the costs of forest management and it generates profits that are deposited in the Conservation Fund, which is used to manage the town's conservation lands and to acquire additional properties.

The purpose of this document is to provide a plan for achieving these forest management objectives over the time period 2020-2040. It is an update to the Amherst Forest Management Plan last revised in 1999. This document is accompanied by a current database containing detailed information on all of Amherst's forest stands, including forest stand ages, stocking densities, species composition, harvest history, significant wildlife elements, invasive species, access for management, among other variables. The database should be updated periodically to reflect forest dynamics. ArcGIS provides a platform for interactive spatial analysis of the database to assist in developing forest management interventions. This management plan offers a set of recommendations for the next 20 years, each of which should be refined via analysis of current conditions and consultation with Amherst's forester, wildlife specialists (e.g., University of New Hampshire Cooperative Extension), and Amherst's citizens.

Figure 1. Forests actively managed by ACC



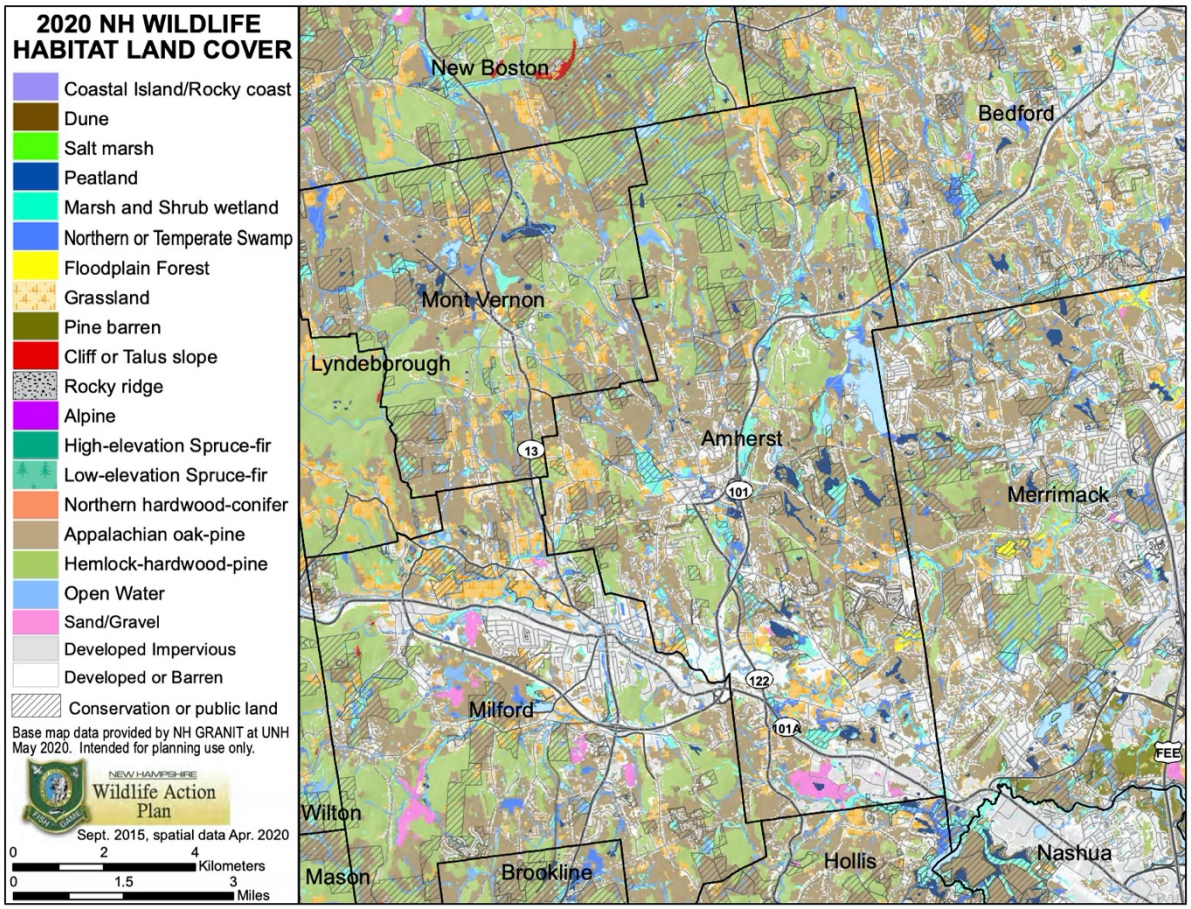
Joe English (536 acres)
Joppa Hill (437 acres)
Betty Arnold Forest (230 acres)
Pond Parish/Wheeler (180 acres)
Haseltine Community Preserve (93 acres)
Dacquino Forest (70 acres)
Upper Bragdon Farm (59 acres)
Boutelle Property (57 acres)
Caesar's Brook Reservation (41 acres)
Woolsey (26 acres)
Grater Woods (22 acres)

Forest Management Context

Amherst's forests are generally categorized as either *hemlock-hardwood-pine* or *Appalachian oak-pine*, as shown in Figure 2. Amherst lies in a transitional zone between southern Appalachian oak forests and northern hardwood forests. In addition to a north-south gradient of species representation, red oak and/or white pine are most common in forests that have taken over abandoned fields. Under historical conditions, these forests would generally be expected to mature to hemlock or beech stands in later seral stages. As climate conditions change, warmer temperatures and pathogens affecting hemlocks could favor the development of oak dominated forests over the long term.

Amherst's most common forest types occur on glacial till deposited in southern New Hampshire approximately 15,000 years ago. The till is composed of broken fragments of bedrock that were deposited by the ice as it retreated. It is rich in quartz and tends to produce poorly buffered, acidic soils with low nutrient value. The soils in Amherst are generally in the Canton series, which are well drained, stony, fine sandy loams. In Joe English it is possible to find hardpan Paxton series on drumlins (eastern side), well drained Scituate in shallow depressions on hilly uplands, and exposed bedrock Chatfield-Hollis complex on the tops of hills and ridges. In Pond Parish, Joppa Hill, and Betty Arnold there are poorly drained mucky peats. The bedrock upon which these soils rest consists of granite and gneiss. The most common is granite (~400 million years old). An older Massabesic Gneiss Complex (~625 million years) occurs in a ribbon of metamorphic rock crossing southern New Hampshire from Milford to Pawtuckaway State Park – extending through Amherst.

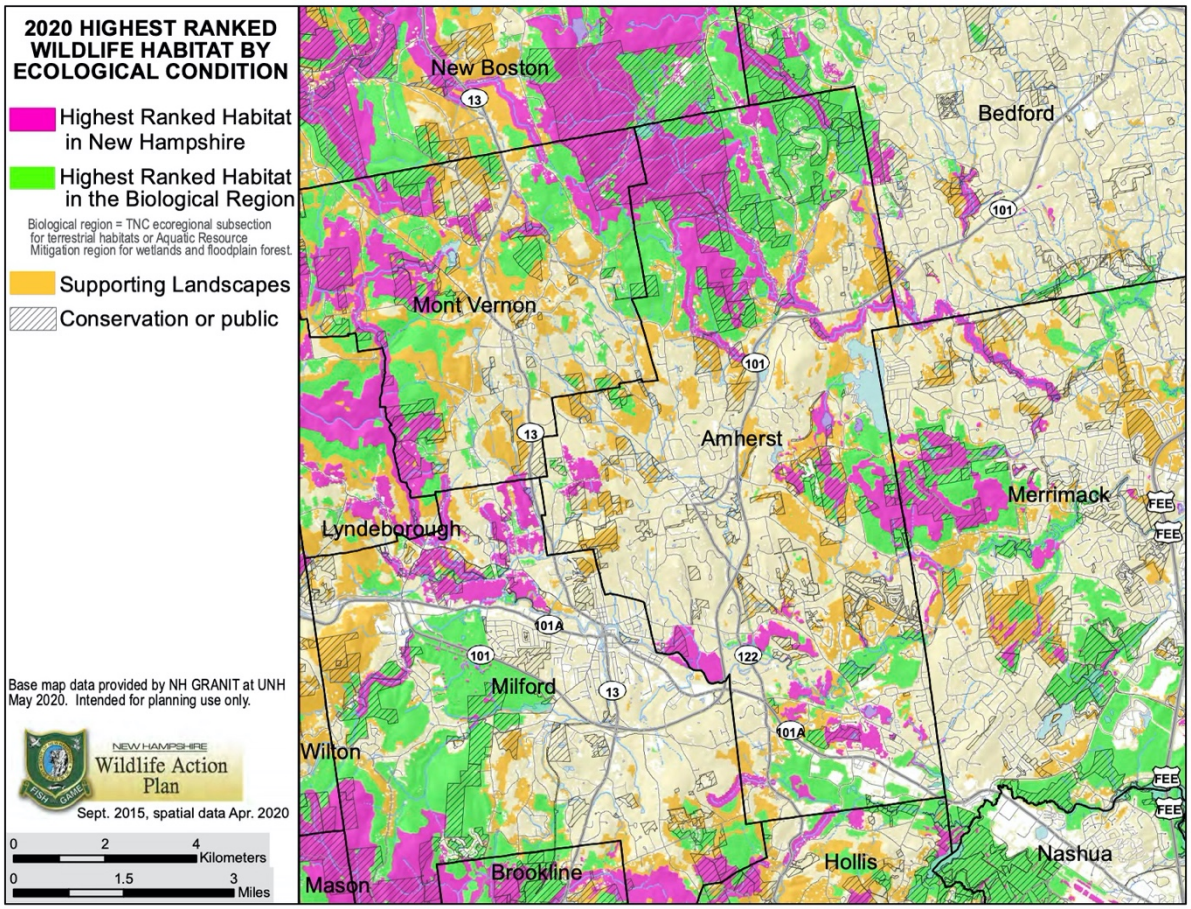
Figure 2: Habitat land cover map of Amherst, NH



Although Amherst's forest types are common in New Hampshire, their relatively large size and low level of fragmentation allow them to support an array of native species, including some species of conservation concern. Amherst supports the black gum-red maple basin swamp natural community and the vertebrate species Jefferson/Blue Spotted Salamander Complex, Banded Sunfish, Spotted Turtle, Blanding's Turtle, Northern Black Racer, and Eastern Hognose Snake. The New Hampshire Natural Heritage Bureau indicates that the Spotted Turtle and Blanding's Turtle have been sighted on the ACC-managed Pond Parish Property. Appendix A provides additional details.

The 2015 New Hampshire Wildlife Action Plan indicates that most of Amherst's forests are among the highest ranked wildlife habitat in New Hampshire *and* the biological region, as shown in Figure 3. Those not achieving these rankings are still considered important supporting habitat in this landscape.

Figure 3: Habitat land cover map of Amherst, NH



Amherst's forests generally occur on abandoned agricultural and grazing lands. Stone walls and other structures within present day forests are evidence of this prior land use (figure 4). Because of a major shift in land use away from agriculture and grazing in the late 19th and early 20th century, many of Amherst's forests are of similar age, few of which are more than 100 years old, although isolated "wolf" trees left to mark property boundaries may be more than 200 years old. Another contributing factor to the forests' even age structure was the 1938 hurricane that leveled much of the region's standing trees.

Figure 4: A stone wall in the forest often indicates a prior non-forest land

Amherst's middle-aged forests do not experience a great degree of tree mortality and blowdowns, and some disturbance regimes such as beaver activity and fire have been curtailed by humans seeking to prevent property damage. This is in contrast to older natural forests that experience more tree mortality, blowdowns, beaver activity, and fires in stochastic patterns, creating a mosaic of forest stands of different ages across the landscape.
Some native forest species rely on, and most species utilize, disturbed forest areas where vegetative re-growth provides forage and cover. Because Amherst's forests have limited

disturbance, young forest is generated relatively infrequently on our landscape. The ideal distribution of timber age classes to optimize wildlife habitat in a New England forest has been theorized by Richard DeGraaf of the U.S. Forest Service Wildlife Habitat Research Unit[1,2]. Relative to this ideal, "sawtimber" and "large sawtimber" age classes are over-represented in Amherst's forests, with an exaggerated proportion in the "large sawtimber" class. At the same time, a very small percentage of our forests are in the young age classes of "seedling," "sapling," or "pole." Figure 5 contrasts DeGraaf's ideal age-class profile against the current age class distribution in Amherst. DeGraaf's ideal forest structure for wildlife is only one point of reference. A different point of reference might be the theorized structure and composition of forests prior to European colonization, based principally on major disturbances such as hurricanes[3,4]. Data upon which to base these descriptions are sparse, and theories vary, but most suggest forests of older trees, likely dominated by hemlocks. Figure 6 shows an example of such an age distribution, again juxtaposed against Amherst's current forests. In this case, Amherst's forests slightly under-represent younger age classes and *greatly* under-represent antique (old growth) forest.

Figure 5: Age structure of Amherst's forests versus an ideal age structure for wildlife

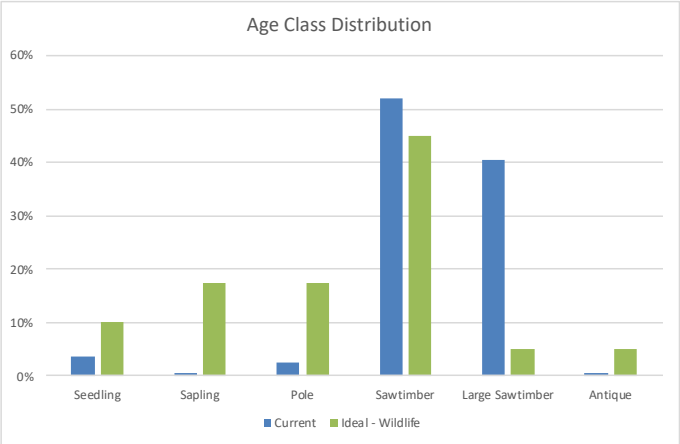
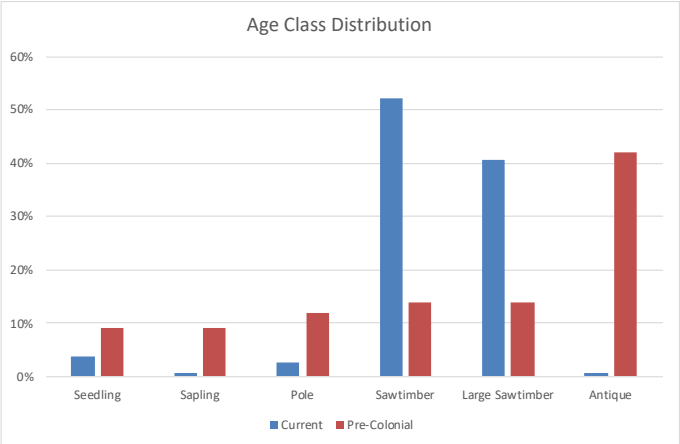


Figure 6: Age structure of Amherst's forests versus theorized pre-colonial forests*



*Estimate based on a major disturbance every 170 years, does not include human or other small disturbances

Leaving Amherst's forests continue to grow would allow them to reach the antique age class and begin to experience higher levels of natural mortality and blowdowns, akin to the age class distribution in Figure 6. That

[1] DeGraaf, R., M. Yamasaki, W.B. Leak, A.M. Lester. 2005. Landowner's Guide to Wildlife Habitat: Forest Management for the New England Region. University Press of New England. 111 pgs.

[2] DeGraaf, R., M. Yamasaki, W.B. Leak, A.M. Lester. 2006. Technical Guide to Forest Wildlife Habitat Management in New England. 305 pgs.

[3] Foster, D., G. Motzkin, and B. Slater. 1998. Land-use history as long-term broad-scale disturbance: regional forest dynamic in Central New England. *Ecosystems* (1) 96-119.

[4] Seymour, R., A. White, P. G. deMaynadier. 2002. Natural disturbance regimes in northeastern North America – evaluating silvicultural systems using natural scales and frequencies. *Forest Ecology and Management* (155) 357-67.

approach, however, could delay the creation of younger forest stands for many decades. Furthermore, some localized sources of disturbance (e.g., beavers and fire) will probably never return to the levels of the pre-colonial era. Thus, wildlife ecologists like DeGraaf argue that a completely "hands-off" approach in contemporary New England forests will generally fall short of meeting the potential for providing wildlife habitat. On the other hand, some argue that we have yet to understand the ecological diversity that could occur in older forests if we were to allow them to mature longer – a rare condition in contemporary New England.

Forests may also be changing as a result of anthropogenic pressures from the surrounding landscape and climate change. Human development has multiple effects on our forests including the introduction of invasive species, alteration of natural wildlife dynamics (e.g., larger deer populations), edge effects where forests meet developed areas, nutrient and pesticide loading from agricultural and residential runoff, air quality impacts, among others. Climate change, although still not fully understood at a local level, may result in changes in precipitation volumes and timing, as well as higher average and peak air temperatures. All of this can affect the species composition that will thrive in our forests in the future.

ACC's Past Forest Management

ACC began to manage its forests formally in 1998. Active forestry interventions sought to improve timber quality of forest stands and provide wildlife with browse and cover. Interventions included *group selection* openings, *low thinning* and *crown thinning*. Group selection is the complete removal of all trees in a small area, leaving a forest gap where forest regeneration re-starts from the earliest successional stage, thereby diversifying the forest's horizontal diversity and age classes. In low thinnings, trees are removed from the lower crown classes. Low thinnings encourage park-like forested habitats with little sunlight reaching the ground. In crown thinning, trees are removed from the upper crown class in order to open up the canopy and favor the development of the most promising trees in the main canopy. In theory, thinning overstocked forests should generate better conditions for further growth of remaining trees with the effect of increasing hard mast production for wildlife, creating a "park-like" aesthetic for recreationists, and increasing the economic value of remaining trees over time.

Logging techniques have included leaving woody debris on the forest floor to provide nutrients for future years, protection of vernal pools with 50-foot buffers, following accepted Best Management Practices for stream crossings and wetlands, and the use of small equipment and small log landings to minimize the operating footprint.

Table 1 provides a summary of the interventions between 1998 and 2020.

Table 1: Amherst timber harvest history 1998-2020

Property	Year	Sawtimber Volume (bf)	Cordwood Volume (cds.)	Pulpwood Volume (tons)	Net Revenue ($)	Silvicultural Systems
Caesar's Brook	1998	119,765	12	114	10,794	Low Thinning, Crown Thinning, Group Selection Openings
Haseltine	1999	149,315	128	376	17,567	Low Thinning, Crown Thinning, Group Selection Openings
Joe English	2001	132,356	69	58	14,532	Low Thinning, Crown Thinning, Group Selection Openings
Woolsey	2005	59,685	0	91	6,698	Low Thinning, Crown Thinning, Group Selection Openings
Boutelle	2008	262,970	120	0	33,042	Low Thinning, Crown Thinning, Group Selection Openings
Pond Parish	2010	75,350	76	155	6,809	Low Thinning, Crown Thinning
Dacquino	2012	106,165	48	409	11,356	Low Thinning, Crown Thinning, Group Selection Openings
Caesar's Brook	2014	92,315	24	100	5,687	Group Selection Openings
Betty Arnold	2016	226,625	414	205	30,567	Group Selection Openings
Haseltine	2016	213,770	24	197	21,566	Hemlock Salvage Cutting, Group Selection Openings
Joe English	2018	205,060	0	106	7,864	Hemlock Salvage Cutting
Totals		***1,438,521***	***915***	***1,811***	***166,482***	

ACC first harvested Caesar's Brook and Haseltine in 1998 and 1999, then re-harvested both areas in 2014 and 2016. Low and crown thinnings were conducted in both areas in the initial harvest. As expected, 10 years later the crowns had grown together and were ready for another thinning. Four acres of group-selection openings were cut

in Haseltine and 2 acres in Caesar's Brook. New seedling reproduction in the openings was adequate with black birch dominating Caesar's Brook and red oak and white pine well represented in Haseltine. However, the individual openings were small (most were 0.1-0.2 acres) and not enough were created to diversify the forest's age structure substantially.

Starting with the Dacquino harvest in 2012, group selection openings were made larger (0.5 acres) and low and crown thinnings were employed only where promising red oak mast trees occurred. And, with the 2014 Caesar's Brook harvest, ACC began to experiment using only group-selection openings, without any thinning. This practice continued with the 2016 harvests of Betty Arnold Forest and Haseltine.

An assumption that colder winter temperatures would keep the hemlock wooly adelgid (HWA) south of New Hampshire was disproved in the fall of 2016, when a routine pre-marking walk through Haseltine revealed moderate to severe infestation. Closer inspection also turned up elongate hemlock scale (EHS) and *Sirococcus tsugae* fungus. A combination of HWA and EHS is generally a death sentence for hemlock trees. ACC conducted a salvage harvest of the infested hemlocks in Haseltine that year. Subsequent examination of hemlocks in Joe English also revealed a severe HWA/EHS infestation (along the Hemlock Trail). ACC conducted a salvage harvest there during 2017 and 2018.

The results of these interventions have not always been as expected. For example, the initial small group selections (<0.25 acre) did not always stimulate regeneration of desirable species, such as oak. ACC increased the size of the group selections (0.5 acres) to allow for more sunlight to reach the forest floor and stimulate growth. The result of that change in approach has been mixed. Figure 8 shows a larger group selection cut in Haseltine, soon after the cut in 2016 and later in 2020. In this cut, regeneration is exuberant and with a mix of species. This site provides good wildlife browse for deer and soft mast for bear, cover for small mammals, and open bird and bat habitat that differs from the mature forest. Tree regeneration appears to favor black birch; however, some white pine and oak saplings can be found interspersed throughout. Overall, this site has been successful in creating habitat diversity but may grow into a forest stand that is dominated by black birch rather than oak as intended. A possible cause is that deer prefer to eat oak seedlings over black birch. New Hampshire Fish and Game report that the deer population has more than tripled in the last 30 years[5]. Nearby in Daquino Forest, the group selections have not regenerated as well as in Haseltine. Initiation of vegetation growth was slow, and eight years after harvest some areas remain unvegetated and the vegetated areas are dominated by fern and black birch. In this case, the habitat benefits are not as great and the long-term potential appears diminished for regenerating a robust oak forest. Figure 9 shows two examples of group selection areas in Daquino in 2020. Again, one likely factor is deer, although other factors may also be affecting the regeneration at these sites.

Figure 8: A group selection harvest area in Haseltine in 2016 and 2020

Figure 9: Daquino Forest group selection sites dominated by fern (left) and failed regeneration (right) eight years after harvest (2020)

[5] https://www.wildlife.state.nh.us/hunting/deer-mgt.html (viewed Oct 23, 2020)


ACC's Forest Management Going Forward

Amherst's forests provide almost 1,800 acres of intact mature forest representative of southern New Hampshire forest types. The intactness of this representative forest ecosystem and the ecological functions it performs, including habitat for forest-dependent species, is becoming increasingly important as the surrounding landscape becomes more fragmented by development. The Joe English–Betty Arnold–Haseltine–Dacquino complex forms the southeast terminus of a large, unfragmented, forested expanse which runs north through the New Boston Air Force Station into Mont Vernon and New Boston. Pond Parish forms the western reach of a smaller forest extending into the Grater Woods Forest in Merrimack. Considering ACC's first objective, *biodiversity conservation*, future management interventions should focus on conserving the forest ecosystems and forest-dependent species they support.

Over the next twenty years, ACC will determine which interventions are most effective for achieving this objective. A degree of patient experimentation will be required to understand how best to diversify forest structure without unintended changes to forest species composition due to heavy deer herbivory. To do so, ACC will not commit to large-scale systematic interventions at this time, in favor of a more gradual *adaptive management* approach[6]. In this way, successes can be built upon and failures can be minimized.

In addition, when developing cutting plans for particular sites ACC will integrate wildlife habitat enhancements, as appropriate to the objectives of the cut and the ecological attributes of the site. Examples include:

1) Releasing deciduous trees and shrubs for beavers when working near lakes and ponds;
2) Girdling selected trees around meadows and large open wetland edges for raptor perches;
3) Retaining snags and cavity trees in the general harvest area;
4) Leaving downed wood in damp areas and vernal pools for salamanders and reptiles;
5) Protecting hickories and selected mature oaks for continued hard mast production;
6) Protecting areas of brambles and blueberry bushes on the south side of meadows at the forest edge for soft mass production;
7) Piling slash for small mammal habitat

ACC re-surveyed the forests it manages during 2018-2020. The field survey included sub-dividing the forests into ~200 stands and recording information on each. Appendix B details the information collected for each stand,

[6] For a concise summary of *adaptive management*, published by the Department of Interior, see: https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/Chapter1.pdf

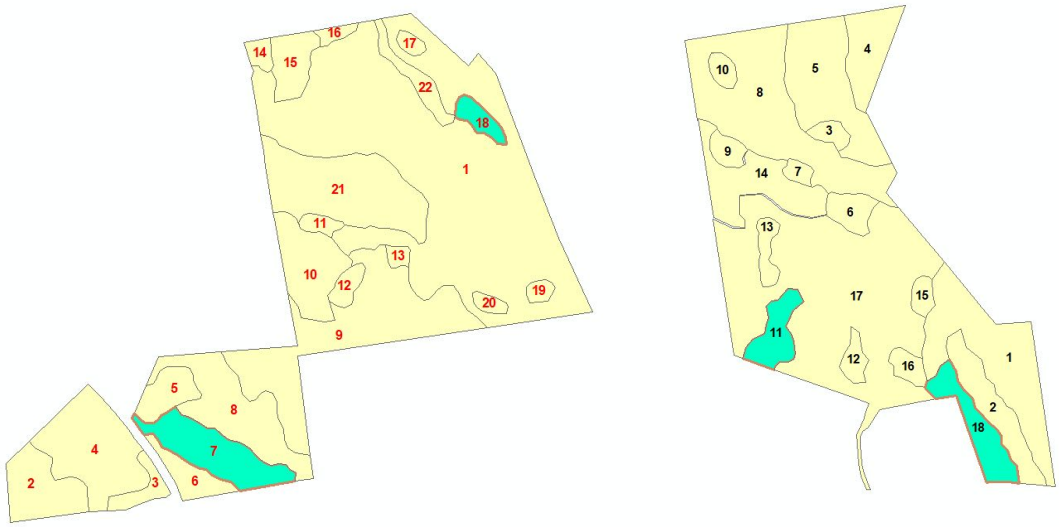
including tree species, age classes, stocking density, harvest history, disease and invasive species present, habitat attributes – 40 different variables in all. The figures in this section are maps of the stands, as displayed in a geographic information system (GIS) – ArcGIS. The GIS allows for map-based storage of ACC's forest attribute data, but more importantly allows for easy visualization and rapid scenario analysis for planning management interventions. Further supporting ACC's forest GIS is the land cover/use and property database and online GIS capabilities provided to Amherst by the Nashua Regional Planning Commission[7].

Intervention type 1: Control invasive species via herbicidal and mechanical treatments

Presently, exotic invasive species occur in a number of forest stands. The principle impact of invasive species that ACC wishes to avoid is crowding out native species and reducing representative biodiversity. One example of a damaging effect of invasive species is the displacement of native forage species with exotic species that are less nutritious for native wildlife. Another is physical damage and premature mortality to tree species from bittersweet, which can actually cover and kill mature native trees. Exotic invasive species have become a permanent feature of our landscape, but they can be controlled via herbicidal and mechanical treatments – the selection of which are species- and site-dependent. Unlike other forest management interventions that generate revenue that covers their costs *and* profits for the Amherst Conservation Fund, interventions to control invasive species can be costly and generate no revenue. For this reason, such interventions should be judicious, with appropriate attention to cost effectiveness and sufficient parsimony to ensure long-term financial sustainability. The following areas should be prioritized for treatments within the next five years:

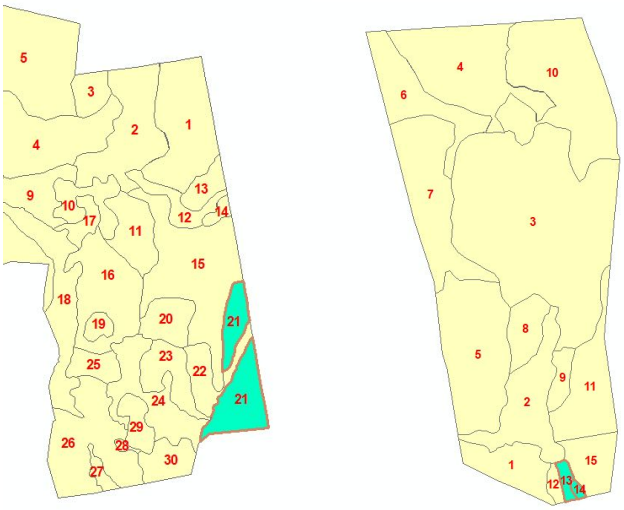
1. Boutelle Forest, stands #7 and #18, for removal of multi-flora rose
2. Caesar's Brook, stands #11 and #18, for removal of bittersweet, autumn olive, multifora rose, honeysuckle, and swallow wort
3. Joppa Hill, stand #21, for bittersweet, barberry, and multiflora rose
4. Pond Parish, stands #13 and 14, for removal of autumn olive, bittersweet, and barberry

Figure 10a: Map of forest stands in Boutelle Forest (left) and Caesar's Brook (right)



[7] https://nrpcnh.mapgeo.io/datasets/properties?abuttersDistance=120&latlng=42.803755%2C-71.549492

Figure 10b: Map of forest stands in Joppa Hill (left) and Pond Parish (right)



Intervention type 2: Diversify age classes via group-selection harvests and shelterwood

Amherst's forest stands are largely even-aged due to the local land use and disturbance history. Over the course of decades, Amherst's forests will age and natural mortality and disturbance (e.g., blowdowns) will lead to regeneration in the resulting forest gaps. These natural processes diversify the age structure of the forest. If ACC chooses, it can accelerate this process via harvests. The advantages of doing so are that more diverse wildlife habitat can be created and the forest may become more resilient to pathogens and major blowdowns in the future. The long-term effect on forest resiliency to climate change is unknown at this time.

Group-selection harvests involve the removal of all the trees in a given area. Under the direction of a forester, the logger removes the commercial boles, leaves selected dead trees standing for wildlife utilization ("snags"), and cuts up and leaves behind the remaining woody debris that serves to reduce soil erosion, release nutrients over time, provide diverse micro-climates for seedlings and habitat features for small species of wildlife. The appropriate size of group-selection harvests for Amherst's forests is between 0.5 and 2 acres. A disadvantage of this approach is that the regeneration outcomes are variable (likely due to increasing deer herbivory) and may not always meet ACC's expectations, as discussed earlier in this plan. Very careful observation of prior harvests should be undertaken to confirm that regeneration outcomes are consistent with ACC's forest management goals.

Shelterwood harvests remove the majority, but not all, of the mature trees in an area – roughly half of the highest quality mature trees remain as a seed source for regeneration. Again, snags and woody debris remain for their ecological value. Once regeneration advances to an adequate stage (10 years or longer), the remaining mature trees can be removed to open fully the canopy, providing full light to the growing seedlings and saplings, or left to grow to biological maturity and contribute further ecological function (mast production, snags, cavity trees). Amherst has not performed shelterwood harvests in the past, but a potential advantage is that it should favor any advanced regeneration of species that are tolerant of shade as seedlings, such as oak and white pine, giving them an advantage in establishing themselves as the dominant species (a challenge faced in group-selection harvests to date). An irregular shelterwood harvest can also be applied, where the treatment is conducted in a shifting pattern of smaller areas within the stand.

At this time, existing sites of group-selection harvests should be monitored to document and more fully understand the long-term regeneration outcomes that can be expected in our forests from this harvest technique. Factors such as the deer population should be considered in evaluating these outcomes. Shelterwood harvests may be undertaken on an experimental basis to begin developing experience with this technique and collecting

data on the outcomes it generates in our forests. Again, a large deer population could have equally negative effects on shelterwood forests, a factor that must be studied. For this reason, it is advisable to take a limited and experimental approach over the next 10-20 years.

The following areas are prioritized for shelterwood harvests over next 20 years:

1. Joe English Reservation, stand #22
2. Pond Parish, stand #11 and 15
3. Boutelle, stands #1, 8, 9 and 10

Figure 11a: Map of forest stands in Joe English

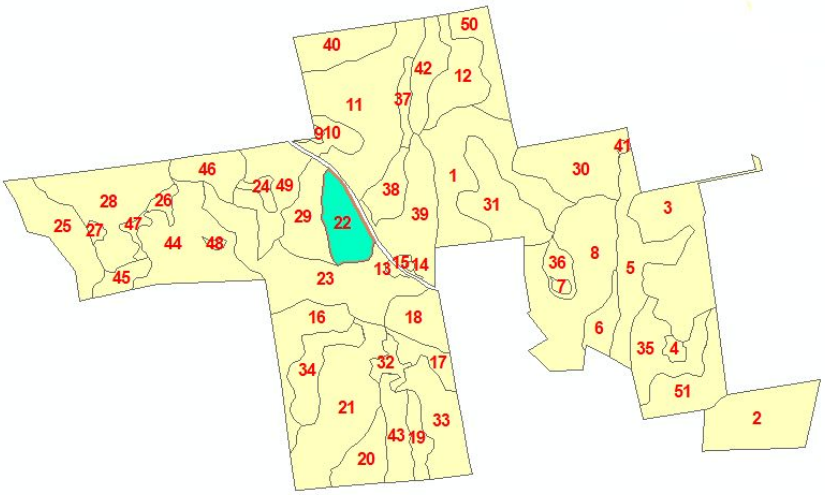
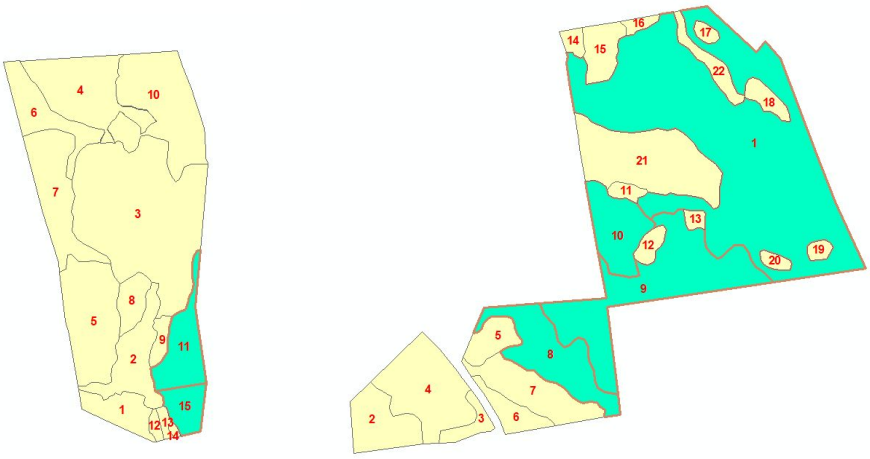


Figure 11b: Map of forest stands in Pond Parish (left) and Boutelle (right)



Intervention type 3: Reduce stand densities via thinning harvests

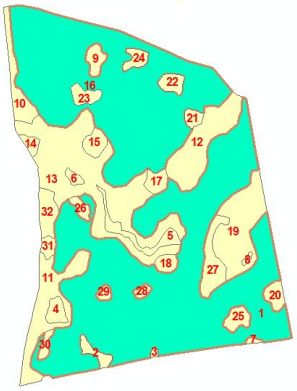
Overstocked areas are those where the density of trees exceeds the space available to maximize crown extension and growth. This condition will naturally resolve over many decades but can be accelerated by removing a percentage of trees and leaving behind healthy individuals with good genetics. In theory, thinning overstocked forests should generate better conditions for further growth of remaining trees with the effect of increasing hard

mast production for wildlife, creating a “park-like” aesthetic for recreationists, and increasing the economic value of remaining trees. This treatment does not directly stimulate forest regeneration.

The following stands could be prioritized for thinning harvests:

1. Haseltine Community Preserve, stands #1 and #16 (entry into this area could be postponed in order to balance forestry activities with recreational use of the area, however these stands are suitable for thinning now and some amount of “self-thinning” mortality will occur):

Figure 12: Map of forest stands in Haseltine



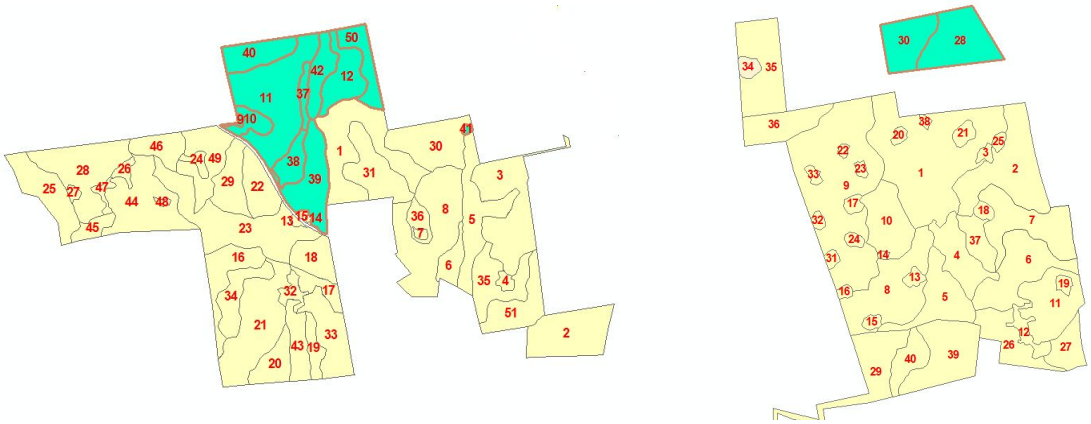
Intervention type 4: Establish sites for protection of old growth forests

To the extent that ACC determines that very mature, “old growth” forests should have a place in the landscape, it will be necessary to identify stands that are appropriate for long-term preservation. This will be necessary to avoid harvests in the future, which could occur if this intent is left unstated. Amherst has no stands old enough to be considered old growth, therefore preservation of existing stands will require many decades to achieve this status. Old growth forests should be valued for more than the presence of mature trees – they may support biological diversity and ecological characteristics that are distinct from younger forests. In addition to having suitable ecological characteristics for this designation, these stands also have high costs associated with accessing them making forest management in them less economically feasible that in others.

The following areas could be prioritized for long-term preservation:

1. Joe English Reservation, stands #9-12, 37-42, and 50
2. Betty Arnold, stands #28 and 30

Figure 13: Map of forest stands in Joe English (left) and Betty Arnold (right)



Monitoring and Adaptive Management

The recommendations in this plan can and should be revisited and re-analyzed to ensure that the assumptions remain correct and to reflect changing conditions (e.g., regeneration outcomes, markets for particular species, presence of disease or invasive species, access issues, conflicts with recreation, changes in climate).

ACC's monitoring will be simple and practical, based on periodic walk-throughs with Amherst's licensed forester. It should cover:

1) Continuous monitoring for the presence of invasive species;
2) Continuous monitoring for the presence of pests and disease; and,
3) Periodic assessments of regeneration in selected previously harvested areas to evaluate species composition and growth.

This plan does not include a wildlife monitoring component for two reasons. First, the wildlife response to forest management / young forest in New England is well documented already. Second, the manpower and resources required to make statistically significant comparisons exceed what ACC is capable of providing. Having said that, data collected via methods such as game cameras, bird counts, and other methods undertaken by amateur wildlife watchers are certainly welcome if offered.

The following adaptations should be considered when the following conditions are met:

1) Invasive species treatments in areas with new and significant occurrences of exotic invasive plant species;
2) Consideration of salvage harvests in stands heavily affected by pests and disease, where appropriate; and,
3) Alteration or cessation of harvest techniques that do not generate favorable regeneration of target species.

Table 2: Provisional Action Plan (2020-2030)

Year	Task	Conditions or Comments
2020	Monitor regeneration in prior group selection sites in Caesar's Brook, Haseltine, Daquino, Betty Arnold, and Joe English	Update GIS database with monitoring results
2021	Mow invasive plants in Caesar's Brook, stands #11 and #18 Clear invasive plants in Pond Parish, stand #13 and 14	Remove bittersweet, autumn olive, multiflora rose, honeysuckle, swallow wort Remove autumn olive, bittersweet, other
2022	Spray invasive plants in Caesar's Brook, stands #11 and #18 Plan and conduct shelterwood harvest in Pond Parish, stands #11 and 15 Clear invasive plants in Boutelle, stands #7 and #18 Clear invasive plants in Joppa Hill, stand #21 Monitor invasive plants in Pond Parish, stand #13 and 14	Remove remaining invasive plants Ensure adequate public consultation and notification re: recreation impacts Remove multiflora rose Remove bittersweet, barberry, multiflora rose Update GIS database with monitoring results
2023	Monitor invasive plants in Caesar's Brook, stands #11 and #18 Monitor invasive plants in Boutelle, stands #7 and #18 Monitor invasive plants in Joppa Hill, stand #21	Update GIS database with monitoring results Update GIS database with monitoring results Update GIS database with monitoring results
2024	Monitor regeneration in prior group selection sites in Caesar's Brook, Haseltine, Daquino, Betty Arnold, and Joe English	Update GIS database with monitoring results
2025	Plan and conduct shelterwood harvest in Boutelle, stands #1, 8, 9, 10	Ensure invasive plants have been adequately managed before proceeding Apply alternative/shifting variant in this area
2026	Conduct thinning harvests in Haseltine, stands #1 and 16	Ensure adequate public consultation and notification re: recreation impacts
2027		
2028	Monitor regeneration in prior group selection sites in Caesar's Brook, Haseltine, Daquino, Betty Arnold, and Joe English Evaluate the efficacy of group selection harvesting and determine if/where future group selection should be deployed	Update GIS database with monitoring results
2029		
2030		
2031	Monitor regeneration at shelterwood site in Pond Parish, stand #13 and #15	Update GIS database with monitoring results
2032	Re-enter shelterwood site in Pond Parish, stand #11 and 15, remove overstory	Only proceed if understory regeneration is adequate
2033		
2034	Monitor recruitment at shelterwood site in Pond Parish, stand #11 and 15	Update GIS database with monitoring results
2035	Monitor regeneration at shelterwood site in Boutelle, stands #1, 8, 9, 10	Update GIS database with monitoring results
2036	Re-enter shelterwood site in Boutelle, stands #1, 8, 9, 10, remove overstory, but conserve selected antique white pines	Only proceed if understory regeneration is adequate
2037		
2038	Monitor recruitment at shelterwood site in Boutelle, stands #1, 8, 9, 10	Update GIS database with monitoring results
2039	Plan and conduct shelterwood harvest in Joe English, stand #22	Only proceed if shelterwood experiments in Pond Parish and Boutelle succeed

		Ensure adequate public consultation and notification re: recreation impacts
2040	Update all stand information in GIS database	Visit all stands in ACC-managed forests and update database

Appendix A: Wildlife Species of Conservation Concern and Habitat Associations

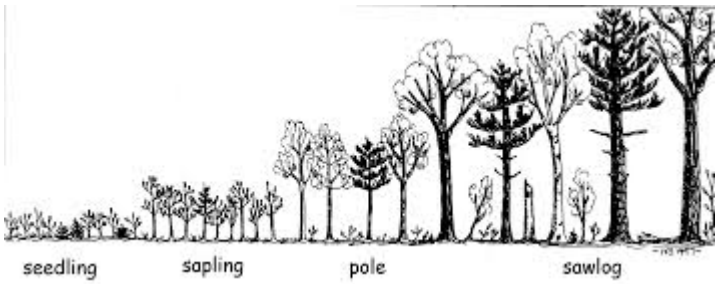
Potential Species - Common Name	Taxonomic Group	NH Status	Habitats	More Info
Blanding's Turtle	Amphibians and Reptiles	SE, SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Temperate Swamps, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/blandings-turtle.html
Blue-Spotted/Jefferson Salamander	Amphibians and Reptiles	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Northern Swamps, Peatlands, Temperate Swamps, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/blue-spotted-salamander.html
Eastern Box Turtle	Amphibians and Reptiles	SC, SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Shrublands, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/box-turtle.html
Eastern Hog-nosed Snake	Amphibians and Reptiles	SE, SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Pine Barrens, Shrublands, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/hognose-snake.html
Eastern Ribbonsnake	Amphibians and Reptiles	SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/ribbon-snake.html
Fowler's Toad	Amphibians and Reptiles	SC, SGCN	Appalachian Oak-Pine Forest, Dunes, Large Warmwater Rivers, Marsh and Shrub Wetlands, Pine Barrens, Shrublands, Vernal Pools, Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/fowlers-toad.html
Marbled Salamander	Amphibians and Reptiles	SE, SGCN	Appalachian Oak-Pine Forest, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/marbled-salamander.html
Northern Black Racer	Amphibians and Reptiles	ST, SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Rocky Ridge, Cliff, and Talus, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/black-racer-snake.html
Northern Leopard Frog	Amphibians and Reptiles	SC, SGCN	Coldwater Rivers and Streams, Floodplain Habitats, Grasslands, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Marsh and Shrub Wetlands, Shrublands, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/leopard-frog.html
Smooth Greensnake	Amphibians and Reptiles	SC, SGCN	Grasslands, Marsh and Shrub Wetlands, Peatlands, Rocky Ridge, Cliff, and Talus, Rocky Ridge, Cliff, and Talus, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/smooth-green-snake.html
Spotted Turtle	Amphibians and Reptiles	ST, SGCN	Floodplain Habitats, Marsh and Shrub Wetlands, Peatlands, Temperate Swamps, Vernal Pools	http://www.wildlife.state.nh.us/wildlife/profiles/spotted-turtle.html
Wood Turtle	Amphibians and Reptiles	SC, SGCN	Coldwater Rivers and Streams, Floodplain Habitats, Grasslands, Shrublands, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/wood-turtle.html
American Black Duck	Birds	SGCN	Lakes and Ponds, Rivers and Streams, Marsh and Shrub Wetlands, Northern Swamps, Peatlands, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-americanblackduck.pdf
American Kestrel	Birds	SC, SGCN	Developed Habitats, Grasslands, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/american-kestrel.html
American Kestrel	Birds	SC, SGCN	Developed Habitats, Grasslands, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/american-kestrel.html
American Woodcock	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Northern Swamps, Shrublands, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/woodcock.html
Bald Eagle	Birds	ST, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lakes and Ponds, Rivers and Streams, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/bald-eagle.html
Bank Swallow	Birds	SC, SGCN	Coldwater Rivers and Streams, Grasslands, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Marsh and Shrub Wetlands, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-bankswallow.pdf
Bay-breasted Warbler	Birds	SGCN	High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Peatlands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-baybreastedwarbler.pdf
Black-billed Cuckoo	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-blackbilledcuckoo.pdf
Blue-winged Warbler	Birds	SC, SGCN	Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-bluewingedwarbler.pdf
Bobolink	Birds	SGCN	Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-bobolink.pdf
Brown Thrasher	Birds	SGCN	Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-brownthrasher.pdf
Canada Warbler	Birds	SGCN	Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-canadawarbler.pdf
Chimney Swift	Birds	SGCN	Appalachian Oak-Pine Forest, Developed Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-chimneyswift.pdf
Eastern Meadowlark	Birds	SC, SGCN	Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-easternmeadowlark.pdf
Eastern Towhee	Birds	SGCN	Appalachian Oak-Pine Forest, Peatlands, Pine Barrens, Rocky Ridge, Cliff, and Talus, Rocky Ridge, Cliff, and Talus, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-easterntowhee.pdf
Eastern Whip-poor-will	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest, Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-easternwhippoorwill.pdf
Field Sparrow	Birds	SGCN	Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-fieldsparrow.pdf
Golden Eagle	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Rocky Ridge, Cliff, and Talus	http://www.wildlife.state.nh.us/wildlife/profiles/golden-eagle.html
Grasshopper Sparrow	Birds	ST, SGCN	Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-grasshoppersparrow.pdf

Northern Goshawk	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/northern-goshawk.html
Pied-billed Grebe	Birds	ST, SGCN	Marsh and Shrub Wetlands, Peatlands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-piedbilledgrebe.pdf
Prairie Warbler	Birds	SGCN	Pine Barrens, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-prariewarbler.pdf
Purple Finch	Birds	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-purplefinch.pdf
Ruffed Grouse	Birds	SGCN	Appalachian Oak-Pine Forest, Grasslands, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-ruffedgrouse.pdf
Scarlet Tanager	Birds	SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-scarlettanager.pdf
Veery	Birds	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-veery.pdf
Vesper Sparrow	Birds	SC, SGCN	Grasslands, Pine Barrens	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-vespersparrow.pdf
Wood Thrush	Birds	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/wap/birds-woodthrush.pdf
American Bumble Bee	Bumble Bees	SGCN	Developed Habitats, Grasslands, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-americanbumbleebee.pdf
Rusty-patched Bumble Bee	Bumble Bees	SGCN	Developed Habitats, Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-rustypatchedbumblebee.pdf
Yellow Bumble Bee	Bumble Bees	SGCN	Developed Habitats, Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-yellowbumblebee.pdf
Yellowbanded Bumble Bee	Bumble Bees	SGCN	Developed Habitats, Grasslands, Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-yellowbandedbumblebee.pdf
Monarch	Butterflies and Moths	Review	Developed Habitats, Grasslands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-monarch.pdf
Noctuid Moth	Butterflies and Moths	SGCN	Pine Barrens	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-pinebarrenlepidoptera.pdf
Pine Barrens Bluet	Dragonflies and Damselflies	SC, SGCN	Peatlands	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-pinebarrensbluet.pdf
Ringed Boghaunter	Dragonflies and Damselflies	SE, SGCN	Appalachian Oak-Pine Forest, Hemlock Hardwood Pine Forest, Marsh and Shrub Wetlands, Peatlands, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/insects-ringedboghaunter.pdf
American Water Shrew	Mammals	SGCN	Northern Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-americanwatershrew.pdf
Big Brown Bat	Mammals	SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-bigbrownbat.pdf
Eastern Red Bat	Mammals	SC, SCGN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-easternredbat.pdf
Eastern Small-footed Bat	Mammals	SE, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Hemlock Hardwood Pine Forest, Northern Hardwood-Conifer Forest, Rocky Ridge, Cliff, and Talus	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-easternsmallfootedbat.pdf
Hoary Bat	Mammals	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-hoarybat.pdf
Little Brown Bat	Mammals	SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Pine Barrens, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/bats.html
Long-tailed Shrew	Mammals	SGCN	High Elevation Spruce-Fir Forest, Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-longtailedshrew.pdf
Moose	Mammals	SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, High Elevation Spruce-Fir Forest, Lowland Spruce-Fir Forest, Marsh and Shrub Wetlands, Northern Hardwood-Conifer Forest, Swamps, Shrublands, Lakes and Ponds	http://www.wildlife.state.nh.us/wildlife/profiles/moose.html
New England Cottontail	Mammals	SE, SGCN	Shrublands	http://www.wildlife.state.nh.us/wildlife/profiles/ne-cottontail.html
Silver-Haired Bat	Mammals	SC, SGCN	Appalachian Oak-Pine Forest, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-silverhairedbat.pdf
Southern Bog Lemming	Mammals	SGCN	Northern Hardwood-Conifer Forest	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-southernboglemming.pdf
Tricolored Bat	Mammals	SC, SGCN	Appalachian Oak-Pine Forest, Caves and Mines, Floodplain Habitats, Hemlock Hardwood Pine Forest, Lowland Spruce-Fir Forest, Northern Hardwood-Conifer Forest, Northern Swamps, Temperate Swamps	http://www.wildlife.state.nh.us/wildlife/profiles/wap/mammals-tricoloredbat.pdf
American Eel	Fish	SC, SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/american-eel.html
Banded Sunfish	Fish	SC, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/banded-sunfish.html
Bridle Shiner	Fish	ST, SGCN	Lakes and Ponds with Coldwater Habitats, Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/bridal-shiner.html
Eastern Brook Trout	Fish	SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats	http://www.wildlife.state.nh.us/fishing/profiles/brook-trout.html
Redfin Pickerel	Fish	SC, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/redfin-pikerel.html
Sea Lamprey	Fish	SC, SGCN	Coldwater Rivers and Streams, Estuarine, Large Warmwater Rivers, Marine, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/sea-lamprey.html
Swamp Darter	Fish	SC, SGCN	Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/fishing/profiles/swamp-darter.html
Brook Floater	Freshwater Mussels	SE, SGCN	Large Warmwater Rivers, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/brook-floater-mussel.html
Creeper	Freshwater Mussels	SGCN	Coldwater Rivers and Streams, Lakes and Ponds with Coldwater Habitats, Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/creeper-mussel.html
Eastern Pearlshell	Freshwater Mussels	SGCN	Coldwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/eastern-pearlshell.html
Triangle Floater	Freshwater Mussels	SGCN	Large Warmwater Rivers, Warmwater Lakes and Ponds, Warmwater Rivers and Streams	http://www.wildlife.state.nh.us/wildlife/profiles/triangle-floater.html

Appendix B: Data Fields for ACC's Forest Stand Database

ACC POLYGON DATA DICTIONARY – Information featured in the description is primarily qualitative; they are not intended to provide numerical indices

1. Has this area been harvested: *Yes/No*
2. If yes, what year was this area harvested: *enter year*
3. Next Anticipated Harvest: *enter year*
4. Next Reevaluation: *enter year*
5. Categorize the Type of Harvest : *(enter 1) low thinning, crown thinning, shelterwood, group selection opening, salvage, other)*
6. If Other: *(list, provide more detail)*
7. Categorize the Timber Type: *(chose as many as needed) Hardwood, White Pine, Red Oak, Hemlock, Field, Wetland (list type), Other*
8. If Hardwood or Other: *(list, provide more detail) – i.e. Es (Early Successional)*
9. Categorize the Size Class: (enter 1) Seedling, Sapling, Pole, Sawtimber, Large Sawtimber, Antique
Seedling (>50% of dominant trees ≤2" dbh) - approx. 0-15 yrs.
Sapling (>50% of dominant trees ≤6" dbh) - approx. 15-30 yrs.
Pole (>50% of dominant trees ≥8" dbh) - approx. 30-50 yrs.
Sawtimber (>50% of dominant trees ≥12" dbh) - approx. 50-80 yrs.
Large Sawtimber (>50% of dominant trees ≥18" dbh) - approx. 80-100 yrs.
Antique (>50% of dominant trees ≥24" dbh) – approx. 100+ years

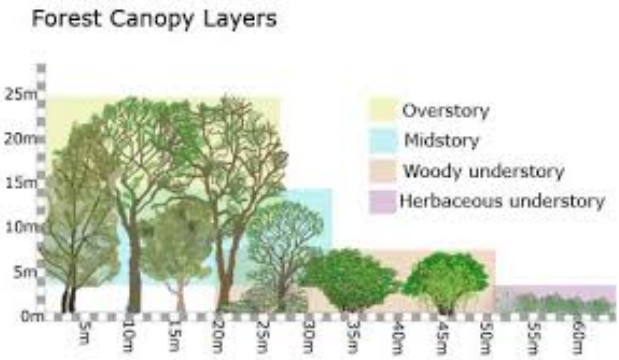


10. Categorize the Canopy Stocking: *(choose 1) none, understocked, adequately stocked, overstocked*
None – canopy absent; generally with surrounding forest matrix
Understocked – canopy closure is less than 50%; promotes advance regeneration and browse development
Adequately Stocked – canopy closure is at the optimum for growth of high quality sawtimber; generally does not need cutting; dappled sunlight reaches ground
Overstocked – canopy at or near the maximum canopy closure; has the highest priority for treatment
11. Provide more Detail (dominant/codominant canopy species): *(list in descending order)*
Dominant – trees with crown extending above the general level of the crown cover and receiving full light from above and almost full light from the sides; crowns wide and relatively full
Codominant – trees with crowns forming the general level of the crown cover and receiving full light from above; crowns wide and full but inferior to dominant's density and spread
12. Provide more detail (overtopped/intermediate canopy species: *(list in descending order)*
Intermediate – trees usually shorter than the dominants and codominants, but crowns sometime extending into the crown cover formed by the dominants and codominants; crowns usually small
Overtopped – trees with crowns always below the general level of the crown cover; crowns usually small
13. Categorize the Midstory Stocking: *(choose 1) none, understocked, adequately stocked, overstocked*
14. Provide more detail (midstory species): *(list in descending order)*
15. Categorize the Regeneration Stocking: *(choose 1) none, understocked, adequately stocked, overstocked*

16. Provide more detail (regeneration Species): *(list – timber species only in descending order)*
17. Invasives Present: *Yes/No*
18. If yes, Level of Infestation: *(choose 1) high, medium, low*
19. If yes Provide more detail: *(list in descending order)*
20. Are there any Logging Conflicts: *(choose 1) No, Yes_Aesthetic, Yes_Recreation, Yes_Natural*
21. If Yes provide more detail: *(list in descending order)*
22. Categorize the Terrain: *(choose 1) inaccessible, steep, moderate, flat*
Inaccessible – not able to log due to no access, excessively steep slopes (>40%), or other extreme natural features such as ledge, cliffs, and water bodies
Steep – slopes generally >30%, may have an abundance of rocky and/ or bouldery terrain
Moderate – slopes generally between 10-30%, may have a limited amount rocky or bouldery terrain
Flat – slopes generally <10%, may have rocky or bouldery terrain, but is sparse
23. Categorize the Skid Distance to Nearest Landing: *(choose 1) Good (0'-1,000)', Fair (1,000'-2,500)', Poor (>2,500)', no access*
24. Is there Insects/Disease: *Yes/No*
25. If yes, level of infestation: *(choose 1) high, medium, low*
26. If yes Provide more detail: *(list in descending order)*

Qualitatively assess the following wildlife features:
none – absent
low – overall low abundance
medium – feature present, but not abundant
high – an abundance of feature

27.Categorize the Hard Mast: *(choose 1) none, low, medium, high*
Hard fruit – acorns, beechnuts, hickory nuts, etc.
28. Provide more detail - Hard Mast: *(list species in descending order)*
29. Categorize the Soft Mast: *(choose 1) none, low, medium, high*
Soft fleshy fruits – apple, cherry, blueberry, etc.
30. Provide more detail - Soft Mast: *(list species in descending order)*
31. Categorize the Understory: *(choose 1) none, low, medium, high*
32. Provide more detail - Understory: *(list – include woody shrubs, herbaceous plants, and groundcover in descending order)*
33. Categorize the Cover: *(choose 1) none, low, medium, high*
34. Provide more detail - Cover: *(list)- **left blank***
(Generally a combination of Regeneration and ***Woody Shrubs)***
35. Categorize the Snags: *(choose 1) none, low, medium, high*
36. Provide more detail - Snags: *(list species if identifiable in descending order)*
37. Categorize the Cavity Trees: *(choose 1) none, low, medium, high*
38. Provide more detail – Cavity Trees: *(list species if identifiable in descending order)*
39. Categorize the Dead & Down: *(choose 1) none, low, medium, high*
40. Provide more detail – Dead & Down: *(list type in descending order)*
brk – breakage (parts of trees that have broken off; generally branches)
bd – blowdown (trees that have either broken off from the main stem and fell to the ground or have been blown over; usually with root ball intact)
se – stem exclusion (natural mortality due to plant competition)
sl – slash (parts of trees that have been left behind after logging; generally tree branches)



1. Overstory = **Canopy**
2. Woody Understory = **Regeneration & Woody Shrubs**
3. Woody Understory & Herbaceous Understory = **Browse**
4. **Regeneration & Browse = Cover**

CANOPY (understocked)

CANOPY (overstocked)

MIDSTORY STOCKING (low)

MIDSTORY STOCKING (medium)

REGENERATION STOCKING (none)

REGENERATION STOCKING (high)

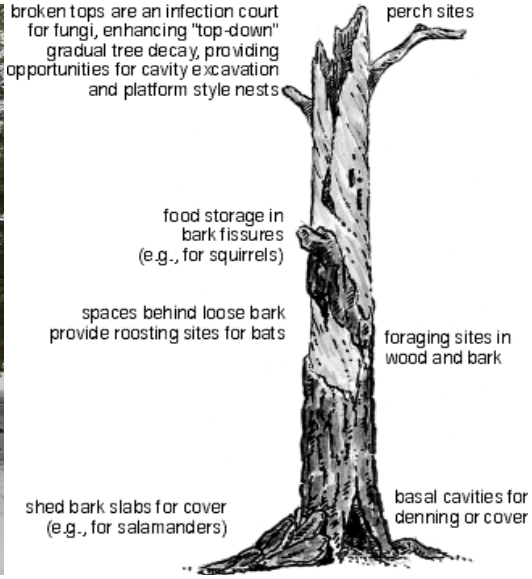
UNDERSTORY (low)

UNDERSTORY (high)

COVER (a combination of regeneration and shrubs)

HARD MAST (acorn)

SOFT MAST (blueberry)



SNAGS

CAVITY TREES

DEAD & DOWN (breakage & blowdown) ***DEAD & DOWN (stem exclusion)***

DEAD & DOWN (breakage)

DEAD & DOWN (slash)

Codes for Data Dictionary

letter code	Data Name		letter code	Data Name
ao	Autumn Olive			
ap	Apple			
as	Aspen			
ay	Ash Yellows			**Timber Type**
ba	Barberry		Ad	Administrative Site
bb	Burning Bush		Es	Early Successional
bbc	Black Birch Canker		Ew	Emergent Wetland
bbd	Beech Bark disease		Few	Fern Wetland
bd	Blowdown		Fi	Field
be	Beech		Fw	Forested Wetland
bev	beaver impoundment		Hk	Hemlock
bg	Black Gum		Hw	Mixed Hardwood
bc	Black Cherry		La	Landing
bh	Beaked Hazelnut		Ot	Other
bi	Bittersweet		Ro	Red Oak
bo	Black Oak		Ss	Scrub-Shrub Wetland
bou	Boulders		Wa	Water
br	Brambles		Wp	White Pine
brk	Breakage			
bu	Buckthorn			
bw	Basswood			
ce	Cedar			**Harvest Type**
ch	Chestnut		Cc	Clear Cut
co	Chestnut Oak		Ct	Crown Thinning
fe	Fern		Gs	Group Selection Harvest
cm	Clubmoss		Ic	Improvement Cutting
el	Elm		Lt	Low Thinning
fo	Forb		Sal	Salvage
gb	Grey Birch		Sl	Selection Thinning
gr	Grass			
grp	Grape			
ha	Hawthorne			
hb	Highbush Blueberry			**Size Class**
hi	Hickory		Se	Seedling Size Class
hik	Hiking		Sa	Sapling Size Class
hk	Hemlock		Po	Pole Size Class
ho	Houselot		St	Sawtimber Size Class
hop	Hophornbeam		Ls	Large Sawtimber Size Class
hs	Honeysuckle		At	Antique Size Class
hwa	Hemlock Wooly Adelgid			
lb	Lowbush Blueberry			

le	Ledge			
li	Lichen			
mb	Mountain Bike			
ml	Mountain Laurel			
mo	Moss			
mr	Multi Flora Rose			
na	no access			
pb	Partridgeberry			
pp	Pitch Pine			
rf	Road Frontage			
rm	Red (soft) Maple			
ro	Red Oak			
sa	Sassafras			
sb	Sweet (black) Birch			
se	Stem Exclusion			
sf	Sweet Fern			
sl	Slash			
slo	Slope			
sm	Sugar (hard) Maple			
stm	Striped Maple			
sw	Swallowwort			
vi	Viburnum			
vs	Viewshed			
wa	White Ash			
wb	White Birch			
wet	Wet			
wh	Witch Hazel			
wo	White Oak			
wp	White Pine			
wpn	White Pine Needle Cast			
yb	Yellow Birch			