



CRAFTSBURY ACADEMY WOODLOT

Forest Management Plan for the Craftsbury Academy
Woodlot: November, 2019

Forest Management Plan prepared for the
Craftsbury Town School District

Jared Nunery

Orleans County Forester

VT Licensed Forester 148.0122274

Forest Management Plan Approval

This Forest Management Plan was prepared by Jared Nunery, Orleans County Forester at the Request of the Craftsbury Town School District School Board and Craftsbury Academy Woodlot Subcommittee.



Jared Nunery

Printed Name

Signature

Date

We certify that we have read and approve of the 2019 Craftsbury Academy Woodlot Forest Management Plan and agree to implement this plan to the best of our abilities. This Forest Management Plan includes the application of silvicultural practices and the best available applied ecological research, as well as the full implementation of the "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont" in order to control stream siltation and soil erosion.

Harry Miller (CTSD Chair)

Printed Name

Signature

Date

Jen Schoen (CTSD Vice Chair)

Printed Name

Signature

Date

Mary Lou Rylands

Printed Name

Signature

Date

Anne Morse

Printed Name

Signature

Date

Kasey Allen

Printed Name

Signature

Date

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Purpose of Forest Management Plan

The purpose of the following Forest Management Plan is to provide information and guidance to be used by the Craftsbury Town School District (CTSD) for the management of the 80-acre Craftsbury Academy Woodlot owned by CTSD. This plan provides management guidance for a ten-year period beginning in 2019. The plan should be updated in 2029, including the completion of a new forest inventory. This report includes information collected by students of Craftsbury Elementary School (Appendix F), as well as community members during the 2019 Craftsbury Academy Woodlot Bioblitz that occurred in June of 2019 (Appendix E). The information in this plan combines ecological, economic and social information to help the CTSD make informed decisions based on long-term management objectives for this land.

This report combines a comprehensive summary of information from the bottom (bedrock and soils) to the top (trees) and everything in between within the forest. This plan is written to be used as both a guidance document for the CTSD as well as a potential tool for teachers and students of the Craftsbury Academy and the Craftsbury Elementary School. Much of the more general information included in this plan is applicable to the forests of the Town of Craftsbury, so will also be applicable to the many private forestland owners in the Town.

Location

The Craftsbury Academy Woodlot is located approximately 1.8 miles north of the intersection of Wylie Hill Road and North Craftsbury Rd. A parking lot with kiosk marks the entrance of the woodlot located near the end of the maintained portion of Wylie Hill Road. The CA Woodlot is located 2.6 miles north of Craftsbury Common, where the Craftsbury Academy is located.

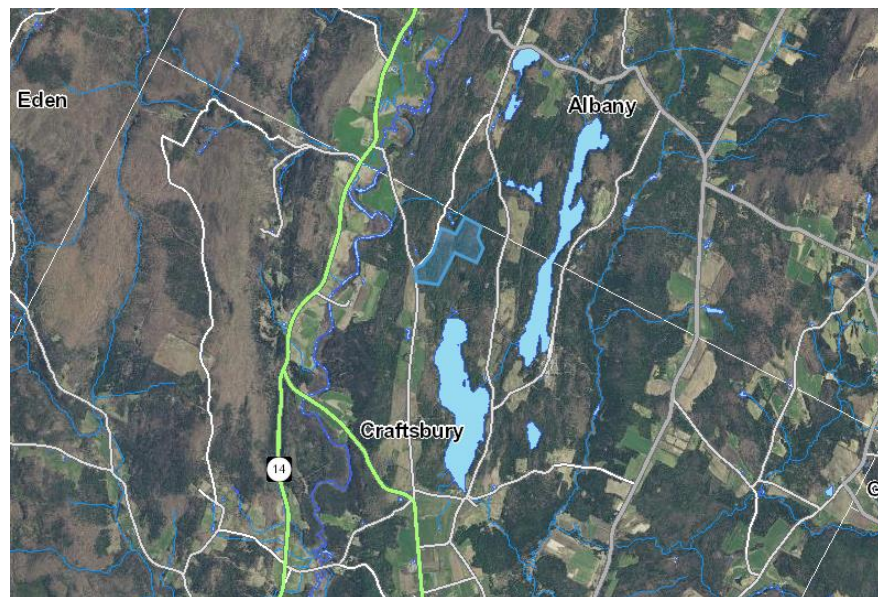


Figure 1: The CA Woodlot is shown in blue on this map, north of Little Hosmer Pond and west of Great Hosmer Pond. The northern boundary of the CA Woodlot is also the Town Line between Albany and Craftsbury.

Forest Ownership

The land which comprises the Craftsbury Academy Woodlot was conveyed to the CTSD by Ruth S. Planten as recorded in Book32, Page 160 of the Craftsbury Town Records. There was a long-

running boundary dispute on this property that has now been settled. The settlement is recorded in Book 74, Pages 217-218. There is no restriction in the deed as to the use of this property.¹

Management goals and objectives

In February of 2018, the Craftsbury Academy Woodlot Subcommittee (a subcommittee designated by the Craftsbury Town School District School Board) began meeting with the Orleans County Forester to discuss developing a comprehensive management plan for the Craftsbury Academy Woodlot (hereafter referred to as the CA Woodlot). Following these meetings each member of the committee submitted in writing their goals and objectives for managing the CA Woodlot. These over-arching goals were then used to organize a Community Meeting held on May 15th, 2019. The purpose of the Community Meeting was to collect information from various members of the community regarding how the CA Woodlot should be managed. The results from this meeting are presented in Appendix D of this plan.

The common overarching goal was to provide a place for education within a managed forest. Below is a summarized list of management goals developed by the Craftsbury Academy Woodlot Subcommittee:

- Provide educational opportunities to Craftsbury Students and the broader Craftsbury community. The woodlot should be managed to provide demonstration of exemplary practices of land stewardship, as well as natural areas to observe and learn about natural processes.
- Building on the first goal, this land should serve as a place of doing, a place for students to get their hands dirty and learn from the natural world, within the natural world, and be a part of any management actions within the woodlot.
- Document current wildlife habitat and wildlife use of the land and monitor and maintain these important areas.
- Provide recreational opportunities (both dispersed such as hunting, and concentrated use on developed trails) for use by students and town residents.

The report below provides both a comprehensive background of the CA Woodlot, as well as a complete overview of the current conditions and a pathway forward for the next 10 years to help achieve the goals above. This report is intended to be a useful tool to all residents of the Town of Craftsbury, as much of the information included in this report is also relevant to adjacent private landowners within the Town.

¹ J Houston & S. Moffatt, Craftsbury Academy Corporation Property Ownership Report. May 23, 2019.

Historical Background

The text below is an adaptation from an article prepared by Rob and Linda Libby in October of 2018, detailing the history of the Academy Woodlot over the last 70 years.

Craftsbury resident Ruth Savage Planten lived on the Common and also owned property on Wylie Hill. In the 1950's, she allowed Academy students to use her land for forestry class under the direction of Bill Farrar, who was the forestry and agriculture teacher. His students built a warmup cabin in the woods, and started a white pine plantation from seedlings in 1952 (see 1948 aerial imagery below taken only a few years prior to the planting of the pines). One student, Walt Gutzmann, worked to build a lean-to on the property to provide cover for students in bad weather. Walt later became a Craftsbury Academy teacher and took over supervision of the forestry program. Forestry class goals were to teach students to raise and nurture the trees until the time when they could be harvested for lumber, and replant seedlings in an organized manner to make the plantation sustainable. Craftsbury students in the classes of 1950- 1952 were active overseers of the land, at a time when Craftsbury was far more active in farming and logging than it is today. Lumber was harvested from the property and used to build the original gym at Craftsbury Academy in 1947, and also cut for the new gym in 2012. Lumber was also cut and used in building the Bernard Young building in 1978 and used for industrial arts. The building was turned over to Sterling College in 2018 as part of a cooperative school agreement.

In 1963, Ruth Savage Planten donated two parcels of land to the town- one the site of the former library next to the post office, and the other the 80 acre woodlot. The woodlot was donated specifically to Craftsbury Academy, to be used at the discretion of the school directors with no restrictions.

During the years between 1963- early 1980's, the property continued to be the location of an outdoor classroom for Craftsbury Academy students in the forestry program. Craftsbury Academy offered classes in woodland management for the many local students who were preparing for careers as loggers, dairy farmers, and lumber mill workers. Students learned chain saw safety, tractor operation, and small hand tool use. They learned selective cutting practices and principles of reforestation in order to sustain natural resources. Students worked under the instruction of Bill Farrar, a respected and revered agriculture teacher who made forestry a popular program for students. Bill served as advisor for a very successful Future Farmers of America (FFA) chapter, and it was under his leadership that many students were introduced to working in and enjoying the woods. Prior to his retirement, Bill took multiple groups of students to Kansas City for the National FFA convention, where they placed well in maple production, forest management, parliamentary procedure, and dairy farming. For many students this was their first trip out of Vermont.

The 1980's saw lower enrollment in forestry programs as students expanded their future plans to include technology jobs and more college programs. Teacher Walt Gutzmann supervised reduced size forestry classes on a part time basis in addition to his other classes. The Planten property received less attention, trails became overgrown, and the outdoor classroom fell into disrepair. The early 1990's saw renewed nationwide interest in environmental studies, and Craftsbury began to combine the forestry program with science classes and added teacher Rob Libby to the mix.

In the mid 1990's four Craftsbury Academy teachers attended a workshop at the Fairbanks Museum titled "Nature's Classroom". It introduced the concept of using the natural environment to teach students about ecology, biology, and environmental science. Faculty visited other schools where faculty had developed nature trails, outdoor classrooms, and recreation trails, and the seed was planted to develop a similar outdoor classroom at the school woodlot. Faculty visits to Cape Cod National Seashore, Desoto Park in St. Petersburg FL, the Rachel Carson Trail, and other national parks clarified a vision of this project. The nationwide "Rails to Trails" project provided more ideas and models of boardwalks, information kiosks, and bridges over wetlands.

In 2002, Craftsbury applied for and was selected to receive a grant from Vermont Department of Forests, Parks and Recreation Department for \$15,000. The grant required in-kind matching funds and counted the value of volunteer work hours provided by Rob Libby, Walt Gutzmann, Craftsbury Academy students and community members including Ken Atherton and Randy Calderwood. The grant money and work hours were used to purchase gravel and pressure treated lumber for retaining wall, and portable sawmill rental to cut lumber for a handicap trail. Woodchippers were rented for cleanup of brush. The vision of the project directors was to create a nature trail through the property which could be used for multiple purposes. The trail would wind through 40 acres of the property for a length of 1.5 miles, using gravel, wood chip mulch, and a cedar floating bridge across a wetland. In addition, a shorter handicap accessible trail would be built on the most level area of the property. Walkers would visit a pine plantation, balsam fir area, spruce trees, and view a large beaver dam which is constantly being re-excavated by the beavers.

Walt, Rob and Don Pierce took students to the woodlot to provide a hands-on experience in biology, environmental science, forestry tree and leaf identification and sampling. Physical education classes used the forest for hiking and games. One memorable afternoon of Capture the Flag ended when Rob and Don Pierce encountered a black bear while rounding up students, but all ended well. Don organized all-school activities where high school students mentored elementary students and taught classes in the forest environment. The property was utilized as part of a thematics program in 2005, titled Open Spaces.

One example of the potential use of the woodlot as a sustainable forest was a demonstration project in production of wood pellets. In 2011, school director Harry Miller worked with Rob Libby, Walt Gutzmann, and Craftsbury Academy



Figure 2: Harry's Lean-to was built by Harry Miller and students and serves today as both a shelter and outdoor classroom.

students harvested logs and trucked them to Vermont Pellets in Clarendon, VT. Students went on a field trip to watch softwood logs being processed and dried to create energy rich fuel. The school installed a pellet burning heating system around the same time, but the trucking distance prevented sustained use of our own pellets to fuel heat for the school. Students were surprised to learn that the heating value of softwood pellets exceeds that of hardwood pellets.

Historic Land Use

Nearly the entirety of the CA Woodlot shows signs of use as agricultural land at one time. Most of the land was likely used as pasture. The plantations on the property were planted in the early 1950's and have been periodically thinned overtime by students from the Craftsbury Academy, with the most recent thinning being completed in 2010 by Walt Gutzmann and his students from the Craftsbury Academy Forestry Program. One cellar hole is located immediately north of the parcel boundary on the adjacent parcel. Stone walls lining western border along the CA Woodlot Road, as well as sheep fence and barbed wire along the northern most border offer clues to the historic agricultural land use of this area. The remnants of an old sugarhouse can be found in the northern section of Stand 5. These legacies of historic land use

provide excellent opportunities for teaching and can be integrated into a variety of classes from social studies and history, to ecology and other life sciences.



Figure 4: 1948 Aerial image of the Craftsbury Academy Woodlot. Note the open field just south of the intersection of the CA Woodlot Road and the Wylie Hill Road (see blue arrow). This field is the current location of the mature white pine in Stand 1 today.



Figure 3: CA Woodlot Subcommittee member Jean Haigh exploring Samuel Craft's canal.

As can be seen in the aerial imagery from 1948, much of the area that is currently towering, mature pine trees was an open field not long ago. This dramatic transition from field to forest is difficult for anyone to comprehend as the transition happens over decades, making change more difficult to appreciate. In addition to the cellar hole just to the north of the property at the intersection of the CA Woodlot Road and Wylie Hill Rd, stone walls, planted white pine trees, remnants of an old sugar house, and the presence of wolf trees (see full description below) in Stand 7 offer insight in to the historical agriculture use of this area. With the exception of Stand 5, it is likely that all of this parcel was at least partially cleared for agriculture use at one time.

One exceptionally unique cultural resource found on the parcel is the canal running north to south thru Stands 7 and 6. This shallow canal was dug by

Samuel Crafts to divert water from the outlet of Heart Pond to Little Hosmer Pond, to increase flow to the mill in Mill Village. This canal can still be located today, following the contour of the hillside, with some areas having impressive stone retaining walls built on the downslope side.

Boundary Line Status

As described above, a complete survey of the property boundaries was completed by Wayne Mutrux in 2018. During the field inventory for the development of this management plan, boundaries were relocated and were recently flagged with blue flagging. Corner pins were relocated at all major corners. In general boundaries were in good condition. It is suggested that boundaries are repainted on a 5 year cycle in order to maintain their current condition.

Following this cycle, boundaries would be due to be painted in 2023.



Figure 5: Example of recently blazed ash tree on the southern border of Stand 1. Boundary is well marked with orange blazes and recently flagged with blue flagging.

Ecological Background

A comprehensive ecological inventory of the CA Woodlot was completed as part of the Bioblitz held on June 8, 2019. An overview of the results of this work are included in Appendix E at the end of this document. In addition to the Bioblitz, on May 17th, 2019, Ms. Lyon's 3rd and 4th grade classes from Craftsbury Elementary School, spent the day completing an informal assessment of the flora and fauna of Stands 3 and 4. As part of this effort, students recorded all species observed during the field visit. Complete results from this work are included in Appendix F of this document.



Figure 6: Craftsbury Elementary Students from Ms. Lyons class completing inventory of flora and fauna in Stands 3 and 4.

Results from both of these assessments confirm a diverse mix of flora and fauna is found throughout the CA Woodlot. Although much of the soils within the upland slopes of the woodlot on either side of Stand 5 support Northern Hardwood Natural Communities, historic land use has resulted in a much more varied forest. Additionally, groundwater seepage enriched in calcium from the underlying bedrock has created at least three isolated Northern White Cedar Swamps. These areas, although small, form excellent

opportunities to teach students and town residents alike about these statewide significant natural community types.

Although relatively small in size, the CA Woodlot hosts a variety of forest conditions, both in structure, species composition, and natural communities. Soils range from well drained sites on upper slopes, to organic mucks developing within the wetland complex that comprises Stand 5. These varied conditions coupled with the landscape context of the location of the woodlot (See Wildlife section below) result in a highly ecologically productive piece of forestland.

Geologic Information (bedrock and soils)

The following geologic description is adapted from the 2005 Ecological Inventory completed by Ross Morgan of the Coburn Town Forest, which is applicable to the CA Woodlot Forest as well. Given Mr. Morgan's long history of working with students in the CA Woodlot, it is only fitting to bring in a few of his words into the development of this Forest Management Plan.

Bedrock Information

This parcel of land lies just east of the exposure of the three kinds of bedrock according to the maps of the Vermont Geologic Survey. The Black River serves as the primary transition point from the bedrock to the west, and the more calcium rich bedrock to the east.

- To the east the underlying bedrock is the Waits River Formation, metamorphic bedrock formed over 350 million years ago during the Ordovician era, as a sedimentary rock under the ocean, now a metasedimentary rock called quartzite.
- Underlying and to the west is the Missisquoi Formation which is also metamorphic from sedimentary but is not as old. The Coburn Hill Town Forest is just to the west of the interface between these two bedrock formations, whereas the CA Woodlot lies just to

the east of these two bedrock types. Also bedded between these two types of bedrock are a thin sliver of Northfield Slade and Shaw Mountain Formation, an old rock containing early fossil discoveries.

The Waits River Formation has higher calcium content than the bedrock to the west. This is significant for two reasons. First, in the microcosm, it means the soils and hence the plant communities on them have available calcium from a slowly decomposing source, the bedrock. This can be seen in many of the herbaceous plants growing along the west side of the CA Woodlot Road as well as in Stand 7, which are indicators of calcium enrichment (i.e. blue cohosh, maidenhair fern, and dutchmen's breeches).

Research in New Hampshire indicates that up to 50% of the calcium in the soils of the northeast may have been lost in 30 years from acidic precipitation. The most vulnerable places are plant communities at higher elevations on bedrock with little available calcium granites, gneiss and schists. The good news is that this property is on the other end of the scale and has some calcium. This is important because tree growing sites where there is calcium are more productive. Scientists have speculated that the long-term sustainability of human life will be tied to the retention of soil calcium. In more specific terms, Cornell University discovered that the declining populations of Wood Thrush are due to thinning of their eggshells which in turn is the result of loss of calcium in the forest ecosystem.

In answering the questions regarding the plant communities on the CA Woodlot, this interface of high calcium bedrock may play a major role in dividing the northern hardwood community and a rich northern hardwood community specifically those found in Stand 7, as well as the excellent growth rates observed in the white pine plantation in Stand 1, and northern white cedar swamps found in Stand 2.

The surficial geology is important and in the process of glaciers melting the parent materials that would become the soils were deposited. Soils that were from the melting ice dropping its load of rocks, sand, silts, and clay directly onto bedrock are called glacial till. Those that were developed from materials that were deposited under glacial lakes are called glacio-lacustrine soils, and those that were developed from material transported and deposited by glacial meltwater are called alluvial and outwash soils. There are glacio-lacustrine and alluvial soils in the Black River valley to the west, but most of the soils in this 40-acre parcel are derived from glacial till origins.

Watershed

This parcel is unique in that the land has varied terrain, resulting in the vast majority of water flowing to the north, albeit through often a circuitous route. Within the parcel, the majority of water collects in the wetland that bisects the property in Stand 5. This wetland complex, comprised of a series of beaver ponds, flows to the north where it meets the outlet of Heart Pond. Once joined with the outlet of Heart Pond, water turns to the west where it flows into the Black River. The

Black River runs north to Lake Memphremagog. Ultimately any drop of water that lands within the parcel (in theory) would end up running a long and winding course to the St Lawrence River as it enters the Atlantic Ocean, however the pathway to the Black River and on to the ocean is quite different depending on where in the woodlot a water droplet lands. For example, a small portion of the southeast corner of Stand 6 actually drains to the south to Little Hosmer Pond, which flows into the Black River north of Craftsbury Village, before traveling thru the Village and turning to the north and traveling over 7 miles before meeting the Heart Pond Outlet carrying water from the majority of the CA Woodlot. The dichotomy in drainages was observed by Samuel Crafts several centuries prior, resulting in the construction of the canal that bisects the back 40 acres of this property, to increase water flow to Little Hosmer Pond. More than anything, this important point allows for excellent teaching opportunities, and is worthwhile sharing with teachers from the Craftsbury Schools who may be interested in teaching about watersheds.

Wetlands

Although there are no mapped wetlands on this parcel, a well-defined wetland complex bisects the parcel, running from the south to the north thru Stand 5. This wetland complex consists of a series of old beaver ponds, one of which is actively used. Impoundments from beavers have created a series of small ponds, and meadows in Stand 5, and are connected to larger meadows

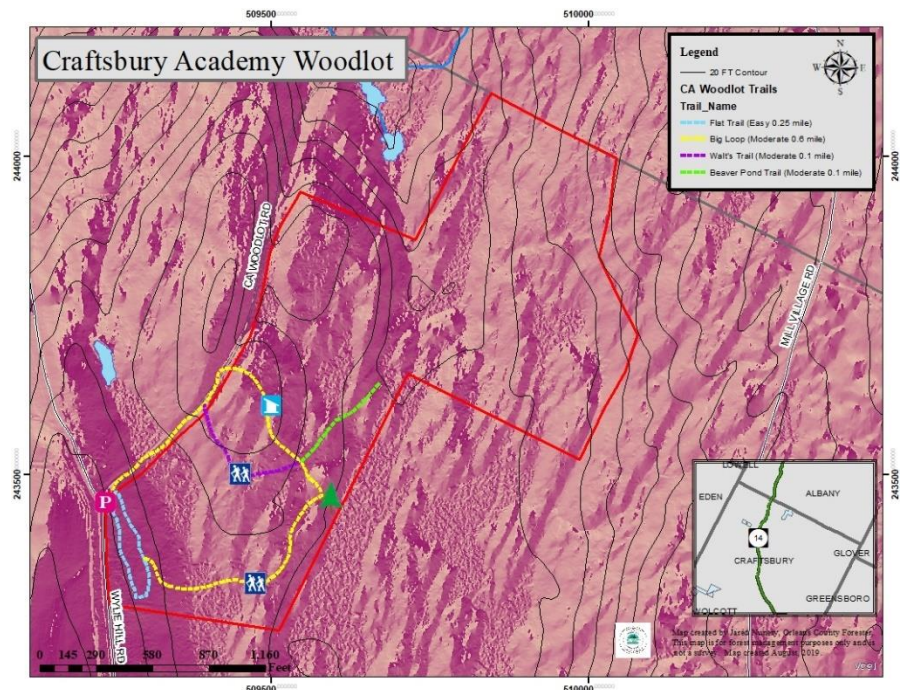


Figure 7: LiDAR Imagery showing topography on the CA Woodlot. Twenty-foot contour lines also help to show the terrain changes throughout the parcel. In general, water within the CA Woodlot flows to the north, merging with the outlet from Heart Pond, and traveling west to the Black River (see Appendices for larger map).

and open waterways to both the north and south of the parcel running along the small stream flowing to the north. Beyond the northern boundary of the CA Woodlot, this stream joins the outlet of Heart Pond near the Albany Town Line, where it then heads west to the Black River. This wetland complex forms a natural bisection of the CA Woodlot, dividing the parcel into two nearly equal halves. Any silvicultural work or recreational trail development on the eastern half of the parcel would require carefully locating an appropriate crossing site of this wetland complex, or alternatively accessing these areas from adjoining privately owned land.

Wildlife

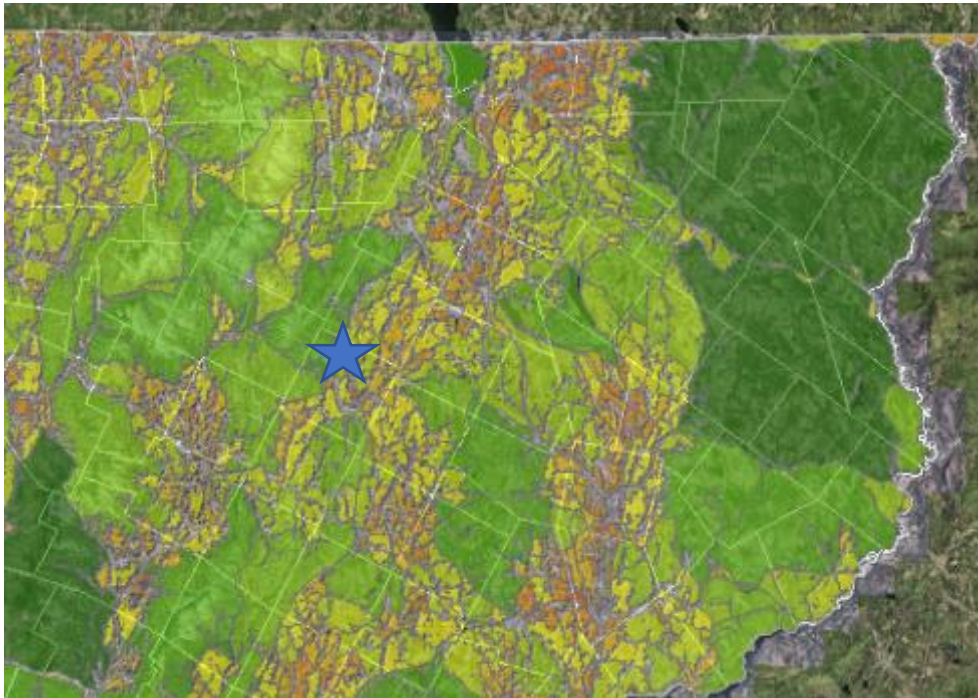


Figure 8: Map of identified habitat blocks in northeastern Vermont. The darker green represents large habitat blocks with less fragmented areas. The blue star shows the location of the CA Woodlot.

The diverse forest conditions found within the seven identified stands on this parcel offer a unique suite of niches for a variety of wildlife. During the field inventory, signs of deer, porcupine, ruffed grouse, coyote, turkey, and black bear were observed. Although many signs of wildlife can be observed on this land, it is

important to recognize that many species are using this land as part of a larger territory. Two of the largest blocks of interior forest habitat in the state of Vermont, exist on either side of this parcel. To the west is the spine of the Green Mountains, running the length of the state of Vermont. To the northeast is the Nulhegan Basin, a large block of forestland historically managed for industrial forestry and now conserved through a variety of private and public entities. Connecting these two blocks is a smaller block of largely unfragmented forest spanning from the Green Mountains to the northeast through the Worcester Mountain Range, linking to another larger forest block starting in Hyde Park near Green River Reservoir and running northward through the Lowell Range. This parcel represents a portion of the eastern edge of this critical linkage that offers a connective bridge to the northeast highlands of the Nulhegan Basin and on to forests of Quebec and New Brunswick. When looking at habitat connectivity at the county and/or state level, the critical importance of this parcel becomes very clear. Agricultural fields and roads through eastern Craftsbury, Albany, Irasburg and

Barton create challenges for wildlife moving through the forested areas of northeastern Vermont. Management of the CA Woodlot as a component of a much larger forest block, with the intent to maintain functionality as corridor for animals traveling between the large forest blocks to the southwest and northeast, is critical. All prescribed management within the plan below consider the maintenance of a healthy and vibrant forest to support functional connectivity of the CA Woodlot to adjacent privately-owned forestland.

Rare Threatened and Endangered Species and Significant Natural Communities

No rare, threatened or endangered (RTE) species were identified during the forest inventory. A review of the Vermont Department of Fish and Wildlife's database also confirmed that there are no known occurrences of RTE species or statewide significant natural communities identified on this parcel. Stand 2 is comprised of several non-contiguous Northern White Cedar Swamps, providing excellent examples of this community type. These particular areas are not mapped as Statewide Significant Natural Communities due to their small acreage, however they do provide excellent examples of this forest type and wonderful opportunities for teaching students about these important natural communities. See Stand 2 description below for additional information on this area.

Biophysical Region

The CA Woodlot lies on the western boundary of the Northern Piedmont Biophysical Region, near the transition of two northern biophysical regions. To the east is the Northern Piedmont, a region characterized by more gentle topography a more moderate climate relative to regions to the west (Northern Green Mountains) and east (Northeastern Highlands). To the west is the Northern Green Mountain Biophysical region, an area characterized by more acidic metamorphic rocks (especially when compared to those of the Northern Vermont Piedmont), cooler temperatures and increased levels of precipitation. For a full detailed description of each biophysical region see the book *Wetlands, Woodlands and Wildlands*².

² Thompson, E.H., and E.R. Sorenson: *Wetland, Woodland, Wildland: A guide to the Natural Communities of Vermont*, (2005). The Nature Conservancy and the Vermont Department of Fish and Wildlife

Forest Health

In general, no significant forest health issues were observed during the 2019 field inventory. The only issue worth noting was the presence of balsam wooly adelgid (BWA) identified on overstory balsam fir trees in Stand 3 and 6. This insect has been observed throughout Orleans County over the last four years. It largely attacks stressed trees and is limited to only balsam fir trees as a host. It can result in a rapid decline in vigor, and in some cases can lead to mortality when combined with other stressors. Management recommendations below for Stand 3 and 6 consider the implications of this insect in recommended silvicultural prescriptions.



Figure 9: Balsam wooly adelgid (small white fluffy patches in the picture above) observed on a balsam fir tree in Craftsbury.

During the summer of 2018, the Vermont Department of Forests, Parks and Recreation installed a monitoring plot within Stand 1 to help understand long-term health trends in Eastern White Pine. This plot is one of 22 across the state of Vermont, and more plots established in Maine, Massachusetts, New Hampshire, New York, and Rhode Island. This work began in order to better understand the impacts of White Pine Needle Damage caused by four different fungal pathogens. In 2018 over 40,000 acres of damaged white pines were mapped during annual aerial surveys. Results from this monitoring plot will be combined with those from other sites across the Northeast to better understand the impacts of these fungi as well as other health issues impacting eastern white pine. All monitoring efforts within the CA Woodlot will be conducted by the Vermont Department of Forests, Parks and Recreation.

No non-native invasive species were identified, which is excellent news considering challenges in managing these aggressive plants in other parts of the town of Craftsbury. It is recommended that annual monitoring for these plants is completed by the CTSD. Of concern would be the presence of plants such as common and glossy and common buckthorn, and non-native honeysuckle (all of which are well established within just a few miles south of the CA Woodlot near Craftsbury Common). Detailed identification of each of these species can be found at www.vtinvasives.org. If any plants are observed or concerns regarding the presence of an invasive species are raised, the County Forester is available for assistance. Early detection of non-native invasive species is critical in maintaining healthy forests.

Management Considerations

Long-term silvicultural techniques will be used to transition current even-aged forests within the CA Woodlot to multi-aged forests. All silvicultural applications will strive to increase the resilience of the forest, maintain and enhance wildlife habitat with a focus on late-successional forests. Silvicultural prescriptions will strive to enhance both vertical and horizontal structure within the forest, as well as increase coarse and fine woody material (the dead wood on the forest floor), all of which has been shown to be critically important to interior forest bird habitat, as well as maintaining many important ecological functions within our forests. All work will strive to integrate educational opportunities whenever possible. The primary management goal for this forest is to provide educational opportunities for Craftsbury Town School District students as well as community members, and all management activities will be designed to maximize this benefit whenever possible.

Educational use

As noted throughout this plan, the CA Woodlot has a long tradition of educational use from all grade levels of the Craftsbury Town School District. In 2017, all teachers from the Craftsbury Town School District visited the CA Woodlot during a school-wide faculty meeting. The following spring, the Craftsbury Elementary School held their annual end of the year hike at the CA Woodlot (see photo to right). Beyond the Craftsbury School District, numerous walks for landowners have



Figure 10: Walt Gutzmann and Rob Libby present to Craftsbury Elementary School Students during a visit to the CA Woodlot in 2018.

been held at the CA Woodlot, and Sterling College has also used the woodlot for site visits for their classes. During the spring of 2019, a class of Sterling Students developed a curriculum tailored specifically for the CA Woodlot to be used by CTSD faculty. A numbered nature walk with corresponding brochure developed by a student from Sterling College, provides educational opportunities for any visitors to the CA Woodlot. This nature walk and brochure are currently be updated by the CA Woodlot Subcommittee.

Recreational Use

Currently the primary recreational use of the CA Woodlot is hiking on established trails on the western half of the property, and dispersed hunting during the fall. In 2002, a multi-purpose

trail system was developed as part of a grant funded by the Vermont Dept. of Forests, Parks and Recreation. These trails are still widely used today and are largely maintained thru the tireless efforts of volunteers from the greater community.

During the public information session held on May 15th, 2019, an entire station at the public meeting was dedicated to gathering input on recreational use of the CA Woodlot. A variety of uses were proposed, with the overarching commonality being to limit the use of the woodlot to human powered and limited equestrian travel only. The development of recreational trails for mountain biking, and connectivity with existing trails in the area was proposed as both a positive and a negative. A common point of agreement was that given the CA Woodlot is owned by the school, receiving input from the students of the school is important. It is suggested that additional input be obtained by the CA Woodlot Sub-Committee on the recreational development of the woodlot, and this input should include students from the Craftsbury school system.

Climate Change Adaptation

The best available science developed over the last three decades has predicted increased changes to our climate that we are beginning to experience today³. Increased precipitation, through frequent intense deluges, followed by periods of prolonged dry spells leading to droughty conditions, have been the norm for the last few years. The Craftsbury area in particular has experienced numerous intense wind and rain events over the last two years. Extreme weather events are predicted to become more regular in the Craftsbury area in our changing climate. Frequent wind events have brought down many of the weakened balsam fir in Stand 3 and 6. Through coupling climate science research with our knowledge of tree silvics (how specific tree species grow), the US Forest Service has developed a prediction tool to better understand how individual tree species will likely respond under predicted climatic changes⁴. The following forest adaptation strategies will be considered in future management of the CA Woodlot to help maintain a resilient forest⁵:

- Focus on establishing and maintaining advanced regeneration across the forest. This will be of concern in the pine plantation where even-aged forest management is being applied as well as the hardwood stand on the eastern edge of the property (Stand 7) where regeneration is currently lacking. Existing regeneration will be maintained during future intermediate thinning treatments.

³ http://scenarios.globalchange.gov/sites/default/files/NCA-NE_Regional_Scenario_Summary_20131018_banner.pdf

⁴ Prasad, A. M., L. R. Iverson., S. Matthews., M. Peters. 2007-ongoing. A Climate Change Atlas for 134 Forest Tree Species of the Eastern United States [database]. <https://www.nrs.fs.fed.us/atlas/tree>, Northern Research Station, USDA Forest Service, Delaware, Ohio.

⁵

https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/Climate%20change%20report_final_v6-18-15a.pdf

- Retain and increase the total volume of coarse and fine woody material on the forest floor. These structural components of the forest are critical for maintaining nutrient cycling, carbon storage, soil protection, wildlife habitat, and play an important role in seedling germination for some species such as red spruce and northern white cedar.
- Monitor for early detection and removal of invasive plant species. Currently no non-native invasive plant species have been identified on the CA Woodlot, however regular monitoring is critical to early detection. CA school members should become familiar with common invasive plant species found in the area and monitor for the presence of these plants annually within the CA Woodlot.
- Manage for tree age diversity and forest structural complexity across stands within the CA Woodlot. Silvicultural prescriptions will strive to enhance forest structural diversity over time through the retention of dead wood both standing and, on the ground, as well as the continued development of multiple age class across the forest.
- Manage deer and moose populations and assure continued hunter access to limit over-browsing in the CA Woodlot.

Forest Inventory and Stand delineation

For the purposes of forest management, areas within the forest of similar age, species and structure are delineated as Forest Stands. Dr. David Smith in his text “The Practice of Silviculture: Applied Forest Ecology”⁶ defines a stand as a “*contiguous group of trees sufficiently uniform in species composition, arrangement of age classes, site quality, and condition to be a distinguishable unit*”. In comparison Dr. Ralph Nyland⁷ defers to the Society of American Foresters definition when delineating a stand which states “*communities or groups of trees that grow together at a particular place, and that foresters can effectively manage as a unit*”. Both of these definitions include trees; however, one looks more holistically at the stand, age and structure of the forest. This is a critical difference, as the success of all future management practices is directly correlated to the site conditions as well as historic land use of a given piece of land. For the purposes of this report, stand delineation was based not only on similar species arrangements, but also common abiotic features within the forest (i.e. the soils and hydrology) and how these features interact with the biotic features (i.e. the trees). This type of delineation within a forest is commonly referred to as a *Natural Community*. In the stand information below you will also see Natural Communities for each stand identified. The Natural Community

⁶ Smith, D.M., B.C. Larson, M.J. Kelty, and P.M.S. Ashton: The Practice of Silviculture: Applied Forest Ecology, (1997) 9th edition. John Wiley & Sons Inc.

⁷ Nyland, R.D.: Silviculture: Concepts and Application, (1996). McGraw-Hill Companies Inc.

is an interacting assemblage of organisms, their physical environment, and the natural processes that affect them.⁸

Applying silviculture in this forest

The concept of managing and cultivating forests is not a new idea. Management of forestland pre-dates the arrival of Europeans to this area by centuries, with the forests of Craftsbury being stewarded by the people of the Abenaki Nation, long before the arrival of the first European settlers. Management of the forest is conducted at the stand level through the application of *Silvicultural Treatments*. This extensive body of collective knowledge is aggregated and distilled into applied science through the practice of Silviculture. The U.S. Forest Service defines silviculture as “*the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.*”⁹ In general this is a good definition, however, it lacks the recognition of the incredible complexity of the multitude of variables that must be considered when practicing silviculture (many of which are highlighted in the diverse goals defined by the CTSD in this report). A more common simplification of this complexity is the fact that silviculture is not rocket science, it is far more complex. It is for this reason that when implementing the silvicultural treatments outlined within this report, the CTSD is strongly encouraged to utilize the services of a Licensed Forester. Additionally, given the goals and objectives defined by the CTSD above, it is also encouraged that any work completed under the guidance of this plan is shared with the broader community, to help demonstrate applied silvicultural practices, as well as educate residents on the benefits of such practices.

Forest Inventory

An inventory of the entire parcel was completed in July of 2019 by the Orleans County Forester. Variable radius point sampling of 29 inventory points was completed using a 10 Basal Area Factor prism (2 points were not measured as one fell in open water in Stand 5 and the other on the parcel boundary in Stand 3). Point sampling is a method of selecting trees to be tallied based on their sizes rather than by their frequency of occurrence¹⁰. Sample points, analogous to plot centers, are located along a random grid generated in ArcMap (a computer mapping program). Once a grid is generated, points are loaded into a handheld GPS unit, which is used to navigate to each point. Within a variable radius plot, the probability of tallying a given tree is based on the cross-sectional area (at 4.5 feet above the forest floor), and the sighting angle (in this case a prism) used. For all inventory work, a 10 Basal Area Factor prism was used, and Vermont State Lands Inventory Protocol was used¹¹. Data was collected using a handheld tablet and processed and stored using the Vermont State FOREX Inventory Database System.

⁸ Thompson, E.H., and E.R. Sorenson: Wetland, Woodland, Wildland: A guide to the Natural Communities of Vermont, (2005). The Nature Conservancy and the Vermont Department of Fish and Wildlife

⁹ Helms, J.A., ed: The dictionary of forestry. (1998) Society of American Foresters. P.210.

¹⁰ Avery, T.E., and H.E. Burkhart: Forest Measurements. (1975) McGraw-Hill Inc.

¹¹ Vermont Department of Forests, Parks and Recreation: Timber Cruise Manual v1.1. (2014)

In all cases within this report, AGS refers to Acceptable Growing Stock. Acceptable Growing Stock Basal Area (AGS BA) consists of that portion of trees tallied as total basal area that are of commercial species and have the potential to produce sawlog-quality or better material now or in the future. Commercial species are those tree species that are commonly acceptable as being commercially valuable. UGS refers to Unacceptable Growing Stock. Unacceptable Growing Stock Basal Area (UGS BA) consists of that portion of trees tallied as total basal area that are not of commercial species, or do not have the potential to produce sawlog or better-quality material now or in the future. Non-commercial species typically include such species as alder, apple, chokecherry, ironwood, gray birch, hawthorn, striped maple, pin cherry and willow sp. AGS and UGS Basal Area (BA) are presented in the following pages to describe stocking of overstory trees within each stand.

Below is a table showing the general summary statistics as well as the number of sample points included in each stand.

Stand	Mapped Acres	Points	Basal Area	Trees Per Acre	Acceptable Growing Stock	QMD (in)
1	4	2	165	153	145	14.04
2	6	2	120	260	90	9.2
3	28	9	83	140	58	10.4
4	8	4	63	136	25	9.2
5	8	2	100	176	55	10.2
6	16	5	130	199	46	10.9
7	10	5	110	123	32	12.8

Figure 11: This table shows the general summary statistics for each stand as well as the number of sample points in each stand. All basal areas are presented in square feet/acre and QMD represents the mean diameter at breast height for each stand.

Management Summary

Stand specific information is described individually for each stand below, although prescribed forest management practices consider implementation across the parcel to improve economic viability in this small parcel. A management activity summary is provided below.

Year	Activity
Annual	Monitor for non-native invasive species
2023	Re-paint property boundary
2023	Stand 1 – Intermediate thinning
2023	Stand 3 – Irregular shelterwood
Anytime	Stand 4 – Crop tree release

Forest Stand 1



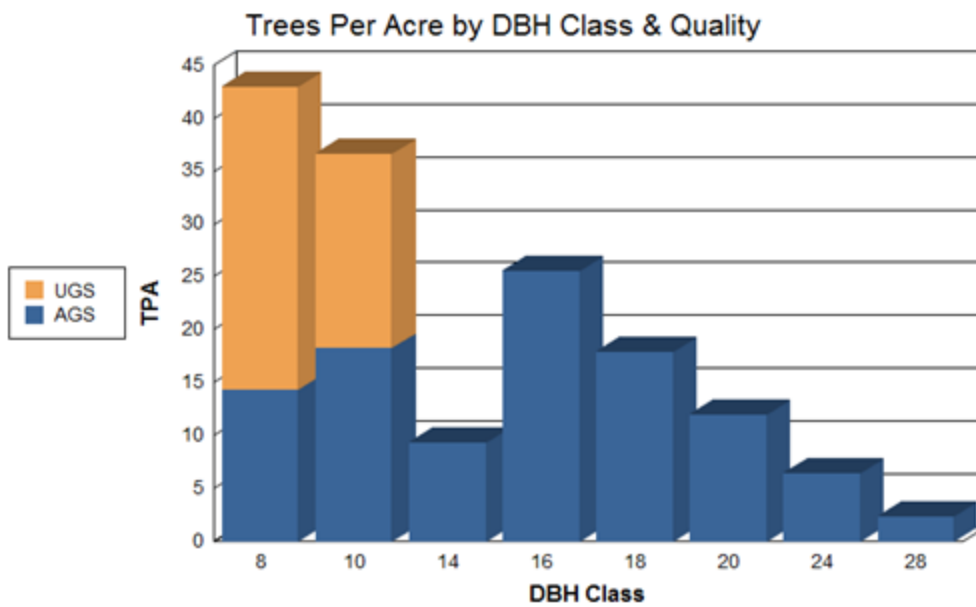
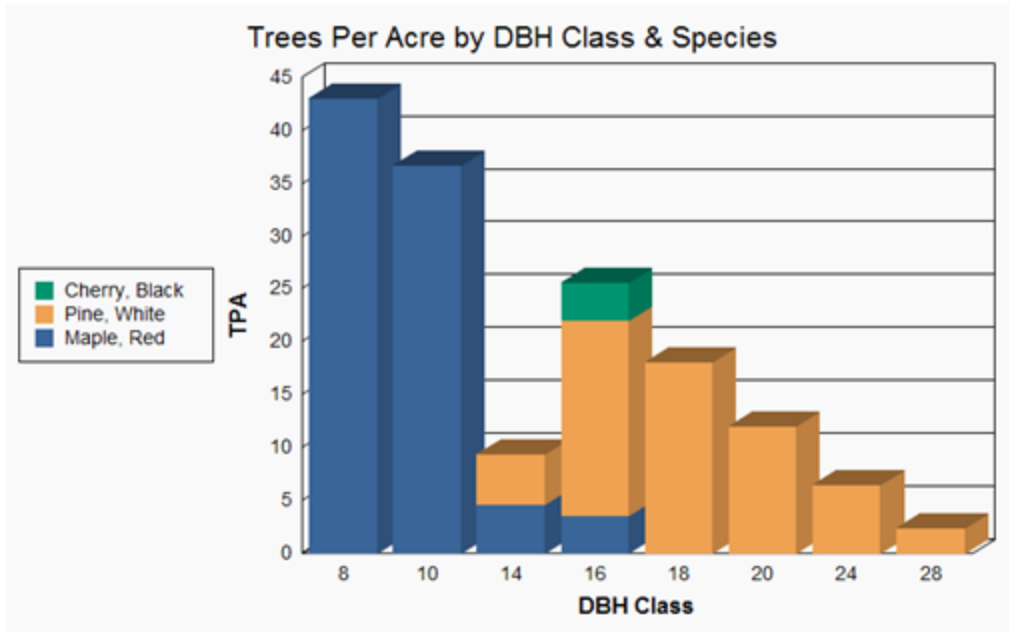
Figure 12: Towering white pines with dense understory is the common condition in Stand 1.

Stand description: This 4 acre stand is comprised of two distinct age classes. The overstory consists of mature eastern white pine that was planted by Craftsbury Academy Students in the 1950's under the oversight of Bill Farrar. These trees have been thinned periodically by Craftsbury Academy forestry classes, most recently in 2010. In general, the quality of the overstory white pine is very good, with the vast majority of unacceptable growing stock (those trees that will not be suitable to mill as lumber) is comprised of co-

dominant red maple that has seeded into this stand since the pine was planted. A second age class of saplings and small poles 20-30 feet tall is well established under the pine overstory. Much of this younger age class is comprised of sugar maple, reflecting the high quality of the soils on this site, and the natural transition to hardwoods on this site over time. The most recent thinning in this stand 1 decade ago was very light, and live crown ratios (how far down from the top of the tree the foliage is growing) is beginning to decline. Ultimately this results in a decline in vigor in these trees, resulting from the high stocking levels.

Stocking Data:

	BA	TPA
Mean	165.0	153.5
St. Dev	21.2	119.1
AGS	145.0	106.6
UGS	20.0	46.9
80% Range	(118.9-211.1)	(-105.7-412.7)
Snags Per Acre		0.3



Overstory Species Composition:

Species	BA	%BA	TPA	QMD	RelDen	%AGS	BF Vol	Pulp Vol
Cherry, Black	5.0	3.0	3.6	16.0	3.9	100.0	411.3	0.0
Maple, Red	45.0	27.3	87.9	9.7	37.7	55.6	811.2	6.5
Pine, White	115.0	69.7	62.0	18.5	41.2	100.0	21,944.5	0.0
Totals	165.0	100.0	153.5	14.0	82.8	87.9	23,167.0	6.5

Soil Series: The dominant soil series in Stand 1 is Vershire-Lombard Complex. This is a well-drained soil with varying depth to bedrock layer. Depending on levels of calcium enrichment, this soil supports excellent growth in white pine, and will likely transition to a Northern Hardwood Forest over time.

Regeneration: Hardwood saplings dominated by sugar maple, with small pockets of balsam fir. Areas where the canopy is more open are dominated by raspberries. Saplings and small poles are well established across much of the stand.

Natural Community Designation Uncertain, overtime this stand will likely evolve into a Northern Hardwood Forest. White pine dominating the overstory is a result of past plantings, and the current understory is dominated by sugar maple and white ash saplings.

Forest Health: Overall this stand is healthy, however vigor within the overstory white pine will continue to decline as the live crown ratios continue to decrease. In 2018, monitoring plots were established in this stand by the Vermont Dept. of Forests, Parks and Recreation. These monitoring plots are part of a larger study looking at the long-term health trends within white pine stands across the northeast (see Forest Health section above for more details on this work).

Silvicultural Long-term Objectives: This stand has been managed as an even-aged stand, and will continue to be managed as such for the remaining rotation of the white pine. The current stand age is approximately 70 years old, with a rotation age of 85-95 years. The final removal of the pine overstory will occur over a series of harvests to transition this stand to a northern hardwood stand over a period of several decades. Given the historical legacy of this plantation and connection with the Craftsbury Academy students from its conception, several dominant canopy white pine will be retained in perpetuity, as a legacy of historic plantings.

Wildlife Management Considerations: The current structure within this stand is relatively simple, being managed as a plantation of eastern white pine, the forest canopy lacks vertical and horizontal structure (this is the change within the canopy from the ground to the top, as well as openings within the canopy creating multiple layers of trees of different ages). Future management should strive to continue the transition from the white pine plantation to a northern hardwood forest thru protecting the younger age class during any harvest activities. Several dominant white pine should be retained in perpetuity to increase vertical structure over time. Additionally, all standing dead trees should be retained where possible.

Silvicultural prescription:

In 2023 complete an Intermediate Thinning in this stand. Overall stand stocking will be reduced to approximately 100 square feet¹². Removals will target poor quality co-dominant hardwood stems, and dominant white pine trees showing signs of white pine blister rust, or other defects. This thinning will also increase light to the hardwood sapling understory. Great care should be taken during thinning so as to minimize any damage to the residual white pine overstory. The next entry in this stand will likely be the removal of the white pine overstory to release the hardwood understory, helping to transition this stand back to the natural community. For this reason, great care should be taken to protect the hardwood sapling understory during the harvest.

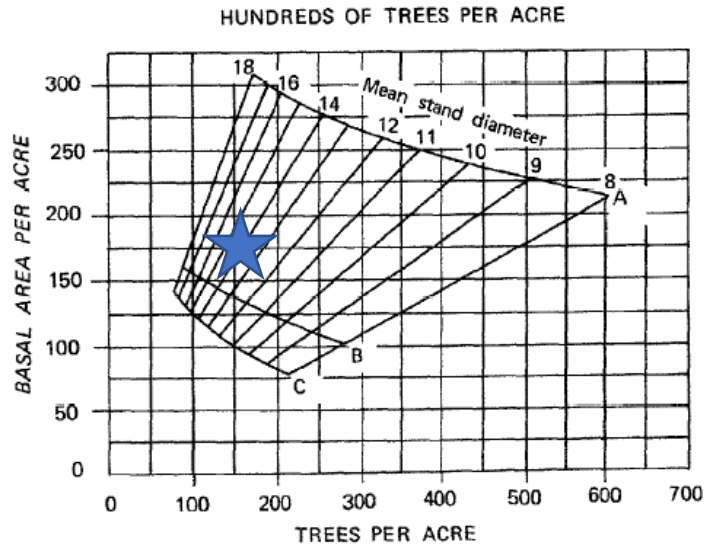


Figure 13: Stocking chart for even-aged pure stand of white pine. Current stocking in Stand 1 is miss-leading relative to this stocking chart as inventory data includes co-dominant red maple trees that are generally of poor quality.

¹² Lancaster, K.L and W.B. Leak, 1978. A silvicultural guide for white pin in the northeast. US Forest Service General Technical Report NE-41.

Forest Stand 2



Figure 14: Northern white cedar swamps growing in organic soils are found in several areas throughout the parcel and are generally mapped as Stand 2.

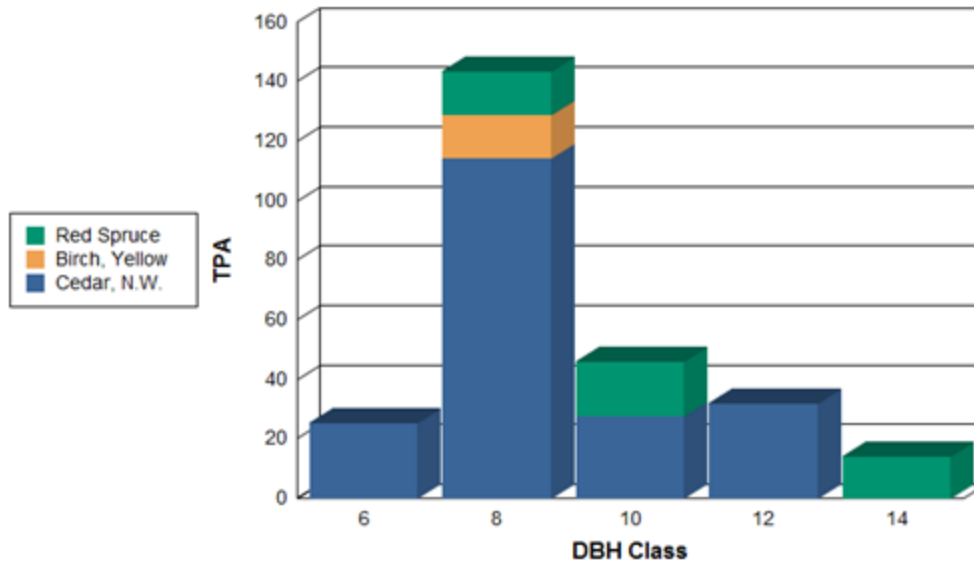
Stand Description: This 6 acre stand is comprised of three distinct areas within the parcel. A smaller, fourth isolated cedar swamp is located just east of Harry's Lean-to, but is not identified on the Forest Stand Map. These areas, although small in size, are excellent examples of Northern White Cedar Swamps. Soils in these areas are poorly drained, and comprised largely of organic materials. Although the inventory information below does not reflect this, black ash is found within these areas. Most of the black ash observed were

small in size, however abundant regeneration in the seedling class shows that these trees are producing seeds. Stocking data below was taken from plots that were located in more open areas relative to the rest of the stand. Stocking is likely higher than is reflected within the inventory, especially in isolated portions of Stand 2 in the eastern part of the parcel.

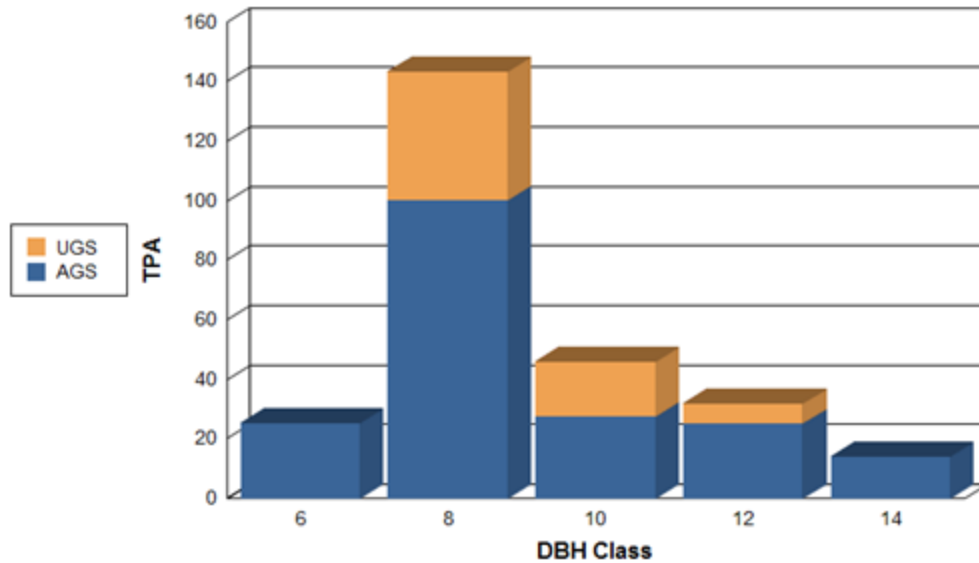
Stocking Data:

	BA	TPA
Mean	120.0	260.1
St. Dev	42.4	93.7
AGS	90.0	192.5
UGS	30.0	67.6
80% Range	(27.7-212.3)	(56.2-464.0)
Snags Per Acre		0.0

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

Species	BA	%BA	TPA	QMD	RelDen	%AGS	BF Vol	Pulp Vol
Birch, Yellow	5.0	4.2	14.3	8.0	4.4			0.7
Cedar, N.W.	85.0	70.8	199.4	8.8	39.5	70.6	1,611.2	9.3
Red Spruce	30.0	25.0	46.7	10.9	11.5	100.0	3,176.6	1.8
Totals	120.0	100.0	260.4	9.2	55.3	75.0	4,787.8	11.8

Soil Series: The dominant soil series in Stand 2 is Cabot silt loam. This stony soil is poorly drained, with a root restrictive layer found 10 to 20 inches below the surface. Isolated portions of Stand 2 found in the eastern half of the CA Woodlot are not mapped as Cabot Silt Loam, however these small pockets are found in poorly drained areas, collecting seepage runoff from hillside above.

Regeneration: Regeneration across stand varies. Scattered black ash seedlings and fir are present, with some areas dominated by sedge and other herbaceous plants. Areas of higher stocking lack regeneration.

Natural Community Designation: Northern White Cedar Swamp.

Forest Health: Although mortality is present within this stand, and windthrow is common due to extremely wet soils, this stand overall is quite healthy. Historic logging within these areas is scattered in nature, with some areas developing as a result of natural disturbance over time caused by isolated individual tree windthrow.

Silvicultural Long-term Objectives: Uneven-aged. The actual age of this stand is not known, and due to the isolated portions of this stand, it is likely that stand age varies widely across the mapped area.

Wildlife Management Considerations: These stands are important refuge within the larger landscape, and function as important linkages of refuge as animals move across the CA Woodlot. Well established deer trails were noted along the edges of many of the cedar swamps, and due to the dense cedar overstory, it is likely that these areas provide isolated winter refuge for deer. Seeps within these swamps also act as important food sources for a variety of wildlife throughout the year.

Management action: No active management is suggested in this stand. Given the high ecological value of these areas, it is suggested that these areas are retained as un-managed areas within the parcel. Natural processes will progress stand development overtime, driven by individual tree mortality and small-scale windthrow. This will continue to result in recruitment of dead wood, which is currently lacking in many portions of this stand and has been shown to be a vital component to northern white cedar regeneration¹³. These areas will also function as excellent places for students to observe and explore northern white cedar swamps. This natural community type, although rare across the state of Vermont, is more common in Orleans County and is an important component of both our landscape and culture. Beyond the occasional harvest of individual trees as needed for trail work or signage specific to the CA Woodlot, these areas should remain unmanaged. Recreational development in these areas should be minimized to reduce impact to fragile hydric soils.

¹³ Boulfroy, E., et al. 2011. Silvicultural guide for northern white-cedar (eastern white cedar). US Forest Service General Technical Report NRS-98.

Forest Stand 3



Figure 15: Variable conditions both in the overstory tree age and species comprise most of Stand 3. Balsam fir within this stand is rapidly declining in vigor.

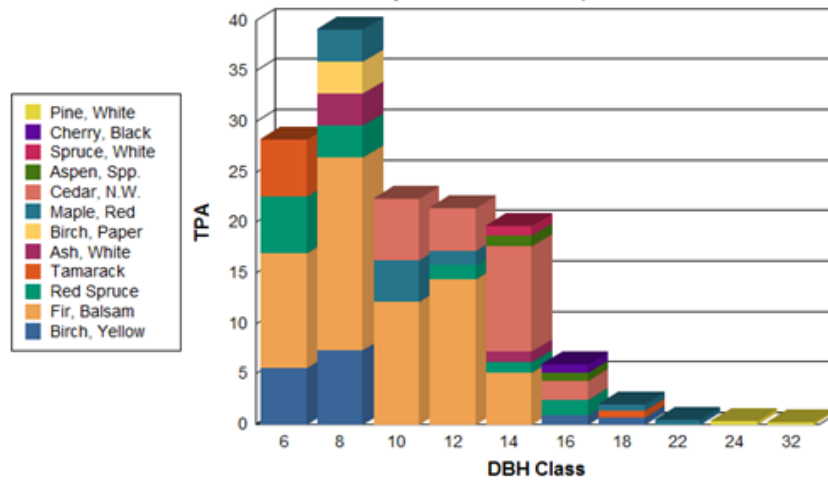
Stand Description: This 28 acre stand is similar to Stand 6 in that it is highly variable across the stand. Portions of this stand have been treated sporadically over the last three decades by students from the Craftsbury Academy. Additionally, this stand was impacted by Hurricane Floyd approximately 20 years ago, after which a small salvage operation occurred. Due to the sporadic harvests over the last 30 years, multiple age classes have begun to develop within this stand. Across the stand, overstory balsam fir is

declining in vigor, with many trees already dead or broken as a result of weakening of the mainstem due to red cubical rot and declining vigor. Balsam wooly adelgid was observed on many balsam fir within this stand, further exacerbating the rapid decline in these trees. Much of this stand is underlain with Vershire-Glover soils, with moderate levels of enrichment from the calcareous bedrock below. These soils grow hardwood species well, and maple, yellow birch and red spruce should be favored over time. This stand is also the location of the majority of the established walking trails on the property, the nature trail, as well as the outdoor classroom at Harry's Lean-to. All management options would need to consider the relative impacts to these recreational, educational, and aesthetic attributes within this stand.

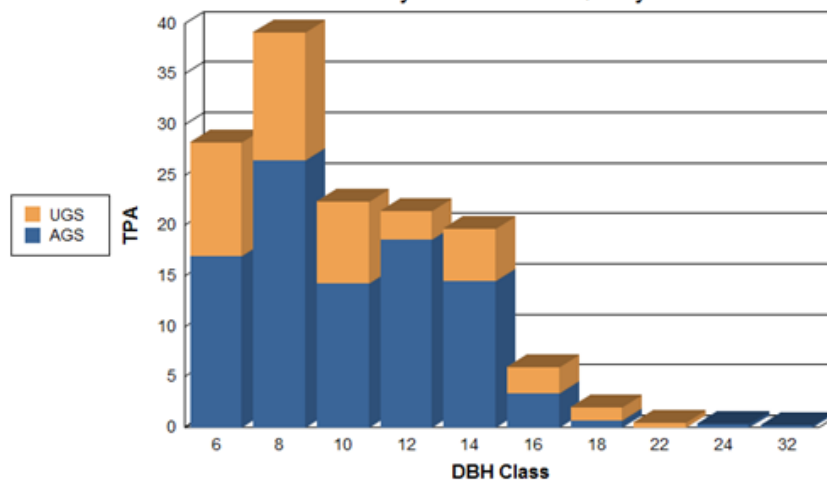
Stocking Data:

	BA	TPA
Mean	83.3	140.1
St. Dev	45.8	54.6
AGS	57.8	95.5
UGS	25.6	44.6
80% Range	(62.0-104.6)	(114.7-165.5)
Snags Per Acre		0.4

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

<u>Species</u>	<u>BA</u>	<u>%BA</u>	<u>TPA</u>	<u>QMD</u>	<u>RelDen</u>	<u>%AGS</u>	<u>BF Vol</u>	<u>Pulp Vol</u>
Ash, White	2.2	2.7	4.2	9.8	1.9	100.0	88.9	0.2
Aspen, Spp.	2.2	2.7	1.8	14.9	1.0			0.6
Birch, Paper	1.1	1.3	3.2	8.0	1.0	100.0		0.2
Birch, Yellow	5.6	6.7	14.6	8.4	4.8	60.0	22.0	0.7
Cedar, N.W.	20.0	24.1	22.6	12.8	9.4	66.7	1,162.4	1.1
Cherry, Black	1.1	1.3	0.9	15.0	0.9			0.3
Fir, Balsam	32.2	38.8	62.3	9.7	13.3	75.9	1,790.2	2.1
Maple, Red	6.7	8.0	9.8	11.2	5.4	33.3		1.6
Pine, White	2.2	2.7	0.6	27.2	0.7	100.0	339.6	0.0
Red Spruce	6.7	8.0	12.9	9.7	2.6	100.0	478.6	0.3
Spruce, White	1.1	1.3	1.0	14.0	0.4	100.0	146.9	0.0
Tamarack	2.2	2.7	6.4	8.0		50.0	154.4	0.0
Totals	83.3	100.4	140.2	10.4	41.4	68.4	4,182.9	7.2

Soil Series: The dominant soil series in Stand 3 is Vershire-Glover Complex. This is a very rocky soil is well drained, with a depth to a root restrictive layer and/or bedrock is generally 20-40 inches, although this is shallower in many places. This soil is well suited for hardwood species.

Regeneration: Regeneration varies significantly across the stand. Areas in the southern portion of the stand that have experienced significant mortality over the last decade have responded well with dense spruce and fir regeneration. Areas in the northern part of the stand have responded more slowly, and are dominated by ferns and raspberries in areas. Soils in this area appear shallower to bedrock and likely more excessively drained which may be delaying regeneration success due to desiccation.

Natural Community Designation: Red spruce northern hardwood forest

Forest Health: As noted above, balsam wooly adelgid is present in this stand. Overstory balsam fir is rapidly declining in health, with significant mortality observed during field inventory.

Silvicultural Long-term Objectives: Multi-aged management. The current stand age of this forest is 80-90 years, with a rotation age of 120 years. Regeneration of this stand began with periodic harvests and salvage harvest over the last three decades and has continued in the last decade with the increased mortality in balsam fir, which currently represents 39% of the overstory.

Wildlife Management Considerations: Areas of dense softwood regeneration in the southern end of the stand provide excellent cover. On numerous occasions ruffed grouse were observed in this area. Numerous dead snags created by declining balsam fir provide short-term food source for a variety of birds, however these standing dead trees generally do not persist upright for a long-period of time, and so this value will likely decrease overtime as the majority of the mature balsam fir is lost.

Management Actions: Irregular group shelterwood in 2023¹⁴. Current stocking in this stand is at optimum density for a stand comprised of both hardwood and softwood species. However, given the observed decline in balsam fir, a small harvest is suggested in combination with work done in Stand 1. The focus of this harvest will be to remove declining fir. Given the high proportion of poor quality of trees in the overstory, it is suggested that this stand is slowly regenerated over an extended period of time to promote higher quality trees. Given the historic salvage harvest following Hurricane Floyd, and the recent mortality and windthrow in this stand creating numerous openings within this stand, this treatment will function as the second entry of an Irregular Group Shelterwood, a silvicultural system designed to develop a multi-aged forest (a forest with three or more distinct age classes of trees). The objective of

¹⁴ Raymond, P. et al (2009) The Irregular shelterwood System: Review, Classification and Potential Application in Forests Affected by Disturbance. Journal of forestry, December, pages 405-13

this treatment would be to regenerate the stand over the course of five entries spanning a period of 60 years. At each entry, three different silvicultural strategies will be employed:

- **Tending/Thinning:** This treatment involves the removal of the poorest quality trees to allocate resources to the best quality trees that remain following the harvest.
- **Establishment:** This treatment involves the creation of conditions that favor the germination of more shade tolerant tree species (red spruce, hemlock, sugar maple and balsam fir). By controlling the amount of filtered sunlight allowed to hit the forest floor, a forester can determine the tree species that will most likely germinate.
- **Overstory Removal (OSR):** Once tree seedlings are established and growing well, the remaining overstory trees can be removed to allow full sunlight to access the established trees.

The first entry would be timed with the prescribed treatment in Stand 1, with subsequent entries occurring on a 15-year entry cycle. This system allows for adaption to variability within the stand through including both the removal of overstory trees in small groups where regeneration is present (Overstory Removal treatment described above), creating areas of sheltered conditions to establish regeneration where it is lacking (Establishment treatment described above), and allowing for the flexibility to retain overstory trees for structural and other ecological values.

The first entry in this stand will continue the slow process of developing multiple age classes within this stand through the removal of overstory trees in small groups ($\frac{1}{4}$ to $\frac{1}{2}$ acre in size) over no more than 4 acres of the stand. Pockets of established regeneration with an overstory of declining balsam fir and poor-quality red maple should be prioritized for locating groups. At this same time, establishment cutting will occur on up to 2 additional acres between overstory removal groups, also in areas dominated by declining balsam fir, but with less regeneration present. In these areas, stocking will be reduced to 80 sq ft/ac in order to maintain shaded conditions and reduce the proliferation of sedge and ferns within the stand. Wherever possible yellow birch, sugar maple and red spruce should be retained as both growing stock and for seed production. The goal is to increase regeneration of shade-tolerant trees before removal of the overstory during a subsequent entry.

In subsequent entries, new areas will be identified for overstory removal and establishment cutting, and tending between overstory removal and establishment groups will focus on the removal of declining balsam fir stems in areas where stocking exceeds 90 sq ft/ac.

Forest Stand 4



Figure 16: Young hardwood poles comprise the bulk of Stand 4. Quality within trees varies significantly.

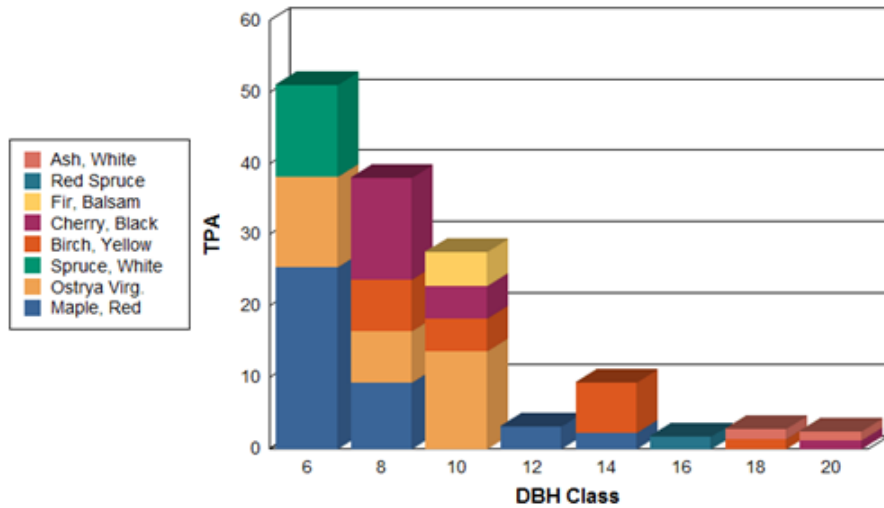
Stand Description: This 8 acre stand is dominated by hardwood poles. Stem form is fair, with many stump-sprouted red maple trees. Overtime this stand has the potential to develop into a high-quality timber stand if managed wisely. Locally this area is referred to as “Porcupine Ridge” which is likely the result of the ridgeline that form steeply along the eastern boundary of this stand, continuing on to the south through the eastern edge of Stand 3. This ridge drops sharply to Stand

5 below, and loamy soils along the eastern edge of this ridgeline are conducive to digging, and are the home to at least one coyote den, and likely other denning animals overtime. A well-established game trail follows this ridge from the northern edge of Stand 4 traveling south along the ridgeline towards the Beaver Pond Trail. Terrain in this stand is gradually sloping, with several nice vistas along the eastern boundary following the ridgeline to the south. No signs of recent harvest were observed in this stand, except for a small area in the southwestern corner of the stand, near Harry’s Lean-To, where yellow birch sawlogs were harvested to be used in the building of the Craftsbury Academy Gymnasium in 2011.

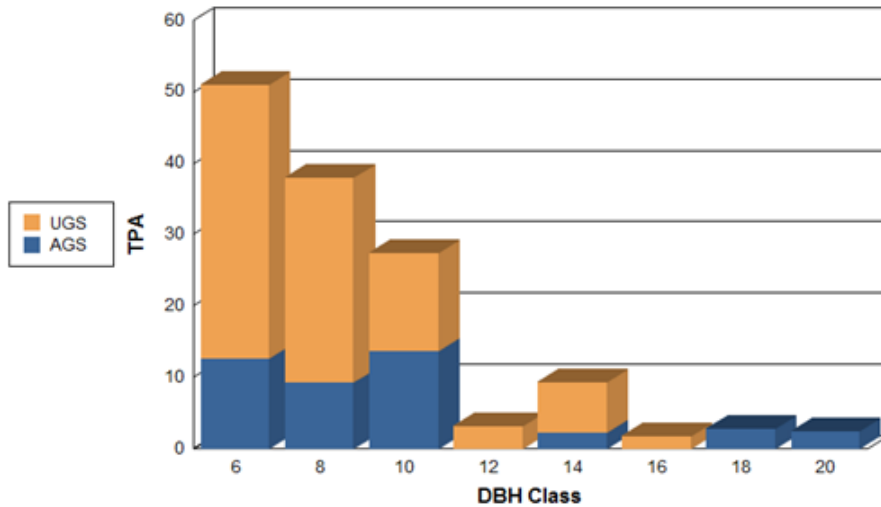
Stocking Data:

	BA	TPA
Mean	62.5	136.1
St. Dev	12.6	64.2
AGS	25.0	43.6
UGS	37.5	92.5
80% Range	(52.2-72.8)	(83.5-188.7)
Snags Per Acre		0.5

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

<u>Species</u>	<u>BA</u>	<u>%BA</u>	<u>TPA</u>	<u>QMD</u>	<u>RelDen</u>	<u>%AGS</u>	<u>BF Vol</u>	<u>Pulp Vol</u>
Ash, White	5.0	8.1	2.7	18.5	3.9	100.0	564.2	0.0
Birch, Yellow	15.0	24.2	20.2	11.7	12.2	50.0	410.0	1.6
Cherry, Black	10.0	16.1	20.2	9.5	8.4	50.0	254.7	2.3
Fir, Balsam	2.5	4.0	4.6	10.0	1.0	100.0	298.5	0.0
Maple, Red	12.5	20.2	40.3	7.5	10.9	20.0		3.1
Ostrya Virg.	12.5	20.2	33.7	8.3				1.8
Red Spruce	2.5	4.0	1.8	16.0	0.7			1.0
Spruce, White	2.5	4.0	12.7	6.0	1.5	100.0		
Totals	62.5	100.8	136.2	9.2	38.6	40.0	1,527.4	9.8

Soil Series: The dominant soil series in Stand 4 is Vershire-Glover Complex. This is a very rocky soil is well drained, with a depth to a root restrictive layer and/or bedrock is generally 20-40 inches, although this is shallower in many places. This soil is well suited for hardwood species.

Regeneration: Regeneration is lacking in this young stand. Ferns dominate many areas.

Natural Community Designation: Northern hardwood forest

Forest Health: Overall stand health is good, with no significant issues noted.

Silvicultural Long-term Objectives: The current stand is even-aged, approximately 40 years old. Overtime, this stand will be transitioned to a multi-aged stand, however due to the current young age of the stand, all treatments in the near future (next several decades) will be limited to tending treatments to increase overall stand quality. As the stand continues to age, in 20-30 years, regeneration treatments such as the use of small groups will be incorporated to establish multiple age classes.

Wildlife Management Considerations: As noted above, well established game trails can be found along the northern and eastern edges of this stand, particularly following the ridgeline that delineates the eastern boundary of the stand.

Management Actions: Current stand stocking and age do not require immediate management. That said, with approximately 60% of the stand being comprised of unacceptable growing stock (UGS), the stand could benefit from light tending to increase stand quality over time. This work would align well with the overall management goals of the parcel to demonstrate excellent land stewardship. For these reasons, crop tree release on 10-20 trees per acre is encouraged¹⁵. This work can occur overtime, as part of educational workshops or by student classes. All trees felled can be left on site to increase coarse woody material within the stand. Crop trees should be identified by a licensed forester, and released on 2 to 3 sides from competition within the canopy. Crop trees should be selected based on form (straight trees free of wounds and poor branching structure) as well as species (species favored will be sugar maple, yellow birch, white ash, red spruce). Work should be done anytime after August 1st to avoid disturbing nesting interior forest birds.

¹⁵ Perkey, A.W., B.L. Wilkins, 1994. Crop Tree Management in Eastern Hardwoods. US Forest Service NA-TP-19-93.

Forest Stand 5



Figure 17: Much of Stand 5 has been impacted by beavers for decades. The photograph above shows the open water of the beaver pond located at the southern edge of Stand 5.

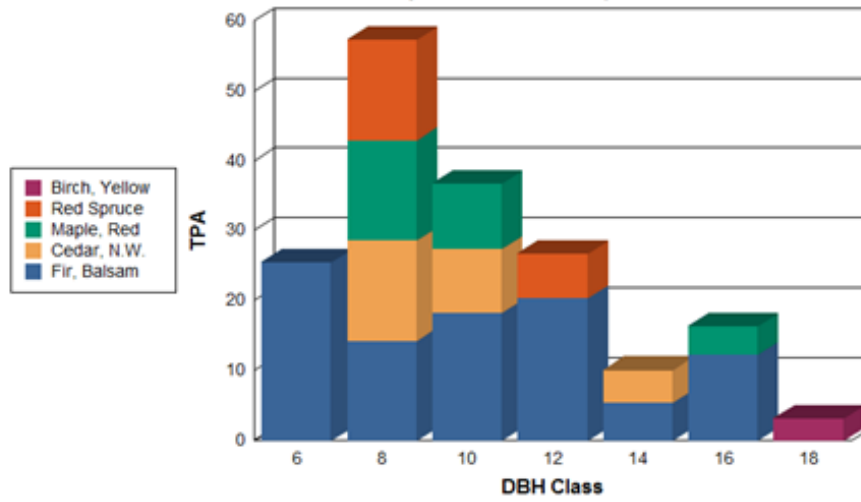
Stand Description: This 8 acre stand bisects the western and eastern halves of the property. The stand has likely always been dominated by softwoods, which can be seen within the 1948 aerial imagery shown in earlier sections of this report. Beavers have greatly influenced this area, creating a series of ponds and meadows from old ponds now drained, stepping downward from the south to the north, where they drain into the Heart Pond outlet. Along the western and eastern edges of this stand are dense spruce fir stands. Dense spruce/fir stands form an

excellent corridor along either side of the wetland complex. No evidence of management was observed on the eastern edge of this stand. The western edge has been harvested sporadically over the last three decades, likely when work in Stand 3 was completed. The remnants of an old sugarhouse can be found near the northern border of this stand. Historic management within this area likely favored hardwood species, however since the abandonment of sugaring in this area, and with the re-introduction of beavers to the stand, the forest has largely reverted to softwood species.

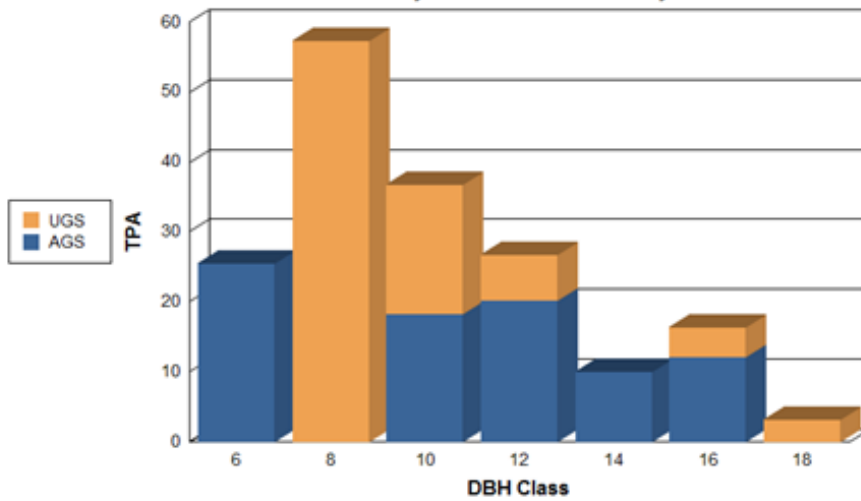
Stocking Data:

	BA	TPA
Mean	100.0	175.4
St. Dev	0.0	16.9
AGS	55.0	86.3
UGS	45.0	89.1
80% Range	(100.0-100.0)	(138.6-212.2)
Snags Per Acre		0.1

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

<u>Species</u>	<u>BA</u>	<u>%BA</u>	<u>TPA</u>	<u>QMD</u>	<u>RelDen</u>	<u>%AGS</u>	<u>BF Vol</u>	<u>Pulp Vol</u>
Birch, Yellow	5.0	5.0	3.2	17.0	3.9			1.4
Cedar, N.W.	15.0	15.0	28.2	9.9	7.0	66.7	485.8	0.5
Fir, Balsam	55.0	55.0	96.1	10.2	21.6	63.6	2,593.7	5.1
Maple, Red	15.0	15.0	27.6	10.0	12.5	33.3	406.2	1.9
Red Spruce	10.0	10.0	20.7	9.4	4.3	50.0	384.5	1.0
Totals	100.0	100.0	175.7	10.2	49.3	55.0	3,870.2	9.9

Soil Series: The dominant mapped soil series in Stand 5 is Vershire-Glover Complex, however site visit confirmed this is likely limited to the upper slopes of this stand. Vershire-Glover Complex is a very rocky soil is well drained, with a depth to a root restrictive layer and/or bedrock is generally 20-40 inches, although this is shallower in many places. This soil is well suited for hardwood species. A wetland complex runs from the south to the north thru the center of this stand, and it is likely that much soils have developed over time due to impact from beaver impoundments. The mapped soils for this stand do not reflect the site conditions and quality. Soils on the eastern and western boundaries of this stand are thin and likely more acidic than adjacent stands and are well suited for growing softwood species.

Regeneration: Areas along the eastern edge of this stand have regenerated densely with spruce and fir saplings that are well established. Areas along the western edge were harvested 20-30 years ago and hardwood regeneration that became established was since consumed by beavers, resulting in an established fern layer with little regeneration.

Natural Community Designation: Lowland spruce-fir forest

Forest Health: Similar to conditions noted in Stand 3, balsam fir is declining in health, although fir within this stand appears more vigorous than those in Stands 3 and 6.

Silvicultural Long-term Objectives: The stand is currently a two-aged stand within the riparian areas (the central portion of the stand is functionally wetland and is non-forested at this time due to beaver activity). Overtime, this stand will develop into a multi-aged stand.

Wildlife Management Considerations: The greatest value of this stand is the habitat provided by both the wetland complex comprising the central portion of the stand, as well as the intact riparian buffer along the eastern portion of the stand.

Management Actions: Given the small size of productive forestland within this stand (estimated at less than 1/3 of the total stand), and given the high ecological value of the wetland system and associated riparian buffer, no active management is prescribed in this area. This area should be monitored regularly for the presence of non-native invasive species within the beaver meadows. Any future harvest or development of trail systems in Stands 6 and 7 will require crossing thru this stand. Due to hydric soils, any harvest would require frozen conditions in winter time, and recreational trails if developed would need to consult with wetland ecologists and trail design professionals to determine the most appropriate crossing site and trail design.

Forest Stand 6



Figure 18: Stand 6 is a highly variable stand both in species and age of the overstory trees.

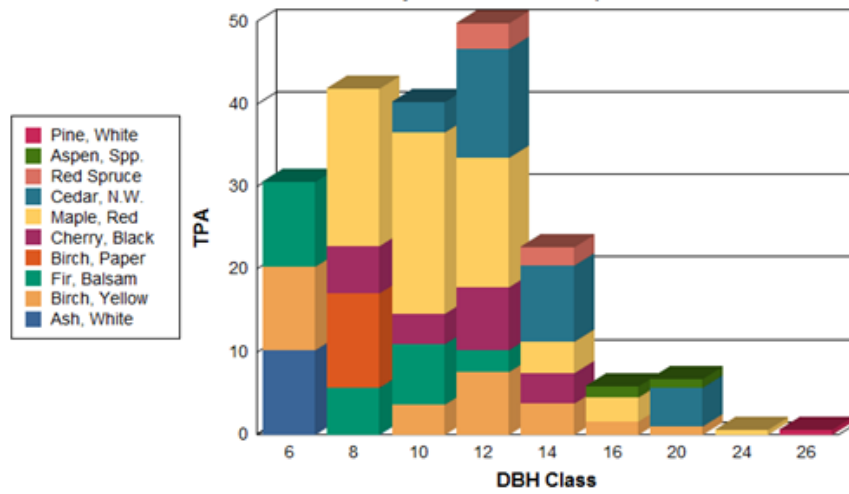
Stand Description: This 16 acre stand is fairly variable both in species and stocking. As noted in the stocking data below, densities ranged between optimum stocking for a mixed wood stand to nearly fully stocked (see Stocking guide below). Stumps within this stand indicate harvest estimated at 40-60 years ago, likely occurring over multiple entries where silvicultural practices were not utilized, thus the high proportion of unacceptable growing stock in the current stand. The eastern edge of this stand shared with Stand 7 follows approximately the trench dug

by Samuel Crafts in the early 19th century, which can still be found today. Any harvest occurring in this stand would need to be planned in such a way to avoid any negative impacts to this significant historic feature. Several old skid trails have been maintained by private citizens throughout this stand to provide access via ATV. Motorized use within this area is limited and appears to be accessed from trails leading to the east toward Mill Village Road. Barbed wire along the western edge of the stand indicate this area was likely used as pasture at one time, likely resulting a greater proportion of softwood species in the overstory over time, due to grazing preference of animals during the field abandonment. Soils within this stand are well suited for northern hardwood species, and management within this stand will favor transition to a greater proportion of this species mix over time.

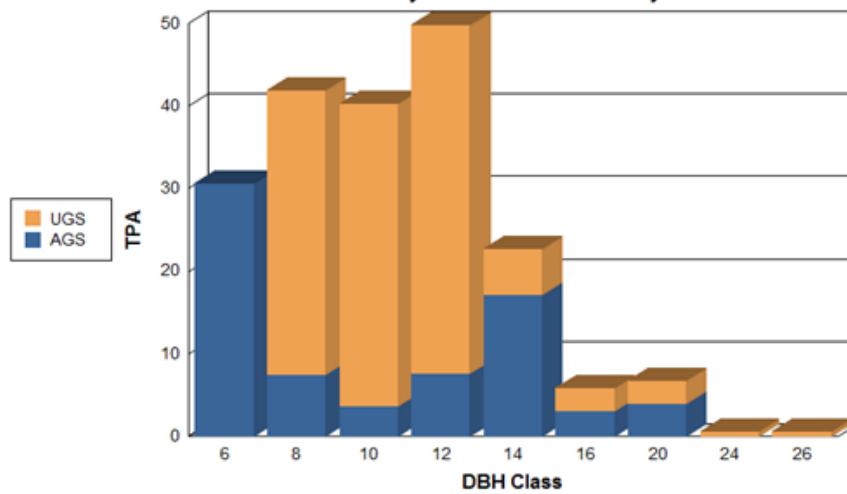
Stocking Data:

	BA	TPA
Mean	130.0	199.1
St. Dev	22.4	35.9
AGS	46.0	73.5
UGS	84.0	125.6
80% Range	(114.6-145.4)	(174.5-223.7)
Snags Per Acre		0.3

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

<u>Species</u>	<u>BA</u>	<u>%BA</u>	<u>TPA</u>	<u>QMD</u>	<u>RelDen</u>	<u>%AGS</u>	<u>BF Vol</u>	<u>Pulp Vol</u>
Ash, White	2.0	1.5	10.2	6.0	1.9	100.0		0.4
Aspen, Spp.	4.0	3.1	2.5	17.3	1.8	50.0	169.4	0.7
Birch, Paper	4.0	3.1	11.5	8.0	3.6			0.6
Birch, Yellow	18.0	13.9	27.9	10.9	14.7	55.6	525.2	2.0
Cedar, N.W.	32.0	24.6	30.9	13.8	15.1	37.5	859.3	3.9
Cherry, Black	14.0	10.8	20.8	11.1	11.5	42.9	473.7	1.7
Fir, Balsam	10.0	7.7	25.8	8.4	4.6	60.0	397.6	1.1
Maple, Red	40.0	30.8	64.0	10.7	32.9	15.0	204.0	7.6
Pine, White	2.0	1.5	0.6	24.9	0.7			0.8
Red Spruce	4.0	3.1	5.2	11.9	1.5	50.0	157.2	0.5
Totals	130.0	100.0	199.2	10.9	88.2	35.4	2,786.5	19.1

Soil Series: The dominant soil series in Stand 6 is Vershire-Glover Complex. This is a very rocky soil is well drained, with a depth to a root restrictive layer and/or bedrock is generally 20-40 inches, although this is shallower in many places. This soil is well suited for hardwood species.

Regeneration: In general regeneration is lacking across the stand.

Natural Community Designation: Red spruce northern hardwood forest. Although the current species composition doesn't reflect this, the current species composition is likely a result of historic land use. Overtime, this site will transition to a more hardwood dominated mixed species composition.

Forest Health: Similar to observations in Stand 3, balsam fir is declining in vigor. In this stand fir comprises only 7.7% of the total basal area, however, it can be found in pockets, and were locally more abundant, management practices should favor transition to longer-lived species.

Silvicultural Long-term Objectives: Current conditions within this stand are even-aged, with some areas showing two-age classes. Over time, management will strive to transition to multiple age classes with a higher proportion of hardwood species.

Wildlife Management Considerations: Current conditions in this stand lack browse as a food source. Future management will strive to establish a new cohort (young saplings) of hardwood species. Although we hope the deer do not eat all these trees, inevitably these openings will provide a needed food source within this stand. Additionally, the establishment of a new cohort will further develop both vertical and horizontal structure within this stand which is currently lacking.

Management Actions: Inventory data shows high stocking in this stand. On the ground, conditions within this stand are highly variable due to past logging practices. Given access limitations to this stand, which require crossing the wetland areas in Stand 5, a harvest is not prescribed at this time. During the next 10 year period, access to this stand should be evaluated. Future management in this stand should focus on establishing a new cohort of trees. As this stand is bisected by the canal originally excavated by Samuel Crafts, any harvesting in this stand would need to maintain extra care to not disturb this important cultural resource.

Forest Stand 7



Figure 19: Stand 7 is a northern hardwood forest with signs of enrichment. Numerous large diameter hardwood trees are scattered throughout this stand.

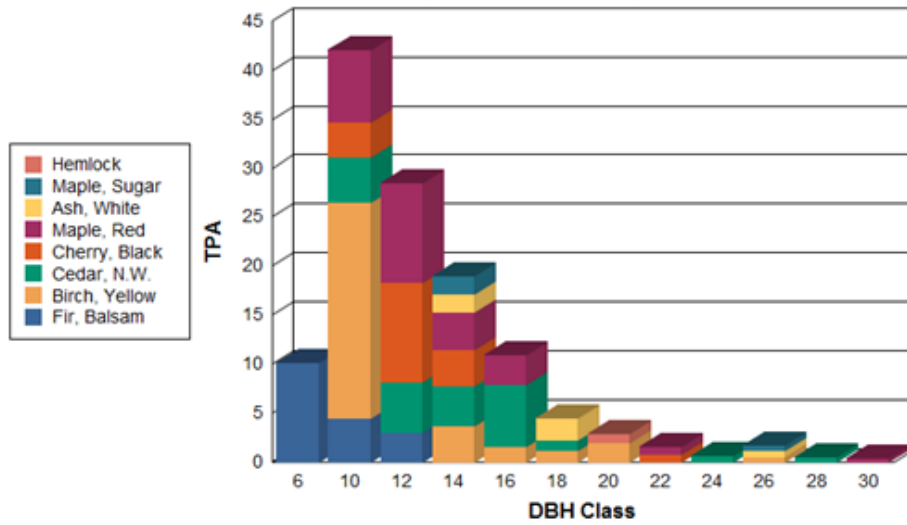
Stand Description: This 10 acre stand has developed over time as a result of historic logging practices that favored the removal of the highest quality hardwood trees. Remnant large diameter sugar maple trees provide evidence that this area may have been used as a sugarbush at one time. Site quality is very high as indicated by the presence of herbaceous plants such as blue cohosh and maiden hair fern. In general, the stand is even-aged, with areas that were harvested more aggressively

historically having established a second age class dominated by yellow birch poles now 30-50 years old. This stand shows excellent promise for the potential to grow high quality sawlogs, as observed in the 22 inch diameter black cherry in the photograph above. The canal dug by Samuel Craft travels along the western boundary of this stand and should be protected in any future harvest operations.

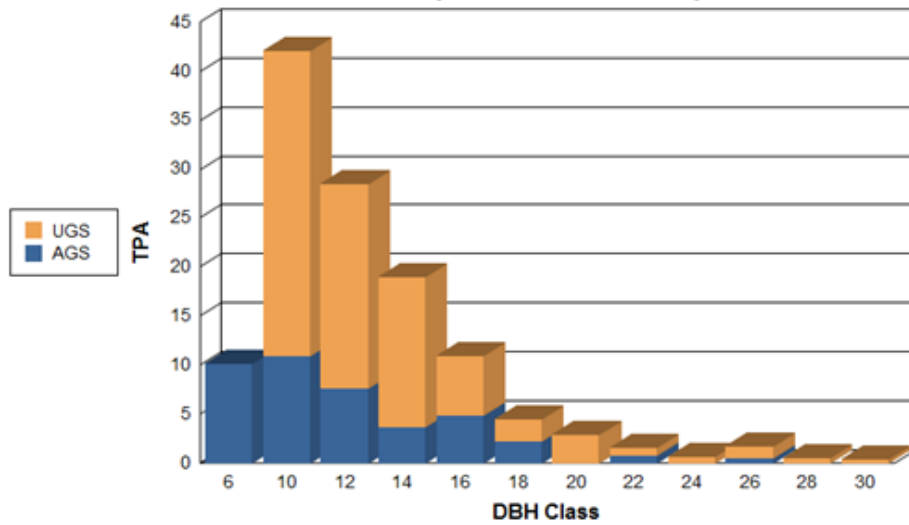
Stocking Data:

	BA	TPA
Mean	110.0	123.0
St. Dev	10.0	50.0
AGS	32.0	41.0
UGS	78.0	82.0
80% Range	(103.1-116.9)	(88.7-157.3)
Snags Per Acre		0.3

Trees Per Acre by DBH Class & Species



Trees Per Acre by DBH Class & Quality



Overstory Composition:

<u>Species</u>	<u>BA</u>	<u>%BA</u>	<u>TPA</u>	<u>QMD</u>	<u>RelDen</u>	<u>%AGS</u>	<u>BF Vol</u>	<u>Pulp Vol</u>
Ash, White	8.0	7.3	4.7	17.6	6.2	50.0	328.0	0.9
Birch, Yellow	26.0	23.6	31.1	12.4	20.9	46.2	254.4	4.1
Cedar, N.W.	24.0	21.8	22.3	14.1	11.4	25.0	470.3	3.0
Cherry, Black	16.0	14.6	18.4	12.6	12.9	37.5	486.7	2.2
Fir, Balsam	6.0	5.5	17.7	7.9	2.9	33.3		0.9
Hemlock	2.0	1.8	0.9	20.0	1.0			0.7
Maple, Red	24.0	21.8	25.6	13.1	19.2	8.3	153.8	5.0
Maple, Sugar	4.0	3.6	2.5	17.3	3.1			0.8
Totals	110.0	100.0	123.1	12.8	77.4	29.1	1,693.1	17.6

Soil Series: The dominant soil series in Stand 7 is Vershire-Glover Complex. This is a very rocky soil is well drained, with a depth to a root restrictive layer and/or bedrock is generally 20-40 inches, although this is shallower in many places. This soil is well suited for hardwood species.

Regeneration: White ash and sugar maple seedlings are scattered throughout this stand. In general current conditions have inadequate regeneration.

Natural Community Designation: Northern Hardwood Forest or Rich Northern Hardwood Forest. Portions of this stand exhibit indicators of calcium enrichment. Although indicators are not observed across the stand in its entirety.

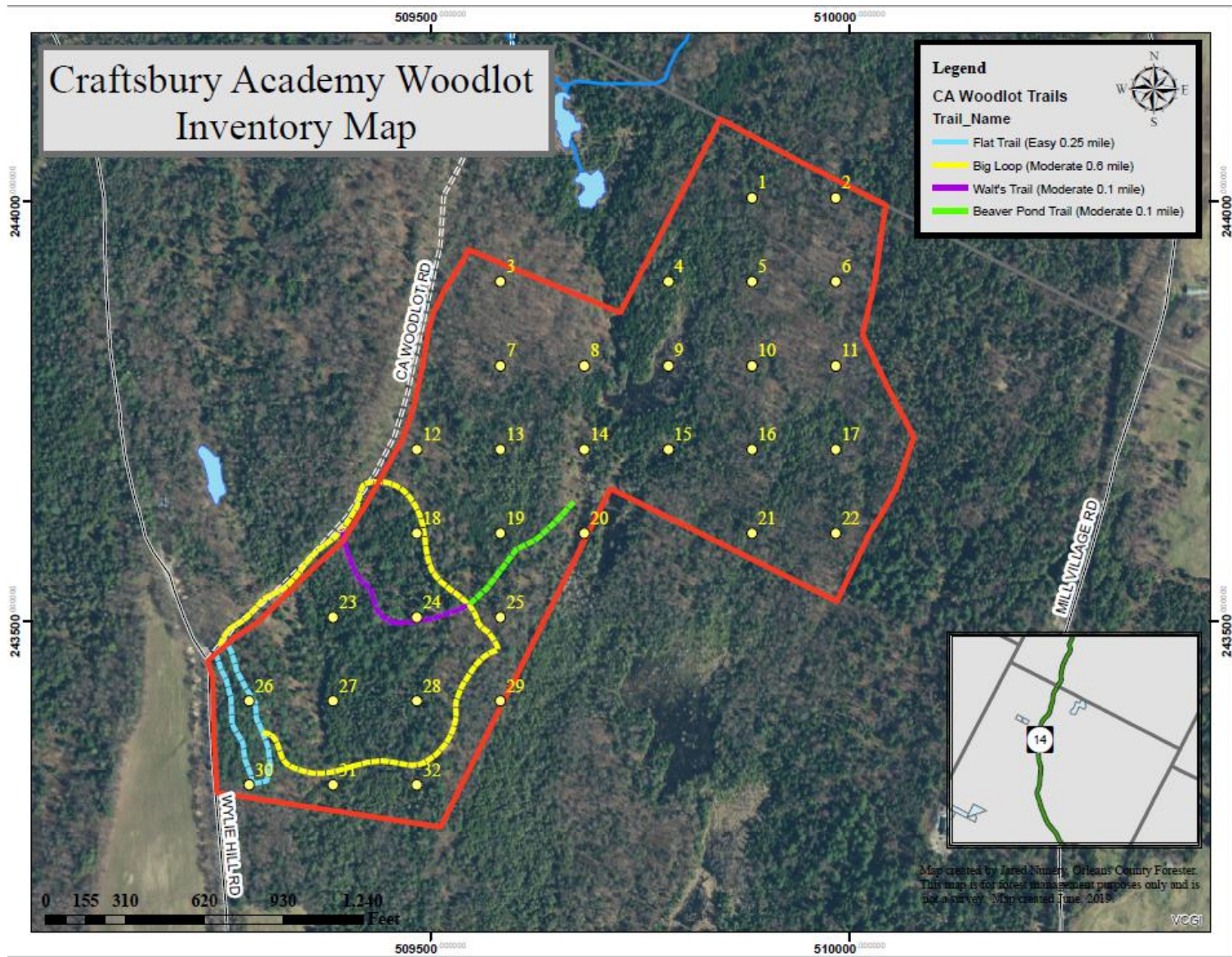
Forest Health: No significant forest health issues were observed during the inventory.

Silvicultural Long-term Objectives: Current stand conditions are even-aged, however over the long-term the hope is to develop multiple age classes. Near-term work will focus largely on improving overall stand quality through an improvement thinning across the stand. The use of multi-aged management will help establish a new cohort of trees.

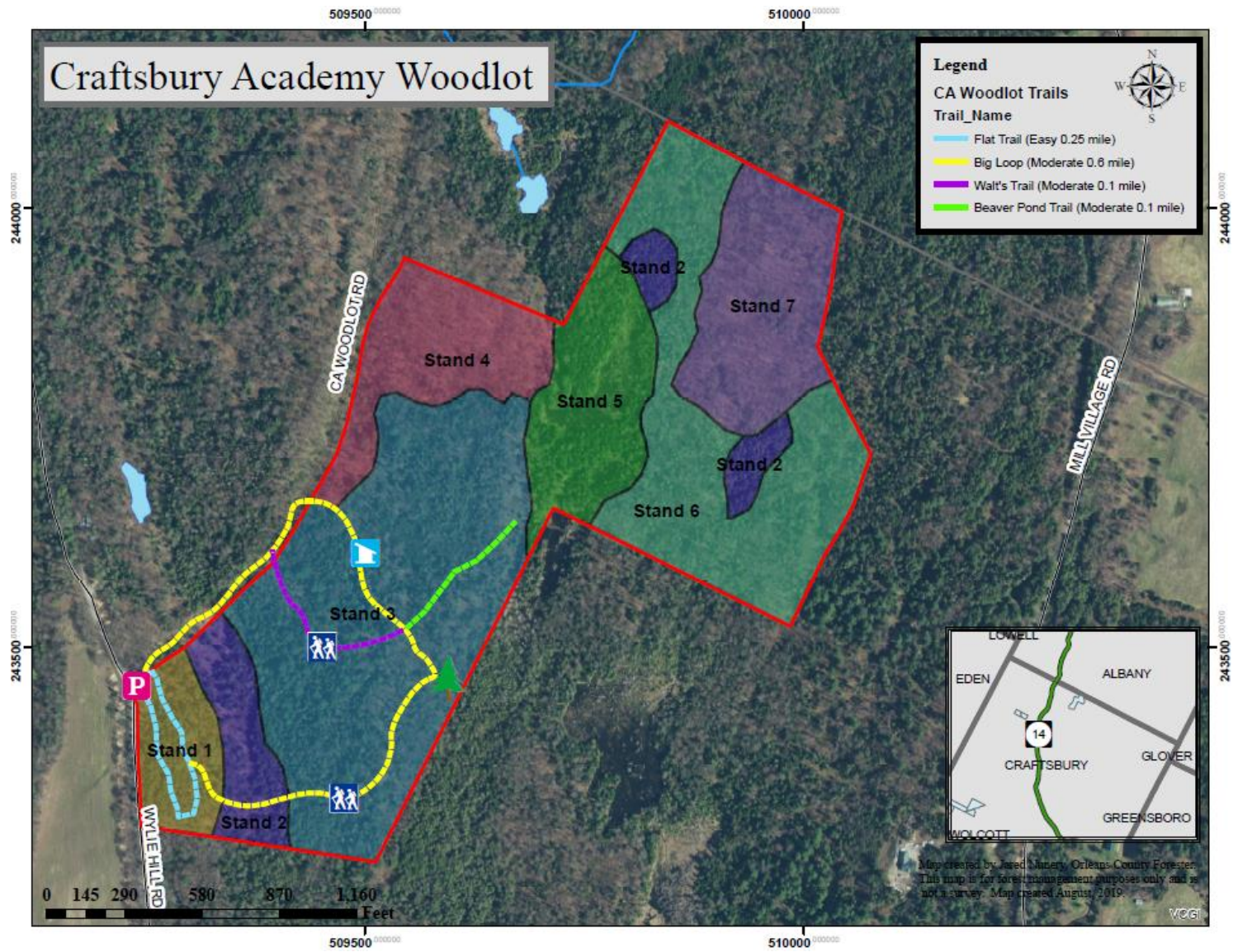
Wildlife Management Considerations: This stand exhibits the most complex structure of any stands within the parcel. Historic harvest left large, poorly formed hardwood species, which have little economic value but are extremely valuable for wildlife. These trees develop hollow stems overtime due to rot, which create homes for a variety of small mammals. These trees are often referred to as legacy trees, as they are a legacy of the forest from decades earlier. Overtime, management will strive to continue to diversify the age structure within this stand, mimicking the development of older forest conditions. Openings created within the canopy will be small in size to promote the establishment of shade-tolerant species. This work will favor a variety of interior forest birds such as the wood thrush and oven bird.

Management Actions: Inventory data shows high stocking in this stand. On the ground, conditions within this stand are highly variable due to past logging practices. Given access limitations to this stand, which require crossing the wetland areas in Stand 5, a harvest is not prescribed at this time. During the next 10 year period, access to this stand should be evaluated. Future management in this stand should focus on establishing a new cohort of trees. As this stand is bisected by the canal originally excavated by Samuel Crafts, any harvesting in this stand would need to maintain extra care to not disturb this important cultural resource.

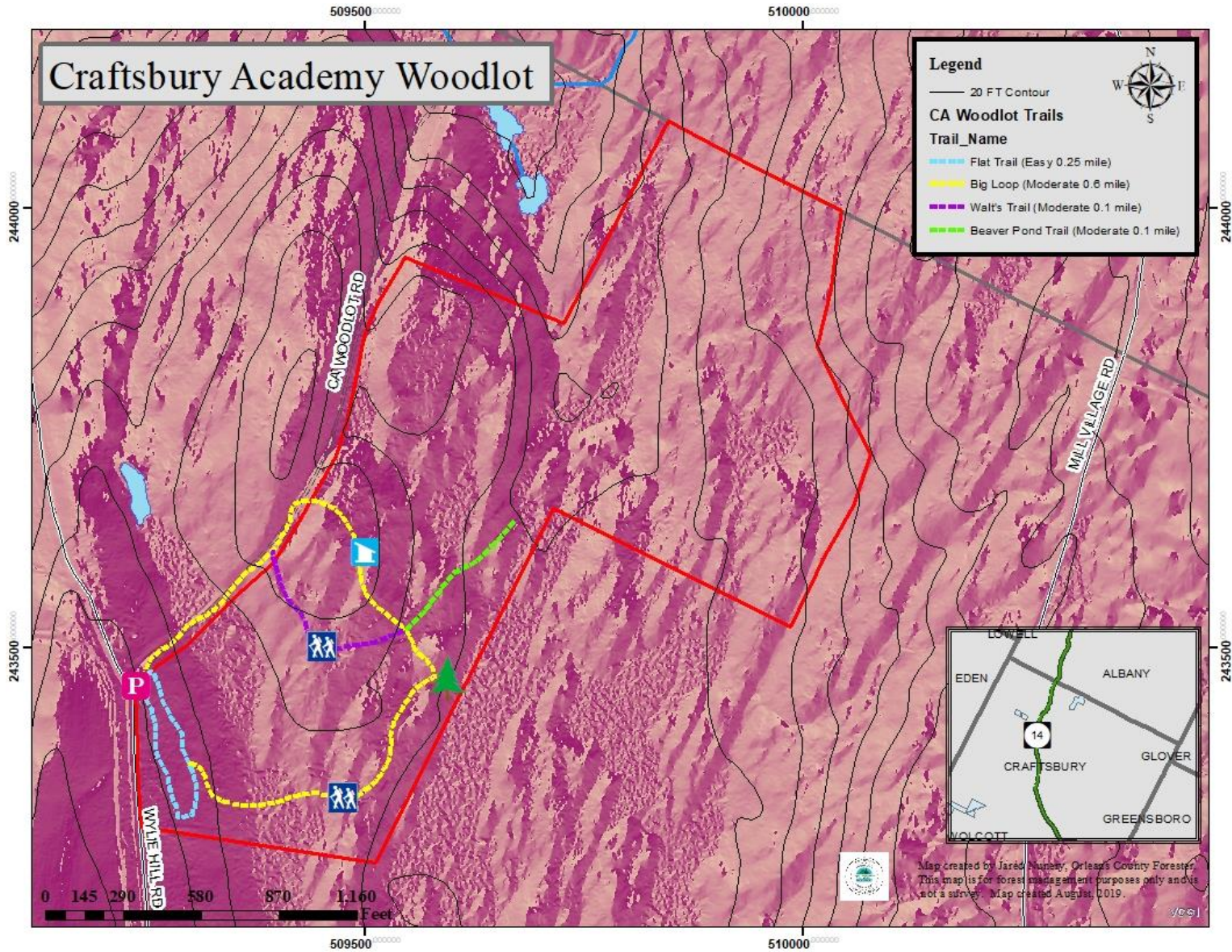
Appendix A: Craftsbury Academy Woodlot Map



Appendix B: Forest Stand Map



Appendix C: Forest terrain map



Appendix D: Public Meeting Comments

Woodlot May 15, 2019 Public Forum

notes from the 4 stations

(We also had a Super Map station which Jared facilitated)

(about 30 people attended the Forum)

Community Engagement: *(facilitated by Susie)*

Sterling College-Ecology Courses

Guided monthly bird monitoring walks

Family picnics

Story maps

On line resource

No camping, no excess [parties

History trail

Include community members in educational programs

Crafts with natural materials

Braille trail

Poetry trail

Community bench building

Indigenous culture-human history, cultural land use practices, now-colonial perspectives

WonderArts classes-painting, drawing

Liability

Ecology and Forestry: *(facilitated by Rob and Elinor)*

Wilderness remain in total

Needs definition

No cutting in Cedar Swamp

Small ski Trails, classic, no grooming

No Motorized vehicles, wheelchairs fine

White pine thinned to productivity, include forester

Ownership details!

School district

Hunting is established and important

No trapping

No Hunting

No target practice

Loves bioblitz

Continue more over time

Diversity-all life forms

To protect fragile areas-low recreation use

Education: *(facilitated by Ned)*

Great setting for all students to learn about the forest, critters, and history

Oral history project

Education should be the over-arching goal of the plan

Good example of sustainable practice

Hands on work-e.g. trail building

Good signage, apps, etc. to show history, plants, trees, etc.

Land use history from indigenous to present

Natural History and field naturalist opportunities-plant and tree I.D.

Forest economics

Physical education/recreation

Water resources and issues

Collaboration with Hazen and OSSU to share resources (e.g. forestry resources)

Act 46 compliance

Have staff to see things go forward

Recreation: *(facilitated by Jean and Judy)*

Bike trails-single track

Can we make it through to Cheney/Mill Village Road?

No ASTV/vehicle trails (please!)

Wylie Hill posted to 35 mph

Controlled places for different recreation interests

Limited recreation; no hoses, bikes, classic skiing only, wheelchair accessible trail

But I like horses

No mountain biking-outdoor Center has trails

Recreation opportunities that kids want-survey school?

If possible, designate some hiking only trails

No camping (unless supervised educational program)

Quiet recreation

Forest bathing

Dog friendly trails (on leash)

"use' zones

Super Map: *(facilitated by Jared)*

Appendix E: June 8, 2019 CA Woodlot Bioblitz Results

The intent was to record as much as possible in this 4 hour period. We used iNaturalist and also a written record. About 50 people participated. Thanks to these 12 intrepid naturalists who led the citizen scientists:

Coordinator	Elinor Osborn
<i>Macroinvertebrates</i>	Farley Brown
<i>Ferns</i>	Michael Lew-Smith
<i>Amphibians</i>	Kiley Briggs
<i>Insects</i>	Jerry Schneider
<i>Plants</i>	Susan Sawyer
<i>Birds</i>	Dave Brown & Marie LaPre-Grabon
<i>Fungi & Mosses</i>	Chad Fox & Laura Spence
<i>Mammals</i>	Emily Brodsky
<i>Trees</i>	Ann Ingerson

Results:

Ferns

lady fern
silvery glade fern
fragile fern
oak fern
hay-scented fern
mountain wood fern
spinulose wood fern
crested fern
intermediate wood fern
marginal wood fern
Christmas fern ostrich fern
sensitive fern
interrupted fern
royal fern
New York fern
long beech fern
cinnamon fern
marsh fern
bracken
Goldie's wood fern

Trees/Shrubs

sugar maple
balsam fir
white ash
black ash
mountain ash
American beech

elderberry
red elder
striped maple hemlock
red maple
mountain maple
red spruce
white spruce
yellow birch
choke cherry
black cherry
pin cherry
quaking aspen
northern white cedar
grey birch
willow
paper birch
speckled alder
red osier dogwood
hop hornbeam
American elm
basswood
eastern white pine
tamarack
beaked hazelnut
Canada honeysuckle
rosa rugosa
balsam poplar
mountain holly shadbush
raspberry

steeplebush
pussy willow
meadow willow
wild black current
dog gooseberry
thimbleberry
meadowsweet

Lichens, etc

Dryad's saddle
birch polypore
turkeytail
chaga
reindeer moss
maze polypore
tinder polypore
hoof fungus
violet toothed polypore
brown pinwheel
willow bracket
yellow slime mold
pink slime mold
prickly tree club moss

Plants

coltsfoot
dandelion
common plantain
thyme-leaved speedwell

fleabane
jewelweed
wild strawberry
Canada mayflower
bittercress
yellow wood sorrel
solomon's seal
false solomon's seal
starflower
small-flowered crowfoot
hooked crowfoot
broad-leaved dock
northern white violet
Canada violet
goldthread
blue flag
dewberry
marsh marigold
cattail
turtlehead
foamflower
marsh blue violet
downy yellow violet
water avens
large-leaved avens
yellow avens
purple avens
jack-in-the-pulpit
wild sarsaparilla
bunchberry
bluebead lily
agrimony
curly dock
burdock
painted trillium
squirrel corn

Birds

red-eyed vireo
blue-headed vireo
ovenbird
common yellow throat
red-breasted nuthatch
white-throated sparrow
crow
yellow-rumped warbler
blackburnian warbler
black-throated blue

wood nettle
herb Robert
sweet cicely
trout lily
toothwort
bittercress
Virginia creeper
wild clematis
moccasin flower
red baneberry
ragwort
large goldenrod
rough-leaved goldenrod
mouse-ear chickweed
wild oats
drooping wood sedge
brome-like sedge
gynandrous sedge
northern woodland sedge
New England sedge
field horsetail
woodland horsetail
shinleaf
blue flag
Indian cucumber-root
purslane speedwell
Canada bluejoint
doll's eyes baneberry
creeping buttercup
sweet scented bedstraw
wood nettle
stinging nettle

Amphibians

wood frog
green frog
chestnut-sided
robin
bluejay
magnolia warbler
northern waterthrush
hermit thrush
Canada warbler
winter wren
loon (fly over)
black-throated green
broad-winged hawk
golden-crowned kinglet

pickerel frog
mink frog
eastern newt
red backed salamander
spotted salamander
green frog tadpoles
mink frog tadpoles

Insects & Butterflies

mustard white
red admiral
spring azure
Canadian tiger swallowtail
Abbot's spinx moth
six spotted tiger beetle
flower fly
crane fly
mosquitos
black flies
honey bee
bumble bee
augochlora sweat bee
meadowhawk dragonfly
whitetail dragonfly
damselfly

northern parula
black-capped chickadee
purple finch
brown creeper
pileated woodpecker
Nashville warbler
raven
yellow-bellied sapsucker
black and white warbler
wood duck
ruffed grouse

Mammal sign

white tailed deer
coyote
white footed mouse
American black bear
beaver
meadow vole
red squirrel
long tailed weasel
snowshoe hare
jumping mouse
porcupine (dead)

raccoon (dead)

Microinvertebrates

stonefly, acroneuria lycorias
darner dragonfly, nymph,
family aeshnidae
stonefly, order plecoptttera
mayfly. order ephermeroptera
caddisflies, hydropsychidae
cheumatopsyche
mayfly, metretopodidae (?)
northern caddisfliues
family limnephilidae
common stoneflies
genus agnetina
dobsonflies and fishflies
family corydalidae

Appendix F: Craftsbury Elementary School Flora/Fauna Assessment

CA Woodlot 4th/5th Grade Visit May 17, 2019 Stands 3 and 4 of CA Woodlot	
Site 1	Site 2
Species	Species
White pine	deer
lichen	princess pine
paper birch	bear
cedar	strawberry
yellow birch	ostrich fern
Canada mayflower	elderberry
spruce	bird
fir	flower
spider	mushroom
cinnamon fern	trout lily
beech	trillium
hemlock	dutchman's breeches
bugs	Christmas fern
intermediate wood fern	red maple
raspberry	ash
sugar maple	blue cohosh
old man's beard	poplar
wild strawberry	violet
trillium	dandelion
deer	marsh marigold
plate mushroom	cat tail
balsam fir	horsetail
club moss	clover
ferns	lichen
	moss
	white birch
	pine
	fir
	Canada mayflower
	grass
	lily
	fiddlehead
	yellow birch
	star flower
	red trillium
	sensitive fern