

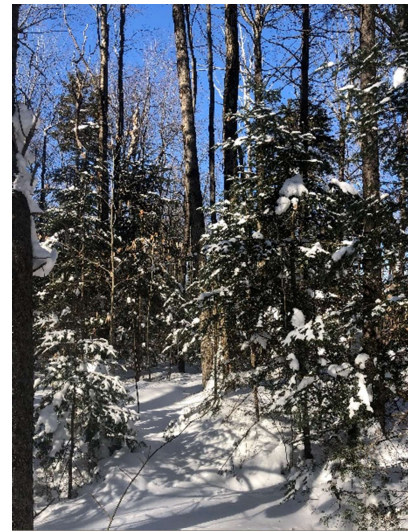
Forest Management Plan (Update)

For lands of: Town of Peru, *Peru Town Forest*

Location: Rock Bottom Lane, Peru VT

Acreage: 105 acres

Date: 2/10/2021



Author:



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Purpose:

Since 1989 the Town of Peru has made clear their commitment to managing the Peru Town Forest (PTF) in accordance with high professional and scientific standards. The goals and objectives expressed in the original 1989 forest management plan included the production of high-quality forest products, the enhancement of wildlife habitat / food sources, and the protection of historical sites on the property that provide a visual record of the past. Later revisions to the forest management plan would include the goal of utilizing the Peru Town Forest as a demonstration site to showcase responsible, intentional, and carefully planned / researched forest management in collaboration with the State of Vermont Department of Forests, Parks, and Recreation. As a demonstration site, the Peru Town Forest is a valuable educational resource for private landowners, their neighbors, and forestry practitioners. This 2021 revision of the forest management plan elaborates on the original goals and objectives to include the protection and preservation of forestland and the many benefits it provides (clean air, clean water, carbon sequestration, etc.), the promotion of forest health and resiliency, a recognition of the world-famous scenery to which this forest contributes, and the enhancement of recreational opportunities. The achievement of these goals will directly benefit the Town of Peru, the residents of the Town of Peru, and all Vermonters.

The 2021 revision of the forest management seeks to accurately describe attributes of the Peru Town Forest including the distribution of natural communities / forest stands, current and potential forest health concerns, wildlife habitat, the current forest resource, and many other conditions. The plan will outline management activities designed to achieve the expressed goals and objectives and prescribes management activities to be conducted over the next 10 years (2021-2031). This forest management plan is meant to be achievable and adaptable and may be amended if warranted. The original 1989 forest management plan, past harvesting activities (within last 31 years), and the 2001 and 2006 updates have been completed or overseen by former Bennington County Forester for the Vermont Department of Forests, Parks and Recreation, Jim White. It is the Town of Peru's desire to continue this relationship with the current Bennington County Forester, Cory Creagan.

Historical Context / Property History:

As is typical of land throughout New England, the land now identified as the Peru Town Forest was cleared for agriculture and existed as a productive farm throughout much of the 19th century. The numerous stone walls, barn and house foundations, and ruins of a former sugarhouse, are the most conspicuous evidence of the past agricultural use on this land. Evidence suggesting the presence of a manmade pond was also observed. Adjacent properties exhibit evidence of similar past uses. The soils of this property are typically rocky and it is most

likely that much of this land was devoted to pasture rather than the large scale production of crops. Agricultural activities on this land ceased sometime in the late 19th or early 20th century and the land began to naturally revert to forestland.



Cellar hole in Stand 2

There is a growing acknowledgement of the fact that the rich human history of Vermont began millennia prior to European occupation of this land. Scholars estimate that human occupation of this region stretches back approximately 11,000 years when Paleoindian peoples first entered the lands now called Vermont. At the time of European contact in the 17th century this area was occupied by Abenaki peoples. Although more permanent settlements are documented primarily in the river valleys, it is likely that native peoples traversed passages through the mountains and hunted in upland areas.

It is recognized that the historical context laid-out above is generally broad. It is recommended that research into the past uses and ownership of this land be pursued at such a time when covid-19 related safety protocols allow for more safe access to Town records. The historical context section of this plan may be updated at any time, without the need for updating any other section.

Current records indicate that this property has been managed for the production of forest products and repeatedly harvested since at least the 1960's, and it is likely that the timber management / harvesting history extends even further into the past. There is little documentation of management activities that took place prior to 1989, however records indicate that much of the PTF was harvested for sawtimber (556 mbf, approximately 50% red spruce) in 1965 when it was part of a larger tract, that 25 acres were treated with a timber stand improvement project (TSI) in 1966, and that a pulpwood harvest was conducted in 1968. The most recent harvesting / management occurred in the mid and late 1990's and was planned and overseen by the Bennington County Forester. Active management in the 1990's used commercial and non-commercial treatments including single-tree selection, group-selection, salvage harvesting, apple-tree release, and deer-yard improvement to achieve multiple goals and objectives including increased timber growth, improved species diversity, and wildlife habitat enhancement. As will be more fully discussed in the individual stand descriptions section of this plan, this past management has done much to shape the forest stands now found on the PTF.

Physical Setting / Environment

The Peru Town Forest is part of large, landscape level network of private and public forestlands that provide essential services and benefits. Adjacent properties are typically forested / rural and used for a combination of recreation, hunting, timber production, and conservation. Management of the PTF will be in keeping with the general nature and character of the surrounding landscape and will seek to enhance biodiversity and the integrity and resiliency of the natural landscape.

The parcel is situated within the Southern Green Mountain biophysical region which is dominated by a combination of high peaks and high plateau and characterized by cool temperatures and heavy precipitation. Growing season in the Southern Green Mountains may be as short as 90 days but is most likely closer to 120 days in this location. The PTF exhibits many of the typical natural communities / forest types of this region including northern hardwood forests, red spruce – northern hardwood forests, and hemlock forests. Terrain on the parcel is best described as nearly-flat / undulating to mildly sloping. Elevations range from 1580ft above sea level in the northeast portion of the parcel, to 1760ft above sea level in the southeast portion of the parcel.

Soil and Water Protection

As is typical of the Southern Green Mountain biophysical region, soils on this property are comprised of deep glacial tills. Soil surveys identify the *Peru fine sandy loam* as the

predominant soil type on this property. Other soil types occurring with significant abundance include the *Tunbridge-Lyman complex*. Together these two soil types cover approximately 95% of the PTF. Both soils are typically deep to bedrock, and further described as “very rocky” / “very stony.” The *Peru fine sandy loam* is the dominant soil type on approximately 80% of the property, is characterized as “moderately well-drained” and covers areas identified as Stands 1, 2, 3, and 5. The *Tunbridge-Lyman complex* is described as “well-drained” and primarily covers areas supporting hemlock forests (identified as Stand 4). Please see appendix for relevant soil type maps.

The PTF is situated within the West River Watershed and within the larger West, Williams, Saxtons River, and adjacent Connecticut River Basin. The West River Watershed encompasses 423 square miles and extends from Mt. Holly to Brattleboro. Waters from this property flow into Cook Brook before entering the Winhall River shortly before its conjunction with the West River. A small intermittent stream is found in Stand 2 and flows south, eventually converging with Cook Brook. This stream has been viewed in the late fall of 2020 and winter of 2021. Further monitoring will take place at every subsequent visit to determine the extent of flow throughout all seasons to determine its nature as either intermittent or perennial.

The protection of water features is a paramount objective of forest management and a key component of any responsible forest management activity. Forest management activities on the PTF will exhibit strict adherence to *Acceptable Management Practices (AMP's) for Maintaining Water Quality on Logging Jobs in Vermont*.

Wildlife & Habitat

It should be recognized that while the 105 acres of the PTF offer distinct wildlife habitat benefits, this property is part of a larger network of lands that support wildlife by providing habitat continuity and connectivity on a landscape level. The PTF is located in an area identified as a “higher-priority habitat block.” The Vermont Fish and Wildlife Department identifies a “habitat block” as a “contiguous area of natural vegetative cover with little or no permanent internal fragmentation from human development.” Large, unfragmented forest blocks serve as critical habitat for many wildlife species in Vermont. The Vermont Fish and Wildlife Department states “Black bear, fisher, otter, bobcats, and other species of wildlife move great distances to find food, water, dens, refuge, and other important habitat resources. Many songbirds require large areas of forest cover that are free from fragmentation and human disturbance. There are many other recognized ecological, social, and economic values of large contiguous forest blocks. These areas represent many of the natural heritage values and support the rural working landscape that makes Vermont unique in the developing landscape of the northeast.” Thousands of unique habitat blocks are mapped throughout Vermont and are typically

separated / delineated from one another by manmade features such as roads. The habitat block in which the PTF is found extends for hundreds of acres and is adjacent to other habitat blocks that extend for tens of thousands of acres. Connectivity between unique blocks, or the ability of wildlife to use areas as connective corridors, is essential for movement and survival of many species. The Vermont Fish and Wildlife Department States “Wildlife corridors (also referred to as wildlife connecting habitat or linkage habitat) are lands and waters that connect larger patches of habitat together within a landscape and allow the movement, migration, and dispersal of animals and plants. Maintaining a connected landscape of this type will not only allow continued movement and migration of wildlife now, but is the primary strategy to maintain biological diversity over the long term, especially in the face of a rapidly changing climate.” The lands of the PTF should therefore not be considered for wildlife benefits or habitat function only in isolation, but rather as part of a large matrix of connected lands that provide essential habitat and connectivity to a variety of wildlife species.

Field visits were conducted primarily in the winter of 2020-2021 and observations of wildlife were limited. Evidence of white tailed-deer, tracks of various mammals, evidence of past bear feeding on beech trees, and snowshoe hare were observed during site visits and a potential vernal pool was found in stand 1. A vernal pool is a unique wetland community described by the Vermont Fish and Wildlife Department as “...small (generally less than 1 acre), ephemeral pools that occur in natural basins within upland forests....perhaps best known as breeding habitat for amphibians. Typical Vermont species that rely heavily on vernal pools for reproduction include the mole salamanders (spotted salamander, blue-spotted salamander, and Jefferson salamander), eastern four-toed salamander, and wood frog. For vernal pools to be effective breeding habitats for amphibian populations, they must retain water for at least three months during the spring and summer breeding season in most years so that amphibians can complete their larval stage. The periodic drying of a vernal pool excludes populations of predatory fish and diving beetles that prey on amphibian larvae. Other animals use the pools as well, such as fairy shrimp, fingernail clams, snails, eastern newts, green frogs, American toads, spring peepers, and a diversity of aquatic insects. The amphibians and invertebrates found in vernal pools constitute a rich source of food for various species of mammals, reptiles, and birds such as wood ducks, mallards, black ducks, and great blue herons. Despite their small size and temporary nature, vernal pools are highly productive ecosystems.” Monitoring of this wetland community for its authenticity as a vernal pool will be undertaken prior to conducting future management activities so that appropriate protections can be implemented.

Individual stand descriptions found later in this plan will discuss unique habitat characteristics and wildlife benefits that may be managed / enhanced in the varying forest stands of this property. In general terms, the management strategies outlined in this plan will seek to enhance preferred cover for white tailed deer and snowshoe hare, improve browse

opportunities and mast production, create more diverse vertical and horizontal structure across the property, protect and improve amphibian habitat, maintain a component of large trees and snags that provide roosting, denning, and feeding opportunities, and will protect this property from development and land-use conversions and will preserve its forested condition.

A search of the Vermont Agency of Natural Resource's *Natural Resource Atlas* found that no occurrences of Rare, Threatened, or Endangered (RTE) animals and / or plants are known / recorded on this property. It is recommended that managers consult the *Natural Resources Atlas* prior to commencing future management activities and whenever updating the forest management plan to monitor for the presence of any known RTE plants or animals. Similarly, on-the-ground monitoring / observations for RTE species will be an essential aspect of site visits to the property. If it is determined that a rare species is found on the property, potential impacts to that species will need to be addressed when any forest management activity is proposed. Forest management activities would need to be appropriately timed and carried out in a manner that minimizes impact to the species and habitats.

Forest Health

Emerald Ash Borer / Ash Yellows Disease: Native to regions in Asia, the Emerald Ash Borer (EAB) is a wood-boring pest of ash trees first detected in the U.S. in 2002. The EAB is now found in numerous U.S. states and Canadian provinces and has been responsible for the death of millions of ash trees. This pest is most recognizable in its adult beetle stage, however it is the larval stage which feeds on the inner-bark and phloem of its host tree, subsequently girdling and killing the tree. Infestations of the EAB have been detected in numerous locations throughout Vermont. Properties directly to adjacent to the PTF are now considered within a "confirmed infested area" while the PTF is mapped within the High Risk Area (see appendix map *Peru TF proximity to confirmed EAB infestation*). It is worth noting that portions of the PTF are less than 300 ft outside of the "confirmed infested area." No evidence of EAB was observed during the 2020 / 2021 field visits, however the ash population on this property should be considered "high risk" for future infestation.

Ash Yellows Disease is caused by a microorganism (phytoplasmas) that invade the phloem sieve tubes and disrupt the trees vascular system. The disease causes gradual decline and can result in mortality of the host tree in 5 – 10 years. This disease was first identified in 1971 and is now widespread throughout Vermont. Past management plans recorded no symptoms of ash yellows on the PTF, however the recent 2020 / 2021 review and inventory found a high proportion of ash stems exhibiting symptoms to varying degrees of severity, as well as many standing-dead ash. The most common symptoms exhibited by the ash population on the PTF

include die-back in the crowns of stems in all canopy positions, vertical cankers / cracks at the base of trunks, shortened internodes / slow twig growth.

Managers should consider how the declining health of the ash population due to Ash Yellows Disease may exacerbate / accelerate the impacts of a potential EAB infestation. Harvesting of ash trees on this property will adhere to *Vermont's Recommendations to Slow the Spread of Emerald Ash Borer When Moving Ash from the Infested Area*.

Forest Tent Caterpillar: Infestations of the Forest Tent Caterpillar are of concern due to the presence of maple species in multiple stands. The Forest Tent Caterpillar is a native species that can cause extensive defoliation to broadleaf species throughout the United States and Canada. Significant outbreaks or infestations appear to occur on a cyclical basis and can occur anywhere from every 6 – 16 years. The caterpillar, which feeds on the leaves of the host tree, is the larval stage of the moth. Hard maple (sugar maple) is the preferred food source for the larvae / caterpillar. Significant defoliation over one or more years can significantly slow growth rates, cause reduction in crown size, and death for already-stressed trees. Chemical control methods are available but are expensive and are cost-prohibitive in a forest setting. Other methods of control include removing egg masses in the spring, or other biological controls. The 2006 update to the forest management plan noted damage as a result of a recent forest tent caterpillar infestation, however no recent damage was noted during the 2020 / 2021 inventory and the maple population appears vigorous and healthy at this time. Periodic inspections in the springtime are encouraged to determine if a significant infestation is present and to assess the extent of damage.

Hemlock Woolly-Adelgid (HWA) and Elongate Hemlock Scale: Native to East Asia, the HWA was first identified in the western U.S. in 1920. HWA is now found throughout the eastern U.S., including Vermont. The HWA attacks the twig tissue of hemlock trees and feeds on stored starch reserves. These starch reserves are vital to the long-term survival of individual trees, and without these reserves a tree will eventually die. Symptoms of an HWA infestation include discolored / yellowing needles, needle drop, branch dieback, and thinning crowns. An infested Hemlock tree may experience mortality within 4 years of infestation, however the decline and mortality process usually takes 6 - 8 years. Current research into controlling the HWA is focused on biological controls. No symptoms of the HWA were observed on this property and the hemlock population should be considered of good health. It is recommended that Stand 4 be regularly monitored for detection of HWA.

Invasive Plants

Populations of invasive plants are typical of properties in Vermont and throughout the northeast, especially on those properties with a history of past agricultural use. In the past,

these plants were imported and planted as ornamentals or to serve utilitarian purposes on farms. As agriculture declined, and crop-fields and pastures were abandoned, these plants quickly colonized the newly abandoned land. With the ability to flourish in such a habitat, and a lack of predators or controlling species, these invasive species proliferated across the land. In the context of forestry, invasive plants are problematic because they often prevent the regeneration of native tree species, which is the main goal of many forest operations and is an essential aspect of sustainable forest management. By occupying growing space that would otherwise be available to native plants, populations of invasive plants disrupt the native environment and cycles of succession. Invasive plants negatively impact many species of wildlife by displacing the native plants they depend on. Active forest management (harvesting) often results in the inadvertent release and proliferation of invasive plant populations, however control of / reductions in the populations of invasive plants can also be a key component of a forest management plan.

Populations of invasive plants are relatively low on the PTF. Recorded observations of invasive plants were limited to scattered individuals and small clusters of Japanese Barberry in limited portions of Stand 2 (primarily adjacent to historic home site). If addressed immediately and routinely, it is likely that the spread of this population could be controlled through mechanical removal of plants. Control of the invasive population on this property could entail an initial treatment. This treatment could entail the mechanical removal of Japanese Barberry prior to any upcoming management work (timber harvesting) and annual monitoring for new growth of invasive plants, accompanied by any additional mechanical removals, for the duration of this 10 year planning period.

Access System

A limited road / skid-trail system provides access to portions of all stands. All skid trails / roads were stable (not exhibiting erosion) at the time of the 2020-2021 management plan update. An established landing / decking area on the west side of rock bottom lane will service stands 1, 4, and 5. Due to this landing's proximity to a vernal pool, an expansion of this landing southward will be prohibited. All practicable efforts towards reducing the size of, and area of disturbance of this landing shall be taken during future uses. An established landing / decking area on the east side of rock bottom lane was found to be established partially in an area of poorly-drained / saturated soils. It is unclear whether these conditions existed at the time the landing was established, developed as the result of drainage structures installed on rock bottom lane, or resulted from changes in hydrology. In an effort to avoid undo damage to easily degraded soils, it is recommended that this landing be abandoned and a new landing be established east of rock bottom lane in a suitable location. Use of all infrastructure (landings, truck roads, skid

trails, etc.) will exhibit strict adherence to *Acceptable Management Practices (AMP's) for Maintaining Water Quality on Logging Jobs in Vermont*.

Recreation

Current recreational infrastructure is limited to a roughly 250' section of catamount trail which crosses PTF land west of rock bottom lane in the north-western portion of the property. This section of the catamount trail also runs along the western boundary of the property on adjacent USFS land. Evidence was observed suggesting that some portions of the limited road network are also occasionally used for horse-back riding.



Signage appears on the catamount trail just west of the trail crossing with rock bottom lane

Other recreational opportunities include off-trail hiking, snowshoeing, cross-country skiing, and bird / wildlife viewing. Opportunities for hunting or foraging also exist on this property. Forest

management activities are typically compatible with recreational interests. In many cases, the trail and road networks created by management activities can double as recreational infrastructure to be used in the years (often decades) between management entries. Assistance with recreational planning can be provided by partners such as UVM Extension, and the Vermont Department of Forests, Parks, and Recreation. Grants for recreational are often available through the National Forest Foundation Grant. The Bennington County Forester would be happy to assist the Town of Peru in recreational planning.

Boundary Lines

Proper boundary line delineation can help protect against trespass and timber theft and helps maintain good relationships with neighbors. A majority of boundary lines are currently well marked with axe blazes, stone walls, paint, or some combination thereof. A majority of the property boundary is shared with adjacent National Forest lands and are will marked and easily identified, however markings with adjacent private landowners have become faded or are absent. It is recommended that all boundary lines be re-painted as soon as possible and prior to any future management activities. It is further recommended that boundary maintenance / re-painting be performed on a 5-year schedule.

Individual Stand Descriptions (See appendix, page 33 for forest stand map)

STAND 1: Northern Hardwoods (Red Spruce – Northern Hardwood Forest)

Structure: Uneven-aged **Acreage:** 14 **Site Class:** I / II

Sample Plots Taken: 5 (BAF 10)

General Stand Statistics

*TPA	**QMSD	***AGS BA	****UGS BA	Total *****BA
150	11.4	53 sqft/ac	55 sqft/ac	108 sqft/ac

*Trees Per Acre

**Quadratic Mean Stand Diameter

***Acceptable Growing Stock

****Unacceptable Growing Stock

*****Basal Area (square feet / acre)

Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	23	3	26
12"-16"	20	24	44
18"+	10	28	38
TOTAL	53	55	108

*Diameter at Breast Height

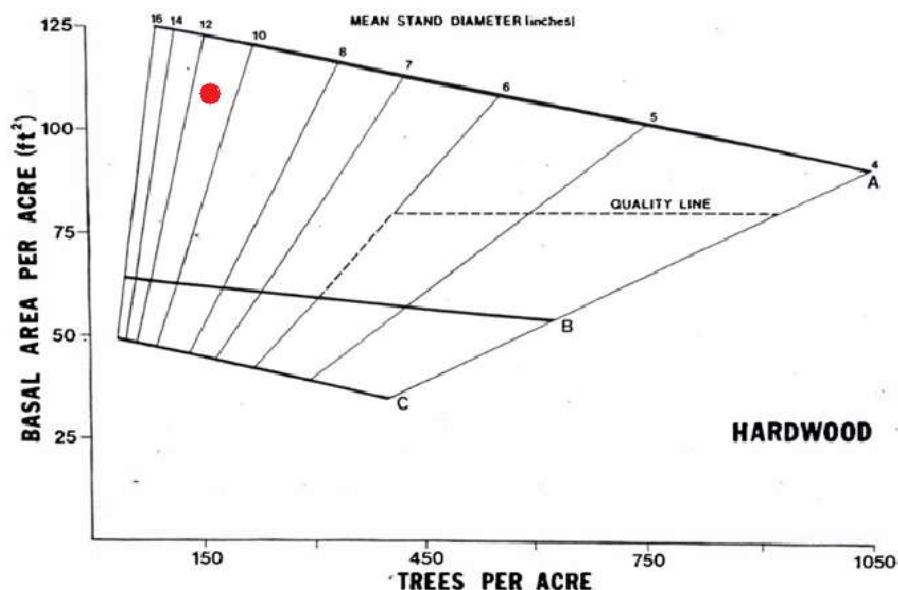
Percent Basal Area of Major Species

SPECIES	STAND TOTAL
Red Maple	37%
Hard Maple	14%
Red Spruce	12%

Current stand conditions, historic aerial imagery, and past harvesting records indicate a high likelihood that this stand saw heavy removals of red spruce and hardwood sawtimber in the mid 1960's. Non-merchantable and lower-quality stems, primarily of hardwood species, were left to comprise the residual stand. The disproportionate presence of such stems in the post-cut stand is evidenced by the high proportion of UGS now present in the sawtimber diameter classes, especially in the 18" dbh and larger diameter classes. This same past harvesting created available growing space for the establishment of a new cohort of stems that has now grown into the poletimber diameter classes. As is illustrated in the Diameter Distribution table above, this youngest cohort, appearing primarily in the 6"-10" diameter classes, exhibits an excellent AGS:UGS ratio in comparison with the 12" dbh and larger diameter classes. The high proportion of UGS in this stand is more the result of past management practices rather than the result of natural development or site capabilities.

Although not reflected in the inventory taken at any of the 5 sample plots recorded in this stand, a significant component of softwood (primarily red spruce) has established throughout much of this stand. This softwood component is currently found primarily as saplings and small poletimber stems in the understory, and less commonly as scattered overstory stems of the sawtimber diameter classes. As stands of this type mature, red spruce and other softwoods often become a more dominant species in the overstory, however this successional trend is often been set back, as is likely the case with this stand, by human interference (harvesting of the softwood). Managing such stands for a more significant component of softwood can provide habitat for wildlife not common in other forest types, including snowshoe hare, which were observed during the inventory of this stand, and is more supportive of natural successional trends.

Stocking Guide for Main Crown Canopy of Even-aged Hardwood Stands



The stand is "fully stocked" and current stocking levels are adequate for promoting acceptable rates of growth and promoting the development of good-quality stems, however overall rates of growth and accretion, especially of higher value forest products, is likely reduced by the component of unacceptable-quality / low-quality and low-vigor stems now present in the stand. Potential establishment and growth of the previously mentioned softwood component is similarly being impeded by the presence of low-quality / low-vigor hardwood stems in the overstory.

Due to the high proportion of UGS now present in the stand, the presence of an established component of acceptable-quality softwood regeneration throughout much of the stand, and

the potential for management that compliments natural successional trends, it is advised that this stand be managed with the “expanding gap” or “femelschlag” approach. The use of this management approach will function to promote uneven-aged structure utilizing an area-control approach, reduce the proportion of UGS in the stand and promote the establishment of desirable species, encourage the establishment of the softwood component, and improve wildlife habitat.



Red spruce and balsam fir advance regeneration is established throughout much of the understory.

Treatment: Apply the “femelschlag” / “expanding gap” method to regenerate 25% of the stand with an initial entry. Gaps will range in size from 1/8 to 1/2 acre in size and shall be placed in portions of the stand supporting high proportions of UGS, mature stems, or high proportions of softwood advance regeneration. Where possible, gaps should contain, or be situated adjacent to, reproductively mature red spruce. Individuals of red spruce or other desirable species shall be retained within gap-cut areas to promote the regeneration of shade-tolerant spruce, temper site conditions, and act as a continued seed source. All other stems, excepting those selected for retention, down to 2” dbh shall be removed / severed within gap-cut areas. Overstory stems selected for retention should be sound, vigorous, and reproductively mature and should be retained at a rate of 10% to 30% of pre-treatment stocking levels. Coarse woody debris at least 20” in diameter shall be recruited when absent within gaps to the maximum extent practical and at a minimum of at least one stem / occurrence in each gap.

A re-entry in 15 – 20 years will expand upon the initial gaps by establishing gap-cuts on the next 25% of the stand area directly adjacent to existing gaps. This treatment regime will be repeated every 15 – 20 years, with adjustments in timing made as necessary. Given an operable stand area of approximately 12 acres (excluding buffer area surrounding vernal pool and landing area and roadside visual buffer) this treatment schedule / cycle will seek to establish 4 unique age classes / cohorts and sets a rotation age of approximately 60 – 80 years for each unique cohort.

This treatment will serve as a demonstration of the “femelschlag” / “expanding gap” management method to implement uneven-aged management, promote the recruitment of red spruce, and enhance wildlife habitat.

STAND 2: Northern Hardwoods

Structure: Uneven-aged Acreage: 48 Site Class: II

Sample Plots Taken: 14 (BAF 10)

General Stand Statistics

*TPA	**QMSD	***AGS BA	****UGS BA	Average *****BA
156	11.4	85 sqft/ac	27 sqft/ac	112 sqft/ac

*Trees Per Acre

**Quadratic Mean Stand Diameter

***Acceptable Growing Stock / Acre

****Unacceptable Growing Stock / Acre

*****Basal Area (square feet / acre)

Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	26	6	32
12"-16"	36	8	44
18"+	23	13	36
TOTAL	85	27	112

*Diameter at Breast Height

Percent Basal Area of Major Species

SPECIES	STAND TOTAL
Red Maple	49%
Hard Maple	24%
Black Cherry	13%

As with other stands on this property, an initial cohort established naturally following abandonment from agricultural use. While this initial cohort developed as an even-aged stand, subsequent repeated harvesting / management has resulted in the establishment of multiple age classes and a transition to uneven-aged structure. The earliest record of a harvest on this property dates to the 1960's, however it is likely that harvesting in this stand also occurred prior to that date. The most recent treatment took place in 1993-94, was supervised by then Bennington County Forester, Jim White, and used a combination of "single tree selection" and "group selection" harvesting methods. The expressed goals of this harvest were to "salvage" / harvest mature and declining white birch sawtimber, release the white pine and well-formed hardwood stems, and to release apple trees by removing adjacent unacceptable-quality hardwoods. A summary report written at the completion of the harvest also documented some "thinning" and "weeding" operations in some portions of the treatment area and described seven "patch cuts" made in an effort to regenerate aspen.

Although not all expressed goals of the 93-94 harvest were realized, the last treatment did succeed in improving available growing space for good-quality stems in the poletimber and sawtimber diameter classes, reducing the proportion of mature / over-mature white birch, and in establishing a new cohort of vigorous and desirable hardwood stems throughout much of the stand area. Areas of newly regenerated forest provided excellent browse and cover. Cavity trees were retained and multiple stems were girdled to create snags throughout the harvest area for associated wildlife benefits. The numerous “group selections” / “patches” created for aspen regeneration did not result in the successful regeneration of aspen, however these areas are now fully stocked with vigorous red maple and hard maple large sapling sized and small poletimber sized stems (it is also possible that some aspen regeneration did establish but did not persist due to intense competition and shading from larger adjacent stems).



Though released in the last harvest, this apple tree (center of photo with ski poles) is now being overtopped by a vigorous cohort of young hard maple, red maple, and ash

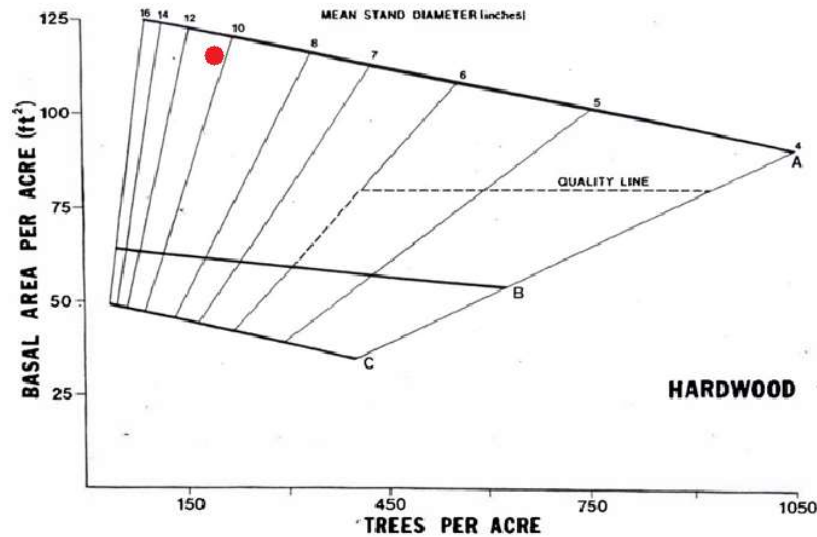
The 24 apple trees released during the 93-94 harvest do not appear to have responded with any improved vigor and have once again been overtopped by vigorous maple poletimber. Apple

stems generally appear to be of extremely low vigor and exhibit few live branches, and several standing dead apple trees were observed.

The 2001 forest management plan called for a removal of large-diameter trees of poor form, the expansion of group openings to release aspen regeneration, and an improvement thinning to remove unacceptable quality stems and sawtimber in some areas of the stand, however this work was not carried-out. The 2006 forest management plan amendment revised the 2001 prescription to call for 8 ¼-acre group-selections / patch cuts, however this work was also not carried-out. The 2020-2021 field review, inventory, and analysis found that this stand continues to transition to uneven-aged structure and is now characterized by the presence of a vigorous, young cohort of red maple and hard maple saplings / poletimber (often in nearly pure pockets established following group-selection treatments), components of good-quality immature poletimber and sawtimber that were released during the 93-94 treatment, and a component of larger mature / over-mature and defective sawtimber. As can be observed in the diameter distribution (**Average Basal Area / Acre by Diameter Class (Diameter Distribution)**) table on the previous page, the 18" dbh and larger diameter classes contain nearly 50% of UGS stocking while comprising only 30% of the overall stocking. In comparison with smaller diameter classes (6"-16" dbh), the 18" dbh and larger classes have twice the proportion of UGS (18% UGS vs. 36% UGS respectively). Although large diameter (18" dbh and larger) UGS are found throughout the stand, they are not uniformly distributed and often occur in small groups (up to 1/3 acre in size) where they represent especially high proportions of the stocking.

Despite localized variations in predominant age classes, quality, and species composition, overall stocking is fairly uniform throughout this stand. The stand is "fully stocked" and current stocking levels are adequate for promoting acceptable rates of growth and the development of good-quality stems, however the stand is approaching "overstocked" conditions (see stocking guide on page for illustration). "Overstocked" conditions are said to exist when all available growing space is occupied and competition between trees is excessive. If allowed to persist, "overstocked" conditions will lead to slower rates of growth and accretion. As previously mentioned, past management plans have prescribed work to reduce stocking levels, however this work has not been completed. It is likely that the work prescribed in the 2001 forest management plan and 2006 amendment was designed to reduce stocking to more productive levels through targeted removals of low-quality stems in the larger diameter classes. Similar treatments, if conducted at this time, could function to reduce the proportion of UGS in this stand, harvest mature / over-mature and high risk stems, create additional available growing space (reduce stocking levels to more productive levels), focus stand resources on more vigorous and best-quality stems, and improve overall growth rates and productivity.

Stocking Guide for Main Crown Canopy of Even-aged Hardwood Stands



Evidence of past black bear feeding was observed on several beech trees in this stand. Beech trees produce hard mast (beech nuts) which are rich in fats and protein and are a superior food source for black bear as they ready for hibernation. Black bear often climb beech trees to reach the nuts that are suspended high in the crown of the tree, leaving their claw marks scratched into bark. Beech trees exhibiting these conspicuous marks are generally referred to as “bear-clawed beech.” An individual bear may re-visit a particular tree year after year to harvest beech nuts. The most recent claw marks exhibited in the PTF appear to be several years old, however these trees should be protected and forest managers should seek to enhance their vigor and health for the associated benefit of black bear.

TREATMENT:

(1) Utilize a combination of single-tree selection and group selection to reduce stocking to more productive levels, focus growth on the best-quality and most vigorous stems, and create conditions favorable for the establishment of a new cohort.

Diameter Objectives for Major Species

SPECIES	DBH
Red Maple	18"
Hard Maple	20"
Black Cherry	18"

The single-tree selection method will be applied on approximately 75% of the stand. UGS from throughout the diameter classes, mature / over-mature and declining stems in the 18"+ dbh

diameter classes, and overstocked stems in all diameter classes will be prioritized for removal. Average basal area per acre will be reduced to 75sqft – 85sqft per acre. Well-formed and vigorous stems of all species will be favored for retention. Retain / release individuals of white birch, black cherry, white pine, red spruce, and balsam fir to promote species diversity. See table below for target post-cut diameter distribution.

Post-Cut Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	25	4	29
12"-16"	31	4	37
18"+	11	4	15
TOTAL	68	12	80

The group selection method will be applied on approximately 6% of the stand area (10% of treatment area). Individual groups will range in size from 1/10 acre to 3/4 acre. Group-selections will be placed in areas of the stand supporting above average levels / proportions of red maple UGS and / or mature, over-mature, or declining stems, or in areas supporting significant quantities of desirable advance regeneration (including advance spruce, fir, and hard maple regeneration). Standing snags and trees with cavities will be retained for wildlife value. Tops of felled trees should be left unlopped to help protect the young cohort from over-browsing. Coarse woody debris at least 20" in diameter will be recruited at a rate of at least 1 stem per acre. Historic / cultural sites including cellar-holes, barn foundations, and stone-wall complexes have been identified in this stand. A protective buffer will be placed around such historic sites in order to prevent disturbance of these sites. A minimum 100' buffer zone will also be placed along Rock Bottom Lane in order to reduce the visual impact of the harvest. Harvesting activities will be carried out at a significantly reduced intensity within this visual buffer zone.

(2) Complete a "mast-tree release" / "crop-tree release) on any beech exhibiting past evidence of black bear feeding. Such trees are typically referred to as "good mast producer(s)." This work may be carried-out in conjunction with other prescribed treatments, but may also be completed as a stand-alone treatment. Release selected beech crop trees using a crown-thinning on 3 sides approach. Retain "guard trees" south of released crop trees to protect against sun-scald. This treatment will improve growing space and resources available to the selected crop-trees, thereby promoting vigor, crown growth, improved mast production and enhanced feeding opportunities for black bear.

These treatments will serve as a demonstration of typical uneven-aged management methods in a balanced uneven-aged northern hardwood stand with a compatible wildlife objective.

STAND 3: Northern Hardwoods (White Ash / Hard Maple)

Structure: Even-aged **Acreage:** 9 **Site Class:** II

Sample Plots Taken: 5 (BAF 10)

General Stand Statistics

*TPA	**QMSD	***AGS BA	****UGS BA	Average *****BA
148	13.4	115 sqft/ac	30 sqft/ac	145 sqft/ac

*Trees Per Acre

**Quadratic Mean Stand Diameter

***Acceptable Growing Stock / Acre

****Unacceptable Growing Stock / Acre

*****Basal Area (square feet / acre)

Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	20	3	23
12"-16"	31	24	55
18"+	64	3	67
TOTAL	115	30	145

*Diameter at Breast Height

Percent Basal Area of Major Species

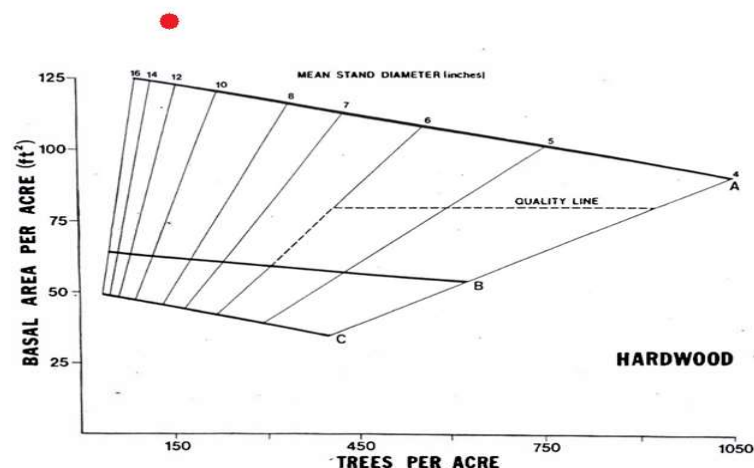
SPECIES	STAND TOTAL
White Ash	64%
Hard Maple	20%

There is no documented management history in this even-aged stand, however evidence of past sugaring activities was observed (foundations of old sugar house / arch). It is likely that this area was once managed for the production of maple sap, and that hard maple (sugar maple) once comprised a much larger proportion of the overall species composition. Most of the maple trees that once comprised the "sugarbush" were likely harvested following abandonment from use. A nearly 100% harvest (early 20th century) of the maple overstory created conditions favorable for the regeneration of desirable hardwood species and allowed for the establishment of a new cohort of white ash. This cohort of white ash is now approximately 100 years old. The current cohort has developed well and all dominant and codominant stems have now grown into the sawtimber diameter classes. Past forest management plans have called for an intermediate thinning to reduce basal areas to more productive levels, however this work has not been carried-out.

Adequate stocking levels appear to have persisted throughout the development of this even-aged stand and have led to the development of good-quality / excellent-quality stems. Excellent-quality white ash sawtimber now occupies a large majority of the dominant and codominant canopy positions. While white ash represents approximately 64% of the species composition in general, the percentage of ash in dominant and co-dominant overstory positions is significantly more. Although the diameter distribution (**Average Basal Area / Acre by Diameter Class (Diameter Distribution)**) table on the previous page shows significant stocking in the poletimber and small sawtimber diameter classes, the presence of trees in multiple diameter classes should not be construed as indicating multiple age classes. Most trees remaining in the poletimber and small-sawtimber diameter classes are found in suppressed or intermediate canopy positions where individual tree growth and vigor is reduced. These trees often exhibit the low-vigor and reduced growth that is typical of stems in less than advantageous canopy positions. Although these trees exhibit relatively small diameters, they are similar in age to the much larger dominant stems. As is typical of sawtimber-sized even-aged stands, there is very little advance regeneration present and virtually no understory.

“Overstocked” conditions have now persisted in this stand for some time (see stocking guide below for stand location in red). “Overstocked” conditions are said to exist when all available growing space is occupied and competition between trees is at its height. If allowed to persist, “overstocked” conditions will lead to slower rates of growth and accretion. As previously mentioned, past management plans have prescribed work to reduce stocking levels, however this work has not been completed. It is likely that this work would have focused on removing much of UGS in the 12”-16” dbh classes.

Stocking Guide for Main Crown Canopy of Even-aged Hardwood Stands



Due to the high proportion of ash in this stand, past management plans have identified “Ash Yellows” as a concern. Similarly, the Emerald Ash Borer, recently detected in nearby locations, is a serious concern in this stand. This property is within the “high risk” area associated with a nearby confirmed infestation and is directly adjacent to the confirmed infestation area.

Although the EAB has not been detected on this property, much of the ash population is now showing symptoms of advanced decline consistent with “Ash Yellows.” Many stems exhibit extensive dieback in the crown and numerous standing dead stems were observed. Stressed and declining stems have proven to be attractive to EAB and this stand should therefore be considered as being at increased risk for a future infestation.

Due to widespread decline in the ash population, maturity of the stand, and overstocked conditions, it is recommended that this stand be regenerated with an even-aged management treatment.

TREATMENT: Implement a “reserve tree” / “seed-tree” harvest on approximately 7 acres of this stand. Cut / remove all stems down to 2” DBH, excepting those stems selected as “leave-trees” / “seed-trees.” The retention of “seed-trees” will act as a continued source of seed and may influence species composition in the newly regenerated stand. Individuals selected as “seed-trees” shall be vigorous, thrifty, and of seed-bearing age and will be selected at a rate of approximately 10 stems / acre. Vigorous white ash showing little or no symptoms of decline will be prioritized for selection as leave trees. Some scattered hard maple stems (remnants of former sugarbush) will also be favored for retention. Standing snags and trees with cavities will be retained for wildlife value. Stocking levels in the post-cut stand will be variable and will range from 0 sqft/acre to 30 sqft/acre (BAF 10). Tops of felled trees should be left unlopped to help protect the young cohort from over-browsing.

This harvest will function to regenerate this stand with a cohort of desirable hardwood species and create an area of early successional habitat for the benefit of associated wildlife. Coarse woody debris at least 20” in diameter will be recruited at a rate of at least 1 stem per acre.

This treatment will serve as a demonstration of an even-aged regeneration treatment in a stand of maturing / mature and declining northern hardwoods and seeks to highlight the value of retaining desirable overstory trees to act as a seed source.

STAND 4: Eastern Hemlock

Structure: Even-aged Acreage: 19 Site Class: I

Sample Plots Taken: 6 (BAF 10)

General Stand Statistics

*TPA	**QMSD	***AGS BA	****UGS BA	Total *****BA
174	13.4	130 sqft/ac	42 sqft/ac	172 sqft/ac

*Trees Per Acre

**Quadratic Mean Stand Diameter

***Acceptable Growing Stock

****Unacceptable Growing Stock

*****Basal Area (square feet / acre)

Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	20	8	28
12"-16"	57	14	71
18"+	53	20	73
TOTAL	130	42	172

*Diameter at Breast Height

Percent Basal Area of Major Species

SPECIES	STAND TOTAL
Eastern Hemlock	74%
American Beech	12%

Past management plans have noted the potential for this stand to serve as a deer-wintering area and as a “travel corridor” for white-tailed deer traveling to identified deer wintering areas on adjacent lands. Stands such as this one, being dominated by mature softwood trees and exhibiting contiguous crown cover, provide critical cover / habitat in the winter and are important for sustaining Vermont’s deer herds. Wintering habitat is considered the cornerstone of a deer’s annual life cycle. It is estimated that this essential habitat makes up less than 10% of Vermont’s forests, and while hemlock stands typically provide superior cover, a majority of deer wintering areas are dominated by spruce and fir. Improving deer wintering habitat and creating conditions that would make this area more favorable as a “travel corridor” have been identified as priority management objectives for this stand in the past. An entry in 1996-1997 removed or girdled much of the hardwood in this stand in an effort to release hemlock individuals, promote softwood cover, and increase the amount of available browse. Eastern hemlock now comprises nearly 75% of the overall stocking and comprises nearly 100% of stems in dominant canopy positions. American beech appears to have been intentionally released to provide a food source

in this stand. While this species is not preferred for browse and does not contribute significantly to creating cover in wintering areas, the nuts produced by mature beech trees are highly nutritious, contain a high fat content, and are highly beneficial for deer. Small pockets of other hardwoods provide an opportunity for a winter food source, however most hardwood stems have now reached the sawtimber diameter classes and very little low-browse was observed as being available to deer.

According to accepted silvicultural manuals and stocking guides for stands of this type, this hemlock stand is “fully stocked” but contains ample available growing space for the continued growth and development of the stand. The stand is not in danger of becoming “overstocked” during this planning period, however many stems are of large diameters and can be considered mature or over-mature. Given that a primary objective of this stand is management as a “deer-yard” or deer-wintering area, management of this stand will need to consider how and when silvicultural activities are appropriate for promoting deer habitat. Guidance documents created by the Vermont Fish and Wildlife Department suggest the use of thinning and small group-selections in hemlock deer-yards, however also make clear that, in some cases, harvesting may not be appropriate. As stated in *Management Guide for Deer Wintering Areas in Vermont* “under some conditions, a no-cut decision is appropriate for a hemlock wintering area. Examples include very small wintering areas where tree removal will destroy shelter value of the canopy, stands with a high percentage of very large or poor quality stems where a commercial operation will lead to stand degradation, or where conditions suggest that hemlock regeneration will be unsuccessful. In such cases, the land-owner, forester, and a wildlife biologist should evaluate the wintering area and surrounding acreage...”

TREATMENT: At this time no treatments are being recommended in this stand for this 10-year planning period. In keeping with the above recommendation, the Bennington County Forester has scheduled a review of this stand in March of 2021 with a Vermont Fish and Wildlife Biologist to further assess whether any treatments are appropriate for enhancing deer habitat during this planning period. If after analysis by the biologist a beneficial treatment is identified, an amendment will be made to this management plan describing such treatment, submitted to the Town of Peru Selectboard and made public for review / comment.

Treatment or non-treatment in this stand will serve as a demonstration of deer-yard / deer wintering habitat management.

STAND 5: Northern Hardwood

Structure: Even-Aged (Two-aged) Acreage: 15 Site Class: II

Sample Plots Taken: 7 (BAF 10)

General Stand Statistics

*TPA	**QMSD	***AGS BA	****UGS BA	Average *****BA
252	9.5	76 sqft/ac	48 sqft/ac	124 sqft/ac

*Trees Per Acre

**Quadratic Mean Stand Diameter

***Acceptable Growing Stock / Acre

****Unacceptable Growing Stock / Acre

*****Basal Area (square feet / acre)

Average Basal Area / Acre by Diameter Class (Diameter Distribution)

*DBH	AGS	UGS	TOTAL
6"-10"	44	12	56
12"-16"	15	10	25
18"+	17	26	43
TOTAL	76	48	124

*Diameter at Breast Height

Percent Basal Area of Major Species

SPECIES	STAND TOTAL
Red maple	41%
Yellow birch	24%
Hard maple	10%

Records show that a much of this area was “clear cut” approximately 40-50 years ago. Other portions of the stand, especially areas west of rock bottom lane appear to have been heavily cut while some areas were also treated with a Timber Stand Improvement (TSI) treatment. Although unique treatments were applied to distinct portions of this stand in the past, this area is now being combined into one stand due to similarities in species composition, stocking, and structure.

The 1989 forest management plan shows that 15 years after treatment the area was dominated by a cohort of white birch and soft maple saplings. 11 years later the 2001 forest management plan documented the advancement of this cohort into the poletimber diameter classes and reflected a shift in species composition by also listing yellow birch and beech as primary species. The 2021 inventory found that this stand is now broadly characterized by a cohort of good-quality, vigorous poletimber and small-sawtimber sized red maple and yellow birch and an older cohort of low-quality red maple sawtimber and is best described as “two-aged.” It is likely that rather than truly clear-cutting this stand, past harvesting removed a large majority of

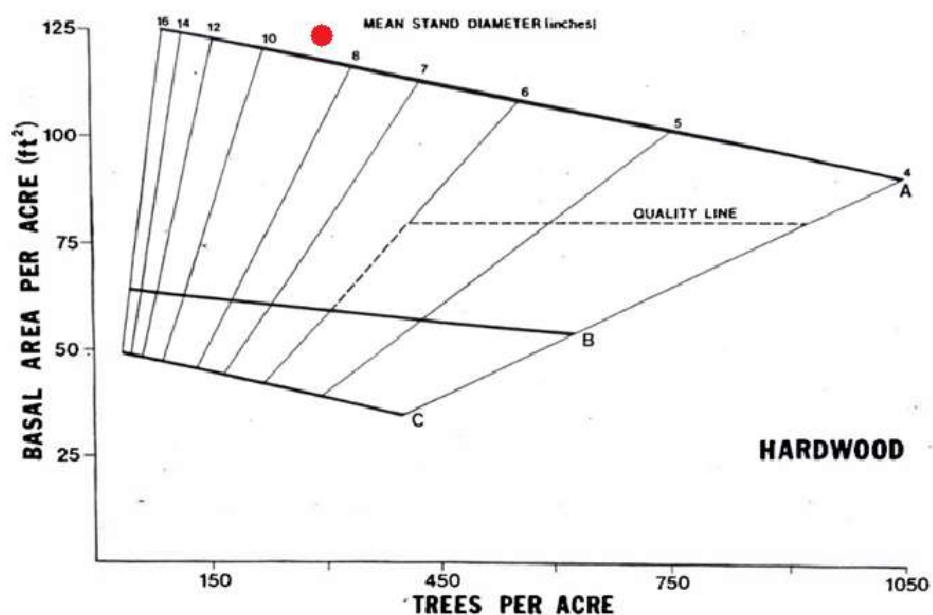
the stems present but left a scattered component of lower-value, low-quality / unacceptable quality sawtimber, as well as smaller component of good-quality poletimber and small-sawtimber. As is illustrated in the diameter distribution table on the previous page, a majority of stems in the 18" DBH and larger diameter classes are of unacceptable quality and comprise a disproportionate amount of the total UGS in the stand. Despite the retention of these lower quality stems, post-cut conditions and relatively low stocking levels allowed for the successful establishment of a new cohort of desirable stems. The newly established cohort flourished in the open available growing space and achieved full site-utilization. Adequate stocking levels throughout the life of the younger cohort and have led to the development of good-quality stems.



A cohort of young birch, maple, and ash is now established below the non-contiguous upper canopy comprised of older sawtimber-sized maple and ash.

The younger cohort has now grown into the main crown canopy while residual low-quality sawtimber stems have continued to stagnate and a smaller component of residual poletimber / sawtimber has grown into the 12" dbh – 16" dbh diameter classes. This stand has now reached "overstocked" conditions where growth rates and accretion will begin to slow. Growth rates will be most impacted within the good-quality poletimber and small sawtimber diameter classes where many stems are found in less advantageous canopy positions in relation to poor-quality, dominant overstory stems of the larger sawtimber diameter classes.

Stocking Guide for Main Crown Canopy of Even-aged Hardwood Stands



Due to the high proportion of UGS in the larger sawtimber diameter classes, the relative maturity of the stems in the 18" dbh and larger diameter classes, the presence of a vigorous and good-quality younger cohort of desirable species, and the persistence of "overstocked" conditions, a treatment to remove a majority of the low-quality / unacceptable-quality stems in the sawtimber diameter classes is recommended. Such a treatment will function to create more productive stocking levels and more fully release / focus growth on the better-quality poletimber and small-sawtimber diameter classes and would seek to remove nearly all of those low-quality, sawtimber-sized individuals that were left as residuals during harvesting operations approximately 50 years ago, and will effectively transition this stand from a two-aged stand to a single-aged / even-aged stand

TREATMENT: Complete an intermediate thinning to reduce the proportion of UGS and low vigor stems, improve spacing / stocking, and focus stand resources on the best-quality, most vigorous

stems on approximately 85% of the stand area (east and west of rock bottom lane). Favor / target unacceptable-quality stems, especially those in dominant and co-dominant canopy positions, overstocked stems, and maturing stems of the older residual age class for removal. Maintain a residual basal area stocking of 75sqft – 85sqft per acre.

Conduct a non-commercial TSI on approximately 3 acres of that portion of the stand situated east of rock bottom lane. These 3 acres comprise portions of the stand that were more heavily cut / truly clear-cut and currently lack the cohort of older residual stems that are typical of the rest of the stand area. Focus removals on unacceptable-quality or defective stems currently competing with good-quality neighbors. Favor retention of best quality stems in dominant and co-dominant canopy positions while improving spacing to promote better rates of growth.

Standing snags and trees with cavities will be retained / recruited for wildlife value. Some large-diameter unacceptable-quality stems in the overstory may be girdled and will serve as future snags. Coarse woody debris at least 20" in diameter will be recruited at a rate of at least 1 stem per acre.

This treatment will serve as a demonstration of an "intermediate thinning" to focus stand resources on, and enhance growth and accretion in a single cohort of stems. Throughout much of this stand, this treatment will also demonstrate the release of a younger, more desirable cohort through the removal of residual low-quality / over-mature stems of an older cohort. A minor component of this treatment will be a demonstration of non-commercial cultural work designed to reduce the presence of UGS, enhance growth of good quality stems, and influence the future conditions of the stand.

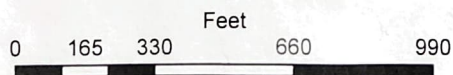
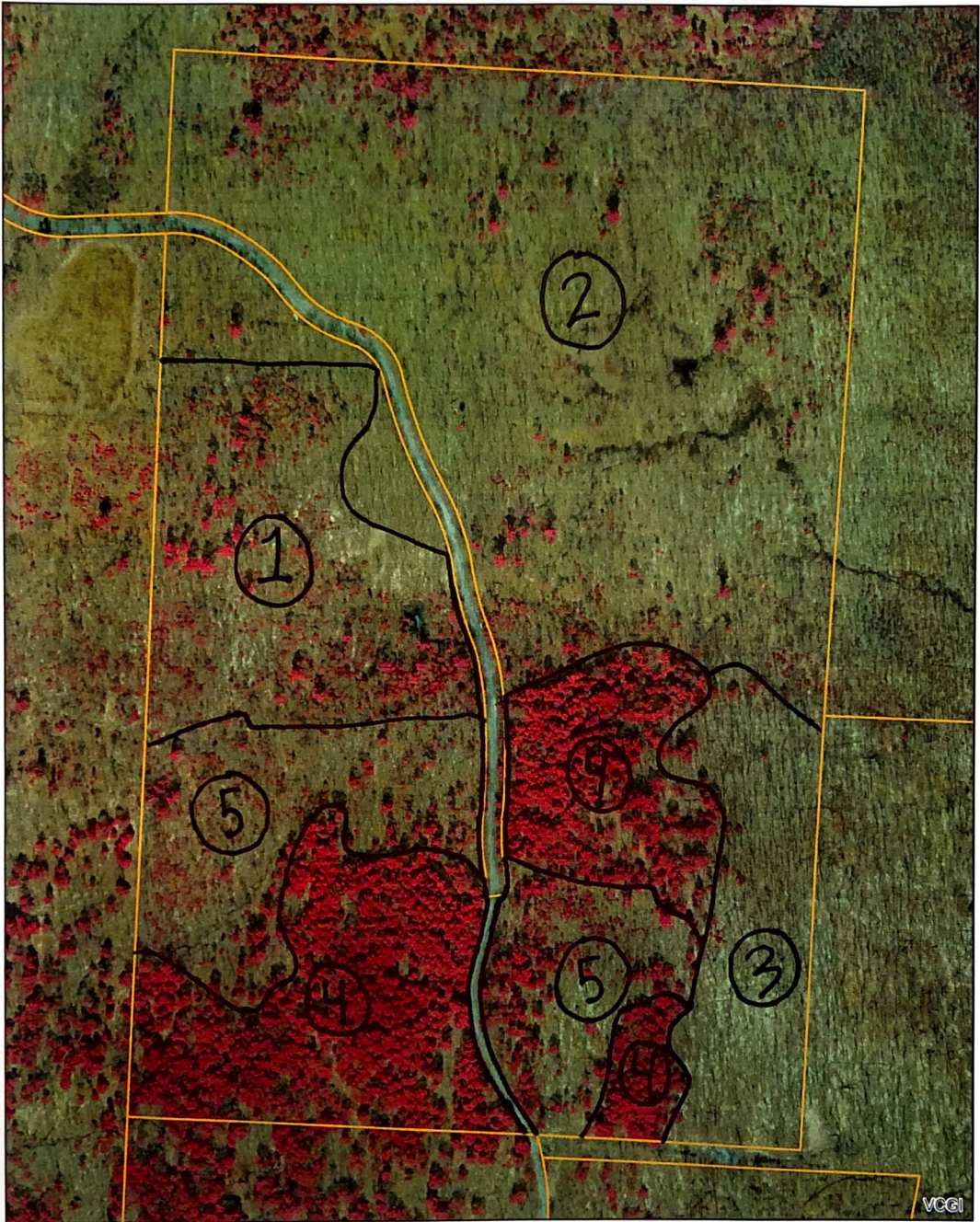
Work Summary / Schedule

Winter 2020 – 2021	Update inventory and draft Forest Management Plan Update Obtain public input on Forest Management Plan Update Obtain additional input from biologists and forest health experts Finalize Forest Management Plan Update
Spring 2021	Complete planning / marking for implementation of prescribed harvesting activities in Stands 1, 2, 3, and 5 Monitor potential Vernal Pool Re-mark / re-paint property boundary
Summer 2021	Solicit bids from harvesting contractors and execute timber harvesting contract. Begin mechanical removal of invasive species
Winter 2021 – 2022	Commence harvesting
Winter 2022 – 2023	Complete harvesting
Spring 2026	Re-mark / re-paint property boundary
2030	Re-inventory entire property and update Forest Management Plan for 2031-2041 planning period
Every year	Monitor invasive plant populations and perform needed mechanical treatments Monitor for forest health issues Consider development of recreational opportunities

Appendix

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Peru Town Forest



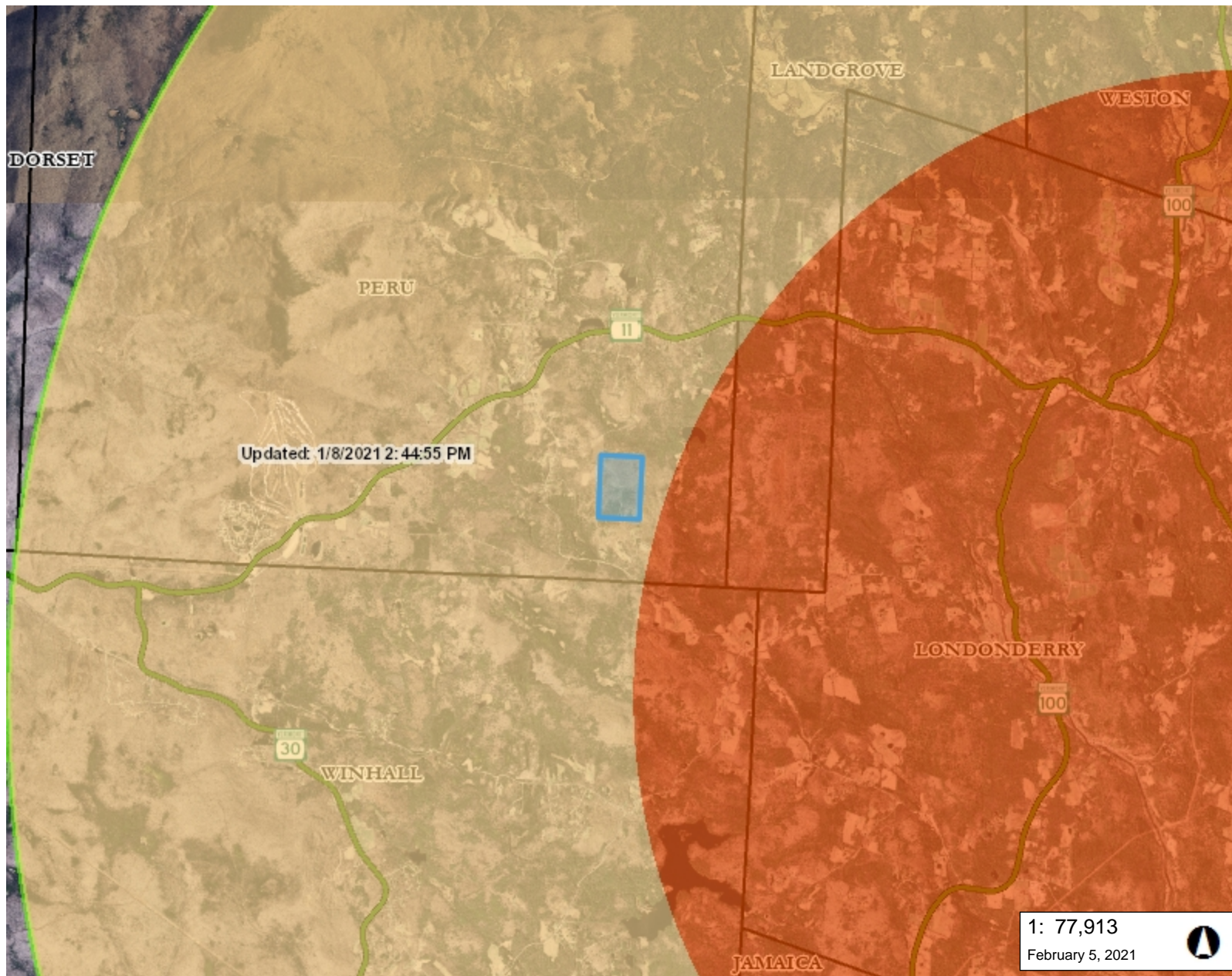


Vermont Agency of Natural Resources

A map of Vermont showing its location relative to New York and New Hampshire. Montpelier is marked with a black dot, Albany with a black dot, and Concord with a black dot. Lake Champlain is shown to the west. A red square is located in the southern part of the state, near the New Hampshire border. The map also shows the New York border to the west and the New Hampshire border to the south.

-  Town Boundary

Map created using ANR's Natural Resources Atlas



3,958.0	0	1,979.00	3,958.0 Meters
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WGS_1984_Web_Mercator_Auxiliary_Sphere

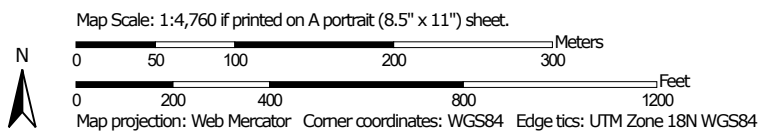
1" = 6493 Ft. 1cm = 779 Meters

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THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

Forest Productivity (Tree Site Index): sugar maple (Lloyd 1971a (070))—Bennington County, Vermont




MAP LEGEND

Area of Interest (AOI)





 Area of Interest (AOI)

Background





 Aerial Photography

Soils





Soil Rating Polygons

-  ≤ 51
-  > 51 and ≤ 57
-  > 57 and ≤ 61
-  Not rated or not available


Soil Rating Lines

-  ≤ 51
-  > 51 and ≤ 57
-  > 57 and ≤ 61
-  Not rated or not available


Soil Rating Points

-  ≤ 51
-  > 51 and ≤ 57
-  > 57 and ≤ 61
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bennington County, Vermont
Survey Area Data: Version 25, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 10, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Forest Productivity (Tree Site Index): sugar maple (Lloyd 1971a (070))

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
108B	Peru fine sandy loam, 0 to 8 percent slopes, very stony	57	41.3	40.4%
108C	Peru fine sandy loam, 8 to 15 percent slopes, very stony	57	13.5	13.2%
108D	Peru fine sandy loam, 15 to 25 percent slopes, very stony	57	30.5	29.8%
109C	Tunbridge-Berkshire complex, 8 to 15 percent slopes, very stony	61	4.0	3.9%
113B	Cabot silt loam, 0 to 8 percent slopes, very stony	51	0.1	0.1%
118C	Tunbridge-Lyman complex, 8 to 15 percent slopes, very rocky	61	12.8	12.5%
Totals for Area of Interest			102.2	100.0%

Description

The "site index" is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this attribute, only the representative value is used.

Rating Options

Units of Measure: feet

Tree: sugar maple

Site Index Base: Lloyd 1971a (070)

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Glossary of Common Forestry Terms

AGS: Acceptable Growing Stock (AGS) is a classification given to trees in a stand which are considered healthy and capable of producing a sawlog sometime in the future.

Age Class: See “Cohort.”

Basal area: A measure of tree density determined by estimating the total cross-sectional area of all trees measured at breast height (4.5 feet) and expressed in square feet per acre.

Browse: Leaves, buds and woody stems used as food by woodland mammals such as deer and moose. Bucking: Cutting a felled tree into segments.

Canopy: The more or less continuous cover of branches and foliage formed by the crowns of adjacent trees and other woody growth.

Codominant (crown class): A tree whose crown helps form the general level of the main canopy and whose crown receives full light from above and little from the sides.

Cohort: A group or generation of trees of generally the same age, often initiating from the same disturbance event.

Composition: The proportion of trees of different species present in a given forest or stand.

Coppice: The production of new stems from stump or roots. A plant derived by coppicing.

Corduroy: Poles, logs or brush laid perpendicular to the direction of travel and used as a roadbed to cross a wet area, where there isn't a defined stream channel.

Cover Type/Forest Type: A classification given to a stand based on the dominant tree species present at a given moment in time.

Crop tree: A tree retained for maximum

Crown: The part of the tree or woody plant bearing live branches.

Crown closure: The percent of the stand canopy overlying the forest floor.

Cutting cycle: The interval between harvesting operations when uneven-aged methods are employed using group or single-tree selection. Sometimes called “entry period.”

DBH: Diameter at Breast Height – the diameter measurement of the trunk of a tree 4.5' above the ground. DBH is the standard system for measuring tree diameter in forestry.

Diameter class: Intervals of tree size (often 1 or 2 inches) used to describe stand characteristics, e.g., 10" or 12" diameter class.

Disturbance: Any relatively discrete event that changes the make-up of a stand, community, or ecosystem. Natural disturbances include windstorms, insect outbreaks, or fire. Human disturbances include harvesting.

Dominant (crown class): A tree whose crown extends above the general level of the main canopy and whose crown receives full light from above and partial light from the sides.

Early successional habitat: Young, regenerating forest and shrubby areas used by animals requiring the thick cover the vegetation provides. The seedling-sapling stage of the early successional type of aspen-birch differs vegetatively and structurally from the “young forest” seedling-sapling stage of other types, and these differences result in different benefits to wildlife.

Ecological Forestry: A system of forest management that seeks to actively manage forest stands using methods that emulate natural processes.

Ephemeral: Existing for a short time; short-lived.

Epicormic sprouting: Small branches occurring on the stem and branches of some tree species in response to increased light, often from thinning or removal of substantial portions of the tree crown.

Even-Aged: A stand comprised of trees of a single age class (cohort), usually resulting from a single disturbance event.

Ford: A structure built for crossing a stream.

Forester: A person trained in the science of developing, caring for, and cultivating forests.

Forest management: The application of business methods and technical forestry principles to a forest property to produce desired values, resource uses, products, or services (see forest sustainability).

Forest type: A natural group or association of different species of trees which commonly occur together over a large area. Forest types are defined and named after one or more dominant species of trees in the type.

Free-to-grow: A tree, often a seedling or small tree, free from direct competition for light, water or nutrients from other plants

Girdling: More or less continuous incisions around a living stem, through both the bark and the cambium with the intent to kill the tree.

Group Selection: This treatment system involves harvesting all stems in a small area, usually between several trees to about 1 acre in size. The areas in which all trees are harvested are called “groups.” The goal of groups is to establish a new pocket of regeneration or to release existing regeneration. Usually, these groups will regenerate a portion of a stand in proportion to the frequency of cutting and the rotation age of the stand, seeking to establish a balance of different ages of trees over time. For instance, in a stand with a cutting cycle (frequency) of 20 years and a target rotation age of 100 years, 20% of the stand would be regenerated using groups each time cutting is done. This way, by the time the full rotation age has passed, all areas have been regenerated and there are 5 age classes of trees in the forest.

Harvest: The process of cutting trees to extract a forest product from the woods.

Hydrology: The properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Intermediate: The canopy position of trees who have been over-topped by other stems, but are still receiving some direct light from above. These stems are generally higher in quality than suppressed

trees, and in the case of shade-tolerant species may be healthy, but overall they are poor in condition.

Invasive: A non-native plant capable of moving aggressively into an area, monopolizing light, nutrients, water, and space to the detriment of native species. Various referred to as exotic, nonnative, alien, noxious, or non-indigenous weeds. Non-native insects are usually referred to as “exotic.”

Landing: A place where trees and logs are gathered in or near a harvest site for further processing and transport. Also called log yard or deck / decking area.

Midstory: Trees with a canopy position below the overstory, but above the understory in a stand. The midstory of a forest usually consists of suppressed and intermediate stems and/or slow growing or shade tolerant species.

Natural Community: An assemblage of biotic/abiotic factors in an environment, and the processes that govern them. Natural communities consist of all levels of biota in a forest, and consider how forest composition and structure changes over time.

Overtop: When one tree (or shrub) is growing over another.

Overtopped (crown class): Also called suppressed. A tree whose crown is completely overtopped by the crown of its neighbors.

Overstocked: Too many trees in a stand (as compared to the optimum number) t

Overstory: The highest canopy position of trees in a forest. Overstory trees are generally those whose crowns are exposed to full or nearly full light.

Pole: An immature tree generally 4"-10" DBH

Prescription: A silvicultural strategy for how to manage a stand to achieve a desired result. A prescription will detail exactly how to harvest a forest, including providing metrics for the residual stand, and a detailed description of trees to be cut and those to be retained.

Regeneration: Young trees and plants (usually less than 4" DBH) in the forest, often growing in response to a human-caused or natural disturbance event.

Release: The process of removing from competition, allowing them to grow more freely.

Residual trees: Trees left to grow in the stand following a silvicultural treatment.

Residual stand: A stand composed of trees remaining after a harvest.

Residual stocking: The numbers of trees left after a harvest.

Rotation: The period between regeneration establishment and final harvest. The age at which a stand is considered ready for harvest. Used in even-aged systems.

Sapling: An immature tree generally 2-4" DBH.

Sawlog: A log considered suitable in size and quality for producing lumber.

Scarification: Loosening topsoil, or breaking up the soil, in preparation for regeneration by planting, direct seeding or natural seed-fall.

Silviculture: The art and science of tending a forested stand, generally using timber harvesting as a tool.

Single Tree Selection: This treatment harvests trees of all age classes in a stand to encourage the growth of higher quality stems and the establishment of regeneration of shade-tolerant tree species. This treatment can also be used to ensure that there is an even distribution of trees of different species throughout the stand. This treatment is often employed between groups as part of uneven-aged management.

Size class: Descriptive term defining the most common tree size in a stand, e.g., poletimber or sawtimber stand.

Skidder: A tractor-like machine, used to drag or “skid” trees out of the forest.

Snag: A dead or dying standing tree, often left in place for wildlife.

Stand: An area of forest in a similar enough condition, with regards to structure, composition, history and other factors, to be managed as a single unit.

Stem: A word used in forestry to refer to a tree.

Stocking: An indication of the number of trees in a stand as compared to the optimum number of trees to achieve some management objective, usually improved growth rates or timber values.

Structure: In a forestry context, structure describes the presence of different age classes and canopy heights within a stand. Vertical structure is comprised of trees of different heights interspersed throughout an area, whereas horizontal structure described the presence of pockets of trees of different ages. In uneven-aged management, single tree selection usually encourages the creation vertical structure, whereas group selection creates horizontal structure. Structure may also describe the arrangement of dead wood across in a forest.

Succession: The process by which trees in a forest move from one generation and condition to the next. “Early successional” stands are those that establish following a disturbance, stocked by shade-intolerant and pioneer species, while “late-successional” (sometimes used interchangeably with “old-growth”) stands, occur when stands have developed into older forest types, often stocked by larger, older trees of shade-tolerant species and a more complex, uneven-aged structure.

Suppressed: Trees which have been completely overtopped by overstory stems, receiving little to no direct sunlight, are considered “suppressed.” Except in the cases of very shade-tolerant species, suppressed trees are often stunted and poor in quality.

Thin: To reduce the stand density by treating a single age class, primarily to improve growth, enhance tree health, or recover potential mortality.

Timber: Timber is used to describe the forest products (sawlogs, pulp, firewood, etc.) located inside the standing trees present in the forest. This word is sometimes also used to describe these products after the trees have been cut but before they have been processed or milled.

Treatment: A silviculturally planned and executed timber harvest.

Two-aged: A stand which is comprised of two distinct age classes. This is a common condition in managed forests, as the overstory is often targeted for logging, regenerating a new understory cohort while retaining some overstory trees.

UGS: Unacceptable Growing Stock (UGS) is a classification given to unhealthy trees unlikely to live long or to produce a sawlog in the future.

Uneven-aged: A stand comprised of three or more distinct age classes of trees. This forest type is common in undisturbed and “old-growth/late successional” forests.

Uneven-age management: This management system seeks to emulate natural disturbance regimes and natural forest growth patterns by establishing and maintaining multiple age classes of trees within a single stand.

Understory: Trees located at the lowest canopy positions in the forest, usually consisting of very young stems less than 10’ in height.

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