COOLEY-JERICHO COMMUNITY FOREST:

AN INTEGRATED NATURAL RESOURCE INVENTORY AND STEWARDSHIP PLAN

840 ACRES IN EASTON, NH

ACT
AMMONOOSUC CONSERVATION TRUST

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SECTION I-CREATING THE COOLEY-JERICHO COMMUNITY FOREST

Preface: Why a Community Forest?

By Rebecca A. Brown
Executive Director, Ammonoosuc Conservation Trust

The land that became the Cooley-Jericho Community Forest was long considered a conservation priority by the Ammonoosuc Conservation Trust (ACT). Large in scale, high in elevation, prominent from surrounding towns, used by generations of residents, wood cutters, hunters, and hikers, home to all sorts of wildlife, it's the kind of place that is emblematic of New Hampshire's North Country, but is increasingly rare due to residential development.

ACT and the landowner reached an agreement for purchase of the property after many years of discussion and negotiation punctuated by the landowner's controversial proposal for a wind farm, a crash in the real estate market, and perhaps most important, the creation of a new federal funding program for community forests.

In the decade that process took to unfold, an important new concept in public ownership of woodlands emerged: community forests. These forests are owned and managed by the communities they are part of. They may be owned by a town, or by a community-based organization like a land trust, but the management is by citizens for the benefit of their community. In this way, community forests are different from traditional New England town forests, where the select board has final authority.

A key goal of the emerging community forest concept was to broaden the sense of public ownership of and investment in the future of woodlands, and to keep the connection strong between people and natural resources. New forest acquisition funding sources from the federal government and some key private foundations arose to support this new approach to community ownership and management. These developments made the Cooley-Jericho Community Forest possible.

Ammonoosuc Conservation Trust had always thought that the property, given its size and many values for the public, was best suited for broadly representative community ownership and management rather than ownership by a single entity, whether one town or ACT itself. Through the process of planning for the forest, the four towns involved and ACT determined that land trust ownership, with management guided by a group with town and land trust representation, was the best framework. This is described in the following pages.

Through the process of acquiring and planning for the property, shared understanding arose among the people involved of key values and visions moving forward:

The Cooley-Jericho Community Forest was created with the conviction that a healthy, vibrant future for the people and environment of our region depends on **a strong connection between land and people.** The Community Forest was created to enrich that relationship.

Figure 1: A Community Forest-The CJCF is a place to foster connections between people and the environment. Creating opportunities for recreation and life-long learning are just two of the ways the Forest enriches this relationship.

Our region's character, identity, heritage, and sense of place are rooted in the landscape. Our actions today will be just as important to people a century from now as the creation of the White Mountain National Forest a century ago is to us today. At a time of disconnection of people and nature – most alarmingly children from the outdoors – our future, not just here in New Hampshire's North Country, but that of the planet – depends on people's understanding, caring for, and intelligent use of our natural resources. **The Community Forest is a place to foster that understanding of interconnections between land and people.**

This is a pivotal time for the creation of this Community Forest because of the changing nature of our region's economy and demographics. Our region's economic growth is increasingly reliant on tourism/outdoor recreation and second home investment. Many new residents and visitors do not understand forests, let alone forestry. They may be horrified at the idea of cutting trees. The beauty of the landscape and its importance to the economy is appreciated – that's why most people come here in the first place. Less clear is the economic importance of forests for products including paper, lumber, and fuel. This region will lose a key aspect of its history and its economic viability if the forests are seen only as scenery or for recreation. Therefore, while this Community Forest provides exciting opportunities for recreation, and is a significant part of our scenery, it is created with the conviction that it will be a **long-term timber resource and a place for growing people's understanding of what good forestry is, and how working forests are integral in our region's future economic prosperity.** The Forest will demonstrate how timber harvesting, public use, and protection of wildlife habitat and water resources may be complementary.

The net proceeds from timber harvesting will be shared by the communities, making the connection between good forestry and financial benefit distinct. An investment in this land today will pay off in economic return for future generations. **This Forest is created to provide economic value to the participating towns, and demonstrate the link between our land and economy.**

The Community Forest is a place where people can experience and learn how natural systems, work, how a forest regenerates itself, how soil, water, geology, and topography interrelate with species, habitat, and natural communities. With education and understanding - made alive through first-hand experience -

citizens may move from being consumers of the land (as recreationists), to caretakers, or stewards, using the tools of good forestry and the science of conservation biology. Learning on the Forest can translate directly to private landowners' own management and land use decisions. **The Community Forest is established to be a learning environment for people of all ages.**

The Community Forest is also created with the conviction that educating young people outside the classroom is of vital importance. **The Forest is a place for students to learn about the natural world and experience it as artists and writers as well as young scientists and naturalists.**

The Community Forest has superb outdoor recreation potential. Planning for its use, doing the work of trail construction, and then managing use as the inevitable questions and challenges arise, offers rich possibilities for growing connections among people and building skills in problem solving and conflict resolution. People will work together to construct trails that protect the land (soils, vegetation, wildlife) and accommodate a variety of users, from mountain bikers and horseback riders to backcountry skiers and snowmobilers. **Recreation in the Community Forest is both a key benefit, and an effective way to build social capital.**

Finally, the Community Forest connects land and people, builds relationships across town and other boundaries, and will strengthen individuals' and communities' ability to work together on other issues and endeavors. **The Community Forest is a meeting place – conceptually and on the ground – where people can exercise "local control" by creating their own ethic around land use, responsibility, and accountability.**

Section I: Creating the Cooley-Jericho Community Forest

1. Overview

By Jesse Mohr and the CJCF Stewardship Team

The Cooley-Jericho Community Forest (CJCF) covers 840 acres in the town of Easton in northwestern New Hampshire. The forest is owned by the Ammonoosuc Conservation Trust (ACT) on behalf of the towns of Landaff, Easton, Sugar Hill, and Franconia. This is the first community forest in the country where four towns and a land trust are working together – typically community forests are single town ownership.
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The land sits adjacent to the White Mountain National Forest and is one of the highest elevations privately held properties in the region. Rising from 1,600 feet to 2,645 feet in elevation, its topographic prominence makes it one of the most visible lands outside the White Mountain National Forest from Sugar Hill and Landaff and from parts of Easton. The forest is named for Jericho, a lost logging community deep in the woods in Landaff, and for the Cooley family, early settlers whose farm is in Sugar Hill. (See Cultural and Land Use History in Section II.6)

The land supports a rich mix of forests, wetlands, streams, and other important wildlife habitats and is traversed by numerous formal and informal trails. For many generations, the land was primarily managed for timber production, including, most recently, when much of the property was logged between 2000 and 2008. This history of logging helped keep the property free of residential or commercial development, leaving the land open for wildlife and people and protecting their property's numerous scenic qualities. When future ownership of this land came into question, triggering some uncertainty about its future wildlife, recreation, and scenic qualities, the four towns and ACT joined forces to ensure that this land would forever remain available for wildlife, recreation, education and timber and that is scenic qualities would be forever protected.

1.1 Planning and Stewardship Teams

Acquiring the property that became the CJCF was a community effort. ACT led and managed the process, but the participation of citizens was critical to the effort's success. A planning committee representing area towns and various user groups met regularly, organized hikes and other events to raise awareness and support, and presented the project at their respective town meetings. All four towns voted to participate in the forest. Some planning committee members became part of the Stewardship Team.

Table 1: CJCF Planning and Stewardship Teams-. Asterisks (*) denote planning members that became part of the Stewardship Team.

Last, First	Town/Organization
***Ash, Ivan**	Bethlehem
Bayer, Brett	Franconia
***Beauchesne, Suzanne**	Franconia
Booth, Marilyn	Landaff
Boyd, Marcia	Franconia
***Broscoe , Angela**	Bethlehem
***Brown, Rebecca**	Sugar Hill/ACT
Cutler, Ned	Easton/ACT
Falkenham, Dave	UNH Extension Grafton County Forester
Glaesell-Brown, Ellie	Sugar Hill
Harwood, Gary	Easton
Henry, Paige	Sugar Hill
***Kenerson, Dan**	Sugar Hill
***Kline, Justin**	Sugar Hill
Lachapelle, John	Franconia
Lesmerisis, Bob	Franconia
Lockwood, Rob	Lisbon
***Moore, Linda**	Bethlehem
Morris, Richard	Franconia
***Nicodemus, Chris**	Franconia
Novak, Jan	Easton
Novak, Bob	Easton
O'Hearn, Susan	Landaff
Perkins, Rufus	Sugar Hill/ACT
Poland, John	Landaff
***Poland, Rita**	Landaff
Pritham, Howard	Easton
***Pritham, Ellen**	Easton
Rehl, Cassidy	Sugar Hill
Renaud-Evans, Julie	Northern Forest Center
***Sabre, Steve**	Easton/ACT
Stever, Roy	Easton
Stever, Debbie	Easton
Wiggett, Joe	Landaff
Wiggins, Dot	Landaff

1.2 Acquisition History

ACT purchased the 840 acres that are now the Cooley-Jericho Community Forest in September 2013 for the bargain sale price of $600,000. In addition to contributions from the four towns, funds were raised from federal, state, private foundation, and individual contributions. The largest funder was the federal Open Space and Community Forest program, administered by the U.S. Forest Service. Other funders include the Open Space Institute, NH Land & Community Heritage Investment Program, New Hampshire Conservation (Moose Plate) Program, Fields Pond Foundation, Davis Conservation Foundation, and the McIninch Foundation. Nearly 100 private individuals and several family foundations contributed to the project.

The project ranked #1 in the country in the federal Open Space and Community Forest application process because of its broad community support, its dedication to using the land for education and community participation, distinct values of the property's natural resources, and its numerous community benefits.

1.3 Conservation Easement and Permitted and Restricted Uses

In addition to being owned by the Ammonoosuc Conservation Trust, a goal is that the CJCF also have a conservation easement. A conservation easement is a legal agreement that is permanent part of the property's title. The document details what may be done on the property in relation to its natural resources (such as timber harvesting following best forestry practices), and what cannot happen (such as building residential structures).

At the time of this writing, federal regulations don't allow placing conservation easements on properties that received federal

funding. The U.S. Forest Service is seeking to changes those rules, and if/when they do, ACT will place a conservation easement on the property with the New England Forestry Foundation (NEFF) of Littleton, Mass. NEFF holds easements on other properties ACT owns and is a backup holder on many of ACT's conservation easements.

In broad terms, the easement will guarantee that the land will never be developed and remains forever available for public recreation access, wildlife, and water quality protection. Activities that are likely to be permitted or restricted by the easement are described in this plan. Key provisions of the easement will be summarized as an addendum to this Plan when an easement is completed.

1.3.1 Restricted Uses Identified During the Stewardship Planning Process

The planning process resulted in decisions regarding motorized uses, noted below.

- Except for snow machines, motorized recreation is not currently permitted.
- Snow machines are only permitted on designated trails.

1.4 Governance

The community aspect of the CJCF is expressed through its governance, meaning how decisions are made and by whom, and how benefits from the forest are delivered. Long-term, net proceeds from timber harvesting will be shared by the four participating towns. Timber proceeds will also be used to replenish the Stewardship Fund (the fund kept by ACT to pay for CJCF taxes, management, insurance, and maintenance.)

A Stewardship Team with official representatives from the four towns and ACT, plus other members representing various user groups (mountain biking, hiking, education, and so on) will oversee management of the property. The town representatives are appointed by the select boards. Some of the team members served on the planning committee that helped create the forest, and others joined after the land was acquired. At this writing, ACT has presented select boards in the four towns with a draft memorandum of understanding outlining the responsibilities of ACT, the towns, and the Stewardship Team, as well as the mechanism for distributing future timber revenue. When that memorandum is signed it will be added to this plan as an addendum.

2. The Cooley-Jericho Community Forest Stewardship Plan

By Jesse Mohr

A stewardship plan guides the long-term management and care of a property. Stewardship plans ultimately culminate in prescriptive actions or prescribed "no actions" that are designed to protect, enhance, develop, or gain benefit from a property's natural resources. These actions are based on an understanding of the site's capacity and the landowner's goals and objectives. This plan guides long-term stewardship of the Cooley-Jericho Community Forest's recreation, education, wildlife, water quality, scenic and timber resources and values.

This stewardship plan provides guidance on management and stewardship of the property for the next 30 years. While the plan provides recommended actions for the next 30 years, it is written with a 100-year vision. For example: protecting and restoring wildlife and native biodiversity is one goal for the property; this includes managing for and protecting old forest habitat. The property does not currently support older forest conditions and older forest conditions can take over 100 years to develop. Some of the prescriptive actions and "no-actions" recommended in the next 30 years are setting the stage for these older forest conditions to develop over the next 100 years.

Additionally, while we understand that the cultural values and expectations surrounding this property may change over the next 100 years, and we know that environmental conditions will most certainly change, we hope that the management goals and general trajectory of stewardship articulated in this plan are embraced for the next 100 years.

2.1 What is in the Plan and How to Use it

This plan contains three narrative sections: Section I-Creating the CJCF; Section II-Across the CJCF; and Section III-Management Compartments of CJCF. The plan has been organized to allow readers to engage in specific portions of the property or specific uses of the property, without having to read the entire plan. The three narrative sections are followed Section IV- References and Appendices and Section V- Maps. Sections I and II are available as one document. Each compartment or subsection within Section III is available as separate document. Lastly, Section IV is available as one document, and each map within Section V is also available individually.

Section I includes background and administrative information about the CJCF, including details on its acquisition, governance and permitted and restricted uses. Anyone interested in engaging in stewardship of the property as a whole or using the property in a specific manner should read this section.

Section II includes information relevant to the whole property. It not only includes property-wide findings and details on the site's natural and cultural features, it includes management goals and actions for stewarding the property's collective recreation, education, wildlife and timber resources. Anyone interested in engaging in stewardship of the property as a whole should read this section in its entirety. Anyone interested in learning about the property's natural and cultural history should also read this section. However, anyone interested in using or stewarding just one facet of the property's diverse natural and cultural resources, should read the property-wide goals and objectives and then the relevant subsections. Readers interested in the trails, for example, could read the goals and objectives and then proceed to the "Recreation Trails on the CJCF" subsection. A word of caution: the property is being managed under a mixed-use system and

there is a strong integration between many of the uses. The recreation trails, for example, are also being developed as an educational resource and may also be used for wildlife and forest management. Reading subsections in isolation may result in an incomplete picture of how resources are being stewarded.

Section III describes the property's management compartments. The property has been subdivided into 10 Ecosystem Management Compartments (see Ecosystem Management Compartment Map) to facilitate management and planning. Section III, which includes the bulk of this plan, includes compartment-level findings and stewardship actions. This section is not intended to be read in its entirety. Readers should direct themselves to the Ecosystem Management Compartments relevant to their area of interest. If readers are interested in learning about the forest near the Trumpet Round Road entrance, for example, they should read the Northern Bench Ecosystem Management Compartment section. It may be helpful, but not necessary, to read about the other compartments.

2.2 Stewardship Planning Its Role within the Adaptive Management Cycle

This stewardship plan is the culmination of a nearly two-year inventory and planning process. Developing the plan is just part of the larger adaptive management cycle. Adaptive management is a structured, iterative management approach for addressing uncertainties and irregularities in nature and for improving long-term management practices and policies by learning from previous outcomes. The concept of adaptive management is depicted in Figure 2. It includes developing a plan, implementing an action, monitoring the outcomes of the action, and adapting

Figure 2: Adaptive Management Planning Process- Adaptive management is an iterative management approach that includes developing a plan, implementing an action, monitoring the outcomes of the action, and adapting future actions and goals if needed.

future actions and goals as needed. Completion of this stewardship plan signals a major transition in the adaptive management planning cycle: from planning to doing.

2.3 Plan Implementation and the Next 30 Years

The stewardship plan will be implemented within a broader adaptive management cycle, meaning that actions (doing things) need to be followed by monitoring, evaluating, and possibly adjusting future actions. This subsection includes a generalized overview of what actions (doing things) are planned in next 30 years and what we hope to accomplish with these actions. A generalized list of the major stewardship actions called for in the plan is presented in a table at the end of this subsection.

In 100 years, the land should be rich with opportunities for recreation, education, and other community uses and provide habitat for a diverse array of wildlife, including species that utilize older forests, young shrubby habitats, and healthy streams and wetlands. The forest should also be well stocked with valuable timber that can be sustainably harvested to generate periodic revenue and contribute to the overall economy of the region.

As of 2015, there is a long way to go to achieve this vision. The property is dominated by younger forests, many of the property's streams and wetlands are recovering from the last round of logging, and the recreation and access system are only in their fledgling stages of development. However, at the end of the 30-year planning period, much of this vision will be set in motion.

The first order of business is to protect the already existing resources and investments. A well-marked property boundary is critical to protecting the investment from encroachment and the activities of abutters. A well-marked property boundary will also minimize the likelihood that community uses of the property spill out onto neighboring lands, a necessary step in maintaining healthy relationships with the neighbors. **Within five years, we hope that the property boundary is well defined and well-marked.** A property survey has already taken place and we are now transitioning to marking the boundary. (*Note: Between 2015-2020, most boundaries were marked with signage and/or blazed.)*

Access to the property is difficult, but necessary for community use and management of the lands. The existing access system, including long gravel roads leading up to the property, represents a significant investment by the previous and abutting landowners. Portions of the access system are being degraded by erosion, ATVs, and off-road trucks. Stabilizing erosion problems and preventing non-authorized ATV and off-road truck traffic, especially in sensitive areas, is critical to preventing further degradation of this significant investment. **Within 10 years, we hope that erosion concerns are minimized and the non-authorized ATV and truck traffic has been stopped.** We have already begun to evaluate possible gate locations (to control unauthorized motorized access) and funding sources for erosion control work. (*In 2017-2018, gates were installed on the Dyke Road and Merrill Mountain Road entrances)*

The next order of business is to provide the infrastructure necessary for basic community use and enjoyment of the property. Establishing a parking area and trail system within the property are both early priorities. We hope within 5 years the property will contain a parking area, gathering site, and basic trail system. **We hope within 10 years that the recreation trail system will be fully built out, including an array of different trail types and difficulties**. We are currently in the early stages of planning the parking area. Planning and layout of the trail

system is already underway and some trail construction will begin in the summer of 2015. (*Note: As of 2020, a parking area has been built, three new trails completed, and a backcountry ski glade with supporting trails constructed. See the 2020 TRAILS AND RECREATION MAP attached as an addendum to this Plan.)*

The final area of emphasis is related to enhancing the property's long-term value for wildlife and timber. Over the course of this 30-year plan, we hope to maintain some of the property's existing young forest habitat while also encouraging the development of some habitats that are missing and the rapid growth of valuable timber**. At the end of the 30 years, we hope that the property supports a diverse array of healthy wetlands and streams and that much of the now young forest is on its way to becoming a healthy old forest that is well stocked with future timber trees of high value**. Again, we expect it to take over 100 years for many of these timber and wildlife goals to be realized.

The major actions to achieve this vision are listed below. Missing from the table is a major stewardship endeavor, namely that of taking "no action." In sum, the actions listed below will affect only about 10 percent of the property**. Over the course of this stewardship plan, most of the property will be allowed to just be: forests will be allowed to regrow, wetlands and streams allowed to recover, and visitors allowed to enjoy the quiet and beauty the CJCF.**

Table 2: Stewardship Actions-The following actions are recommended to develop and steward the property's natural and cultural resources. These actions are overviewed here and described in greater detail in latter sections of this plan.

2015-2020	2020-2025	2025-2035	2035-2045	Property-wide Stewardship Actions Table
				Protection and Stabilization of Existing Resources and Investments
x				Establish and mark property boundary
		x	x	Maintain boundary marking
x				Install gates to prevent non-permitted motorized access; this action indudes the following NRCS practices and estimated amounts: 2 each of Access Control (472) in 2016 or 2017. Please note that the best location for these gates are on the abutting property.
x				Stabilize and prevent further erosion on existing primary access road and primary access trails; this action indudes the following NRCS practices and estimated amounts: 5,884 feet of Forest Trails and Landings (655) in 2016 or 2017. Please note this only indudes trails on the CJCF. There is an additional 11,729 feet access road on the abutting property also in need of stabilization
				Development of Recreation and Education Resources
x				Develop parking area and improve primary access road off of Trumpet Round Rd
x				Construct recreation trail system
x	x			Develop and construct interpretive trail
x	x	x	x	Monitor and maintain trail system
x	x			Develop and install demonstration sites
x				Develop school curriculum to support local schools usage of property
				Infrastructure
x				Seek to implement access road maintenance agreement with abutters
x				Improve primary access road off of Trumpet Round Rd
		x	x	Improve primary access road off of Dyke-Jim Noyes Pond
		x	x	Improve primary access trails off of Dyke-Jim Noyes Pond entrance
x	x	x	x	Monitor and maintain access trails and roads
				Enhancement and Management of Wildlife and Timber Resources
x	x	x	x	Install wildlife and forest management demonstration sites
x				Evaluate and potentially install chestnut reintroduction planting site. The location and number of trees is TBD. This action may indude the following NRCS practices: Tree/Shrub Establishment (612) and Tree/Shrub Site Preparation (490) in 2016-2018.
x	x	x	x	In Northern Bench Compartment, maintain a ~1 acre herbaceous opening around the entrance. This should also be on the interpretive trail. This action indudes the following NRCS practices and estimated amounts: 1 acre of Brush Management (314) or Early Successional Habitat Development/Management (647) in 2016-2019. Reapply for cost share practices as frequently as possible, as maintenance will been needed ~1-3 years.

	x			Across the Western Shoulder, Northern Slope and Northern Bench Compartments, maintain early successional habitat with Bronoto or, if viable, a biomass harvest. One of these opening should be on the interpretive trail. This action may include the following NRCS practices and estimated amounts: 40 acres of Early Successional Habitat Development/Management (647) in 2024-2026.
		x		In Northern Bench Compartment, maintain opening on interpretive trail; this action may include the following NRCS practices and estimated amounts: 3 acres of Early Successional Habitat Development/Management (647) in 2034-2036.
x				Across the Southern and Eastern Steeps Compartment, increase snags by creating 28 dusters of snags through girdling. Each duster could include 6-8 girdle trees with one or two exceeding 12 inches DBH and if possible one exceeding 28inches in diameter; this action may include the following NRCS practices and estimated amounts: 224 snags of Upland Wildlife Habitat Management (645) in 2016-2019
x				In Northern Slope and Southern Bowl Compartments, conduct crop tree release; this action includes the following NRCS practices and estimated amounts: 15 acres of Forest Stand Improvement (666) in 2016-2019
		x		Evaluate the potential for additional crop tree in areas of current sapling regeneration; this action may include the following NRCS practice: Forest Stand Improvement (666).
		x		Across the Northern Slope and Western Shoulder Compartments, if viable, harvest approximately 40 acres into improve long-term timber values and age class distribution and maintain early successional habitat.
			x	Across the Northern Slope and Northern Bench Compartments, if viable, harvest approximately 40 acres into improve long-term timber values and age class distribution and maintain early successional habitat.

	=	High Priority. Action is essential to protecting investment and establishing basic access and public use.
	=	Medium Priority. Action is essential for expanded public use and expanded access.
	=	Low Priority. Action is not essential, but will enhance property's long-term value for timber and wildlife
	=	NRCS Practice. Action includes an NRCS approved practice that may be eligible for technical or financial support

2.4 Stewardship Planning Process and Public Input

After the property for the CJCF was purchased, ACT and members of the acquisition planning committee evolved into looking at how the Forest would be managed. This group decided to call itself the Stewardship Team (see section 1.1). One of its first actions was to put out a request for proposals for consultants to help create a Stewardship Plan. The team sought a consultant with both forestry/natural resources and community planning expertise. The team chose Native Geographic, LLC, of Fairlee, Vermont, whose principal is consulting ecologist Jesse Mohr.

By design, development of the stewardship plan was a participatory process. Led by Mohr and the Stewardship Team, the process engaged community members and stakeholders in conducting the underlying inventory, identifying management goals and objectives, and evaluating management alternatives. The two-year stewardship planning process included the following benchmarks and points of community engagement:

1. *Community Outreach and Engagement* throughout 2013. ACT and the four towns hosted a series of community hikes and celebrations. These events introduced community members to the newly acquired forest and provided opportunities to publicly invite interested community members and stakeholders to join the stewardship planning process.
2. *Assessment of Management Goals and Stakeholders* in October 2013. Through the course of two meetings and surveys, Stewardship Team members identified priorities and preliminary goals for the property.
3. *Inventory of Existing Recreation Uses, Potential Recreation Resources, and Sensitive Features* in late summer and fall of 2013. This work was conducted by Native Geographic, LLC and members of the Stewardship Team.
4. *Wildlife Track and Sign Surveys* in winter of 2013-2014. This work was conducted by Native Geographic, LLC and members of the Stewardship Team.
5. *Recreation Trail Planning and Identification of Preliminary Trail Network* in April of 2014. Based on review of existing recreation uses, management goals/priorities, and an inventory of sensitive features, the Stewardship Team created a conceptual plan for the recreation trail network over the course of two meetings.
6. *Breeding Bird Surveys* in spring of 2014. This work was conducted by Native Geographic, LLC and members of the Stewardship Team and broader community.
7. *Inventory of Wildlife and Timber Resources* in summer of 2014. This work was conducted by Native Geographic, LLC.
8. *Cultural History Research and Inventory Potential Cultural Resources* in summer and fall of 2014. This work was conducted by members of the Stewardship Team.
9. *Community Event and Interim Presentation* in November 2014. ACT and the four towns hosted a presentation and potluck. This event provided the opportunity to highlight inventory work and preliminary thoughts on management. Meeting was also used to publicly invite interested community members to join planning process.
10. *Wildlife and Timber Management Planning* in January and February 2015. Over the course of 4 meetings, the Stewardship Team reviewed site-specific management alternatives and management scenarios.
11. *Stewardship Team Comment on Draft Stewardship Plan* in April 2015.
12. *Public Presentation and Invited Public Comment on Stewardship Plan in April 2015.* ACT and the four towns hosted a

presentation on the draft stewardship plan and provided an opportunity to follow-up public input and comment.

13. *Finalize Stewardship Plan* in May 2015 (With plan amendment in 2020).

Section II: Across the Cooley-Jericho Forest

3. Property-wide Goals and Objectives

By Jesse Mohr and the CJCF Stewardship Team

The CJCF is managed under a mixed-use system, including management for recreation, education, aesthetics, wildlife, water quality protection, and timber production. Goals and objectives[1] of the CJCF addressed in this plan have been developed at two scales: property-wide and for relatively discrete ecosystems within property, Ecosystem Management Compartments. Ownership goals are implemented across the entire property and include goals that require management across multiple Ecosystem Management Compartments to achieve. Within each Ecosystem Management Compartment, ecosystem-level goals and objectives are addressed. Property-wide goals and objectives include:

Goal: Enhance the site's scenic, educational and recreational qualities. This includes the following property-wide objectives:

- create and maintain one or more parking areas and access points, including access that is suitable for school groups;
- create and maintain a diversity of trail types and difficulties;
- create and maintain scenic vistas;
- develop an interpretive trail; and
- work in conjunction with local and state partners to host workshops and field trips for environmental education.

Goal: Protect and restore wildlife, native biodiversity and water quality. This includes the following property-wide objectives:

- manage for a diversity of habitat types, including some areas of young and old forest;
- protect and enhance critical wildlife habitats;
- manage for complex, resilient ecosystems;
- enhance and protect of threatened, endangered, uncommon and priority species and ecosystems;
- control the spread of exotic invasive species; and
- work in conjunction with local and state partners to host workshops and install demonstration sites showcasing wildlife management and water quality protection projects and best management practices.

Goal: Practice and demonstrate sustainable and economically viable forestry. This includes the following property-wide objectives:

- manage for a diversity of tree species and age classes;
- use science-based silvicultural practices to stimulate growth of native trees well-suited to local site conditions, expedite forest development and enhance the long-term timber value;
- maintain soil productivity and capacity;
- over the long-term, generate some revenue to offset costs of property-ownership;
- meet or exceed all forest practice regulations and best management practices;
- contribute to the local economy by using qualified local contractors, loggers, foresters, mills, and manufacturers; and

[1] Management goals are generally broad statements that described a desired condition and aim of management. Typically, a collection of goals articulate an end vision, not necessarily the steps or means to get there. Objectives, on the other hand, are often measurable and geographically specific outcomes or steps to achieve the broader goals.

- work in conjunction with local and state partners to host workshops and install demonstration sites showcasing forest management projects and best management practices.

4. The Surrounding Region

This section includes descriptions of and management considerations based on the surrounding region and landscape.

4.1 Ecoregion

The CJCF is located along a transition zone where two broad-scale divisions of climate, geology, soil, geomorphology, and vegetation intersect. The property sits within the North Country ecological region, but also shares characteristics of the White Mountain and even the Connecticut River Valley ecoregions[2].

Cooler, spruce-fir and spruce-northern hardwood forests are characteristic of the North Country and White Mountain regions, as are cooler peat accumulating wetland systems. In general, the northerly latitudes and higher elevations of these ecoregions have boreal affinities. While mountainous granitic terrain is the marquee feature of the White Mountains, the North Country contains more variable valley and mountain terrain, often with sandy ice-contact deposits, such as kames, eskers, and outwash, well represented in the valleys and lower valley walls. Till-derived soils dominate upper mountains and tall hills of both regions. While limited in extent, the North Country contains some of the state's most calcium rich bedrock types.

The Connecticut River Valley, on the other hand, is characterized by flat glacial outwash (sands and gravels) and glacial lake (silts

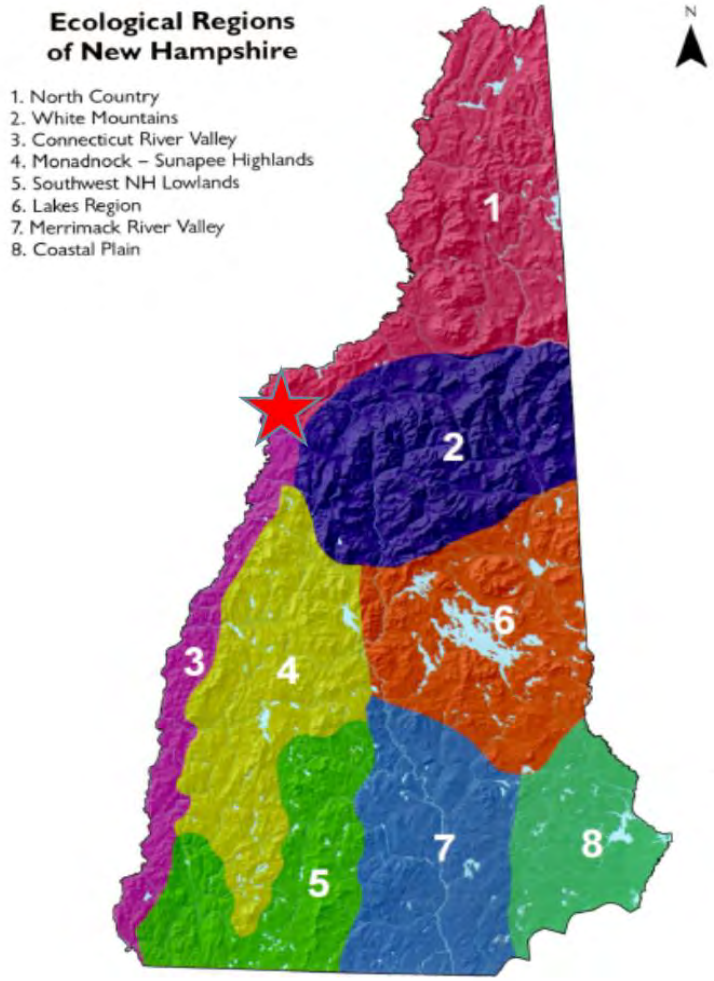


Figure 3: Ecological Regions of New Hampshire- The CJCF (red star) is located along a transition zone where three broad-scale divisions of climate, geology, soil, geomorphology, and vegetation intersect.

[2]An ecoregion is an area of similar climate, geology, geomorphology and broad-scale vegetation patterns. The ecoregions here are subsections of the

)ped

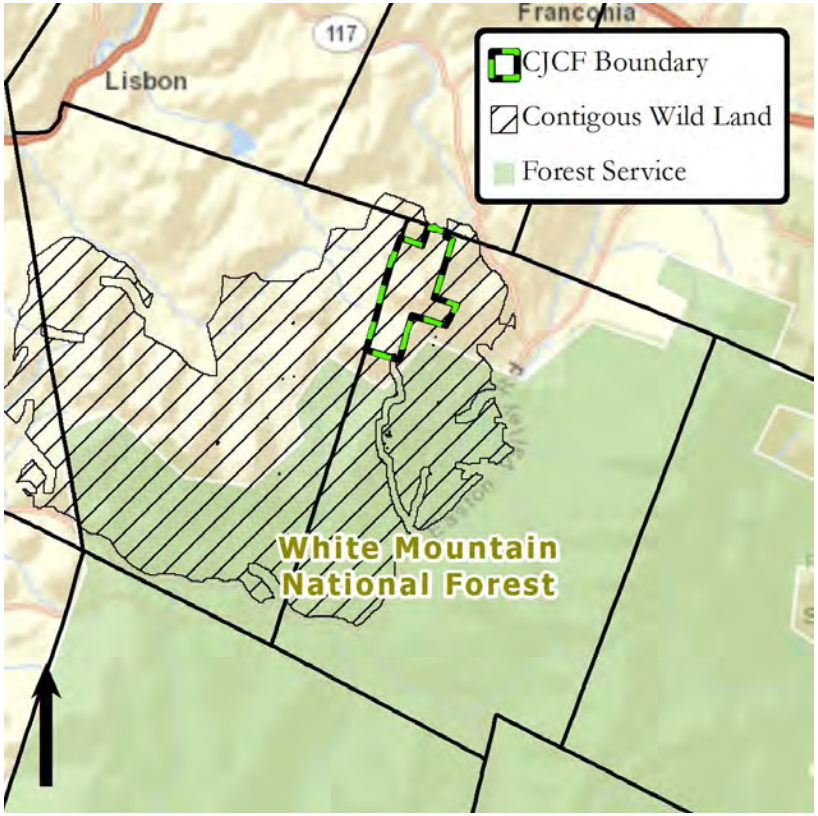
by United States Forest Service and National ECOMAP project.

and clays) deposits rimmed by low slopes and hills of glacial till. The region is also characterized by relatively milder, warmer temperatures that yield forests with a greater warm species component, such as hemlock, red oak, and white pine.

A blending of these three larger ecoregions is evident on the CJCF. On the CJCF, we occasionally see some species more typical of warmer temperatures, such as hemlock and white pine, as a significant component of typically cooler or moderately cooler spruce-fir and northern hardwood systems. In fact, the hemlock-hardwood-pine system mapped by NH Fish and Game across much of the area is a testament of the cool-warm intermingling. The terrain and soils of the area are very much a reflection of the site's White Mountain-North Country locale.

4.2 Cole and Cooley Hill Landscape and the White Mountain National Forest

Cole and Cooley Hills—the two small mountain peaks that dominate the CJCF--sit at the northern tip of a vast block of contiguous wild lands: nearly 20,000 acres of interconnected mid and high elevation forests; remote, undeveloped wetlands; and miles of clean mountain streams and rivers. A little less than half of this land area is within White Mountain National Forest. Forestry, wildlife management, and recreation are the primary land uses in the area. Dispersed residential and open agricultural areas are also present, although they are limited in extent. Areas of this size that are unfragmented by roads and development are rare in the state, with less than 1 percent of the state's other unfragmented blocks being larger. The massive size of this habitat block makes it critically important for a number of wildlife species.



Flora and fauna freely move between the CJCF and surrounding ownerships, utilizing the diversity of habitats that this landscape provides. Wide-ranging and area-sensitive species that require lots of space, like black bear and northern goshawk, are dependent on the largest blocks of habitat in the region and are present in the Cole Hill landscape. The most area-sensitive species, such as bear, may wander home ranges greater than 20 square miles. While the CJCF alone cannot accommodate such a vast home

Figure 4: Landscape of the CJCF-The CJCF abuts White Mountain National Forest and is part of a nearly 20,000-acre block of undeveloped wild lands.

range, it is well-connected to adjacent blocks of natural/semi-natural habitat, which together function as a single large habitat complex fully capable of supporting the most area sensitive species. Generally, large blocks of habitat are also more capable of supporting the region's full suite of wildlife, including many Species in Greatest Need of Conservation[3] and Forest Responsibility Species[4]. The CJCF and surrounding landscape are likely to support most or all of the Tier 1 species listed in Figure 5.

Beyond proving homes for wide-ranging species, the CJCF and surrounding area also contains some ecosystems of high and medium biodiversity value. The High Elevation Spruce-Fir Forest on the CJCF has been identified as one of the highest quality examples of this habitat type in the greater North Country Ecoregion[5] (see Landscape and Location Map), as has the Lowland Spruce-Fir Forest, Peatlands, and Shrub Wetlands of the adjacent White Mountain National Forest. Both of these are considered critical in maintaining the state's full suite of native biodiversity.

[3] As defined by the Wildlife Action Plan.
[4] As defined by Audubon Vermont.
[5] As defined by the Wildlife Action Plan. See Wildlife Habitat and Forest Birds in the Ecological Background Information Section.

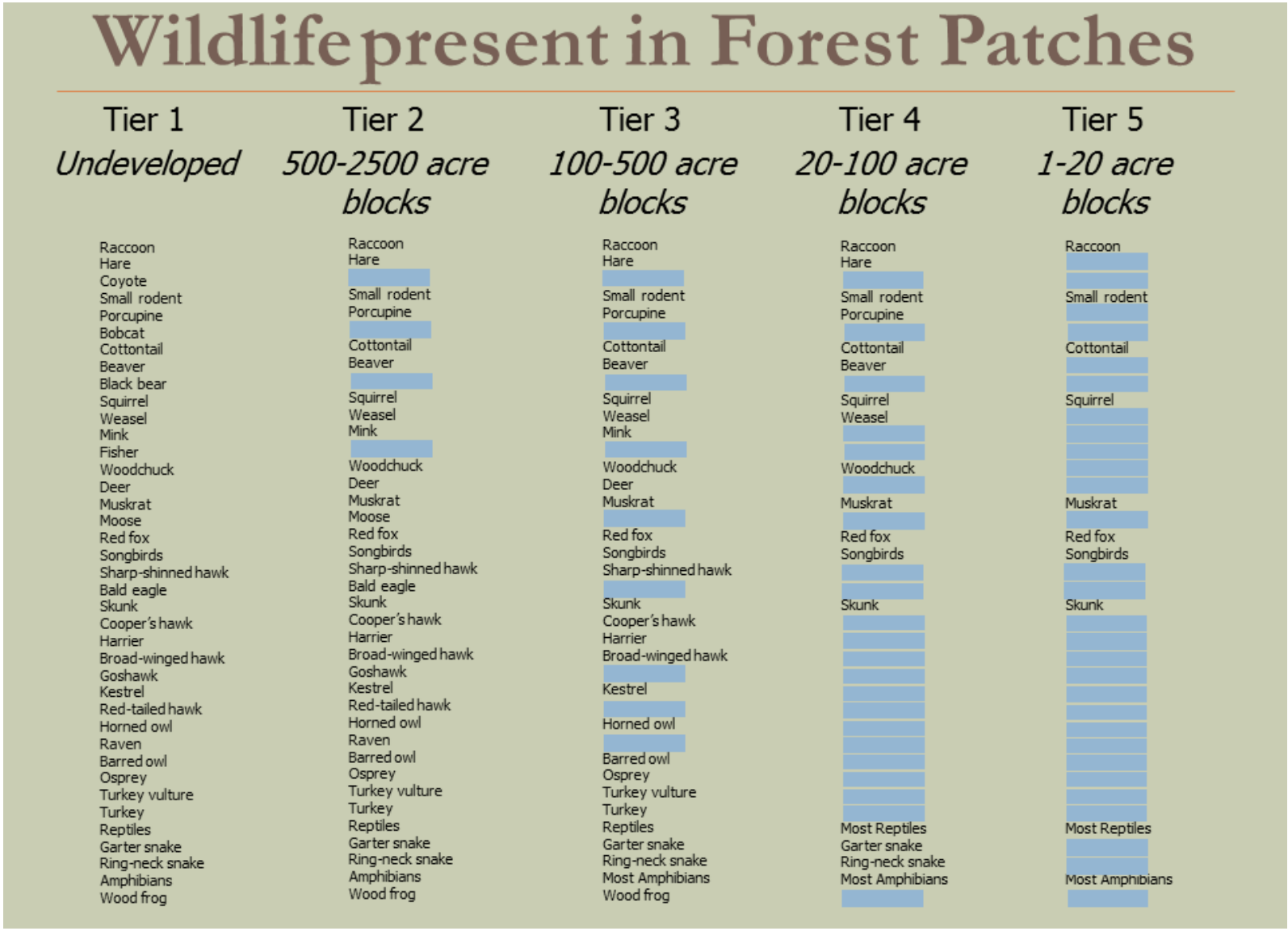


Figure 5: Wildlife Present in Different Sized Forest Patches- From Above and Beyond (2002) Campoli, J., Humstone, E., & MacLean, A.

To further understand the landscape surrounding the CJCF, the area was coarsely classified by habitat type; forested habitats were further classified by development stage (See Appendix 4 for more details). Photo interpretation of the surrounding one-mile radius (approximately 6,442 acres) highlights what is likely a changing mix of both intermediate-aged forest habitats and shrubby, early successional forest habitats. Approximately 57 percent of the landscape is occupied by intermediate to mature forest. Due to logging, early successional and young regenerating forest habitats are abundant in the landscape, although these are ephemeral conditions and the availability of this habitat may become more limited in the future.

The power line right-of-way and shrub swamps also provide a more persistent form of shrubby, early successional habitat. Combined, 27 percent of the landscape supports shrubby, early successional and young forest habitats in the form of regenerating forests, power line ROWs, and shrub swamps. In addition to these forested and shrubby habitats, 10 percent of the landscape is in open agricultural covers and less than one percent of the area supports open wetlands or ponds. Dispersed residential uses are found throughout the forested and agricultural areas, totaling approximately five percent of the area. While difficult to access from aerial imagery, late successional or old growth forests are likely lacking in this area and broader region.

4.2.1 Important management considerations based on the surrounding ecoregion and landscape:

- The CJCF and surrounding landscape supports area-sensitive species, including Species in Greatest Need of Conservation and Forest Responsibility Species. Habitat suitability for area-sensitive species can best be enhanced by maintaining connectivity with adjacent blocks of habitat, particularly with the vast forest lands associated with White Mountain National Forest south of the CJCF.
- While recommendations for maintaining early successional habitats and early successional wildlife species vary greatly, including maintaining anywhere from 3-15 percent of the landscape in this type of habitat, the Cole Hill landscape is likely to contain adequate amounts of early successional habitat for the next 10 years. To benefit early successional species, management should prioritize maintaining or improving existing patches of early successional habitat after 2024.
- Late successional forests and structures are poorly represented on the landscape and may be a limiting factor for some priority wildlife species. Encouraging the development of these conditions and structures should be a priority for management.
- There are opportunities to connect the CJCF trail system to the White Mountain National Forest trail system; this will dramatically increase the trail mileage available to CJCF trail users. (*Note: As of 2020, the CJCF Yellow Trail connects to the WMNF Jericho Trail.)*

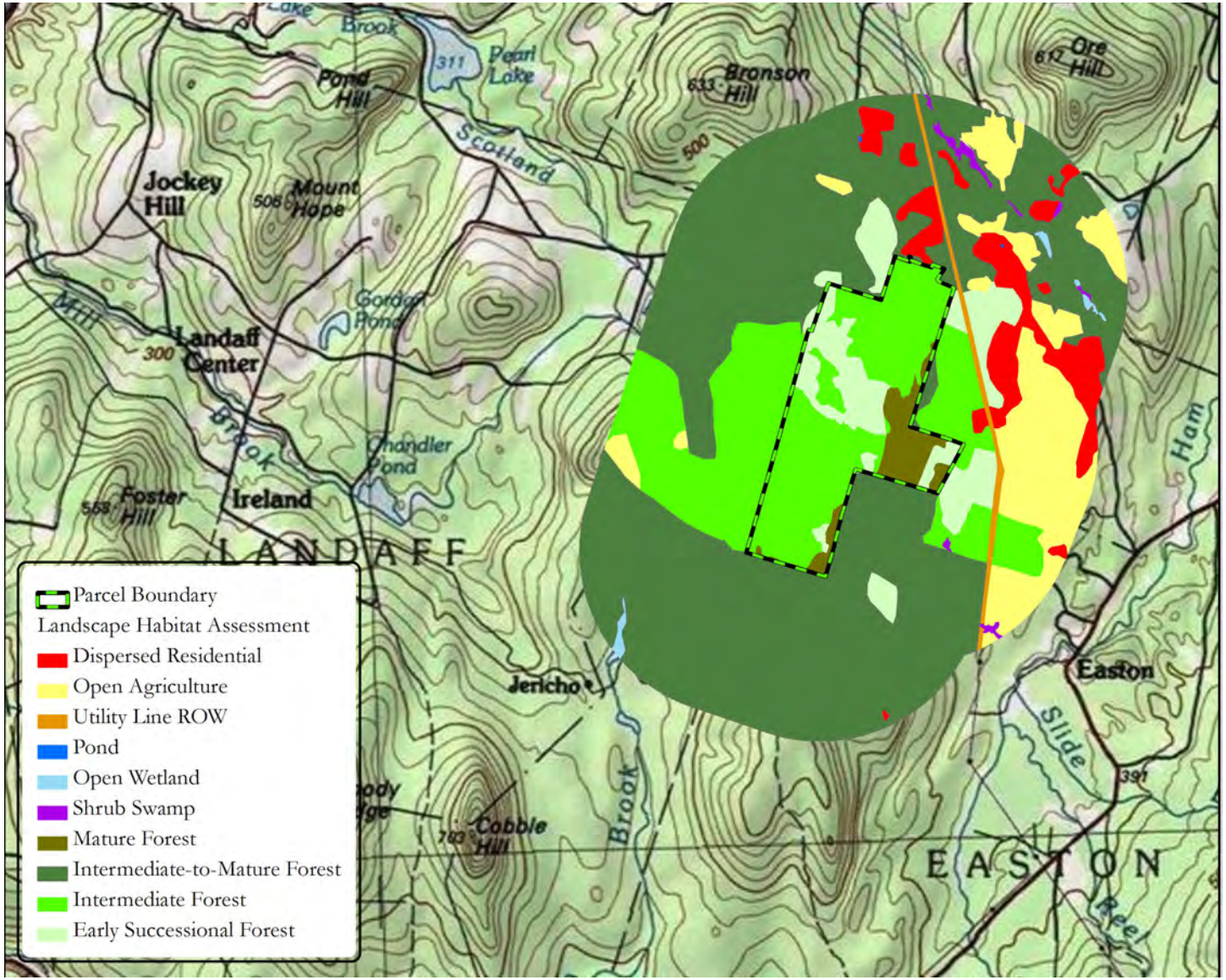


Figure 6: Landscape Analysis-The landscape (depicted as a 1-mile buffer here) includes a rural mix of mix of both intermediate-aged forest habitats and shrubby, early successional forest habitats.

5. Physiography, Hydrology and Vegetation

By Jesse Mohr

The following is a brief synopsis of the property's ecological features, particularly as they relate to and set the stage for forest management.

5.1 Landform and Topography

The CJCF, which ranges in elevation from 1,600 feet to over 2,600 feet, sits along three small, ridgeline peaks: Cooley Hill (2,485 feet) at the southern end of the property; Cole Hill (2,645 feet), the tallest, in the middle, and small un-named peak at the northern end (2,345 feet). All three peaks rise out of a U-shaped north-south trending ridge. The three peaks are connected by a relatively flat-topped saddle and ridgeline. The ridge and peaks generally feature steeper, rockier terrain on the east and southeast slopes. The west and northwest slopes tend to be gentler and covered in dense, sometimes shallow, compacted till with lesser amounts of surface stones.

The shape of the ridgeline and three peaks—steep, rocky slopes on the east and southeast side and smoother, compacted till slopes on the west and northwest side—was likely sculpted by the last round of advancing glaciers. This "Roches moutonnées" landform results when a glacier, advancing from northwest to southeast, smooths the up-ice (northwest) side of the hill, while chunks of bedrock are plucked away from the down-ice, or southeast, side of the hill.

Elevation has a strong influence on plants, animals, and many fundamental ecosystem processes, such as soil development. Higher elevation areas tend to be cooler, more exposed to wind, and more frequently subject to ice and snow loading than lower elevation areas. While it can be greatly influenced by localized conditions, high elevation plants and animals are often found starting at the ~2,500-2,600-foot threshold. Higher elevation species and species assemblages are found in the CJCF, occasionally extending below 2,500 feet in cold air drainages and sinks and steep rocky terrain. These areas tend to have cold, thin, and relatively nutrient limited soils. Both red spruce and balsam fir are particularly well adapted for these conditions.

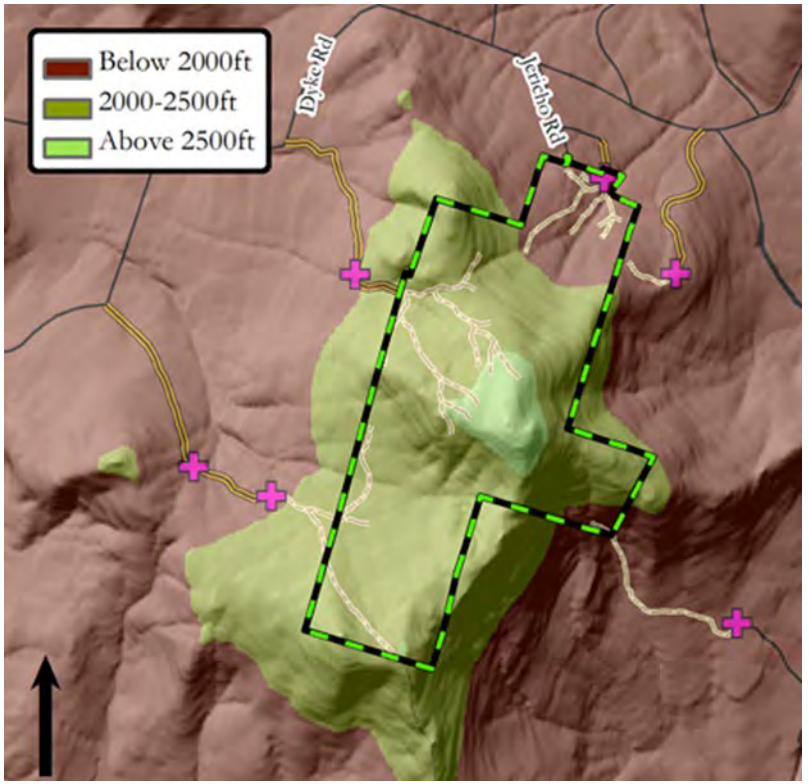


Figure 7: Elevation of the CJCF-The CJCF sits along three small ridgeline peaks extending to over 2600 feet in elevation.

Below 2500 feet, where the soils are more productive and the environment less stressful, northern hardwoods are better adapted and either outcompete or co-mingle with cooler adapted red spruce and balsam fir. In lower in elevations, often below 2000 feet, species that are dominant in southern and warmer locals begin to comingle with the more typical northern hardwoods. White pine, eastern hemlock, and red oak – all generally considered "warmer species" – are found in the lower elevation portions of the CJCF.

5.2 Bedrock and Surficial Geology, and Soils

Understanding the surrounding bedrock, is one important layer when considering the property's current and future wildlife, vegetation, and long-term forestry values. Beyond cliffs, outcrops, and knobs – where bedrock is exposed at the earth's surface – bedrock is both a shaper of soils and topography.

The varying resistance of different bedrock formations - or even localized variation within an individual bedrock formation - to weathering, and, at times, glacial advance and retreat also has a profound effect on topography. Many prominent mountains and hills of the area are underlain by resistant bedrock formations.

The underlying and surrounding bedrock can also have a strong influence on a soil's pH, nutrient availability and structure. Bedrock that is close to the soil surface can affect localized growing conditions through direct weathering of nutrients and sediments. Bedrock fragments, rocks, and boulders transported and deposited by advancing and retreating glaciers have a much broader influence on soils and growing conditions. Glacial till was deposited over most of the CJCF. A large majority of the rock fragments found in this soil come from bedrock located to the northwest of the property.

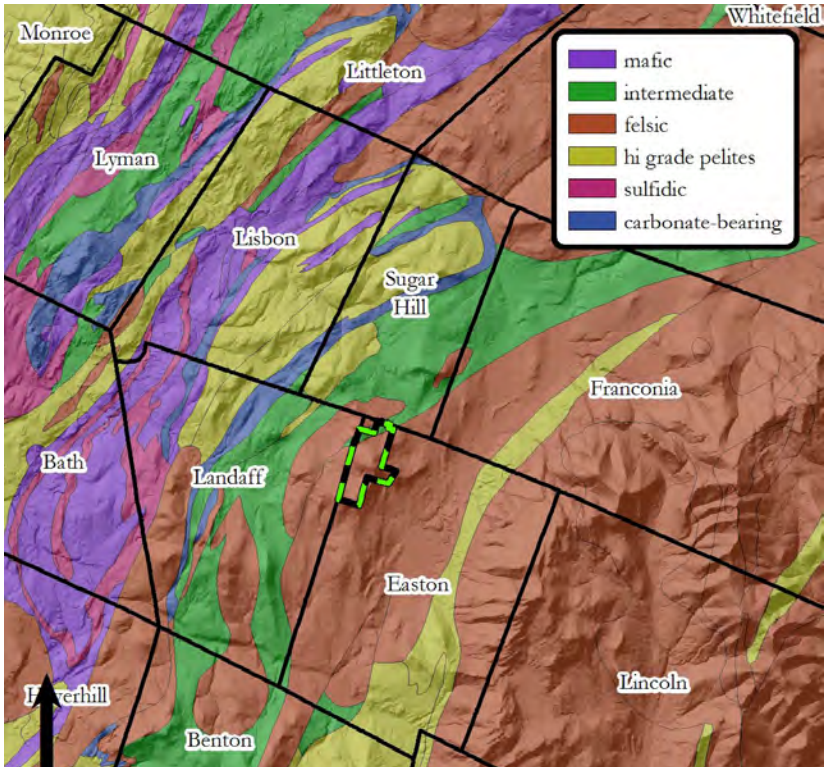


Figure 8: Ecological Bedrock Types-The CJCF is underlain by felsic bedrock types likely to produce acidic soils with low amounts of nutrient availability. Intermediate, carbonate-bearing and Mafic bedrock types to the northwest can create more enriched conditions

The property sits directly over the Bethlehem granodiorite formation, a bedrock formation that is part of the larger NH Plutonic Suite. There is also a thin band of Ammonoosuc Volcanics mapped under the northern tip of the property. To the northwest lie alternating bands of Ammonoosuc Volcanics, Littleton, Fitch, and Clough formations. In terms of its influence

on soil development, nutrient supply and soil and water acidity, the 195 bedrock units mapped in the state have been grouped into six broad ecological bedrock types.

Table 3: Ecological Bedrock Types- Six ecological bedrock types are found in the vicinity of the CJCF. These bedrock types have varying influence on soil chemistry and nutrient availability.

Ecological Bedrock Type	Soil Acidity	Calcium Levels	Formations in the CJCF area
Mafic	Neutral	Moderate-to-high	Ammonoosuc Volcanics – metabasalt, Littleton Formation - mafic and felsic volcanic lentils
Intermediate	Slightly acidic	Low-to-moderate	Ammonoosuc Volcanics - bimodal volcanic rocks
Felsic	Acidic	Low	NH Plutonic Suite - Bethlehem granodiorite
Hi Grade Pelites	Acidic	Low	Ammonoosuc Volcanics - volcaniclastic metagraywackes, Littleton Formation, undivided - metapelite, metawacke and subordinate metavolcanic rocks
Sulfidic	Very Acidic	Low	Partridge Formation, undivided - sulfidic-graphitic slate or schist
Carbonate-bearing	Neutral-to-basic	Moderate-to-high	Fitch and Clough Formations

While the CJCF primarily sits on top of Felsic bedrock types that weather to produce acidic soils with low nutrient availability, Carbonate-bearing, Mafic, and Intermediate bedrock types lie to the northwest; these bedrock types can create more enriched conditions with higher levels of nutrient availability. A thin band of Intermediate bedrock may also underlie the northern tip of the property.

The activities of advancing then retreating glaciers deposited till[6] across the property. Till-derived soils now underlie the property. Most of this till is dominated by slightly acidic fine and coarse rock fragments and boulders from underling and nearby bedrock formations. The southeast trajectory of the advancing glaciers did transport (in the form of soil rock fragments, cobbles, and boulders) some of the Carbonate-bearing, Mafic, and Intermediate bedrock types that sit to the north and west of the property.

Two different till-derived soils and one closely related association of till-derived soils are found on the property: Marlow Fine Sandy Loam; Peru Fine Sandy Loam; and Tunbridge-Lyman-Rock Outcrop Complex.

Marlow and Peru are closely related soils, both forming on loamy till in glaciated uplands. The till-derived soils have a sandy loam matrix that is underlain by a dense hardpan of basal till (till deposited and compressed under tremendous weight and pressure). The surface soil ranges from well-draining to moderately well-draining. The moderately well-drained Peru soils are generally associated with lower landscape positions and shallower water tables. Marlow soils are found in better draining upland areas. Field observation suggests that the poorer draining Peru soil is more abundant than mapped (see Soils and Topography Map). Both are productive soils for forest management and have a good balance of fertility and soil moisture. They tend to favor hardwoods such as beech, sugar maple, red maple, white birch, yellow birch, aspen, white ash, and northern red oak in varying combinations with red spruce, balsam fir, hemlock, and occasionally white pine.

[6] Till is unsorted sediment deposited directly below a glacier, which exhibits a wide range of particle sizes, from fine clay to rock fragments and boulders.

The majority of the property is underlain by the Tunbridge-Lyman-Rock Outcrop Complex, an intricately patterned mosaic of two soils and bedrock exposure that are found on glaciated uplands. The Tunbridge soils are loamy, moderately deep to bedrock (20-40 inches), and well drained, while the Lyman soils are loamy, shallow to bedrock (less than 20 inches), and somewhat excessively drained. While both of these soils can be productive for tree growth, they have some physical limitations, such as steep slopes, bedrock outcrops, and extreme rockiness that can make forest management more difficult and more costly. Soils are further described for each Ecosystem Management Unit.

5.3 Wetlands and Streams

The property contains sensitive hydrologic features, including forested, shrubby, and open wetlands, areas transitional between upland and wetland conditions, seeps, and ephemeral and perennial streams (See Natural Communities and Hydrology Map). On a per-acre basis, wetlands, streams, and seeps support extremely high levels of wildlife and plant biodiversity.

There are at least 40 seeps – small wetlands where ground water is emerging from the soil surface – on the property. On the CJCF, seeps frequently occur in few settings: basins and depressions where groundwater natural accumulates; where shallow bedrock or a shallow hardpan holds ground water near the soil surface; and on sloping terrain where water running along bedrock and hardpan is exposed. There are likely many more seeps that have not been mapped. The last round of logging has obscured many seeps. The seeps will be protected through no harvest and, and if possible, no heavy equipment special treatment areas

The seeps vary widely in size and condition, from small emergent trickles of water to muddy flats and slopes up to a 1/10 of an acre in size. Many of the seeps were logged over during the last entry and now support a mix of early successional and wetland grasses, sedges, and herbs. Seeps that were not logged tend to support a mix of wetland grasses, sedges, and herbs ringed by trees and shrubs.

These seeps are an important small-scale wildlife habitat feature. These features greatly contribute to the property's wildlife diversity by providing drinking water sources, cool humid micro-climates, and aquatic habitats; these features are critical for many amphibian species and are used by an even greater number of bird and mammal species. The early-to-green-up vegetation of these areas is important springtime forage for many mammals. The seeps are also an important headwater source for the property's wetlands and streams.

There are nearly seven miles of streams on the CJCF, including headwater streams feeding into Salmon Hole Brook, Mill Brook, and the Ham Branch. Most of these streams are ephemeral or intermittent, flowing after rain events or during wet times of the year. Although, the lower reaches of the streams near the Trumpet Round Road and Dyke Road landings may flow throughout the year. All the streams are small enough that they can easily be forded or jumped over. Even with recent widespread logging, many of the streams flow through a forested, or partially forested, setting.

Streams not only provide important habitat for aquatic species, but are also critical for many species that live in upland areas, as they provide a cool humid-micro-climate and drinking water. Intact stream-side forest cover helps to protect these important values. The small streams and seeps also feed many of the property's larger wetlands.

The property contains a range of wetland types and areas transitional between wetland and upland conditions (marginal or intermediate wetlands). Many of the wetlands were logged over during the last entry and now support a mix of early successional and wetland grasses, sedges, and herbs. However, the property also contains some unlogged wetlands, including dark and mossy spruce swamps and an ever-changing beaver pond complex ringed by emergent marshes and shrub swamps.

CJCF's wetlands are generally found in three settings: large topographic bowls; shallow bedrock or hardpan depressions on level-to-gently sloping terrain; and/or along stream and seep margins. Many of the wetlands are concentrated along an elongated beaver complex between Cole Hill and Cooley Hill. The property contains 11 acres of true wetlands, 53 acres of seepy, moist areas that are intermediate between wetland and upland conditions, and six acres of upland forest that contains frequent small, wetland inclusions.

Figure 9: Small Wetland-The CJCF contains a range of wetland types, include many small logged-over wetlands that now support a mix of early successional and wetland grasses and sedges.

These wetlands have tremendous wildlife and water quality values. Their soft soils can easily be degraded by heavy equipment. The wetlands and a 25-foot buffer around each wetland are excluded from timber harvest and heavy equipment access. There are lesser restrictions in a 150-foot buffer around each wetland as well; these restrictions are intended to protect the water quality and biodiversity values of the wetlands and the immediately adjacent upland areas.

Wetlands and streams further described for each Ecosystem Management Compartment (See Ecosystem Management Compartment).

Figure 10: Streams-The CJCF includes a mix of small ephemeral and perennial streams. The small stream pictured here flows throughout much of the years and is primarily surrounding by an intact riparian forest buffer.

Figure 11: Wetlands-The property contains a handful of smaller, primarily forested wetlands. Open wetlands, like the beaver pond pictured here, are relatively uncommon on the property.

5.4 Natural Communities

On the CJCF, the interplay of geology, climate, elevation, aspect[7], topography and moisture combine to create a diverse array of growing conditions: from warm, dry, high elevation southwest exposures to cool, moist, shady bowls. This interplay of environmental conditions can foster an equally diverse, and often somewhat predictable, array of natural community types.[8] At this time, however, much of the CJCF lacks this expected mosaic of natural community types. Instead, relatively recent logging has dramatically homogenized the vegetation composition. Patterns of geology, moisture, and landform interplay are masked by the post-logging conditions. While natural communities have been mapped across the CJCF (See Natural Communities and Hydrology Map), it is important to understand that in areas of recent logging, these natural community designations reflect potential vegetation rather than existing vegetation. This potential natural vegetation also gives us a management target based on the site's environmental conditions.

Sugar Maple-Beech-Yellow Birch Forest (S5) and Northern Hardwood-Spruce-Fir Forest (S4) are the dominant community types of the property; these widespread natural community types are very similar in composition. The primary difference is the relative abundance red spruce and balsam fir. In general, cooler sites, including areas that may be cooler due to elevation (See Figure 7) and/or aspect (see Figure 12), tend to favor coniferous species, such as spruce and fir. Additionally, poorly draining, hardpan soils, sandy soils, and/or soils that are shallow to acidic bedrock types tend to favor coniferous species. Under these conditions, conifers can often outcompete more nutrient demanding deciduous species, including red and sugar maple, American beech, and yellow and paper birch.

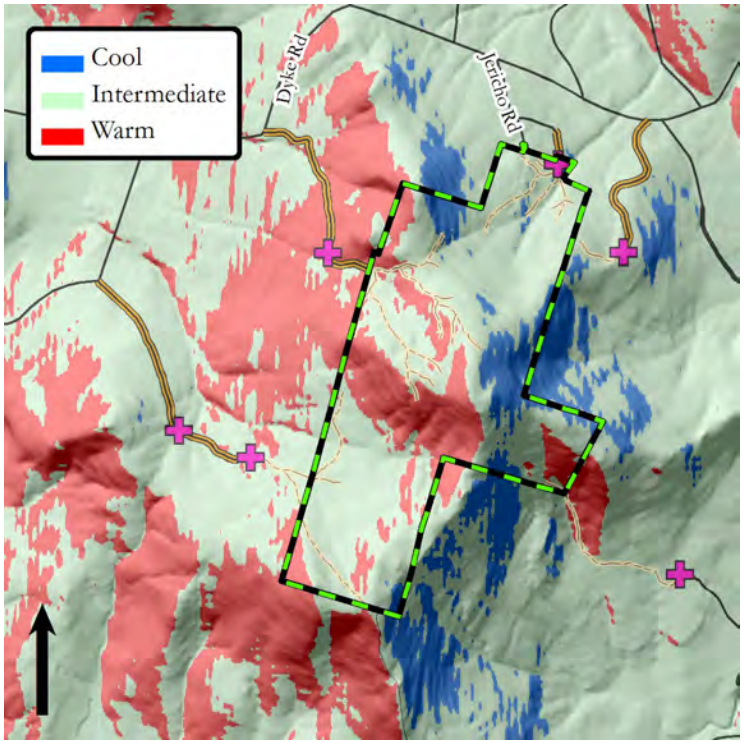


Figure 12: Aspect of the CJCF-The CJCF includes a mix of cool, warm, and intermediate aspects which can affect natural community distribution.

[7] Aspect is the compass direction that a slope faces. Generally, in the New Hamsphire, southerly, southwesterly, and westerly aspects are warmer due to increased sun exposure.

[8] A natural community is a recurring assemblage of plants and animals found in a particular physical environment. Three characteristics distinguish natural communities: 1) plant species composition, 2) vegetation structure (e.g., forest, shrubland, or marsh), and 3) a specific combination of physical conditions (e.g., water, light, nutrient levels, and climate). Each natural community type occurs in specific settings in the landscape, such as wind-exposed rocky summits at high elevations, or muddy coastal river shores flooded daily by tides.

Table 4: Elevation and Natural Communities-Elevation can have a strong influence on vegetation and natural communities. The CJCF ranges from 1,600 feet to over 2,600 feet and, as a result, supports variety of different natural communities. The below natural communities were observed on or near the CJCF.

Elevation	Dominant Natural Community(s)	Occasional Natural Communities
Above 2500ft	High Elevation Spruce-Fir Forest, Northern Hardwood-Spruce-Forest Forest	Spruce-Moss Wooded Talus, Red Spruce Swamp
2000-2500ft	Northern Hardwood-Spruce-Forest Forest, Sugar Maple-Beech-Yellow Birch Forest	Seepage Northern Hardwood Forest, Red Spruce Swamp, High Elevation Spruce-Fir Forest, Spruce-Moss Wooded Talus
Below 2000ft	Sugar Maple-Beech-Yellow Birch Forest	Red Spruce Swamp

On the CJCF, most of the spruce and fir is found in the cooler high elevation (above 2,000 feet) areas. However, in the northern tip of the property Northern Hardwood-Spruce-Fir Forest was mapped at a relatively low elevation (below 2,000 feet) in what appears to be a cold air sink with moist hardpan soils.

High Elevation Spruce-Fir Forest (S4) is found along the property's highest elevations and on two rocky bands of steep terrain on the south and east sides of Cole Hill. The steep rocky bands were not cut during the last harvest. Not separately mapped, but certainly present on these rocky bands are pockets of Spruce-Moss Wooded Talus (S2S3) and the Yellow Birch Variant of Spruce-Northern Hardwood Forest; these communities are very similar and generally consist of relatively open woodlands growing on bands or slopes of large boulders with little soil. On the CJCF these areas include varying mixtures of red spruce and yellow birch with abundant ground cover of ferns and/or mosses.

The Sugar Maple-Beech-Yellow Birch Forest, which covers much of the property, contains a handful of small, nutrient rich pockets, which tend to support Semi-rich Sugar Maple Forest (S3S4); only one larger occurrence of this natural community type has been separately mapped. This sugar maple and white ash dominated forest primarily occurs along the margins of seeps, in small bowls, and/or in areas overlying calcium rich till or bedrock (see Bedrock and Surficial Geology subsections).

Interspersed among this forested matrix are small wetlands: Subacid Forest Seep (S3S4), Emergent Marsh (S5), Mixed Tall Graminoid - Scrub-Shrub Marsh (S4S5), and Red Spruce Swamp (S3). The Marshes are concentrated along the beaver wetland complex in the basin between Cole and Cooley Hills. There are also isolated Red Spruce Swamps peppered across the property and they are primarily found in shallow bedrock or hardpan depressions that do not readily drain due to the flat or gently sloping terrain; while most of these swamps have been logged over, uncut examples remain. Along the ridge between Cooley and Cole Hill, Red Spruce Swamp occurs in tight mosaic with upland forest types; in this area, the Red Spruce Swamp boundaries were not reasonably mapped on an individual basis.

The large topographic basins on the northeast and northwest slopes of Cole Hill and in between Cole and Cooley Hill are naturally wet locations and support Northern Hardwood Seepage Forest (S3); many of the property's streams flow to and fan out over these areas. Additionally, much of the property's unseen groundwater is accumulating in these areas. The concentrating effect of the topography is just one of the reasons this area is wet. Water remains at or very near the soil surface because of a dense hardpan or shallow bedrock which stops or slows downward percolation of water into the soil column. As a result, this area supports a diffuse mosaic of wetland, marginally wetland, and

even upland forest conditions—this mosaic is characteristic of Northern Hardwood Seepage Forest (S3).

Figure 13: Spruce Swamp-The CJCF includes a handful red spruce swamps that were not logged during the last entry**.**

Natural communities are one of the primary means for identifying ecosystems of high conservation value in a statewide or even global context. While over 180 natural community types have been identified and described in New Hampshire, there is a tremendous disparity in the relative rarity or commonness of the 180 plus community types. Some natural community types, like Semi-Rich Mesic Sugar Forests, are often bound to uncommon combinations of substrate, landscape position, and climate. Rich Mesic Forests, for example, grow on calcium rich bedrock, an uncommon feature in New Hampshire. Other natural community types, like Sugar Maple-Beech-Yellow Birch Forests, occur throughout the state on a wide range of substrates and landscape positions. Each natural community type is given a state rarity rank by the New Hampshire Natural Heritage Bureau. The ranks are on a scale of S1-S5, with S1 being assigned to natural community types with extremely limited distribution and S5 being assigned to widespread natural community types. Because state-level natural community classifications are embedded in an international classification scheme, it also makes it possible to understand the relative rarity and conservation value of a given community or system in a global context. Each natural community is also assigned a global rarity rank (G1-G5).

To achieve wildlife and biodiversity goals, S1 and S2 natural community types will be excluded from management and protected with appropriate special treatment areas. Management of all areas should encourage characteristics species based on natural community type.

Table 5: Natural Communities of the CJCF-The following natural communities were identified across the CJCF. Each natural community type is given a state rarity rank by the New Hampshire Natural Heritage Bureau. The rarity ranks are on a scale of S1-S5, with S1 being assigned to the rarest natural communities. The Heritage Bureau also uses intermediate ranks, such as S2S3, meaning that the rarity rank is between an S2 and S3 or the rarity rank is still undecided, but likely to be a S2 or S3. On the CJCF, some natural communities were not separately mapped; in the below table these combined communities and their rarity ranks are separated by a "/". The rarity rank, acreage, and dominant wetland conditions for each natural community type or combined natural community type mapped on the CJCF are also included in the below table.

Natural Community Type	Rarity Rank	Acres	Wetland Class
Aquatic Bed	S5	.3	Wetland
Aquatic Bed and Short Graminoid - Forb Meadow Marsh/Mudflats	S5 / S4	1	Wetland
Birch - Mountain Maple Wooded Talus	S3	2	Upland
High Elevation Spruce-Fir Forest	S4	25.6	Upland
High Elevation Spruce-Fir Forest/Spruce -Moss Wooded Talus	S4 / S2S3	80	Upland
Lowland Spruce-Fir Forest	S3	10	Upland
Northern Hardwood-Spruce-Fir Forest/Red Spruce Swamp	S4 / S3	6.1	Upland with Frequent Wetland Inclusions
Northern Hardwood Seepage Forest	S3	43.4	Intermediate between Upland and Wetland
Northern Hardwood-Spruce-Fir Forest	S4	375.2	Upland
Sedge Meadow Marsh	S4	.7	Wetland
Red Spruce Swamp	S3	9.1	Wetland
Semi-rich Mesic Sugar Maple Forest	S3S4	3.1	Upland
Sugar Maple-Beech-Yellow Birch Forest	S5	281.8	Upland

Figure 14: Spruce-Fir Forest-High elevation spruce-fir forest lines the steep and often rocky slopes near the summit of Cole Hill.

Figure 15: Spruce-Northern Hardwood Forest-A mix of northern hardwoods, red spruce, and balsam fir is the dominant natural community of the CJCF.

5.5 Existing Vegetation and Past Logging

From 2001 through 2008, much of the property was logged. This was the most recent cut in a history of active logging. The extent and timing of the most recent logging is depicted below. Logging included a mix of clearcutting, partial cutting, and strip cutting. Approximately 220 acres were left uncut. While all the cutting encouraged a dense of flush of sapling, seedling, shrubs and bramble growth, the different types of logging, and lack of logging in some areas, resulted in four fairly distinct patterns of remaining vegetation.

5.5.1 Clearcut

Clearcut logging includes the removal of all or nearly all of the overstory (vegetation greater than 30 feet in height) and midstory (vegetation 6-30 feet in height) trees. In well planned and well implemented clearcuts, scattered overstory trees are left behind to provide future seed sources and some level of residual wildlife habitat. On the CJCF, occasional overstory trees were left in the clearcut areas. However, ,many of these remnant trees were left because they were of little economic value, including species that have limited potential use for forest products, such as beech or red maple, and/or individual trees of poor form. Across the CJCF, clearcut areas contain remnant overstory cover of 0-25 percent.

By removing the overstory canopy, clearcut logging allows sunlight to reach to forest floor, which stimulates the growth of tree seedling and saplings, shrubs, brambles and other understory (vegetation less than six feet in height) herbs. The first areas to be clearcut on the CJCF, now contain dense thickets of tree saplings that are right around six feet in height; in these areas, the saplings are starting to transition from the understory to the midstory. Dense thickets of brambles and shrubs are scattered throughout these older clearcuts.

The last areas to be clearcut, contain a relatively equal mix of tree saplings, brambles, and shrubs. The tree saplings are generally less than six feet tall in these areas. With time, these saplings will grow up and shade out some of the brambles and shrubs.

5.5.2 Strip Cut

Strip cutting is a logging system where long narrow clearcuts are made with alternating uncut areas; the result is a striped pattern of cut forest and uncut forest. In well planned and well implemented strip cuts, strips are left behind to provide future seed sources, protection for new tree seedlings, and residual wildlife habitat. On the CJCF, the remnant stripped patterning is probably more a result of equipment access than intentional strip cut design. On the CJCF, heavy logging equipment was driven in parallel rows approximately 70 feet apart; in these areas, all overstory and midstory vegetation was removed. While driving down these parallel rows, the equipment would also reach over into the remnant strips and remove high value overstory trees. Across the CJCF, strip cut areas contain remnant overstory and midstory cover of 25-50 percent.

Like clearcut logging, strip cut logging allows sunlight to reach to forest floor, which stimulates the growth of tree seedling and saplings, shrubs, brambles and other understory (vegetation less than six feet in height) herbs, especially in the open strips. Open strips now contain a relatively equal mix of tree saplings, brambles, and shrubs. The tree saplings are generally less than six feet tall in these areas. With time, these saplings will grow up and shade out some of the brambles and shrubs. The "uncut" strips generally contain intermediate-aged forest, with dense understories of regenerating tree seedlings and saplings.

5.5.3 Partial Cut

Partial cutting includes the removal of some overstory and midstory trees. In well planned and well implemented partial cuts, the overstory is left behind to provide future seed sources, protection and shade for new tree seedlings, wildlife habitat, and protection of soil and water resources. Partial cutting can also be implemented to ensure a regular flow of timber products. On the CJCF, partially cut areas contain remnant overstory and midstory cover of 25-75 percent.

The amount of sunlight reaching the forest floor in partial cutting is more variable, so the understory response is also more variable. In more heavily cut areas, where more sunlight is reaching the forest floor, there are generally more saplings, seedlings, and shrubs. In areas of lighter harvest, understory growth is more limited. The first areas to be partially cut now support saplings that are right around six feet in height; in these areas, the saplings are starting to transition from the understory to the midstory. In the last areas to be partially cut, tree saplings are generally less than six feet in height and mixed in with more brambles and shrubs.

5.5.4 Uncut Forest

A portion of the CJCF was not cut during the last round of logging. These uncut areas include terrain that was too steep and/or too rocky to log. It also includes areas that were just too far away and too difficult to access. Most of the uncut forest is of intermediate-age. There is a limited amount of mature forest.

Figure 16: Logging-The last round of harvesting included a mix of clearcutting (top), partial cutting (bottom), and strip cutting (middle).

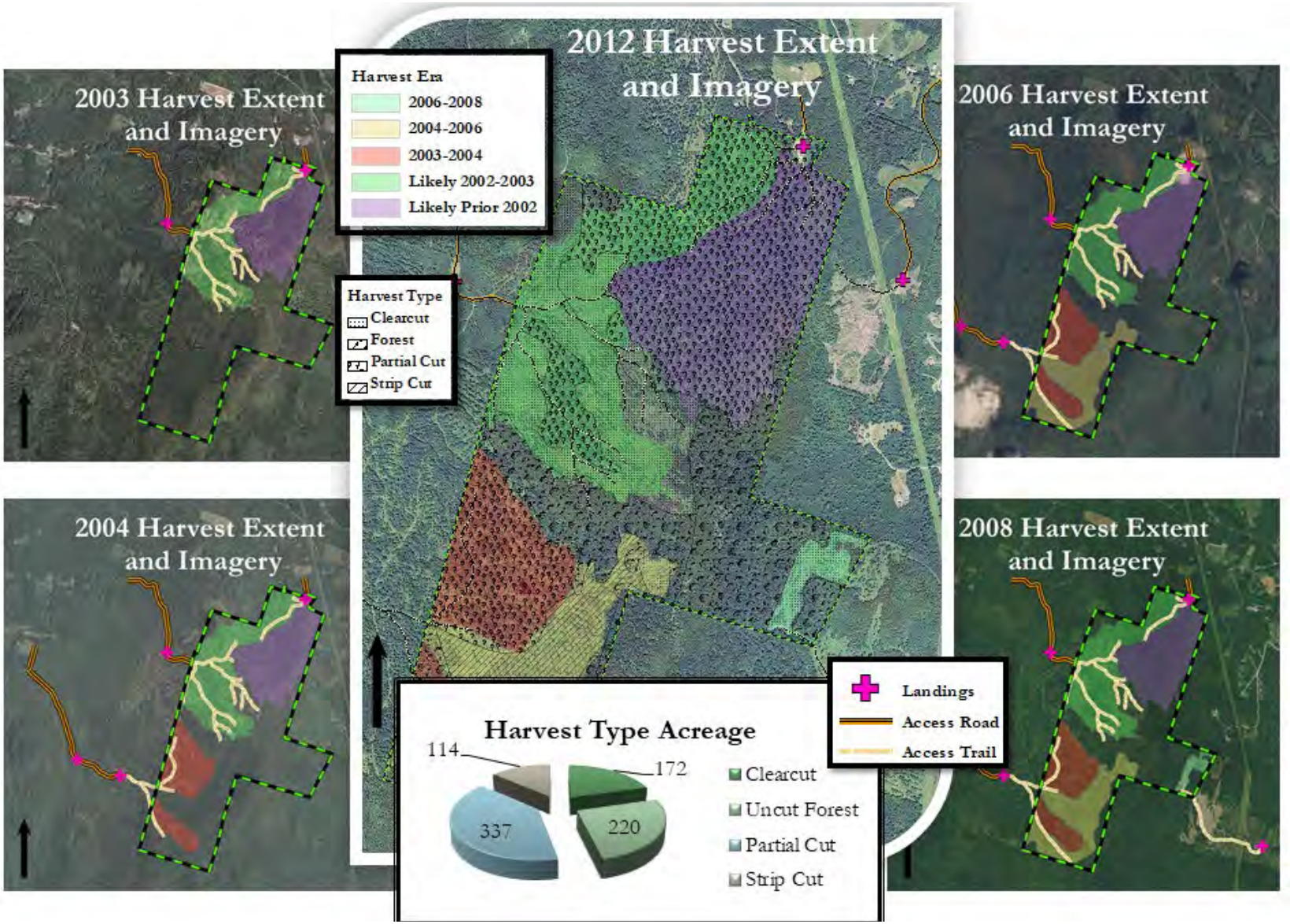


Figure 17: Recent Harvest History and Extent-The last round of logging on the CJCF occurred over an approximately 8-year period. The above graphic depicts the approximate timing, extent, and type of logging.

Figure 18: Uncut Forest-The CJCF contains a few areas of uncut forest. The sugar maple-beech-yellow birch forest pictured here is located near the summit of Cooley Hill.

6. Cultural and Land Use History

By Chris Nicodemus
Member, CJCF Planning and Stewardship Teams

As a relatively high ridgeline connecting Cole Hill and Cooley Hill, the Cooley-Jericho Community Forest (CJCF) is part of the physical barrier that separated the traditional farming communities of the Connecticut River valley to the west from the more mountainous hill towns of the Franconia valley to the east. Many vistas from the east side of the Forest include Ore Hill in Sugar Hill, where old iron mines can still be found. From the western heights, the fields and forests of the Ammonoosuc River valley just north of its junction with the Connecticut River are plainly visible, and the Connecticut River valley separating Vermont and New Hampshire readily visualized.

As the region was settled in the post-colonial period, the Franconia area industrialized around a local iron foundry. It has evolved into a mountain recreation destination and hospitality economy. To the west, while agriculture is no longer the prime driver of the economy, working farms remain within a mosaic of open fields, woodlands, and residential development.

6.1 Geologic Contributions to Culture

Much of human history can be related to geology, and this essay is indebted to *The Geology of New Hampshire's White Mountains*, which presents an illustrative and in-depth discussion of the shape of our region.[9]

As the authors of *Geology* explain, the area comprising the CJCF sits atop remnants of ancient volcanos, and thus includes some of the oldest rocks in New England. The Ammonoosuc Volcanoes of the Ordovician period erupted from the Bronson Hill Island arc some 486 million years ago. Since then, various geologic events, including the movement of tectonic plates, emergence of faults, and intrusion of rock types over millions of years resulted in the mineral deposits that spawned a 19th-century mining boom.

Much more recently, glaciation shaped the modern landscape of New Hampshire. The Forest was proximal to the ice face of the retreating Laurentide Ice sheet when it paused and then briefly re-advanced south over several centuries ~14,000 years ago. This pause provided for the extensive glacial moraine deposits that characterize the Littleton to Bethlehem region and also the Easton valley. The CJCF is mostly above the moraines and consists of ledge rock.

The area of the CJCF is protected by the high White Mountains from easterly ocean winds, and the valley is warmed by both easterly and southerly winds that descend over the higher peaks and ridges (altitude 4,000-6,000 feet) when low pressure tracks by to the west and north during the colder seasons. Local thaws occur in this region that otherwise are experienced only on the coastal plain and down the Connecticut River valley. Thus, these valleys are distinct in climate from the high-country valleys farther to the south and east, as well as those farther to the north.

In winter the area of the CJCF experiences occasional deeper thaws than regions to the south and east of the higher peaks and a fluffier lighter northern updraft snow. This contrasts to the

[9] Eusden, Dysktra, et al, *The Geology of New Hampshire's White Mountains* (Lyme, NH: Durand Press, 2013).

heavy ocean moisture predominant snow that is characteristic in areas stretching from the higher mountains south and east. Those neighboring areas are rarely deeply thawed by the much colder rains experienced during winter as the high ridges provide cold air damming and cooling up-drafts and not the warming down-draft southerly "Bungha" winds experienced in the area of the CJCF in these weather patterns. Thus, although growing seasons were short and minimal temperatures in winter extreme, mid-winter thaws did occur regularly and drought was less severe in the region of the CJCF than in more southern regions. The mountains result in more reliable summer showers, so that water is generally available all year round.

These conditions made for relatively favorable growing of crops and trees. With the possible exception of small areas on its periphery, the Forest itself, being relatively high in elevation, steep, and remote, was not used as farmland or for grazing. But land directly adjacent to its was, and the land that is now the Forest was very productive for growing trees. The land has been cut for timber for many generations, with its wood going to fuel the iron furnace in Franconia, to provide lumber for building the growing local towns, and shipped to faraway places.

6.2 Native American and Colonial History

There is no direct evidence of Paleo-Indians using what is now the CJCF, but it is well known that these pioneering human inhabitants moved into the region as they followed the retreat of the continental ice sheet, some 12,000 years ago. Archeological evidence of settlements has been located on the Ammonoosuc and Connecticut rivers. One can imagine that the Cooley and Cole Hills ridgelines may have been visited in hunting and scouting activities. The Forest is within the grazing territory of the herding migratory caribou which were a primary game pursued by Paleo-Indians.

New Hampshire was home to the Abenaki, who had villages along the Connecticut River and its tributaries, and hunted in and traveled through the area well over 2,000 years before European settlement. The Connecticut River valley was a main artery and life-blood of Abenaki culture west of the White Mountains, according to R. Duncan Mathewson III, and many other archeologists and historians. Many place names of today are derivations of the Abenaki language[10]. It is easy to imagine the forests of the present Cooley-Cole ridgeline being used by the Abenaki for hunting and gathering.

The area around the Forest itself was one of the last in present-day Grafton County to be settled by non-native Americans, because of its difficult terrain and its location well off the beaten track. Early European settlement progressed up the Connecticut River valley where the best farm land was found and where the river and its tributaries provided transportation and trade routes.

Landaff was still what Europeans considered a wilderness when King George III granted the territory to James Avery and co-investors in 1764. A requirement of the charter was settlement and active agriculture, and when these failed to materialize, the charter was revoked in 1770 by New Hampshire's colonial governor, Benjamin Wentworth. The territory was then granted

[10] See for instance, R. Duncan Mathewson III, "Western Abenaki of the Upper Connecticut River Basin: Preliminary Notes on Native American Pre-Contact Culture in Northern New England," Vtarcheology.org; for place names and an Abenaki interpretation of this region's history, see Lisa Brooks, Donna Roberts Moody, John Moody, "Native Space," in Where the Great River Rises, An Atlas of the Connecticut River Watershed in Vermont and New Hampshire, Rebecca A. Brown, ed. (Univ. Press of New England, 2009).

to the trustees of Dartmouth College, who enticed homesteaders to the region, built a mill, and incorporated the town in 1774. During the period of the American Revolution, the group who had lost the original Landaff grant sued in the new American court claiming that their grant was unfairly revoked, and they eventually won their case. The trustees of Dartmouth focused their efforts in Hanover, and released their claims to territory and improvements in Landaff.

In 1845 a portion of the town of Lincoln in the Ham River Valley and up to Kinsman ridge to the southeast was added to what was referred to as East Landaff. This area of the Ham Branch valley and the Kinsman slopes represented a distinct community population and was separated economically from the western side of town. In 1860 a bitter dispute arose over creating a road, to provide access to the rail lines along the Wild Ammonoosuc River. Known as the Bungha Road, it would have primarily served the logging community, Whicherville, located near the present day junction of state routes 112 and 116. The residents of Landaff Center saw no benefit from subsidizing the Bungha Road project. In 1876 East Landaff was declared the separate municipality of Easton. Today, the entire CJCF is located in the town of Easton

The communities separated by the highland ridge of the CJCF experienced different economic pressures in the 18th and 19th centuries. The western slope of the CJCF rose above agricultural lands that extended down to the Ammonoosuc River and merged with the Connecticut River valley to the southwest. West Landaff developed as a hill farming community with a regional river based industry and river valley based transportation reaching to the south. The western slope of CJCF is located at the farthest easterly extent of that continuum, and a stone wall marking an upper pasture edge extends for a significant length of the forest's northwestern border.

In contrast, the eastern side of the CJCF (Easton or East Landaff) was the western extent of a continuum defined by the valley communities immediately adjacent to the high peaks of the northwestern White Mountains and the glacially sculpted valley basins of the region. This area was less accessible to Connecticut River valley commerce but developed an early industrial economy to process ore mined in this isolated upland valley.

6.3 The Iron Industry and Mining

In the 1790s a rich vein of magnetite was discovered at what became called Ore Hill in the current town of Sugar Hill. In 1805, Massachusetts investors established the New Hampshire Iron Foundry Company and then the Franconia Iron Company. "Upper and Lower Iron Works" were constructed along the Ham Branch and the Gale rivers in Franconia, where the stone iron furnace remains to this day. Those relatively rich iron deposits established the early mining and iron foundry economy that was central to the economy of East Landaff, East Lisbon and Franconia in the early 19th century. The Cole family, early settlers on the east side of what became known as Cole Hill, had an ownership interest in the Foundry in Franconia.

The iron industry was fueled by charcoal, and trees were cut from all over the region to feed the furnaces. Ore Hill, site of the productive iron mines, is situated just to the northeast of the Forest. Cooley Hill was prospected for iron but no mines dug. It is very likely that the CJCF, especially on its eastern slopes closer to Franconia, was a major source of wood fuel.

Roger Aldrich's booklet, The *Iron Industry of Franconia and Sugar Hill 1805-1860* published in 1996 by the Sugar Hill Historical

Museum, documented many details of local mining activity in the East Landaff, East Lisbon, and Franconia valley. The region produced pig iron used in Franconia stoves and distributed for industrial applications for the emerging nation. The furnaces required 200,000 to 300,000 bushels of charcoal every year. The discovery of greater deposits of ore elsewhere, the emergence of coal-fired furnaces, changes in metallurgy, and the advent of rail transportation led to the cessation of mining and smelting activity by approximately 1860. It is noteworthy that with the hillsides denuded of trees, flash flooding was a frequent occurrence in these valleys during this era. These references are available through local history museums.

As the iron industry faded, mining for gold, lead, copper, and other minerals flourished in what was designated the Ammonoosuc Mining District by NH State Geologist Charles Hitchcock in 1878. It's hard to imagine today, but parts of Lisbon, Lyman, and Landaff were bustling mining communities, especially for gold, around the time of the Civil War and for several decades following. The CJCF is on the eastern edge of the Ammonoosuc Mining District.

6.4 Agriculture and Farming

While the geology of the region made for a relatively short-lived but exuberant mining industry, good soils helped grow trees, crops, and grass. The merino wool craze of the first half of the 19th century saw tens of thousands of sheep grazing along the Connecticut River, and the trend extended into hill towns such as Landaff as well. As with mining, however, greener pastures elsewhere beckoned. After the Civil War, news of the remarkably stone-free and fertile soils of the Plains led to the abandonment of many hill farms, especially those further away from the fertile river valleys[11].

Nearly a century later, two researchers for the U.S. Dept. of Agriculture, Kenneth MacLeish and Kimball Young, spent time in Landaff for a project on rural instability across the U.S. Their report, Culture of a Contemporary Rural Community: Landaff New Hampshire (1942), details the economic activity of the Landaff farms and community from its inception to the mid 20th century.

The report notes that subsistence homestead farming emerged as soils in southern New England were losing productivity in the late 18th and early 19th centuries. Land use was affected by the types of forests settlers encountered. After clearing deciduous forests, crops could be planted around residual stumps which rotted relatively quickly, while coniferous forest areas required stump removal and were primarily used for forest products and fuel.

The first permanent settlers in the early Lisbon-Landaff area lived on isolated farms that were mostly self-sufficient. Markets were limited and a cash economy was secondary to barter. There was little specialization and farms produced barley, wheat, flax, potatoes, and hay as well as keeping oxen, cattle, sheep, and hogs. Demand for merino wool from textile mills in southern New England created a cash market and by the third generation of farming, there seems to have been a good deal of communication with neighboring communities. This was a period of growth and relative prosperity in Landaff with timber and wool providing cash income.

[11] See, for instance, Steve Taylor, "Early Agriculture," in Where the Great River Rises, op.cit.

Farmsteads were established on both the eastern and western slopes of the CJCF by multiple individuals, including several members of the Cooley and Cole families. The Forest is named in part for the Cooleys, whose farm was at the corner of what are now the Dyke and Sugar Hill roads in Sugar Hill, formerly Lisbon. In his daily diary, Ward Cooley mentions going to Sugar Hill, West Landaff, East Landaff, Franconia, and Lisbon on a regular basis. He went to visit people, make deals, sell and buy livestock, seed, etc., barter for or buy services, and to hear the Adventist minister, who preached in Sugar Hill and East Landaff. He also went further afield on several occasions, but made business and social visits to the communities involved in the Cooley-Jericho Community Forest on a regular basis, clearly using some roads that no longer exist. He was routinely "settling up" in all four communities. Roger Aldrich of Sugar Hill compiled the writings from Ward Cooley's diary, along with the text of Henry Crapo's 1938 monograph on the Cooley farm in his book, *Two Years in the Life of a Sugar Hill Farmer 1851 & 1859*, published by the Sugar Hill Historical Museum 1994.

A cousin, Alonzo Cooley, had a major farming operation on the east side of the CJCF. His operations included 900 acres as listed in the Herman Child's Grafton County Gazetteer published in 1886. On the west side of the Forest, the Grafton Gazetteer identifies John C Atwood and his son Warren B to have 700 acres in farmland and a coarse lumber saw mill to the east of Dyke Road near the junction with Noyes Road in Landaff. This is near the site of the Noyes family burial ground, now a secluded spot in the woods not far from the CJCF. Isaac Cole, the last remaining member of the Cole family in the area, had a farm just north of Cole Hill off Dyke Road.

Several stone walls delineating 19th century pastures can be found just north of the intersection of Dyke and Noyes roads in Landaff (see Figures 19 and 20). A high wall marking the western boundary of the property has a height adequate to contain livestock on the downhill western side. A lower wall marking the eastern border of the property follows the ridge line of the eastern rise for several hundred vertical feet before diminishing and disappearing. The highland limits of the farm operations were situated within the CJCF property, but the heights were too remote to have served as homestead sites. There may be additional walls, foundation holes, or other remnants of prior occupation found, but it appears that most of the property was used for timber, the margins for grazing, and crop based agriculture was mostly pursued at the lower altitudes. The 19th century rights of way between East and West Landaff were neglected throughout the 20th century and remain as either overgrown abandoned routes or class VI roads.

Figure 19: Northeast Corner of Landaff Land Survey of 1803-Farms were established on nearby lands but generally did not extend onto the upper slopes of Cole Hill, where the CJCF is located.

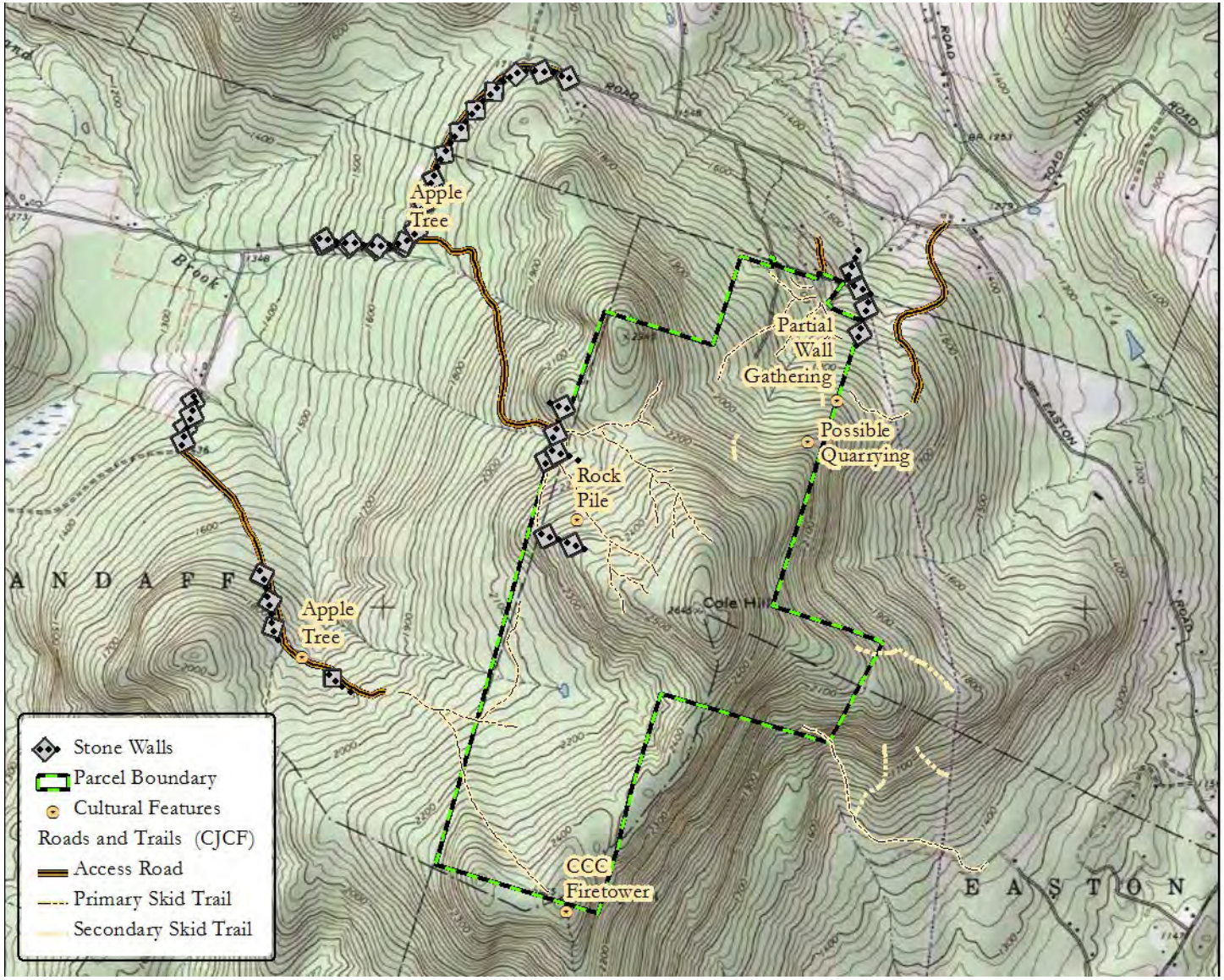


Figure 20: Cultural Features of the CJCF-The above features were observed and recorded during inventory of the property.

6.5 The Impact of the Railroad in the Late 19th Century

The coming of the railroads had a huge impact on the history of the rural communities around the CJCF. The railroad from Boston extended up the Ammonoosuc River valley to Lisbon and Sugar Hill depots by the 1850s, bringing city dwelling vacationers by the trainload and beginning the conversion to the tourism economy that is strongest today. But the railroads also opened up the fertile farmlands of the Midwest. Population growth here peaked by the census of 1860 and an emigration of farmers began at that same time. Ward Cooley moved his family to Iowa in December 1859. The merino wool market, which had provided good cash income to sheep farmers, had declined by the Civil War. Farms in more remote regions were abandoned during this period and remain as second growth forest land to the present time. Trains also facilitated logging operations in the remoter regions of the White Mountains and much of the area was deforested.

After the iron mine at Ore Hill ceased operations about 1860, the more mountainous eastern district comprising East Landaff, the eastern part of Lisbon and Franconia transformed into a destination tourist center drawing visitors from the newly affluent urban class emerging in growing American cities. The urban environment was hot and unsanitary in the summer, and country retreats and the rise of the grand hotels followed. The tourist economy and supply of goods to that business became the prevailing economy to the east of CJCF, all made practical by rail transportation.

The railroads also allowed greater extraction of one of the region's primary resources --timber. The iron horse allowed lumbermen to venture far from the rivers, which were used for driving logs to the mills. Vast areas of the White Mountains were cut bare. But the grand vistas of the White Mountains revealed through local tree clearing for agriculture and/or lumber helped propel the tourist economy, as well as the activism that marked the beginning of the movement toward forest protection.

6.6 20th Century Changes

Clear cutting left large areas of forest susceptible to landslides, flooding, and fires from drying slash. Several devastating fires occurred at the turn of the 19th to 20th century. In response to public and eventually business outcry, national leaders recognized the need to protect the forest and provide for more responsible land management. Congress passed the Weeks Act establishing the national forest system in 1911. The White Mountain National Forest was created in 1918. Its territory included the higher peaks region to the east, but also a section of south Easton and Landaff reaching up to the summit of Cooley Hill. Jericho Pond to the southwest of Cooley Hill lies in a finger of national forest land near private lands marking an abandoned settlement dating back to the 19th century.

Members of the Civilian Conservation Corps, the federal works project created during the Great Depression, constructed the Jericho Trail from the present Route 116 in Easton up through the national forest to the summit of Cooley Hill, where they built a fire tower. The foundation of the tower remains, and prospecting holes from the 19th century are said to be in the vicinity. *(As of 2020, the Yellow Trail on the CJCF links to the WMNF Jericho Trail.)*

The two world wars and the Great Depression brought leaner times and a decline in the grand hotel tourism industry. But the

post war urban/suburban culture and reliance on the automobile led to the introduction of weekend second homes through the region, including areas surrounding the CJCF property.

The Weeks Act led to the establishment of sustainable land use practices, environmental controls, and the emergence of more complex environmental legislation marked an evolving attitude toward open land in the national culture.

6.7 CJCF in the 21st Century

The creation of the CJCF marks a new chapter in this cultural history. The computer and internet era, coupled with highway transportation, makes this southern outpost of New Hampshire's North Country far more accessible to urban populations to the south and north than in prior periods. The region is less isolated and, with modern technology, area residents are readily able to participate in the new global economy. Outdoor recreation and appreciation of local wilderness environments remain major attractions for residents and visitors to the region.

The four-town community forest is intended to serve multiple uses for the regional community. A variety of recreational uses are envisioned, all connected to principles of sustainability and conservation. Efforts to create and foster habitats for species at risk are a priority. The property can serve to bring together and link the four local communities participating in forest management, extend to greater New England, and prove to be an excellent resource for educational experiences for all ages from early elementary school to university and adult education programs. The Forest provides a living laboratory for the natural sciences, including history, geology, and biology. Ultimately, the CJCF property will serve as a living museum of the history and future of community land use.

7. Property Boundary and Access Infrastructure

By Jesse Mohr and the CJCF Stewardship Team

7.1 Boundary

Clear, well maintained boundary lines are the best form of protection from accidental and intentional encroachment and sometimes theft or degradation of resources. Because the CJCF will be used and maintained by a number of different groups and individuals, a well-defined boundary will also help prevent accidental trespass onto abutting properties.

As part of the purchase and easement process, the CJCF was formally surveyed in 2008 by Kellogg Surveying and Mapping, Inc. The survey indicates that monuments were relocated or installed at corners. See "Survey of Land for George Foss III and Sara C Foss" for more details.

The boundary depicted in this report was derived from the actual survey; the shape and size of the boundary in this report is exact, but its geographic location is likely off by a small amount.

While a systematic survey of the property boundary was beyond the scope of this project and report, some data on boundary condition was gathered. Survey monuments (rebar) were noted at some boundary corners, but not all. Witness tress and/or other signs indicating that survey monuments are nearby are generally lacking. The shared boundary with White Mountain National Forest is an exception. Monuments along this boundary were easily located and marked by witness trees and blazes.

Besides the shared boundary with White Mountain National Forest, the boundaries are not blazed in their entirety. Shared boundaries with White Mountain National forest are well blazed.

Along the eastern boundary, there appears to be a significant discrepancy in the surveyed boundary location and on-the-ground boundary evidence. The difference in location between the observed blazes and the survey boundary appears to be more than the errors from GPS units and importing surveys can alone describe.

See Boundary Line Evidence Map for more details.

7.1.1 Stewardship Actions

Establishing and regularly maintaining the property boundary is recommended. Actions to establish and maintain the boundary include:

Table 6: Boundary Stewardship Actions-The below actions and timeline are recommended for maintaining and developing the property boundary.

Date			Action
2015			Work with surveyor to address eastern boundary discrepancy.
2015	-	2017	Blaze property boundary. If surveyor is not responsible for work, additional funding will be needed.
2025	-	2027	Reblaze/ maintain property boundary. Once boundary has been established by a surveyor; this can be done by knowledgeable volunteers or another natural resource professional.
2035	-	2037	Reblaze/ maintain property boundary. Once boundary has been established by a surveyor; this can be done by knowledgeable volunteers or another natural resource professional.

7.2 Access Infrastructure

The access infrastructure—roads and trails that allow access to the property and movement within the property-- includes primary access trails, secondary access trails, and access roads. Access roads provide vehicular access onto the property for management or recreation. Landings—open flat areas where logs are consolidated and loaded onto trucks—are a critical part of the access infrastructure too and need to connected, or easily reconnected, to the access roads. The primary and secondary access trails, are dirt trails that serve the property interior. On the CJCF, this access network is part of a larger interconnected recreation system (See Recreation Trails of the CJCF for more details). Portions of the access network are also shared with an abutter.

Roads, trails, landings, and other access infrastructure were inventoried and recommended for management according to the following classes:

Access Roads - Primarily permanent gravel-surfaced roads capable of supporting vehicle or log-truck access. They should be designed to support year-round use. They should be designed, maintained, and constructed in accordance with the Truck and Haul Road standards of "*Best Management Practices for Forestry: Protecting New Hampshire's Water Quality*" and "*Best Management Practices for Erosion Control in New Hampshire*" or successor publications. Winter plowing should occur on an "as needed" basis. These roads should be continually maintained in a state free of vegetation and downed logs. This class of road has been systematically mapped across the property and surrounding area.

Primary Access Trails - Primarily permanent un-surfaced trails capable of supporting skidder and tractor access, although portions of some trails of this class can and do support snow machine access. They should be designed for use under frozen or dry soil conditions. They should be designed, maintained and constructed in accordance with the strictest Skid Trail Standards stated above. Downed logs and vegetation should be regularly removed from trails of this class that are used for recreation purposes. This class of trails has been systematically mapped across the properties.

Secondary and Tertiary Access Trails - Primarily non-permanent un-surfaced trails capable of supporting skidder and tractor access. They should be designed for use under frozen or dry soil conditions. They should be constructed for temporary use and should be re-vegetated and decommissioned after use. They should be designed, maintained, constructed, and decommissioned in accordance with the Skid Trail Standards stated above. Downed logs and vegetation should not be removed from this class of trails except for the duration of management activities. This class of trails has not been systematically mapped across the properties.

Landings - Primarily permanent, well drained flat area capable of supporting heavy equipment and log-trucks during frozen and/or dry conditions. They should be designed, maintained, and constructed in accordance with the Log Landings standards stated above. Landings have been systematically mapped across the property

The following table provides a breakdown of length for each of the road and trail classes on the properties:

Table 7: Access Infrastructure of the CJCF

Access Infrastructure	Length (Feet)/ Number
Access Road, including the full length of private and class VI access road serving the CJCF	~21,300
Total Primary Access Trails, including the full length of access trails serving and within the CJCF	~35,000
CJCF Primary Access Trails, including the access trails within the CJCF	~27,000
Landings, including landings on and adjacent to the CJCF	6

Access infrastructure is depicted in a map at the end of this section.

7.2.1 Access Roads to the Property

There are (or were) five primary ways to access the property, each with its own associated landing. Only three of the five accesses were extensively evaluated.

7.2.1.1 Trumpet Round Road Access (Sugar Hill)

This is the primary access point and gateway to the property and will be developed as such. It was extensively used during the last round of logging. The access point currently consists of a short graveled access road and a large landing. Eventually, this access will include a parking area (on the CJCF), a kiosk, signed trailhead, and outdoor classroom/gathering spot. It is currently the only access point where the property can be easily reached by low clearance vehicles. It is also the only access point where the associated landing is on the CJCF.

The property is accessible via a ~550-foot gravel right of way departing from the top of Trumpet Round Road. This access road crosses a small stretch of private property between the CJCF and Trumpet Round Road. The road is not currently accessible by low-clearance vehicles; however, it is a short walk from a small parking area to the CJCF. There is currently parking for 2-4 cars at the end of Trumpet Round Road on the town-owned right of way. The town is currently expanding this parking area. *(Note: The parking area was expanded by the town of Sugar Hill and as of 2020 accommodates approximately 10 vehicles. A kiosk and trailheads have also been constructed near the entrance.)*

Development of the Trumpet Round Road entrance into a primary access point will require additional planning and refinement. We have, however, included some details related to developing this site:

- Minor improvements (grading and re-surfacing) to the ~550-foot access road will be required for vehicles to access the CJCF;
- The large landing should be developed for multiple purposes: parking area, gathering spot/outdoor classroom site, and staging area for management operations. Site plans for the access will need to include room for log piling/sorting, turning around log trucks, and unloading heavy equipment, in addition to a surfaced area for parking and a grassy area for gathering;
- Site plans should evaluate the feasibility of incorporating the rock outcrops into a gathering space; and
- The site plan should integrate the interpretive trail and kiosk (see section 8 Recreation Trails and Uses). *(As 0f 2020, a kiosk has been installed.)*

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Figure 21: Trumpet Round Access-The Trumpet Round Road access includes a large log landing that will be developed into the primary access point for the property.

7.2.1.2 Dyke Road -Jim Noyes Hill Road Access (Easton, Landaff, and Sugar Hill)

This is a secondary access point into the property and was extensively used during the last round of logging. The actual parking area, access road, and landing associated with this access are not on the CJCF. Over the 30 year planning horizon of this plan, if an operating agreement can be reached with the abutter, this access will be managed and improved to facilitate forest and wildlife management operations, but development for public access and recreation will be limited.

From this side of the property, the CJCF is accessible via a combination of Class VI road (Dyke Road from the Sugar Hill side and Jim Noyes Hill Road from the Landaff side) and a private access road. There is a large landing at the top of the private access road. From the landing, primary and secondary access trails head up into the CJCF. Again, the Class VI roads, access road, and landing associated with this access point are not on the CJCF.

The landing, and CJCF property, is not currently accessible to anything but a high clearance 4WD vehicles. Erosion is occurring on portions of the access road; rutting is problematic on portions of the Class VI roads too. Getting heavy equipment and log trucks to the property using this access will require minor improvements to over 3000 feet of class VI road and private access roads.

Property users can currently park at the end of Dyke Road or Jim Noyes Hill Road and walk up into the CJCF. There are parking spots for two-thee vehicles at each of these locations.

High clearance vehicles and ATVs are damaging this access. They are also getting onto the CJCF from this access and causing erosion and rutting problems on primary access trails within the CJCF (see next subsection).

Eventual improvement of the Dyke Road-Jim Noyes Hill Road access will require additional plan refinement and likely substantial funding. In the interim, immediate stabilization efforts should be undertaken to prevent further damage from erosion and illegal truck and ATV use. We have included some details related to stabilization and access control here:

- Waterbars other erosion control devices should be immediately installed on ~1,300 feet of the access road; the whole access road does not need waterbars as part of it has very little grade. This should be done in conjunction with stabilization work done on the primary access trail (within the

property) that goes to the summit of Cole Hill (see next subsection). A quick preliminary assessment suggests that 20-30 waterbars will likely be needed to stabilize this access and associated access trail on the property. The preliminary waterbar locations are depicted in a map at the end of this section. This erosion control work is eligible for NRCS cost share funding and includes the following NRCS practices: Forest Trails and Landings (655).

- A gate, to control access, should be placed very near or at the property boundary. There is a small rock wall at the property boundary. Reconnaissance of the area suggests this is probably the most effective location to install the gate on the CJCF. If an operating agreement can be reached with the abutter, there are also possible gate location below the landing. This access control work is eligible for NRCS cost share funding and includes the following NRCS practices: Access Control (472) *(Note: In 2018, a gate was placed by the Lisbon Stump Jumpers on the abutting ownership, blocking the private access road and vehicle traffic. The gate was placed where the access road branches from Dyke Road.)*

7.2.1.3 Merrill Mountain Road Access (Landaff)

This is a secondary access point into the property and was extensively used during the last round of logging. The parking area, access road, and landings associated with this access are not on the CJCF. Over the long-term, if an operating agreement can be reached with the abutter, this access will be managed and improved to facilitate forest and wildlife management operations, but development for public access and recreation will be limited. Improvement of this access is not required for the stewardship actions included in this plan, but will likely be necessary for the next planning period.

From this side of the property, the CJCF is accessible via a combination of Merrill Mountain Road (class VI road) and a private access road. There are two large landings at the top of the private access road. From the landings, primary and secondary access trails head up into the CJCF. The Class VI road, access road, and landings associated with this access point are not on the CJCF.

The landings and CJCF property are not currently accessible to anything but a high clearance 4WD vehicle. Erosion is occurring on portions of the access road and class VI road. Getting heavy equipment and log trucks to the property using this access will require improvements to over 5,000 feet of class VI road and private access road.

Figure 22: Erosion-Part of the Merrill Mountain Road access and private access roads that serve the property are starting to erode.

Property users can currently park at the end of Merrill Mountain Road and walk up into the CJCF. There are parking spots for two-three vehicles at this location.

High clearance vehicles and ATVs are damaging this access. They are also getting onto the CJCF from this access and causing erosion and rutting problems on primary access trails within the CJCF (see next subsection).

Eventual, improvement of the Merrill Mountain Road access will require additional planning and likely substantial funding. In the interim, immediate stabilization efforts should be undertaken to prevent further damage from erosion and illegal truck and ATV use. We have, included some details related to stabilization and access control here:

- Waterbars and other erosion control devices should be immediately installed on ~5,454 feet of access road and steep portions of the class VI road. This should be done in conjunction with stabilization work done on the primary access trail (within the property) that goes to the summit of Cooley Hill (see next subsection). Preliminary assessment suggests that 40-50 waterbars will likely be needed to stabilize this access and associated access trail on the property. The preliminary waterbar locations are depicted in a map at the end of this section. This erosion control work is eligible for NRCS cost share funding and includes the following NRCS practices: Forest Trails and Landings (655).
- A gate, to control access needs to be installed. This access control work is eligible for NRCS cost share funding and includes the following NRCS practices: Access Control (472). *(Note: In 2018, a gate was placed on the abutting ownership, blocking the private access road and vehicle traffic to the landings.)*

7.2.1.4 Ruskin Road and Private Road Access (Easton)

These accesses were not examined in great detail and played a limited or no role in the last round of logging.

The Ruskin Road access includes a large landing at the top of Ruskin Road (a town road). From the landing, a long primary or secondary access trail (over 4,300 feet) serves the property. This long access trail is steep, highly eroded, and not currently passable for any equipment. Only a small portion of CJCF is reachable via this access. Because this portion of the CJCF will be managed as a natural area, heavy equipment access is not necessary, so improvements are not recommended. Additionally, improvement and stabilization of this access would be substantial and is entirely on the abutting property.

The CJCF boundary is also accessible via a long private access road that starts near the Dyke Road-Easton Road intersection. This access road is passable to a high clearance 4WD vehicle. This access road is on the abutter's property, which is posted, and does not appear to actually serve the CJCF. The road goes to a landing very near the CJCF boundary, but this portion of the CJCF is very steep and rocky and otherwise not conducive to forest or wildlife management. Because this portion of the CJCF will be managed as a natural area, heavy equipment access is not necessary, so improvements are not recommended.

7.2.1.5 Stewardship Actions

Many of the following stewardship actions are eligible and recommended for NRCS cost-share practices, including Access Control (472) and Forest Trails and Landings (655). See compartment descriptions for more details.

Table 8:Access Stewardship Actions-The below actions and timeline are recommended for maintaining and developing access to the property. Recommendations for access trails within the CJCF are detailed in the next subsection.

Date	Action
2015	In cooperation with local eagle scout, construct kiosk at Trumpet Round Road entrance.
2015	Identify location for installation of access control gates on Dyke Road-Jim Noyes Hill Road and Merrill Mountain Road accesses.
2015	Work with snowmobile club to install gates on Dyke Road-Jim Noyes Hill Road and Merrill Mountain Road accesses.
2015 - 2018	Seek funding to support construction of Trumpet Round Road access.
2015 - 2018	As funding becomes available, implement Trumpet Round Road access improvements.
2015 - 2018	Develop operating and maintenance agreement with abutters who use shared access roads and landings off Dyke Road and Merrill Mountain Road.
2018 - 2021	With operating agreement in place, refine plan and develop budget for stabilization of Dyke Road and Merrill Mountain access roads.
2018 - 2021	Seek funding to support stabilization of Dyke Road and Merrill Mountain access roads.
2018 - 2021	As funding becomes available, stabilize Dyke Road and Merrill Mountain access roads.
2024 - 2026	Evaluate Dyke Road access for possible improvements to facilitate truck and heavy equipment access for forest and wildlife management operations scheduled for this time.
2024 - 2026	If needed, implement improvements to Dyke Road access in conjunction with forest and wildlife management operation scheduled for this time.

7.2.2 Access Trails within the Property

Due to the relatively recent round of timber harvesting, primary and secondary access trails run throughout most of the property interior. Primary access trails were mapped across the property. The condition of these trails is highly variable. Steep trails without proper erosion control, such as waterbars, are susceptible to erosion, where surface soil washes away, leaving gullies or an entrenched trail that further funnels water and exacerbates erosion. Because continued erosion will increase future improvement costs, stabilization and slowing of erosion is a priority. This stabilization work will also be implemented to improve recreation uses (see next section).

Lower topographic positions (bottom of slopes, basin floors, etc.) on the CJCF tend to be wet due to accumulating water and impeded soil drainage. In these locations, trails tend to be wet. When equipment drives through these wet areas, it compacts the soil creating ruts and further slowing drainage. While ditching and culverts can be installed to improve drainage, this is an expensive solution and is not recommended unless the access trail will also be used for recreation (see next section). The primary solution for wet trail sections is to either relocate the trail to an upland drier area (if that is an option) or limit equipment access to frozen ground conditions. To prevent further rutting and soil compaction, access control will be implemented.

7.2.2.1 Trumpet Round Road Access Trails

The primary and secondary access trails off of the Trumpet Round Road are generally in acceptable condition and will likely only need minor improvement for future access and recreation. Widespread, immediate stabilization work is not necessary. They contain adequate waterbars and/or have been successfully re-vegetated. There are some wet areas that can only be used under

frozen ground conditions. Re-routes around wet areas may be needed for recreation uses or summer-time access.

7.2.2.2 Dyke Road-Jim Noyes Hill Road Access Trails

The primary access trails climbing Cole Hill from the Dyke Road-Jim Noyes Hill access road are rapidly deteriorating and require immediate stabilization work. Steep sections of these trails were not correctly water barred or re-vegetated at the end of the last logging job. In some locations, the soil has been completely washed away leaving bare bedrock. Erosion problems are being compounded by illegal truck and ATV use of the trail. In addition to these erosion prone areas, there are some wet areas that can only be used under frozen ground conditions. Re-routes around wet areas may be needed for recreation uses or summer-time access. Immediate stabilization efforts should be undertaken to prevent further damage from erosion and illegal truck and ATV use. Stabilization is likely to require additional planning and refinement, but we have included some details here:

- Waterbars and other erosion control devices should be immediately installed on ~3,365 feet of the primary access trail. This should be done in conjunction with stabilization work done on the primary access road to the property. A quick preliminary assessment suggests that 20-30 waterbars will likely be needed to stabilize this trail and the associated access road. The preliminary waterbar locations are depicted in a map at the end of this section. This erosion control work is eligible for NRCS cost share funding and includes the following NRCS practices: Forest Trails and Landings (655)

7.2.2.3 Merrill Mountain Road Access Trails

Less extensive erosion problems are also occurring on parts of the primary access trail up Cooley Hill from the Merrill Mountain Entrance; waterbars were installed in this area, but these waterbars need some maintenance and need to be supplemented

Figure 23: Severe Erosion-The primary access trail into the property from Dyke Road-Jim Noyes Hill Road has significant erosion problems.

with additional waterbars. Erosion problems are being compounded by illegal truck and ATV use of the trail. In addition to these erosion prone areas, there are some wet areas that can only be used under frozen ground conditions. Re-routes around wet areas may be needed for recreation uses or summer-time access. Immediate stabilization efforts should be undertaken to prevent further damage from erosion and illegal truck and ATV use. Stabilization is likely to require additional planning and refinement, but we have included some details here:

- Waterbars other erosion control devices should be immediately installed and maintained on ~2,500 feet of primary access trail up Cooley Hill. There is an additional ~1,625 feet of access trail on the abutting property that also needs erosion control devices. This should be done in

conjunction with stabilization work done on the primary access road that serves this area. A quick preliminary assessment suggests that 40-50 waterbars will likely be needed to stabilize this trail and associated access road on the property. The preliminary waterbar locations are depicted in a map at the end of this section. This erosion control work is eligible for NRCS cost share funding and includes the following NRCS practices: Forest Trails and Landings (655).

7.2.2.4 Stewardship Actions

Many of the following stewardship actions are eligible and recommended for NRCS cost-share practices, including Access Control (472) and Forest Trails and Landings (655). See compartment descriptions for more details.

Table 9: Stewardship Actions for Access Trail on the CJCF-The below actions and timeline are recommended for stabilizing and maintaining access trails on the CJCF. Recommendations for trails and roads providing access to the CJCF are detailed in the preceding subsection.

Date			Action
2018	-	2021	In conjunction with stabilization of access roads, refine plan for stabilization of primary access trails to Cole Hill and Cooley Hill from the Dyke Road-Jim Noyes Hill Road and Merrill Mountain Road entrances, respectively.
2018	-	2021	Seek funding to support stabilization of primary access trails up Cole Hill and Cooley Hill.
2018	-	2021	As funding becomes available, stabilize primary access trails climbing Cole Hill and Cooley Hill.

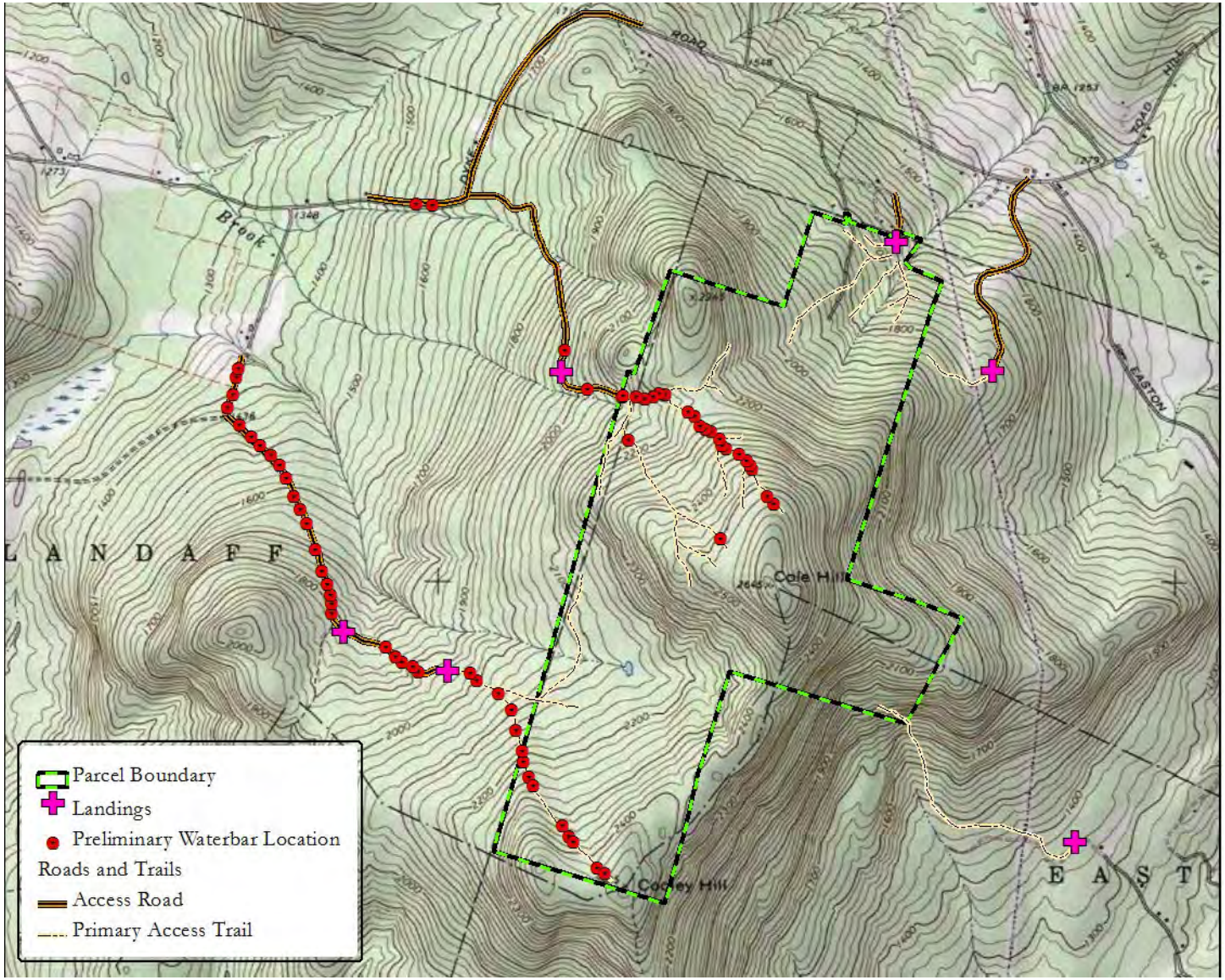

Figure 24: Access Infrastructure and Recommended Waterbars-The CJCF is accessible via a series of access roads and trails. On-going erosion is damaging the access network. Water bars are recommended to slow and stabilize on-going erosion. Preliminary water bars locations are also depicted.

8. Recreation Trails and Uses

By Jesse Mohr and the CJCF Stewardship Team

(Note: As of 2020, approximately six miles of trails have been built. See the 2020 Trails and Recreation Map.)

Enhancing and promoting recreational uses of the property was identified as a primary goal for the property. Property-wide objectives to achieve this goal include:

- create and maintain one or more parking areas and access points, including access that is suitable for school groups;
- create and maintain a diversity of trail types and difficulties;
- evaluate development of an interpretive trail; and
- work in conjunction with local and state partners to host workshops and field trips for environmental education.

Recreational uses were identified as the highest priority for the property. We anticipate that recreation will be a primary point of engagement for most community members. The recreation trail system will provide opportunities to get out and see the property and/or engage in active construction and stewardship of the trails.

Friends of Franconia Area Trails, a local chapter of White Mountain NEMBA, and the Stump Jumpers, the local snowmobile club, were both engaged in the trail planning process. Members of each organization are represented on the Stewardship Team.

In the spring of 2014, the Stewardship Team reviewed a spectrum of alternatives addressing the extent of the trail system and how the trail system would be accessed. Generally, the team embraced alternatives that provided the maximum amount of trail recreation opportunities. The team decided on a preliminary trail network design that would include a mix of primitive and multi-use trails, provide access to a handful of key destinations and create connections with existing WMNF and regional snowmobile trail systems. The preliminary network design is based on Trumpet Round Road serving as the primary access point to the property and trail system, while the Merrill Mountain Road and Dyke Road-Jim Noyes Hill Road entrances would serve as secondary and undeveloped access points.

Throughout 2014 and 2015, a select, recreation -focused subcommittee of the Stewardship Team, including members of Friends of Franconia Area Trails, continued to refine this overall trail network design and scout preliminary trail locations. The preliminary trail network design presented here (See 2015 Preliminary Recreation Network Map) reflects the alternatives selected by the larger Stewardship Team and later refinements made by the recreation subcommittee.

Development of the property's recreation resources is already beginning to transition from planning to implementation, and we expect that the preliminary network design will continue to evolve as construction begins and as Appalachian Mountain Club (AMC) resources become increasingly available. During the spring and summer of 2015, AMC provided ACT and the CJCF Stewardship Team with trail construction support, including additional refinement of trail locations and the overall network, laying out construction projects, and trainings in trail construction and maintenances. AMC trail construction crews were onsite for least two weeks throughout the summer.

Even with AMC support, the bulk of the long-term trail construction and maintenance will fall to volunteers mobilized by

ACT, the Stewardship Team, Friends of Franconia Area Trails, and the Stump Jumpers.

8.1 Desired Future Condition

The CJCF will provide diverse recreation opportunities. The property will include trails for hikers, bikers, snowshoers, and backcountry skiers. The property will also include snowmobile use on designated trails. The trail system will serve as the backbone for both recreational and educational uses. Trails will provide access to a number of scenic or educational features and serve as launching point for diffuse, off-trail travel. The property will include the infrastructure necessary-- parking, signage, and cleared trails--to support smaller groups and larger school groups.

8.2 Existing Conditions

Prior to any trail-related planning, an inventory of existing trail uses and resources was conducted. The results of that inventory are presented here. While many of the pre-existing recreational uses were innocuous, some were directly related to ongoing erosion and degradation issues.

The Stump Jumpers, the Lisbon snowmobile club, grooms and maintains two spur trails on the property, one to the summit of Cole Hill and one to the summit of Cooley Hill. These spur trails are connected to the larger snowmobile trail network. On the CJCF, these trails make use of existing primary access trails (see Access Infrastructure). There are currently no gates on these trails. As noted in the Access Infrastructure subsection, use of the snowmobile trails by 4-wheelers and off road trucks is causing trail degradation on the CJCF. The primary access trails up Cole Hill (from Dyke Road) are extensively eroded and rutted in some areas. *(Note: As of 2019, gates have been installed on the Dyke Road-Jim Noyes Hill Road and Merrill Mountain Road entrances.)*

Prior to the last round of logging, a local group of mountain bikers constructed and maintained a small single-track mountain bike trail on the property. The trail connected Trumpet Round Road to the WMNF Jericho Trail and Cooley Hill fire tower. The trail was abandoned after the logging, but sections of it are still visible today.

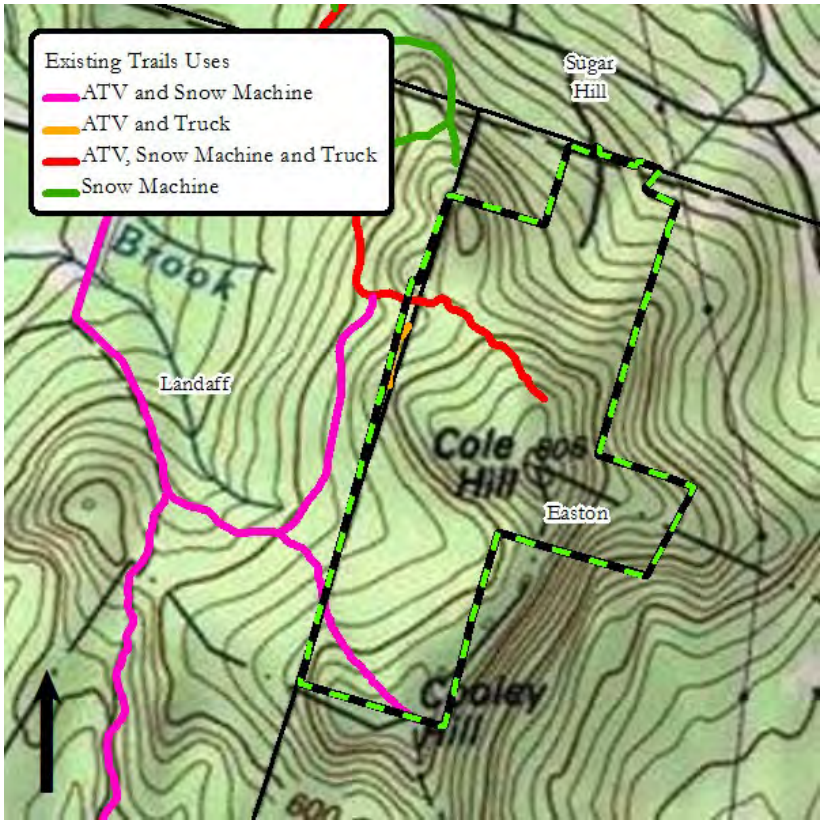

Figure 25: Existing Trail Uses-The CJCF contains two snowmobile trails maintained by the local snowmobile club. These trails are also used by ATV's and trucks.

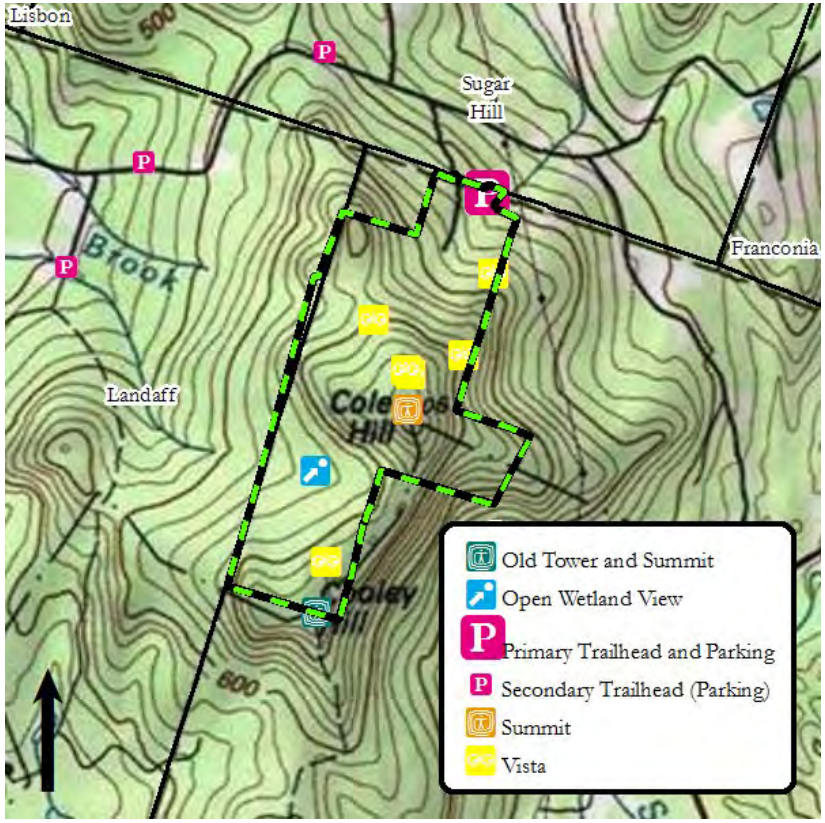

Figure 26: Trail Destinations-The CJCF includes a variety of features that make desirable destinations for hiking.

A number of desirable destinations were also identified. The property currently contains a number of scenic vistas, many of which will be difficult to maintain once the post-logging forest grows back. A few vistas that could more easily be maintained were also identified along the Eastern Steeps. In addition to the vistas, a few other trail destinations were identified. While not particularity showy, the Cole Hill summit and Cooley Hill fire tower are also draws. There is also a beaver wetland complex on the property; the complex provides a somewhat open view and the open wetland aesthetic is unlike any other area on the property.

8.3 Preliminary Trail Network

The preliminary trail network (See 2015 Preliminary Recreation Network Map) is based on the Trumpet Round Road serving as the gateway to the property's trail system. The preliminary design calls for a parking area and trailhead information to be installed at this entrance. The Dyke Road-Jim Noyes Pond and Merrill Mountain Road entrances will serve as secondary access points.

As proposed here, the trail network will allow users to access and enjoy a few loops from the parking area, including loops associated with local and Class VI roads. The preliminary trail network also allows users to access the following destinations/connections from the Trumpet Round Road entrance:

- Summit of Cole Hill;
- Summit of Cooley Hill and the Cooley Hill fire tower;
- WMNF Jericho Trail and the WMNF Jericho Trailhead parking area on Rt 116 in Easton;
- Naturally occurring and easily maintained easterly vistas;
- Ephemeral post-logging westerly and northerly vistas;
- Educational resources near the parking area; and
- Regional snowmobile trail network.

If the trail system and other recreation related proposals are developed to their full extent, the trail system as whole would provide users with access to these additional destinations:

- Beaver wetland complex; and
- Backcountry skiing glade.

8.3.1 Trail User Classes

The preliminary trail network design and recommendations are based on two trail classes identified by the Stewardship Team.

Table 10: Trail Classes of the CJCF- The Stewardship Team identified two separate trail classes to facilitate recreation planning and management. The suggested uses, trail tread width, and trail corridor clearing limits for each class are detailed below.

Trail User Class	Design and Maintenance Specs
Primitive Suggested Uses: Hiking, snow shoeing, and low impact biking	**Tread**: ~18inches **Clearing Limits**: ~24-36 inches Cleared and maintained by non-motorized hand crew.
Multi-Use Suggested Uses: All primitive uses and snowmobiling (on designated trails), cross-country skiing, and horseback-riding	**Tread/Groomed Surface**: ~6 feet **Clearing Limits**: ~8 feet Cleared and maintained by a combination of equipment and motorized hand crew. If possible trails should be constructed so they can be maintained by brush-hog, utv mower, or a walk behind mower.

As proposed here, the trail classes are lumping users that traditionally require different trail design specs. The shared use of some trails may also lead to conflict and safety issues at high levels of use. Addressing both the design and long-term use concerns will require an adaptive management approach. As trail layout proceeds, AMC and the CJCF Stewardship Team will try to address some of the design differences. Assuming that we are able to layout and construct a trail that accommodates multiple uses, there will need to be some long-term monitoring to evaluate trail erosion/condition and user feedback.

8.3.2 Phased Trail Development

Trail development is being planned in three major phases. Trail development will generally proceed from north-to-south, with the highest priority work located around the Trumpet Round Road entrance. Phase I and Phase II generally includes the minimum work needed to provide basic infrastructure for the property and to ensure sustainability on already existing trails.

8.3.2.1 Phase 1: Trumpet Round Road Entrance.

Initial trail construction and layout efforts will focus on developing a loop that can be hiked from the Trumpet Round Road entrance. This includes portions of trails A, B, and C in the next subsection. Ideally a loop is cleared and signed by the end of 2015, if not fully constructed.

For 2015, trail A construction efforts will focus on the trail between Trumpet Round and Cole Hill. Section Ab, the WMNF portion of trail should be flagged in 2015, so WMNF can continue to evaluate it as part of their larger scoping project. Phase 1, should also include a preliminary budget for an interpretive trail. Note that this work should be done in conjunction with development of the Trumpet Round Road entrance. See Trumpet Round Road subsection for more details.

(Note: As of 2020, approximately six miles of Phase-1 trails have been constructed and signed on the CJCF. The newly constructed trails are hiking, low impact mountain biking, and skiing trails that can be accessed from Trumpet Round Road, including a series of trails that can be hiked as a loop. Additionally, in 2019, working in conjunction with the Granit Backcountry Alliance, a backcountry ski glade was constructed along the eastern side of Cole Hill. This glade is also accessed via designated trails from the Trumpet Round Entrance. See the 2020 Trails and Recreation Map for additional details.

8.3.2.2 Phase 2: Dyke Road-Jim Noyes Hill Road Entrance

Phase 2 trail development efforts will focus on improving and formalizing trails associated with the Dyke Road-Jim Noyes Hill Road entrance. This work will depend on grant availability and an operating agreement with abutters. Much of this work will require heavy equipment and should be done in conjunction with improving access to the property.

8.3.2.3 Phase3: Merrill Mountain Road Entrance

Phase 3 trail development efforts will focus on trails associated with the Merrill Mountain Road entrance. This work will depend on grant availability and an operating agreement with abutters. Much of this work will require heavy equipment and should be done in conjunction with improving and stabilizing access to the property.

8.3.3 Trails

The following is a brief description of the proposed trails within the preliminary trail network. Please note that trail locations are approximate and that trails currently have no names. For this plan, trails have been given an alphabetic label. See Recreation Network Planning Map for labels and more details.

8.3.3.1 Trail A

This long primitive trail (referred to as the traverse trail throughout much of the planning work) and its two associated spurs (Aa) is being proposed to allow users to traverse the property in its entirety; visit the summits of Cole Hill and Cooley Hill; access easterly vistas; and connect to the larger WMNF trail system. As proposed, the trail would be moderately intense for most hikers and highly advanced for bikers.

The proposed trail winds through a mix of logged and unlogged forest. For most if its length, the proposed trail does not follow existing logging trails. Much of the trail has been scouted by members of the CJCF Stewardship Team and Friends of the Franconia Area Trails. The trail skirts and descends into the Eastern Steeps compartment where users can enjoy the relatively mature spruce-fir forest and occasional vistas to the east. By way of one or two spur trails, trail A connects to the Cole Hill summit and trails B and C, which allow a loop to be hiked back to Trumpet Round Road.

South of Cole Hill, this proposed trail crosses onto White Mountain National Forest (WMNF). Construction of this portion of the trail (Ab) is contingent on approval from WMNF. They are currently reviewing and scoping the proposed trail location.

Friends of the Franconia Area Trails have been the primary stakeholder involved in planning of this trail. Their primary interest is in connecting CJCF trails with the Jericho Trail. They should continue to be an important partner for maintenance and construction of the trail. Actions to develop this trail include:

Table 11: Stewardship Actions for Trail A-The following actions and timeline are recommended to construct and develop Trail A.

Date		Action
2015		Work with AMC to layout and flag entire length of trail all the way to Cooley Hill. At least one spur trail to summit and trails B and C should be laid out.
2015		Begin construction of trail with emphasis on creating a loop (A, to Aa, to B and C) that can be hiked from Trumpet Round Road.
2015		Blaze or sign loop (A, to Aa, to B and C) that can be hiked from Trumpet Round Road.
2015	2016	Continue working with WMNF on Ab section.
2016	-	Continue construction as needed.
Post	Yearly	Conduct monitoring and maintenance.

8.3.3.2 Trail B

This trail is being proposed to allow users to visit the summit of Cole Hill and, in conjunction with trails A and C, allow users to travel a loop from Trumpet Round Road. One possible trail location would also allow users to visit the relatively small, but forested peak at the north end of the property (colloquially referred to as North Peak).

The trail could be constructed and maintained as a multi-use (non-motorized) or primitive trail. As proposed, the trail would be of moderate intensity for most users. Depending on its final construction and classification, this trail may also provide non-motorized multi-use trail users (such as horseback riders) the option to park at the Trumpet Round Road parking area and access the multi-use trails (and loop opportunities) associated with the Dyke Road-Jim Noyes Hill Road entrance. Even if classified as a primitive trail, this trail is wider and more open than trail A, allowing skiers, snowshoers, and bikers a bit more room to navigate the trail, which may be important if a backcountry ski glade is developed.

While not thoroughly scoped for this plan, there is interest in maintaining an area for backcountry glade skiing. The slopes adjacent to and below this trail are being evaluated for this activity. Following trail B to the summit of North Peak may provide the best option for this activity.

For most if its length, the proposed trail follows existing logging trails and winds through partially logged forest. Portions of the logging trails are wet, but erosion problems are limited and many water bars are already in place. Near the height of land, a second location option, Bb, is depicted. Bb would likely be easier to build as it follows more established logging trails, but B is more scenic. Much of the trail has been scouted by members of the CJCF Stewardship Team.

Portions of the existing logging trails proposed for use in trail B will be utilized for access to the property interior for forest and wildlife management operations.

If possible, this trail should be constructed so it can be maintained by brush-hog, utv mower, or a walk behind mower. Actions to develop this trail include:

Table 12: Stewardship Actions for Trail B-The following actions and timeline are recommended to construct and develop Trail B.

Date	Action
2015	Work with AMC to layout and flag entire length of trail.
2015	Begin construction of trail with emphasis on creating a loop (A, to Aa, to B and C) that can be hiked from Trumpet Round Road.
2015	Blaze or sign loop (A, to Aa, to B and C) that can be hiked from Trumpet Round Road.
2016 -	Continue construction as needed.
Post Yearly	Conduct monitoring and maintenance.

8.3.3.3 Trail C

This trail is being proposed to allow users to visit the summit of Cole Hill from the regional snowmobile trail network and from the Dyke Road-Jim Noyes Hill Road entrance. This trail is also being proposed to allow additional multi-use trail users, such as horseback riders and cross-country skiers (who want wider trails) access to the property. In conjunction with trails A and B, portions of this trail allow users to travel a loop from Trumpet Round Road. This trail also allows users, particularly bikers, to

create even larger loops utilizing the CJCF trails in conjunction with local and Class VI roads.

The Lisbon Stump Jumpers already maintain and groom this trail. In its current state, the trail terminates very near the Cole Hill summit. The Club has been the primary stakeholder involved in planning of this trail. Their primary interest is in maintaining this trail as a short spur from the larger snowmobile trail network. They should continue to be an important partner for maintenance and construction of the trail.

For most if its length on the CJCF, the proposed trail follows existing trails and winds through mostly logged forest. Portions of this trail are eroded and will require re-routing and stabilization. Between the CJCF boundary and the parking areas at the end of Dyke and Jim Noyes Pond Roads, this trail follows Class VI roads and private access roads. Erosion and rutting is a problem on some of these roads too. For both recreation and forest management, securing long-term access through abutting private land and stabilizing immediate erosion problems needs to be addressed. See the "Dyke Road-Jim Noyes Hill Road Access Trails" subsection in the proceeding section for more details.

If possible, this trail should be improved so that it can be maintained by brush-hog, utility vehicle mower, or a walk behind mower. Actions to improve and formalize this trail include:

Table 13: Stewardship Actions for Trail C-The following actions and timeline are recommended to construct and develop Trail C.

Date	Action
2015	Work with snowmobile club to install gates.
2015	Blaze or sign loop (A, to Aa, to B and C) that can be hiked from Trumpet Round Road.
2015 - 2018	Develop operating and maintenance agreement with abutters who use shared access roads and landings off Dyke Road.
2018 - 2021	With operating agreement in place, develop plan and budget for stabilization of access roads and trails associated with Dyke Road-Jim Noyes Hill Road entrance.
2018 - 2021	As funding becomes available, implement stabilization of access road and access trails.
2018 - 2021	With operating agreement in place, blaze/sign trail in its entirety.
Post Yearly	Conduct monitoring and maintenance.

8.3.3.4 Trail D

This multi-use trail is being proposed to allow users to visit the summit of Cooley Hill and from the regional snowmobile trail network and from the Merrill Mountain Road entrance. This trail also allows users, particularly bikers, to create even larger loops utilizing the CJCF trails in conjunction with the Jericho Trail and local and Class VI roads.

The Lisbon Stump Jumpers already maintain and groom this trail. In its current state, the trail terminates very near the Cooley Hill summit. The Club has been the primary stakeholder involved in planning of this trail. Their primary interest is in maintaining this trail as a short spur from the larger snowmobile trail network. They should continue to be an important partner for maintenance and construction of the trail.

For most if its length on the CJCF, the proposed trail follows an existing trail and winds through a mix of logged and partially logged forest. Near the summit of Cooley Hill, that trail enters more mature forest. Most of the trail within the CJCF boundary is in good shape, with some minor drainage issues. Water bars were installed and/or maintained at the end of the last logging job.

Between the CJCF boundary and the parking area at the end Merrill Mountain Road, this trail follows a Class VI road and private access roads. Erosion is a problem on some of these roads and trails. For both recreation and forest management, securing long-term access through abutting private land and stabilizing immediate erosion problems needs to be addressed. See the "Merrill Mountain Road Access Trails" subsection in the proceeding section for more details.

This proposed trail will be utilized for access to the property interior for forest and wildlife management operations.

If possible this trail should be improved so that it can be maintained by brush-hog, utility vehicle mower, or a walk behind mower. Actions to improve and formalize this trail include:

Table 14: Stewardship Actions for Trail D-The following actions and timeline are recommended to construct and develop Trail D.

Date			Action
2015			Identify location for installation of access control gate
2015			Work with snowmobile club to install gate
2015	-	2018	Develop operating and maintenance agreement with abutters who use shared access roads and landings off Merrill Mountain Road.
2018	-	2021	With operating agreement in place, develop plan and budget for stabilization of access roads and trails associated
2018	-	2021	As funding becomes available, implement stabilization of access road and access trails
2018	-	2021	With operating agreement in place, blaze/sign trail in its entirety
Post		Yearly	Conduct monitoring and maintenance.

8.3.3.5 Trail E

This primitive trail is being proposed to allow users to visit the beaver wetland complex. This ecosystem is unique on the CJCF and this is the only spot that affords a relatively open view of a wetland. The trail would also provide a primitive trail experience in the southern portion of the CJCF. This trail is of a lower priority relative to establishing a basic trail system off of the Trumpet Round Road and Dyke Road-Jim Noyes Hill Road entrances.

This trail would not follow any existing trails and would instead need to be a new construction. The trail would cut across a mix of logged and partially logged areas. As of April 2015, precise trail locations had not yet been scoped for this trail. Actions to create this trail would include:

Table 15: Stewardship Actions for Trail E-The following actions and timeline are recommended to construct and develop Trail E.

Date			Action
2015	-	2018	Develop operating and maintenance agreement with abutters who use shared access roads and landings off Merrill Mountain Road.
2018	-	2021	With operating agreement in place, evaluate the current need/desire for this trail

Figure 27: Beaver Pond-The small beaver pond complex located at the end of proposed trail E may make a desirable destination for hiking.

8.3.3.6 Interpretive Trail

A ~¼ mile- improved interpretive trail could be constructed at the Trumpet Round Road entrance. A trail of this nature would allow users, especially school groups, to easily access educational points within the forest regardless of ground conditions. It would also provide users with a short, easy, and mostly mud-free

walk from the Trumpet Round Road entrance. Unlike other trails being proposed for the forest, this trail would provide a more front country experience, including a smoothed and improved tread. This trail is of a lower priority relative to establishing a basic trail system of the Trumpet Round Road and Dyke Road-Jim Noyes Hill Road entrances

This loop trail would not follow any existing trails and would instead need to be a new construction. As soils near the Trumpet Round Road entrance tend to be moist, surface improvements and drainage will likely be needed to provide easy and relatively mud-free access during most of the year. As of April 2015, a specific route had not yet been scoped for this trail.

While developing an interpretive trail will require a project construction plan, we have included some details here:

- The trail should be a loop, beginning and ending at the Trumpet Round Road entrance;
- Surface improvement would likely include a combination of geotextile fabric and gravel;
- Drainage is likely to include a combination of inside ditching, culverts, and turnpikes; and
- The theme of the interpretive trail should be developed in partnership with local school and/or PSU and AMC. Interpretive opportunities compatible with the site and planned management of the surrounding area include: forest succession, wildlife-habitat relationships, and wildlife and forest management.
- Wildlife management actions are scheduled for nearby areas, including creating a permanent herbaceous opening and a permanent shrubland opening. These sites will provide wildlife viewing opportunities and will provide relatively static examples of different stages of forest succession. These sites should be evaluated for inclusion in the interpretive trail

Actions to create this trail would include:

Table 16: Stewardship Actions for an Interpretive Trail-The following actions and timeline are recommended to construct and develop an Interpretive Trail from the Trumpet Round entry.

Date			Action
2015			If time permits, AMC staff flag out possible interpretive trail location.
2015	-	2016	Prepare preliminary budget.
2015	-	2016	With preliminary budget in place, evaluate the current need/desire for this trail.
2015	-	2020	Seek funding to support construction
2015	-	2020	As funding becomes available, work with AMC to refine construction plan.
2015	-	2020	Partner with school, to develop interpretive theme and materials.
2015	-	2020	Construct trail.
Post		Yearly	Conduct monitoring and maintenance. Trail should be maintained as part of the "Adopt a Trail" program.

8.4 Trail Maintenance

The CJCF will generally use an "adopt-a-trail" structure for trail and trailhead maintenance. While the CJCF Stewardship Team will need to recruit and/or provide adopters, AMC's existing Adopter's Handbook and work reporting forms should be used to guide and report maintenance activities. Seed Adopter's Handbook for maintenance specifics. As trails and trailheads are constructed, yearly maintenance will need to take place. Generally, maintenance of trails and trailheads will include:

- Cleaning out existing drainage structure (waterbars, ditches, dips, etc.);
- Cutting away brush and removing down material from the trail corridor;
- Checking and replacing trail blazes and/or signage as needed;
- Picking up trash; and
- Reporting on trail/ trailhead conditions and if necessary additional maintenance work needed

Depending on the trail, trailhead, and level of use, these tasks will need to be performed two or three times per year. Generally, the maintenance schedule should strive for the following seasonal benchmarks:

- Initial late spring visit to clean-out all drainage structures;
- Clearing of overgrown brush and downed logs before the heavy hiking/biking season;
- Before snowfall, making sure drainage structures are cleaned and in working order; and
- Making sure blazing and/or signage is visible in all seasons.

The CJCF and/or ACT will appoint a "Trails Coordinator." The Trail Coordinator will be responsible for: overseeing the trail adoption process and pairing adopters with appropriate trails/trailheads; coordinating trail maintenance trainings as needed; verifying work is being completed; and coordinating tool sharing. The Trail Coordinator will also serve as a liaison between the community forest and AMC, who may be available for trainings and technical support.

8.4.1 Stewardship Actions

Maintenance of existing and newly constructed trails is necessary to avoid potential environmental impacts and provide a safe and enjoyable user experience. The CJCF will use an "adopt-a-trail" approach for on-going trail and trailhead maintenance. Actions to create and support this trail maintenance program include:

Table 17: Trail Maintenance Actions for the CJCF-The following actions and timeline are recommended for trail maintenance on the CJCF

Date	Action
2015	Identify Trail Coordinator.
2015	Identify Trumpet Round Road Trailhead adopter.
2015	Develop and implement adopter checklist and schedule.
2015	Identify trail adopter for trails cleared in 2015.
2015	Host trail maintenance and construction training.
Post Yearly	Conduct monitoring and maintenance.
As needed	As new trails become constructed, recruit and train new adopters as needed.

Figure 28: Mountain Vista-The proposed trail A winds near a few natural canopy openings that look east towards Cannon Mountain and Kinsman Ridge. These opening could be maintained as a vista and trail destination

Figure 29: Estimated Summit-Cole Hill lacks a prominent summit. The boulder pictured here is at or near the high point of the property. The high elevation flat peak is still a preferred trail destination and within the recommended trail network

9. Educational Uses

By Jesse Mohr and the CJCF Stewardship Team

Enhancing and promoting the educational qualities and uses of the property was identified as a primary goal for the property. Property-wide objectives to achieve this goal include:

- create and maintain one or more parking areas and access points, including access that is suitable for school groups;
- create and maintain a diversity of trail types and difficulties;
- evaluate construction of an interpretive trail;
- working with local schools and AMC, continue to develop place-based curricula and opportunities for all age learning; and
- work in conjunction with local and state partners to host workshops and field trips for environmental education.

As a whole, educational uses of were identified as a high priority for the property. Use by grade-schools and colleges were deemed the highest priority. Use of the property for professional development workshops, research, and demonstration was also deemed important, but of lesser importance.

Educational uses of the property are quickly evolving and developing. Over the course of the stewardship planning process, ACT, the Appalachian Mountain Club (AMC) and Plymouth State University (PSU) partnered with local school to help develop and implement curriculum specific to the CJCF. This work, coupled with improvement to access and trails, will feed into increased educational uses in the following years.

9.1 Desired Future Condition

The CJCF will provide developed and undeveloped opportunities for education, demonstration, and research. The property will include the infrastructure necessary-- parking, signs, gathering areas, and access--to support school groups and workshops. The property will include demonstration and research sites for advancing natural resource stewardship. The property may include an interpretive trail that is accessible and easy to navigate.

Figure 30: Forestry Lesson-Former county forester David Falkenham leading an educational trip to the property.

9.2 Existing Conditions

Over the course of the stewardship planning process, educational uses of the property have substantially expanded. The following educational uses were on-going during inventory work for this plan:

- School group visits led by local teachers, ACT, AMC, and UNH extension. Topics covered during the visits included, but were not limited to, forest succession, forest management, and history of logging;
- Community hikes led by ACT. Topics covered during the walks included, but were not limited to, wildlife track and sign and breeding birds; and
- ACT, AMC, and PSU engaged with local schools to develop and implement grade-school curriculum and activities specified designed for the property.

9.3 Outdoor Classroom/Gathering Spot Development

Development of the Trumpet Round Road entrance will include accommodations for an outdoor classroom/gathering spot. This should include a space to comfortably gather groups of visitors. While developing this entrance and classroom/gathering site will require a specific site plan, we have included some details related to the outdoor classroom/gathering spot here:

- The entrance and access should allow for a bus to get onto or very close to the property;
- The entrance and access should allow for a bus to turn around;
- The site plan should include a small lawn or other maintained area for sitting and gathering;
- Site plans should evaluate the feasibility of incorporating the rock outcrops into a gathering space; and
- The site plan should be integrated with the interpretive trail (see next section)

9.3.1 Stewardship Actions

Table 18: Stewardship Actions for an Outdoor Classroom Site-The following actions and timeline are recommended to establish and improve an outdoor classroom site/gathering spot at the Trumpet Round Road entrance.

Date			Action
2015	-	2020	Seek funding to support development of entrance, outdoor classroom/gathering site, and interpretive trail.
2015	-	2020	As funding becomes available, develop refine plans for entrance, outdoor classroom/gathering site, and interpretive trail.
2015	-	2020	Construct entrance, outdoor classroom/gathering site, and/or interpretive trail.
Post		Yearly	Classroom site/outdoor gathering space and interpretive trail can be maintained as part of the "Adopt a Trail" program (see Recreation Trails on the CJCF for more details).

See "Northern Bench Ecosystem Management Compartment" for more details.

9.4 Demonstration and Research Site Development and Maintenance

We expect demonstration and research sites to be an emerging use of the property. Two demonstration sites have been included in this plan.

9.4.1 Interpretive Trail

An interpretive trail could be constructed at the Trumpet Round Road. See Section 8, Recreation Trails for more details. Construction of this type of trail is costly and is of a lower priority relative to developing a basic trail system on the property. While developing an interpretive trail will require a project construction plan, we have included some education-related details here:

- The theme of the interpretive trail should be developed in partnership with local school and/or PSU and AMC. Interpretive opportunities compatible with the site and planned management of the surrounding area include: forest succession, wildlife-habitat relationships, and wildlife and forest management.
- Wildlife management actions are scheduled for nearby areas, including creating a permanent herbaceous opening and a permanent shrubland opening. These sites will provide wildlife viewing opportunities and will provide relatively static examples of different stages of forest succession, especially when paired with recovery of the surrounding forest. These sites should be evaluated for inclusion in the interpretive trail

9.4.1.1 Stewardship Actions

Actions to create an interpretive trail include:

Table 19: Stewardship Actions for an Interpretive Trail-The following actions and timeline are recommended to construct and develop an interpretive trail at the Trumpet Round entrance.

Date			Action
2015			If time permits, AMC staff flag out possible interpretive trail location.
2015	-	2016	Prepare preliminary budget.
2015	-	2020	Seek funding to support construction.
2015	-	2020	As funding becomes available, work with AMC to refine trail construction plan.
2015	-	2020	Partner with school, to develop interpretive theme and materials.
2015	-	2020	Construct trail
Post		Yearly	Conduct monitoring and maintenance. Trail should be maintained as part of the "Adopt a Trail" program (see Recreation Trails on the CJCF for more details)

See "Northern Bench Ecosystem Management Compartment" for more details.

9.4.2 Chestnut Reintroduction and Test Site

An American chestnut reintroduction site may be established on the property. The site would be used for education and research, in addition to assisting in restoration of an endangered species. The site would likely include chestnut plantings across 1-2 acres. Barrier fences or other protection would also need to be installed to protect the young plants from browsing. A site has not yet been identified, but we know the following attributes are important:

- Easily accessed for maintenance and education;
- Drier with a southern-to-western exposure;
- Productive soils; and
- Already open overstory

9.4.2.1 Stewardship Actions

The following stewardship actions are recommended to establish a chestnut re-introduction and test site. The planting may be eligible for the following NRCS cost-share practices: Tree/Shrub Establishment (612) and Tree/Shrub Site Preparation (490).

Table 20: Stewardship Actions for Chestnut Reintroduction Site-The following actions and timeline are recommended to establish and monitor a chestnut reintroduction site.

Date			Action
2015			Locate potential site.
2015			Review site and possible impacts, with Stewardship Team.
2016	-	2018	If site is approved, conducting planting and construct fence to limit/prevent browse.
Post		As needed	Monitoring plants and maintain site as needed.

10. Wildlife and Wildlife Habitat

By Jesse Mohr

Protecting and restoring wildlife habitat, native biodiversity and water quality was identified as a primary goal for the property. Property-wide objectives to achieve this goal include:

- manage for a diversity of habitat types, including maintaining some areas of young forest and encouraging other areas to develop older forest conditions;
- protect and enhance critical wildlife habitats and habitat features;
- manage for complex, resilient ecosystems;
- enhance and protect threatened, endangered, uncommon and priority species and ecosystems;
- control the spread of exotic invasive species; and
- work in conjunction with local and state partners to host workshops and install demonstration sites showcasing wildlife management and water quality protection projects and best management practices.

It is also important to note that forestry and timber harvesting (see next section) is an important tool to maintain some wildlife habitats. As prescribed in this plan, many of the forest management stewardship actions are dual purpose, meaning they are being implemented to achieve wildlife and timber-related objectives.

All wildlife species have three basic life requirements: food, water, and cover, which collectively comprise the habitat of a given species. Almost all of New Hampshire's land is potential wildlife habitat, including backyards, pastures, and flower gardens. However, some parts of the living landscape are considerably more important than others in supporting the state's overall biological diversity. Many wildlife species are dependent on a relatively specific type of habitat. Species like wood frog and spotted salamander, for example, are dependent on vernal pools, which likely occupy less than 1 percent of New Hampshire. Species-specific habitat protection and management requires a deep of understanding of the life history and biology of any given species. Considering that 35,000 plus species with varying and sometimes conflicting habitat needs might occur in New Hampshire, it is impossible to simply manage for all wildlife species.

To account for the impossibility of managing for all species, the CJCF is taking a three-pronged approach, which is reflected in the wildlife and biodiversity objectives. First, the CJCF will be managed to maintain a diversity of habitat types, ensuring that all species present on the CJCF may find some available habitat. Second, portions of the forest will be managed for a select group of priority wildlife species including New Hampshire Species of Greatest Conservation Need (see Appendix 3) and Responsibility Birds of the Northern Forest (see Figure 31). Third, across the whole property, management will protect critical habitats and promote ecosystem health, integrity and resilience.

10.1 Desired Future Condition

Over the long-term, the CJCF will be managed to promote a diversity of high-quality habitats and healthy, resilient ecosystems. Critical habitats will be protected across the property.

10.2 Wildlife and Habitat Inventory

There were four general areas of wildlife and habitat data collection: mapping and assessment of habitats and habitat features; breeding bird surveys; motion camera traps; and wildlife track and sign surveys.

Habitat mapping and assessment was an iterative process that took place over the full two years of the inventory and planning process. In the first year, wetlands, streams, ledges, natural communities, early successional forests, and other larger-scale habitats were mapped and qualitatively assessed across the property. In the second year, a more detailed quantitative assessment was implemented as part of the detailed forest inventory; this included assessment smaller scale habitats and habitat features including understory, midstory, and overstory layers, snags, cavity trees, and downed woody debris.

Winter track and sign surveys took place in the winter of 2013-2014. Track and sign transects were established to cover the full diversity of habitats present on the CJCF; volunteers helped monitor these transects. These established transects were supplemented with additional data collection based on intuitive reconnaissance of the property. These transects are depicted on the "Wildlife Habitat and Inventory Map" See Appendix 2 for full Wildlife Tracking and Sign Survey Results.

Between February-October 2014, motion cameras were also deployed on the property. Cameras were placed in what was deemed the best potential Marten habitat. The cameras were baited with a long-distance scent lures and sardines. Visual attractants were also placed at the camera stations. Camera locations were depicted on the "Wildlife Habitat and Inventory Map."

Breeding bird surveys took place in the spring of 2014. Breeding bird monitoring stations were established to cover the full diversity of habitats present on the CJCF; volunteers helped monitor these stations. These established stations were supplemented with additional data collection based on intuitive reconnaissance of the property. These stations are depicted on the "Wildlife Habitat and Inventory Map". See Ecosystem Management Compartments for full Breeding Bird Survey Results.

10.3 Existing Conditions

10.3.1 Species of Greatest Conservation Need

The state of New Hampshire has recently undergone a mammoth statewide wildlife assessment project to identify species that should be a priority for protection and management. The Wildlife Action Plan not only provides a prioritized list of Species of Greatest Conservation Need but also prioritizes habitats that are critical to long-term viability of these species. In essence, the Wildlife Action Plan provides direction on what species and habitats we should consider managing for. The priority habitats and the Species of Greatest Conservation Need that are likely to occur on the properties were treated as priorities while developing management goals and objectives for the property.

During species-level inventory work for this plan, the following Species of Greatest Conservation Need were documented on the property: Canada warbler, American woodcock, bobcat, ruffed grouse, veery, olive-sided flycatcher, and wood thrush. The following big game species identified in the Wildlife Action Plan were also confirmed on the property: black bear, moose, white-tailed deer, and turkey. The inventory and habitat assessment findings suggest that all of these species are living and breeding on the CJCF, rather than just passing through. See the Appendix for the complete Species of Greatest Conservation Need list.

10.3.2 Responsibility Birds of the Northern Forest

Forest birds are among the most useful taxa for developing wildlife-based management prescriptions and understanding the relative impacts of those prescriptions. While many species of wildlife are elusive and time consuming to detect, birds, especially during the breeding season, are efficiently detected through visual and audible surveys. Because of their visible nature, there is a large scientific body of knowledge regarding birds and their specific habitat needs and responses to management. Their visible nature and relatively well understood habitat associations make them useful indicators of habitat suitability and condition for other species of wildlife too. The number of bird species present in New Hampshire and their sometimes conflicting habitat needs necessitate some type of species prioritization.

Each spring and summer, dozens of bird species dependent on forested habitats descend on the undeveloped lands, parks, backyards, and working lands of northern New York, Vermont, New Hampshire and Maine. Many of these species winter and live throughout the northern hemisphere, but during the breeding season, concentrate their numbers and activities to the relatively narrow swath of forest across northern New York, Vermont, New Hampshire and Maine. For some species, up to 90 percent of their global population is breeding within this area. These species are what Audubon and other leading agencies and organizations vested in bird conservation have identified as Responsibility Birds of the Northern Forest. The implication is that we, as stewards of the northern forest, have a great responsibility in the global success of these species. These Responsibility Birds (see Fig. 31) and their associated habitat needs were treated as priority species while developing management goals and actions.

In the inventory work for this plan, the following Responsibility Birds were documented on or utilizing the property: wood thrush, blackburnian warbler, mourning warbler, olive-sided flycatcher, alder flycatcher, American woodcock, black-throated blue warbler, veery, scarlet tanager, ruffed grouse, black-throated green warbler, ovenbird, blackpoll warbler, northern flicker, white-throated sparrow, Canada warbler, and chestnut-sided warbler. The blackpoll warbler was only observed during migration and not during the breeding season. Inventory and habitat assessment findings suggest that all of the other species are living and breeding on the CJCF rather than just passing through.

Alder Flycatcher	Magnolia Warbler
American Redstart	Mourning Warbler
American Woodcock	Nashville Warbler
Bay-breasted Warbler	Northern Flicker
Bicknell's Thrush	Northern Parula
Black-backed Woodpecker	Olive-sided Flycatcher
Blackburnian Warbler	Ovenbird
Blackpoll Warbler	Palm Warbler
Black-throated Blue Warbler	Purple Finch
Black-throated Green Warbler	Ruffed Grouse
Blue-headed Vireo	Rusty Blackbird
Boreal Chickadee	Scarlet Tanager
Canada Warbler	Spruce Grouse
Cape May Warbler	Swamp Sparrow
Chestnut-sided Warbler	Tennessee Warbler
Chimney Swift	Veery
Eastern Wood-Pewee	White-throated Sparrow
Gray Jay	Wood Thrush
Lincoln's Sparrow	Yellow-bellied Flycatcher
Louisiana Waterthrush	Yellow-bellied Sapsucker

Figure 31: Responsibility Birds of the Northern Forest-For the above species, up to 90% of their global population breeds in the northern forest. As a result, Audubon and other bird conservation organizations have identified these are priorities for forest conservation and management.

10.3.3 Habitat Age Diversity

The property was coarsely classified by development stage (See Appendix 4), a corollary to age. Where forests contain trees of varying ages, they were classified based on the age of the dominant overstory trees. The development classes used include: early successional (0-10 years); intermediate (11-40); mature (41-120); and late successional (greater than 121 years). The property is dominated by early successional and intermediate age classes. See chart on next page.

The ratio and juxtaposition of development classes has implications for wildlife and sustained timber yield. The development class distribution can be manipulated to maximize a continued flow of timber. Recommendations for sustained timber flow are similar to recommendations for early successional species conservation. Similarly, development class distributions that mimic natural disturbances are similar to recommendations for late successional species conservation. These two development class distributions and the property's current development class distribution are depicted in the figure below. Additionally, a target development class distribution, which seeks to provide the recommended levels of early successional habitat while balancing late successional species conservation and timber production has also been provided.

See Section 11 Timber & Forestry, for more details.

10.3.4 <u>Important management considerations based habitat age diversity</u>:

- Intermediate-aged forests are abundant on the property;
- Late successional and early successional habitats are known to support declining species;
- In its current age class distribution, the property supports recommended levels of early successional habitat;
- In its current age class distribution, the property provides no or very limited late successional habitat;
- Allowing mature stands to age, will increase the amount of available late successional habitat over the long-term; and
- Promoting and protecting old growth (late successional) structures and conditions within managed forests, will likely increase the amount of available late successional habitat.

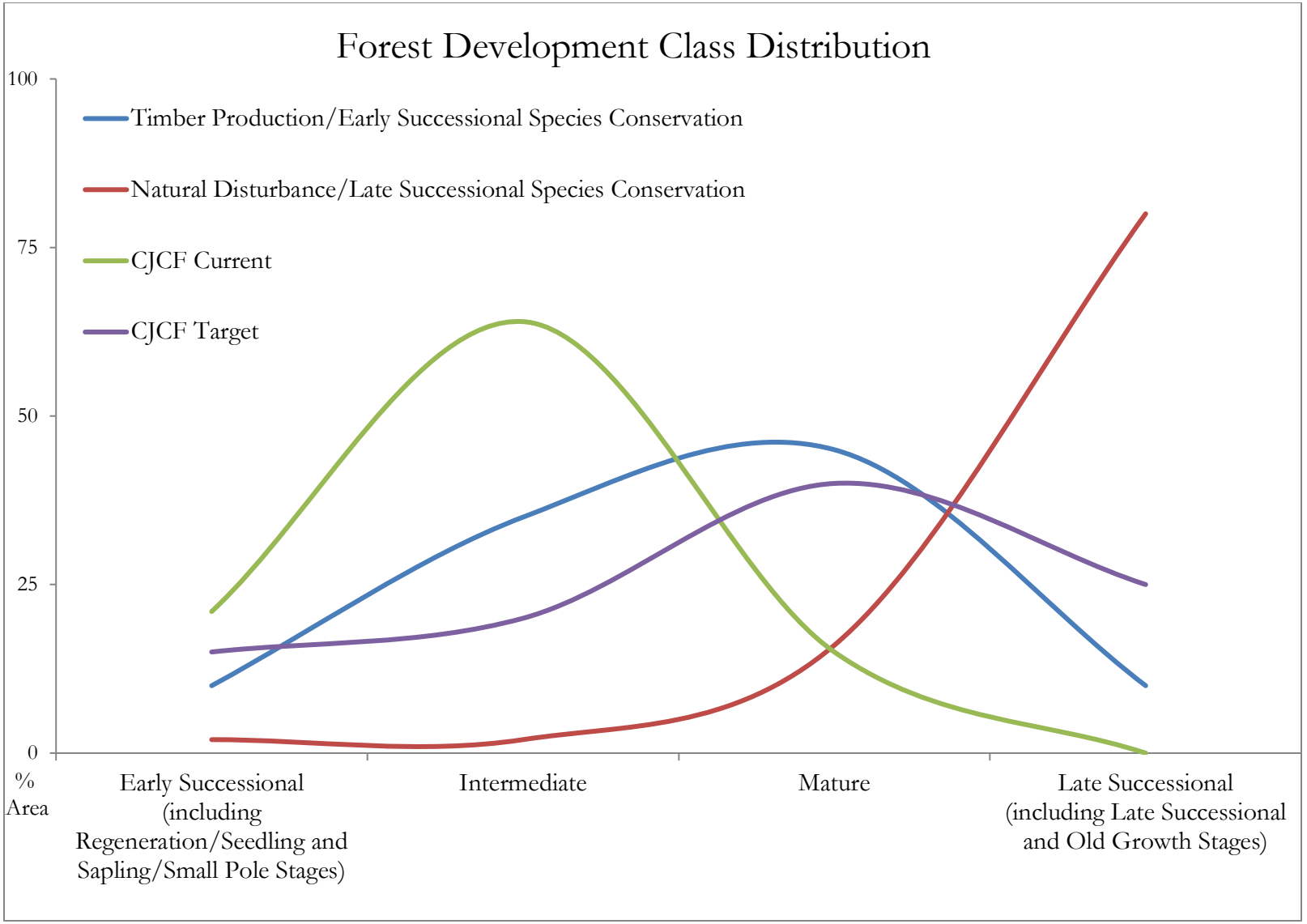

Figure 32: Forest Development Classes- The property was coarsely classified by development stage (See Appendix 4), a corollary to age. The chart shows the relative amount (% of overall property) of the four development stages. In 2016, the property is dominated by early successional and intermediate age classes. Also pictured are two different recommendations based on differing landowner goals.

10.3.5 Critical Wildlife Habitats and Habitat Features

While wildlife species require various combinations of food, water, and cover to survive, some wildlife species have very specific habitat needs that are critical to maintaining their populations. In many cases, wildlife may be concentrated in or dependent on these critical habitats. When these critical habitats are lacking or are degraded, wildlife populations can suffer even if other forms of food, cover, and or water are available.

On the CJCF these critical habitats include amphibian breeding areas; deer and moose wintering areas; ledges and steep and/or talus slopes; soft and hard mast; early successional forest and shrublands; interior forest; and snags and downed woody debris. Wetlands and streams, which are described in the "Hydrologic Features" subsection can also be critical habitats. Because these features are essential to survival of dependent wildlife species they will be detailed here. Please note that measures to protect or enhance these critical habitats are detailed in the "Ecosystem Management Compartments" section.

10.3.5.1 Amphibian Breeding Areas

Fish-free water bodies are critical to the long-term breeding success of many amphibian species. Most amphibians breed and lay their eggs in water bodies. Amphibian egg masses are an easy meal for many species of wildlife, including fish. Additionally, most amphibians start out their life as larvae in water. As with eggs, a concentration of larvae can also be an easy meal for many species of wildlife.

Wood frogs and spotted salamanders are generally considered vernal-pool dependent species; these species will breed in and utilize a wide variety of water bodies, but it is the concentrated breeding success of the fish-free water bodies that provide a life-boat for other suboptimal habitats. While vernal pools and other fish-free waters tend to be small and seasonally dry bodies of water, they support extremely high levels of biodiversity on a per acre basis.

Gray tree frogs, American toad, green frogs, and spring peepers also breed in wetlands and water bodies; these species, however, are less dependent on vernal pools and are able to utilize a wider range of wetlands including pond shorelines, shrub and emergent wetlands, and forest swamps.

The property does contain some critical amphibian breeding areas including smaller fish-free wetlands, spruce swamps, and shrub and emergent wetlands associated with the larger beaver pond wetland system. The property also likely contains a handful of small isolated vernal pools; however, the most recent round of cutting has hidden, and likely degraded, many of these pools. These areas will be protected to with no equipment access/no timber harvesting special treatment areas and buffers. Many of the hydrological features are concentrated in the Southern Basin Ecosystem Management Compartment; this compartment will be treated as a natural area and managed under a natural management regime (see Timber and Forestry on the CJCF).

10.3.5.2 Deer and Moose Wintering Habitat

During severe winter temperatures and deep snows, deer and moose will seek areas that provide thermal protection and have shallower snow depths. Slightly warmer temps and/or slightly shallower snow depths can help these animals conserve energy and more efficiently forage when food supplies are at a minimum. Throughout the winter, both species are losing more energy than they are taking in. Even slight energy savings can make a major difference in survival. Wintering habitat is fundamental to the survival of these species and the same areas tend to be used year

after year. Typically these are areas with dense conifer cover, which helps to intercept snow and trap in radiant hear, and favorable sun exposure and/or wind protection. While both species tend to seek out similar cover, deer tend to utilize lower elevation area and moose higher elevation areas.

On the CJCF, there is concentrated sign of both wintering deer and wintering moose; these areas have some of the attributes commonly associated with deer and moose wintering habitat. Relative to its broader North American distribution, the CJCF is a relatively cold and snowy area for deer. Long-term survival of deer on and around the CJCF is certainly dependent on the availability of wintering habitat. In terms of moose's broader distribution, the CJCF is relatively mild. Moose may not actually need ideal wintering habitat on the CJCF to be successful.

Deer are currently concentrating in the Eastern Bowl (See Wildlife Habitat and Inventory Map). While this area has a favorable sun exposure and the bowl-shaped terrain provides some protection for the wind, it does not have coniferous cover. Regardless, the deer are concentrating here during the winter. Both the Eastern Bowl and the adjacent Eastern Steeps will be managed under natural management regimes (see Timber and Forestry on the CJCF) were timber harvesting and other intensive land use are not permitted, protecting this critical habitat.

Smaller numbers of deer are also concentrating in part of the Southern Basin (See Wildlife Habitat and Inventory Map). The compartment used to have extensive lowland conifer cover before the last round of logging. The compartment now contains just a few relatively narrow bands of fully intact conifer cover. While it is no longer ideal wintering habitat, some deer are concentrating here; there is abundant browse nearby, due to the logging, and, perhaps, this helps to offset the lower quality cover. Deer may also be gathering here because it used to be a much larger and higher quality deer wintering area. In the lower portion of the Basin, some of the conifer trees left at the last harvest have a browse line (evidence of a deer wintering area). These isolated trees no longer provide the necessary protection, but are indicative of what was probably a much larger wintering area. The Southern Basin will be managed as a natural area under the natural management regime (see Timber and Forestry on the CJCF). Timber harvesting will be excluded from this area, not only protecting what deer wintering habitat is still present but also allowing the area to regrow and possibly once again function as a larger deer wintering area.

There are also a few small pockets of concentered moose wintering sign (See Wildlife Habitat and Inventory Map). These pockets of concentrated sign are likely associated with small groups of moose, probably ranging from 2-4 animals. Again, these areas were extensively cut and now only support a few small clumps of intact conifer cover, not the ideal snow or thermal protection. However, there is abundant browse in the area due to the logging. So again, perhaps moose are making do in this suboptimal cover because of the abundant browse. For a number of goals and objectives, mature high elevation conifer forest is desired and projected for the area. Over the long-term, some logging will take place in the surrounding area, which will continue to provide some nearby browse. The combination of re-growing high elevation coniferous forest and nearby browse will help to ensure that the future CJCF forest will provide optimal moose wintering habitat. See Ecosystem Management Compartment Descriptions for more details.

10.3.5.3 Ledges and Steep, Talus Slopes

Steep rocky slopes, bands of large broken ledges and boulders (talus), and vertical rock faces can provide important denning,

nesting, and refugia sites. On the CJCF, porcupine and raccoon live in the crevices, small caves, and hollows found in this terrain. While no raven nests were observed on the CJCF, numerous ravens were heard and observed; this species will build nests on larger ledges and rock faces. Some bat species will also utilize broken, crevice-filled terrain like this for warm weather roosts. Inventory of bats was beyond the scope of this assessment.

Fisher and bobcat also have an affinity for this type of terrain. Both species were documented via motion cameras and wildlife tracking using this type of habitat. Fisher will utilize holes under large boulders as dens; they may also seek out the protective cover this type of habitat affords. Additionally, one of fisher's preferred prey, porcupine, are dependent on this type of habitat.

Figure 33: Talus Crevice-The property contains two areas of steep talus slope with crevices and small caves suitable for denning.

Bobcats have a multifaceted relationship with ledges, talus, and steep rocky slopes. In the northeast, this habitat can be a breeding and courtship hotspot. Regional studies also show that bobcat will use rock crevices as natal dens. Even post-birth, bobcat will seek out this terrain for rearing young. Ledges and steep talus slopes provide relatively safe and defensible refugia for young bobcats, which can be preyed upon by coyotes and fisher.

Most of the property's steep talus slopes and ledges are in the Eastern and Southern Steeps Ecosystem Management Compartments. Due to the steep, rocky terrain, there areas were not logged and now support intact forest cover, greatly benefiting the species that use this critical habitat. Both the Eastern and Southern Steeps will be managed under natural management regimes (see Timber and Forestry on the CJCF) were timber harvesting and other intensive land use are not permitted, protecting this critical habitat.

10.3.5.4 Soft and Hard Mast

On the CJCF, some trees, including American beech, red oak, pin cherry and black cherry and understory plants, including raspberries and blackberries, either annually or cyclically produce copious amounts of hard mast (nuts and seeds) or soft mast (fruit and berries). These food sources are critical to wildlife survival. While many species of wildlife will take advantage of available mast, some species on the CJCF are absolutely dependent on mast, especially for winter survival. The more dependent species include black bears, deer turkey, mice, squirrels, grouse, and even fisher.

Blackberries and raspberries are currently widespread throughout the CJCF. These berries are an important summer food sources on the property. Blackberries and raspberries respond with aggressive growth to the disturbances and increased sunlight associated with logging. Berries of this nature, however, can be

ephemeral post-logging; quickly growing tree saplings and tall shrubs will shade these species out, first causing fruit production to decline and then eventually causing them to die out. The last round of logging took place from 2001-2008. In the first areas logged, soft mast production has already begun to decline. In another 10 years, berry production will be much more limited on the CJCF. Berry production will be maintained in some areas with active habitat management, including creating openings with logging and other mechanical means. See Property-wide Management of Wildlife and Wildlife Habitat (below) and individual Ecosystem Management Compartment Descriptions (section III) for more details. Black cherry and pin cherry are a relatively minor part of the CJCF forest and will continue to remain present in relatively low abundance.

Figure 34: Bear Scarring-The American beech pictured here is heavily scarred from bear feeding on beech nuts. The property contains a relatively few mast producing beech.

Hard mast, including acorns and beech nuts, are more limited on the property, but are still an important fall food source. The high in fat and high in protein beech nut is an especially critical food source for bears; the crop comes just when bear are trying to build up their winter fat reserves. There are a few patches of mast producing red oak and American beech scattered across the property; many of these areas have been mapped and will be protected with no equipment access/no timber harvesting special treatment areas. Increasing mast production through crop tree release treatments may be appropriate in some of these areas; this is detailed in individual Ecosystem Management Compartment Descriptions. Individual mast producing beech are also scattered throughout much of the recently harvested areas; these will be retained during any future logging.

Beech and oak tend not to become good mast producers until they get older than 50 years. Many of these older trees were removed during the last harvest, but portions of the property now contain younger beech trees that were released by the last round of logging; some of these future mast producing trees will be retained during any future timber harvesting.

10.3.5.5 Regenerating and Early Successional Forest

When forest management and/or natural disturbances removes or kills overstory trees, the abundance of sunlight and available growing space can create dense thickets of shrubs, herbs, and tree saplings. As the forest recovers and trees once again shade the forest floor thinning out the understory, the quality and extent of this habitat diminishes; typically this phase of forest succession lasts about 15-20 years. Early successional and regenerating forests are important source of food and cover for many wildlife species, including many of the region's declining bird species.

On the CJCF, the abundance of young, regenerating trees and shrubs found in this habitat is an important source of browse for

moose, snowshoe, deer, grouse, and other small mammals. The abundance of prey species, including hare, grouse, mice and shrews makes this habitat type an important hunting ground for many predators including bobcat, ermine, coyote, fox, and lynx. On the CJCF, this habitat is also rich with soft mast (see above), especially blackberries.

The nearly impenetrable tangle of waist-to-head high vegetation is favorite nesting areas for many bird species. Chestnut-sided warbler, ruffed grouse, American woodcock, mourning warbler, and Canada warbler all thrive in these areas.

Due to the relatively recent, widespread logging, this habitat type is extremely abundant on the CJCF and surrounding landscape (see Cole and Cooley Hill and White Mountain National Forest subsection). Over ¼ of the CJCF and surrounding landscape supports this type of habitat, more than enough to currently sustain the species that depend this type of habitat. However, to ensure that this habitat will remain available, management actions to maintain this habitat will be implemented starting in 2024.

10.3.5.6 Interior Forest

Large intact patches of forest are critical to supporting two suites of species which can be limited by loss and fragmentation of forests: area-sensitive and interior forest species. Area-sensitive species that require lots of space, like black bear and northern goshawk, are dependent on large blocks of unfragmented habitat; their use of the CJCF is detailed in the preceding "Cole and Cooley Hill Landscape and the White Mountain National Forest" subsection.

Interior forest species like the ovenbird, hermit thrush, and American Marten, are most successful when they breed in the safety of deep forest, well away from predators and competitors more common along the forest edge and in small forest patches. Additionally, fragmented patches of vegetation mean more edge and more opportunity for the spread of aggressive non-native species, a process which can overpower and displace native species and natural communities.

The effects of forest fragmentation really occurs along a gradient, with strongest changes in wind, humidity, predation, nest parasitism, and other deferential effects, concentrated along forest edge. Generally effects become less pronounced moving away from the edge and deep into the woods. While changes in flora and fauna have been documented up to 300 meters from the forest edge, a 100-meter buffer from forest edge is often used in regional delineations of interior forest.

Using a 100-meter buffer, interior forest conditions were analyzed across the CJCF to better understand their current distribution. Due to the last round of harvest, interior forest conditions are limited on the property, greatly reducing the property's suitability interior-forest species.

Existing interior forest will be protected over the course of this management plan by prohibiting timber harvest and creation of wildlife openings. Most of the existing interior forest is the Eastern and Southern Steeps Ecosystem Management Compartments. Due to the steep, rocky terrain, there areas were not logged and now support intact forest cover, greatly benefiting the species that use this critical habitat. Both the Eastern and Southern Steeps will be managed under natural management regimes (see Timber and Forestry on the CJCF) were timber harvesting and other intensive land use are not permitted, protecting this critical habitat.

10.3.5.7 Snags and Cavity Trees

Like declining live trees, snags (dead standing trees) provide opportunities for cavity excavation by many woodpeckers. These cavities, in turn, are later utilized by a number of other species of birds and mammals. Many invertebrates and other prey species are also dependent on snags. Many declining bat species, including the little brown myotis, northern long-eared bat, and the big brown bat, utilize hollow snags as roosting sites. Wild animals use snags of all different sizes, but, in general, the larger the snag or cavity tree, the greater the number of wildlife species that will use it.

Figure 35: Large Cavity Tree-Large diameter cavity trees like this are poorly represented on the property. These provide critical nesting and denning sites.

Snags are currently moderately-well represented on the property. However, many of the snags are smaller in size and of short-lived species. The last round of harvesting created a pulse of paper birch snags, but with few overstory trees remaining, there is a limited supply of future snags. As these short-lived and small birch snags fall, the availability of snags, even small snags, will become extremely limited on much of the property. Large diameter snags and large diameter dead cavity trees are even more limited on the property. In the short-term and mid-term, the property's suitability for larger cavity nesting bird species, such as pileated woodpecker, and cavity denning wildlife species, including fisher and roosting bat species, is very limited.

The recruitment and protection of snags will be ensured through active management and best management practices. Existing snags will be identified and protected during management operations and new snags will be created through girdling or killing of live trees.

10.3.5.8 Downed Woody Debris

Downed woody debris provides habitat for many insects and other invertebrates that are a stable food source for many bird species throughout the critical breeding season. Piles of downed woody debris also provide important perch sites and structure for ground nesting bird species. Large piles may also be utilized as cover and denning sites for larger mammals including bear. Lastly, large diameter downed woody debris also provides a critical terrestrial habitat for many frog and salamander species, including wood frog and two-lined salamanders.

The property as a whole currently has moderate levels of coarse and fine woody debris lying on the ground, but this material is likely to become very limited in the near future. The last round of logging did leave an abundance of trees tops and branches; however, these small diameter materials quickly decompose. There are some whole trees and main stems lying on the ground; again, much of this consists of paper birch and other species that decompose fairly quickly. While the last round of logging created a pulse of downed woody debris, by removing so much of the

overstory--especially larger, older trees--it created a bottleneck in the of future supply of downed woody debris.

The property currently provides many of the functions associated with smaller diameter downed woody debris and smaller brush piles, including being moderately suitable for arthropods (and the species that prey on them). Again, these functions are expected to decline in the near future. The suitability of the property for species that use larger diameter downed woody debris, including amphibians, and larger brush piles, including denning bears, is more limited. Again, these functions are expected to decline in the near future. Increasing the abundance of these structures, especially larger diameter downed woody debris, would increase the property's suitability for species that depend on these woody debris structures for prey species, perching, nesting, or denning.

Downed woody debris will protected and recruited through active management and best management practices. Existing downed woody debris will be left onsite and protected during management operations and new downed woody debris will be created through felling and girdling of live trees. These prescriptions are further detailed in the Ecosystem Management Compartment Descriptions.

10.4 Property-wide Management of Wildlife and Wildlife Habitats

Achieving wildlife and biodiversity related goals and objectives will require strong integration with forestry and timber related goals and objectives. While some stand-alone wildlife-related stewardship actions are prescribed, the vast majority of the wildlife habitat management will be implemented as dual purpose wildlife and timber actions. Timber harvesting (see next section) is an important tool to maintain early successional and shrubby habitats and soft mast. On the flip-side, older forest habitats can only develop where harvesting is excluded or limited. Furthermore, small scale habitats and habitat features, such as seeps and ephemeral streams, need to be protected with special treatment areas during timber harvest.

10.4.1 Compartment Management Regimes

As, further detailed in section III, the broader property has been divided into 10 Ecosystem Management Compartments; each compartment is described in detail in section III. Each compartment was assigned one of four timber and wildlife management regimes (see Timber Management and Table 21).

Taken as a whole, the different management regimes will ensure that a diversity of habitat types and ages are eventually present on the property. Compartments managed under the natural and mixed-used small opening regimes will eventually support late successional and interior forest habitats; in all likelihood, these areas will also provide the highest concentrations of snags and downed woody debris.

Table 21: Management Regimes-Each Ecosystem Management Compartment has been assigned to one of the following management regimes based on broader wildlife and timber goals. Utilizing a variety of management regimes will ensure that the CJCF will eventually support a diversity of forest ages and habitat types.

Regime	Timber and Wildlife Goals	Management Specifics
Natural	Forests allowed to age under natural pathways of development. Over the long-term, should provide habitat for mature and interior forest species.	Generally, no harvesting for timber or wildlife. May support management activities to encourage the development of mature forest conditions and structures.
Mixed-use Small Openings	Forests lightly managed for wildlife and timber. Over the long-term, should provide habitat for interior, forest gap, and mature species. Should also provide for regeneration of shade tolerant tree species.	Openings should not exceed three acres. Most of the opening should not exceed 1 acre. Silvicultural systems will include a mix of Small Patch Cuts/Small (B) Shelterwoods and Single Tree/Group Selection (A).
Mixed-use Medium Openings:	Forests moderately managed for wildlife and timber. Over the long-term, should provide habitat for interior and forest gap species. May also provide some habitat for early successional species. Should also provide for regeneration of shade tolerant and intermediate tree species.	Openings should not exceed 5 acres. Most of the opening should not exceed 3 acres. Silvicultural systems will include a mix of Mix of Large Patch Cuts/Large Shelterwoods (C) and Small Patch Cuts/Small Shelterwoods (B) and Single Tree/Group Selection (A)
Mixed-use Large Openings:	Forests intensely managed for wildlife and timber. Over the long-term, should provide habitat for early successional species. May also provide some habitat for interior forest species. Should also provide for regeneration of shade intolerant and intermediate tree species.	Openings should not exceed 8 acres. Most of the opening should not exceed 5 acres. Silvicultural systems will include a mix of Mix of Small Clearcuts (D) and Large Patch Cuts/Large Shelterwoods (C), Small Patch Cuts/Small Shelterwoods (B) and Single Tree/Group Selection (A)

Compartments managed under the medium and large opening regimes will eventually support early successional openings

surrounded by a mosaic of intermediate and mature forests. In addition to providing for species that use early successional conditions (or mosaics of early successional openings and intact forest), managing for some medium and large openings will also ensure that soft mast, particularly blackberries and raspberries, remain available on the property. Again, openings created by timber harvesting are fairly ephemeral in nature. Within 15-20 years, these early successional conditions have been replaced by a young forest.

See Section 11, Timber and Forestry for more details on each of these silvicultural systems.

10.4.2 Permanent Wildlife Openings

Early successional habitat that is created through logging will be supplemented with permanently maintained openings. These openings will be fixed in location and be designed to provide optimal, long-term early successional habitat. Permanent openings can be maintained in one of two ways and conditions. Both are prescribed on the CJCF.

A permanent herbaceous opening is dominated by non-woody vegetation; this type of vegetation is an important source of browse and is a good compliment to food found in a typically forested setting. Herbaceous openings require some site prep, including seeding and sometimes leveling and stumping. On the CJCF, an herbaceous opening would be best located near the Trumpet Round Road landing and also be managed as scenic opening and possible gathering spot. Herbaceous openings need to be maintained with annual or semi-annual mowing. The regular mowing keeps the opening in the very earliest stages of succession and forest development.

A permanent shrubland opening maintained by a brontosaurus (a tracked excavator with chipper head rather than bucket) also mimics early stages of forest succession. However, a brontosaurus is capable of leveling small trees, so the vegetation is allowed to age a bit longer before it is cut back. Generally, shrubland openings maintained by a brontosaurs are cut back every 10-15 years. Openings of this nature are dominated by a transitional mix of herbs, shrubs, brambles, and young trees.

Brontosaurus maintained openings are very similar in composition to openings created by logging. A permanent opening makes wildlife viewing much easier and more predictable. On the CJCF, multiple brontosaurus created openings are prescribed at the 10-year mark only because the forest will not have aged enough to support a commercial timber harvest. Only one of these opening will be maintained by a brontosaurus over the long-term; this one permanent brontosaurus opening will also be managed a scenic opening and interpretive/demonstration site.

Creating wildlife openings are eligible and recommended for the following NRCS cost-share practices: Early Successional Habitat Development/Management (647).

10.4.3 Critical Habitats, Snags, Downed Woody Debris Sensitive Features

Within each ecosystem management compartment (see section III) critical habitats and other sensitive features are identified. Site-specific measures, such as special treatment areas, and prescriptions to protect and enhance these features are detailed in each compartment description.

In general, features that can easily be degraded by logging, such wetlands, streams, seeps, and amphibian breeding areas are protected by no access/no timber harvesting special treatment areas, which are further buffered by limited access/limited harvesting special treatment areas. Streams, seeps, and wetlands can also be degraded by heavy recreation use. The preliminary trail network design minimized overlap with these features as primary measure to avoid degradation. However, complete avoidance is not possible or desirable as the beaver wetland complex is desirable destination. Regardless of its proximity to these sensitive features, trails will be constructed and maintained to ensure that erosion problems are minimized.

Snags and downed woody debris can be enhanced by targeted forest management activities. Again, site specific actions and prescriptions are detailed in the ecosystem management compartments.

Creating snags is eligible and recommended for the following NRCS cost-share practices: Upland Wildlife Habitat Management (645).

10.4.4 Stewardship Actions

The following major wildlife stewardship actions are scheduled for the next 30 years. As detailed in the compartment descriptions, smaller wildlife-related stewardship actions related protecting and enhancing small-scale critical habitats and sensitive features are also prescribed throughout the 30 year plan. Additionally, many of these actions are contingent on availability of funding and the recovery of the forest from the last round of harvesting.

Many of the following stewardship actions are eligible and recommended for NRCS cost-share practices, including Upland Wildlife Habitat Management (645) and Early Successional Habitat Development/Management (647). See compartment descriptions for more details.

Table 22: Wildlife Stewardship Actions- The following actions and timeline are recommended to maintain and improve wildlife habitats across the CJCF. Smaller, wildlife-related stewardship actions are also detailed in each compartment.

Date			Action
2016	-	2019	In Southern and Eastern Steeps Compartments, create snags.
2016	-	2019	In Northern Bench, consider establishing a ~1 acre herbaceous opening. Opening should be large enough to allow ample sunlight.
2024	-	2026	In Northern Bench and Northern Slope Compartments, Bronto a total of 20 acres creating wildlife openings no larger than 3 acres. At least one of these opening will be on the interpretive trail.
2024	-	2026	In Western Shoulder Compartment, Bronto 20 acres creating wildlife openings no larger than 8 acres.
2034	-	2036	In Northern Bench Compartment, Bronto opening on interpretive trail.

Figure 36: Black Bear-Black bear are abundant on the property. The logging has encouraged a flush of berries and other food. The large bear pictured here is scent marking a large spruce tree that is baited with sardines and a commercial scent lure. Multiple adult and sub-adult bears were individually photographed. Multiple sets of sows and cubs were also photographed.

Figure 37: Moose-When this inventory was conducted, moose were abundant on the property. The cow moose pictured here is thin from winter. The patches of discolored and missing hair are indicative of winter ticks, a parasite this is likely contributing to the recent decline of moose.

Figure 38: Bobcat and Kits-The mother bobcat and two kits are playing a log baited with sardines and a commercial scent lure. In addition to the trio, a solo bobcat was also photographed. The logging has encouraged a flush of bobcat prey species.

11. Timber and Forestry

By Jesse Mohr

Practicing and demonstrating sustainable and economically viable forestry was identified as a primary goal for the property. Property-wide objectives to achieve this goal include:

- manage for a diversity of tree species and age classes;
- use science-based silvicultural practices to stimulate growth of native trees well-suited to local site conditions, expedite forest development and enhance the long-term timber value;
- as opportunities emerge, conduct crop tree release treatments to encourage the rapid growth recent regeneration;
- maintain soil productivity and capacity;
- meet or exceed all forest practice regulations and best management practices;
- over the long-term, generate some revenue to offset costs of property-ownership;
- contribute to the local economy by using qualified local contractors, loggers, foresters, mills, and manufacturers; and
- work in conjunction with local and state partners to host workshops and install demonstration sites showcasing forest management projects and best management practices.

It is also important to note that forestry and timber harvesting is an important tool to maintain early successional and shrubby wildlife habitats, an important wildlife-related objective.

While decisions regarding timber and forest management should be informed by the best available science, they must also account for the great number of uncertainties inherent in nature. Growing a tree to financial maturity can take up to a century. During that that time, the forest is subject to numerous disturbances, such hurricanes and ice storms, and stressors, such as climate change and forest pathogens. How the forest responds to some of these is relatively well understood while others, such as climate change, bring another level uncertainty. Many of the forestry objectives are in place to hedge our bets against this uncertainty. For instance, the climate of the CJCF may look very different in 100 years. Managing for a diversity of tree species will maximize the likelihood that at least some of the species already onsite are capable of growing under these new conditions. Additionally, many of the forestry objectives are in place to protect the forest's capacity for long-term productivity, regardless of the stressor.

Over the course of the stewardship planning process, the stewardship team reviewed a spectrum of alternatives related to the overall intensity and extent of timber-related management and determined not all portions of the property were appropriate for timber management. The data and management objectives here are specific to the portions of the property that will be managed for timber over the long-term. See Timber Management Map for more details.

Timber management objectives and stewardship actions are further detailed under each Ecosystem Management Compartment description.

See Appendix 5 for Forest Inventory Methods.

11.1 Desired Future Condition

Over the long-term, portions the CJCF will produce a sustainable supply of forest products, high quality timber and provide opportunities to demonstrate sustainable forestry. Harvesting of forest products will generate funds to offset costs of property

ownership and contribute to the local natural resource economy. Management of timber resources will also be implemented to maintain a diversity of wildlife habitats.

11.2 Existing Conditions

Timber resources were assessed during the summer of 2015. See Appendix for methods.

11.2.1 Stocking

Stocking is a measure of how well the growing space available for trees is being occupied. There are several different measures that estimate how 'crowded' a forest is, generally based on forest type and the number and size of trees. This report includes basal area and relative density as measures of stocking.

Basal area is the cross-sectional area of all stems greater than five inches in diameter at breast height in a forest. Generally, coniferous or mixed coniferous-hardwood forests have higher basal areas than straight hardwood forests. Northern hardwood forests are considered well stocked and put on optimal timber growth with a basal area from 70-80 feet² per acre, while mixed-wood forests are considered well stocked and put on optimal timber growth with a basal area from 70-100 feet² per acre and coniferous forests are considered well stocked and put on optimal timber growth with a basal area from 100-130 feet² per acre. The portions of the property identified for timber management range in basal area from 0 to 150 feet² per acre with a weighted average of 39 feet² per acre. Because the property contains hardwood, mixed-wood and coniferous forest and recently harvested areas with no overstory, basal area averaged across the whole property is a poor metric for understanding overall stocking.

Figure 39: Timber Stocking -The upper forest is fully or even over-stocked. Tight growing conditions and competition are likely reducing timber growth. The lower forest, which is common through the CJCF, is under stocked. Here the growing space is not fully utilized in the open condition may encourage poor tree form.

Relative density is a measure of tree crowding that accounts for both the size and species of an individual tree, so it is an especially useful measure in mixed species stands. A relative density of 100 percent implies that the growing space is fully occupied. At 80 percent, tree mortality starts to occur due to competition. Maximum forest growth occurs near the 60 percent level, and enough trees occupy the site to discourage detrimental effects on stem form, such as large lateral branches. Forty percent is the lower limit of stocking necessary to reach 60 percent stocking in ten years on average sites. Generally, timber harvests and forest management operations are designed to keep relative density between 60-80 percent. The property contains ecosystem management units that range in relative density from 0 percent to 119 percent with a weighted average of 30 percent relative density. Again, relative density across the whole property is a poor metric for understanding overall stocking.

11.2.2 Growth Rates and Productivity

Trees in the average managed woodlot in New Hampshire grow two to four percent per year. In an average northern hardwood unit with a basal area of 60-80 feet² per acre, this growth equates to a yearly 1.5-2.0 feet² per acre increase in basal area. While an in-depth assessment of site-specific growth rates was not conducted as part of this assessment, some variables were examined to improve tree growth projections for the property. Aspect, elevation, and soils were all assessed at the treatment unit-level to refine tree growth projections. Tree growth rates are also influenced by some individual tree-level variables. Age and crown condition can also dramatically influence an individual tree's growth rate.

Tree productivity and growth rates can be directly correlated to substrate: deep, fertile, moist soils are generally more productive than shallow and/or excessively wet or dry soils. All other factors being equal, low elevation soils tend to be more productive than high elevation soils. Aspect can influence both the amount of sunlight an area receives and the soil moisture. As a whole, the CJCF is likely to have average productivity. Shallow-to-bedrock, shallow-to-hardpan, and wet areas likely have below average productivity.

11.2.3 Timber Quality and Volume

Overall, the current timber quality of the property is quite low, but there is good future potential. The quality of large, sawlog-sized trees on the property is below average. The property has a long history of intense forest management, including high-grading. This most recent round of cutting often left behind a partial or scatted overstory of low value trees. By selectively removing the most desirable species and best-formed individuals, high-grading can push forest composition to species of lower economic value. Throughout the property, high grading has probably encouraged red maple and beech at the expense of more commercially desirable species, including sugar maple and yellow birch. By removing just the well-formed trees, high-grading can also shift growing resources to poorly formed stems with limited future timber value.

While the last round of intense cutting pushed the overstory composition to species and forms of lower economic value, it did encourage an abundance of new saplings. This abundance of saplings includes many species of good commercial value. With proper stewardship, these sapling-dominated areas have the potential to eventually grow into a forest of high timber value. Total timber volume in areas suitable for harvest is 422,033 board feet of sawtimber and 1602 cords (205,097 cubic feet) of pulpwood. Based on a three percent annual growth rate, the existing timber is projected to grow 12,660 board feet of sawtimber and an additional 48 cords of pulpwood a year. Again,

this figure does not include the abundance of saplings and seedlings that will eventually grow into trees suitable for sawtimber or pulpwood.

11.2.4 Future Crop Trees

While the current timber quality is quite low, the future timber quality has the potential to be quite good. Currently, much of the stocking is comprised of vigorously regenerating tree saplings and seedlings. While variable across the property, a high percent of the regenerating tree saplings are of species with good timber potential, including yellow birch, paper birch, red spruce, and balsam fir. The mass of tree regeneration is also likely to contain variable genetic quality in term tree vigor and form.

However, the forest is just beginning to reach the age of recovery and development where superior individuals will begin to outgrow their weaker competitors. In time, the superior stems will become increasingly apparent. As crop trees begin separate themselves from the competition, stewardship actions will have the potential to shift resource to these more desirable species and more vigorously and better formed individuals.

11.2.5 Development Class Distribution

Forest of the CJCF were coarsely classified by development stage, a corollary to age. Where forests contain trees of varying ages, they were classified based on the age of the dominant overstory trees. The development classes used here include: early successional (0-10 years); intermediate (11-40); mature (41-120); and late successional (greater than 121 years). The property is dominated by stands in the intermediate and mature age classes. See Appendix for further details on Development Stages.

The ratio and juxtaposition of development classes has implications for wildlife and sustained timber yield. The development class distribution can be manipulated to maximize a continued flow of timber. The property's current development class distribution is depicted in the below table and at the end of the Property-wide Management of Timber Resources subsection. Additionally, a target development class distribution, which seeks to provide the recommended levels of early successional habitat while balancing late successional species conservation and timber production has also been provided.

Table 23: Forest Development Class-The property was coarsely classified by development stage (See Appendix 4), a corollary to age. This table shows the current proportion (% of overall property) of the four development stages. The table also shows the recommended target area for each development class. The target area seeks to balance timber productions and wildlife conservation.

	CJCF Current % Area	CJCF Target % Area	Difference
Early Successional (including Regeneration/Seedling and Sapling/Small Pole Stages)	21	15	+6
Intermediate	64	20	+44
Mature	15	40	-25
Late Successional (including Late Successional and Old Growth Stages)	0	25	-25

See Wildlife and Wildlife Habitat of the CJCF to compare how these development class distributions compare with regional recommendations for early successional habitat/sustained timber flow and late successional species conservation.

11.2.6 Forest Health

The forests of the CCJF are recovering from a relatively intense round of harvesting. While common pests and pathogens, such

as beech bark disease, sugar maple borer, pine canker, ash yellowing, and forest tent caterpillar are present and resulting in individual tree decline, they seem to be having little impact on overall forest health.

Exotic invasive species are present, but very limited on the properties. Scattered Japanese barberry *(Berberis thunbergii)*, and Eurasian honeysuckle (*Lonicera spp*) are present, but at their current levels they are likely to have negligible impact on overall forest health. However, as Japanese barberry and Eurasian honeysuckle are known invasive exotic species capable of significantly impacting native biodiversity and are considered a significant threat in New England (NatureServe, 2012), they should be targeted for eradication.

While they are both native to this area, hay scented fern (*Dennstaedtia punctilobula)* and New York fern (*Thelypteris noveboracensis)* can both come to dominate forest floors, often excluding or slowing the growth and regeneration of native tree, shrub, and herb species. Additionally there is a strong feedback between the ferns and small mammals and deer, further exacerbating the inhibition of other species. Hay scented fern is locally abundant on the property and may be slowing regeneration of commercially viable trees species in some areas.

Heavy moose browse in portions of the property is stunting the growth and reducing the quality of some regeneration, especially yellow and paper birch along the skid trails. The last round of harvesting dramatically increased the amount of moose browse on the property, which likely caused an increase in the number of moose on the property. While the property will continue to support a moose population, moose numbers, and extent of the damage caused by moose, will likely decrease as the regeneration ages and becomes less desirable browse. However, some areas of concentrated moose impacts should be expected over the long-term. Some regional studies indicate that heavy browse associated with concentrated wintering moose can affect the trajectory and quality of forest growth.

Figure 40: Moose Browse- When foraging and rubbing moose can damage regenerating trees. On the CJCF, heavy moose browse is evident on birch trees lining the access trail network.

Emerald ash borer is a relatively recent exotic pest to the forests of New England. The beetle can cause significant ash decline and where infestations have occurred, tree mortality is extremely high, approaching 100 percent in many areas. At this time, there are no known controls for the beetle. Healthy woodpecker populations are known to slow, not stop, the spread of the beetle. Due to the abundance of ash in some parts of the property the emerald ash borer could pose a serious threat to ash and possibly overall forest health on the property. To address this threat, woodpecker friendly management practices have been included in

this plan. This plan also includes management prescriptions to ensure the continued regeneration of sugar maple, the tree most likely to fill the niche left behind by declining ash trees on the property.

11.3 Other Important Silvicultural Concepts

11.3.1 Forest Succession

Forest ecosystems are dynamic entities, constantly changing in composition and appearance due to internal processes and external influences. Succession is the orderly process through which one suite of plant species replaces another. This change in plant species composition often occurs because the existing suite of plant species alters the growing conditions to the point that they are no longer able to regenerate and a new suite of species, better adapted to the new conditions of the site, takes over. In forested ecosystems, one of the primary drivers of succession is changes in light availability.

Consider an abandoned field, for example. After abandonment, the field first grows in with herbs, shrubs, and trees capable of germinating under intensely sunny conditions. These first brushy stages of succession are generally referred to as early successional vegetation, and they represent a declining habitat type in the northeast. Included in this brushy vegetation are a handful of sun loving trees. With time, these trees grow up and above the shrubs, eventually casting shade over much of the site. The environment of the abandoned field has now changed from an open sunny condition to a shady condition. Under these new shadier conditions, a new suite of species capable of growing in shade begins to grow up and through the previously established trees.

11.3.2 Shade Tolerance

Shade tolerance refers to a tree's ability to grow in the shade of another tree. Some trees are well adapted to germinate in open sunny conditions, while others are adapted to germinate in deep shade. In silviculture, a tree's ability to germinate and grow in shade is described as: intolerant, meaning it is not capable of regenerating in deep shade; intermediate, meaning it is capable of regenerating in intermediate light levels; or tolerant, meaning it is capable of regenerating in shade. As a forest matures and goes through succession, we generally see intolerant species being replaced by intermediate and tolerant species.

The primary intolerant species in the region are white pine, aspen, black cherry, and paper birch.

The primary intermediate species in the region are white ash, balsam fir, yellow birch, red oak, and red maple.

The primary tolerant species in the region are sugar maple, American beech, eastern hemlock, and red spruce.

11.4 Management Considerations Based on Forest Health, Development Class Distribution and Timber Quality.

- Scattered Japanese barberry *(Berberis thunbergii)* and Eurasian honeysuckle (*Lonicera spp)* are present and should be targeted for eradication before they become problematic.
- Moose browse is currently reducing the quality of some growing stock but the extent of this impact should decline.

- Future forest treatments should continue to reduce the amount of unacceptable stock and shift growing resources to well-formed trees that are well-suited for the site.
- There is an abundance of high quality tree regeneration, including many species and stems of high potential timber value. In time, as crop trees begin separate themselves from the competition, stewardship actions will have the potential to shift resource to these more desirable species and more vigorously and better formed individuals.
- The forest is dominated by intermediate age classes and pole size classes. In general, mature forest age classes and large sawlog size classes should be allowed to develop. Over the long-term, increasing the amount of mature forest and large sawtimber will improve the timely flow of timber products and wildlife habitat.

11.5 Property-wide Management of Timber Resources

11.5.1 Compartment Management Regimes

For management purposes, the broader property has been divided into 10 Ecosystem Management Compartments; each compartment is described in detail in section III. Based on a review of site capacity, target development class distribution, and management constraint opportunities, each compartment was placed into one of four timber and wildlife management regimes (see Timber Management Map) based on the maximize-sized opening and silvicultural systems recommended.

Figure 41 on the next page provides some details on each of opening size classes and associated silvicultural systems.

Under these management regimes, the vast majority of the property will provide opportunities to regenerate trees capable of growing in shady and intermediate conditions; it will also provide habitat for forest-dwelling wildlife species. Generally, only the medium and larger opening will provide opportunities to regenerate sun loving tree species. The medium and larger openings will also provide ephemeral early successional habitat.

Table 24: Management Regimes-Each Ecosystem Management Compartment has been assigned to one of the following management regimes based on broader wildlife and timber goals. Utilizing a variety of management regimes will ensure that the CJCF will eventually support variety of forest ages and habitats.

Regime	Timber and Wildlife Goals	Management Specifics
Natural	Forests allowed to age under natural pathways of development. Over the long-term, should provide habitat for mature and interior forest species.	Generally, no harvesting for timber or wildlife. May support management activities to encourage the development of mature forest conditions and structures.
Mixed-use Small Openings	Forests lightly managed for wildlife and timber. Over the long-term, should provide habitat for interior, forest gap, and mature species. Should also provide for regeneration of shade tolerant tree species.	Openings should not exceed three acres. Most of the opening should not exceed 1 acre. Silvicultural systems will include a mix of Small Patch Cuts/Small (B) Shelterwoods and Single Tree/Group Selection (A).
Mixed-use Medium Openings:	Forests moderately managed for wildlife and timber. Over the long-term, should provide habitat for interior and forest gap species. May also provide some habitat for early successional species. Should also provide for regeneration of shade tolerant and intermediate tree species.	Openings should not exceed 5 acres. Most of the opening should not exceed 3 acres. Silvicultural systems will include a mix of Mix of Large Patch Cuts/Large Shelterwoods (C) and Small Patch Cuts/Small Shelterwoods (B) and Single Tree/Group Selection (A)
Mixed-use Large Openings:	Forests intensely managed for wildlife and timber. Over the long-term, should provide habitat for early successional species. May also provide some habitat for interior forest species. Should also provide for regeneration of shade intolerant and intermediate tree species.	Openings should not exceed 8 acres. Most of the opening should not exceed 5 acres. Silvicultural systems will include a mix of Mix of Small Clearcuts (D) and Large Patch Cuts/Large Shelterwoods (C), Small Patch Cuts/Small Shelterwoods (B) and Single Tree/Group Selection (A)

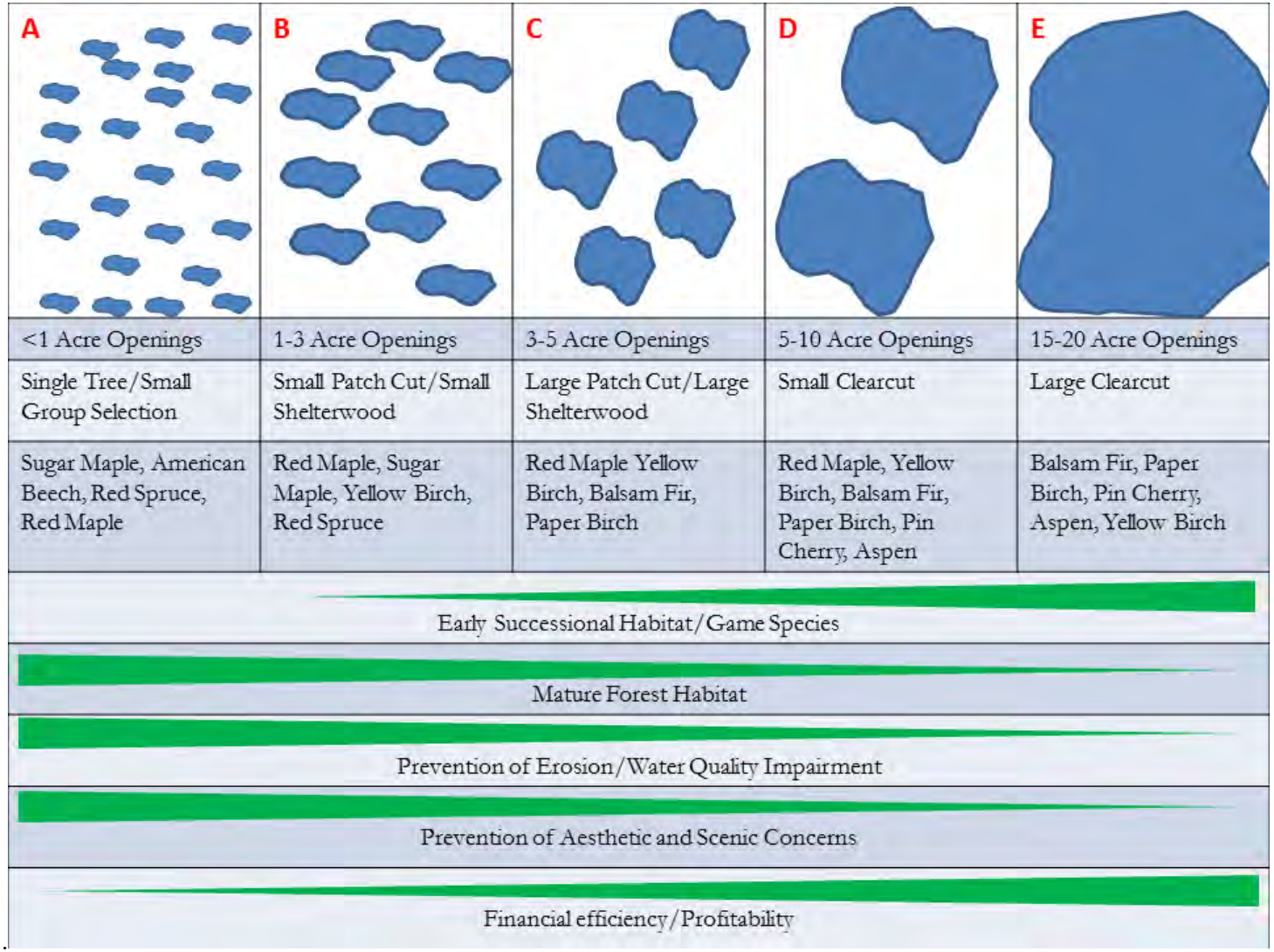

Figure 41: Opening Size Classes-This table summarizes the diversity of opening sizes (first two rows) commonly created by silvicultural systems (third row) used in the region. The fourth row lists what tree species are likely to be regenerated in the opening, while the last four rows highlight the relationships with other management issues. For instance, openings larger than 3 acres are generally needed to create early successional habitat. Large clear-cuts will create the most and highest quality early successional habitat. Large clear-cuts also tend to be the most financially efficient. Large clear-cuts, however, are more likely to create aesthetic concerns and erosion problems.

11.5.2 Overall Management Intensity

The property is heavily skewed towards intermediate and younger-aged forests. Growing into the future, this lump of similarly-aged forest will mostly age as a whole, meaning in 100 years there will be a lump of mature forest with little younger forest. A diversity of development classes is both important for a sustained flow of timber, but also for wildlife. Ultimately, it will take active management to diversify the current age structure and create a distribution where all development classes are present and some timber can be harvested every 10-25 years.

The Stewardship Team reviewed four property-wide 30-year management-intensity scenarios designed to move the forest closer to its target development class distribution. The four scenarios included: no action, least intense, moderately intense, and most intense. The most intense scenario moved the forest closest to its target development class distribution. Each alternative also had implications for access improvements and early successional wildlife habitat. Here is a summary of four alternatives the team reviewed:

Table 25: Management Intensity Scenarios: Four different management intensity scenarios were reviewed by the Stewardship Team. Except for the "no action" scenario, all the scenarios were designed to move the forest closer to its target development class distribution. The four scenarios and their potential implications on access, wildlife, and development class distribution are summarized below. The team selected the moderately intense scenario.

Scenario	Access Needing Improvement	Development Class Distribution	Early Successional Wildlife Habitat
No Action	None	Continue with existing distribution	Loss of habitat in 10-15 years
Least Intense	Trumpet Round Road	Minimal improvement to age class distribution	High quality habitat in one portion of the property
Moderately Intense	Trumpet Round Road, Dyke Road-Jim Noyes Pond Road	Moderate improvement to age class distribution	High quality habitat in two portions of the property
Most Intense	Trumpet Round Road, Dyke Road-Jim Noyes Pond Road, Merrill Mountain Road	Most improvement to age class distribution	High quality well-distributed across the property

The Stewardship Team decided to move forward with the moderately intense scenario, understanding that monitoring and finances may necessitate a deviation from this plan. A 100 year growth projection for this scenario is included in the below figure. The figure includes the current development class distrubution and the projected distrubution at the 10, 20, 30, and 100 year marks under the moderte intensity scenario. As visible below, in 100 years, this scenario will still not perfectly fit the target distrubution, but will help diversify the development e class distribution while also maintaining adqueate amounts early successional habitat. Remember that this plan only covers actions over the next 30 years, so any stewardship actions taken post 30 years are not included in this projection.

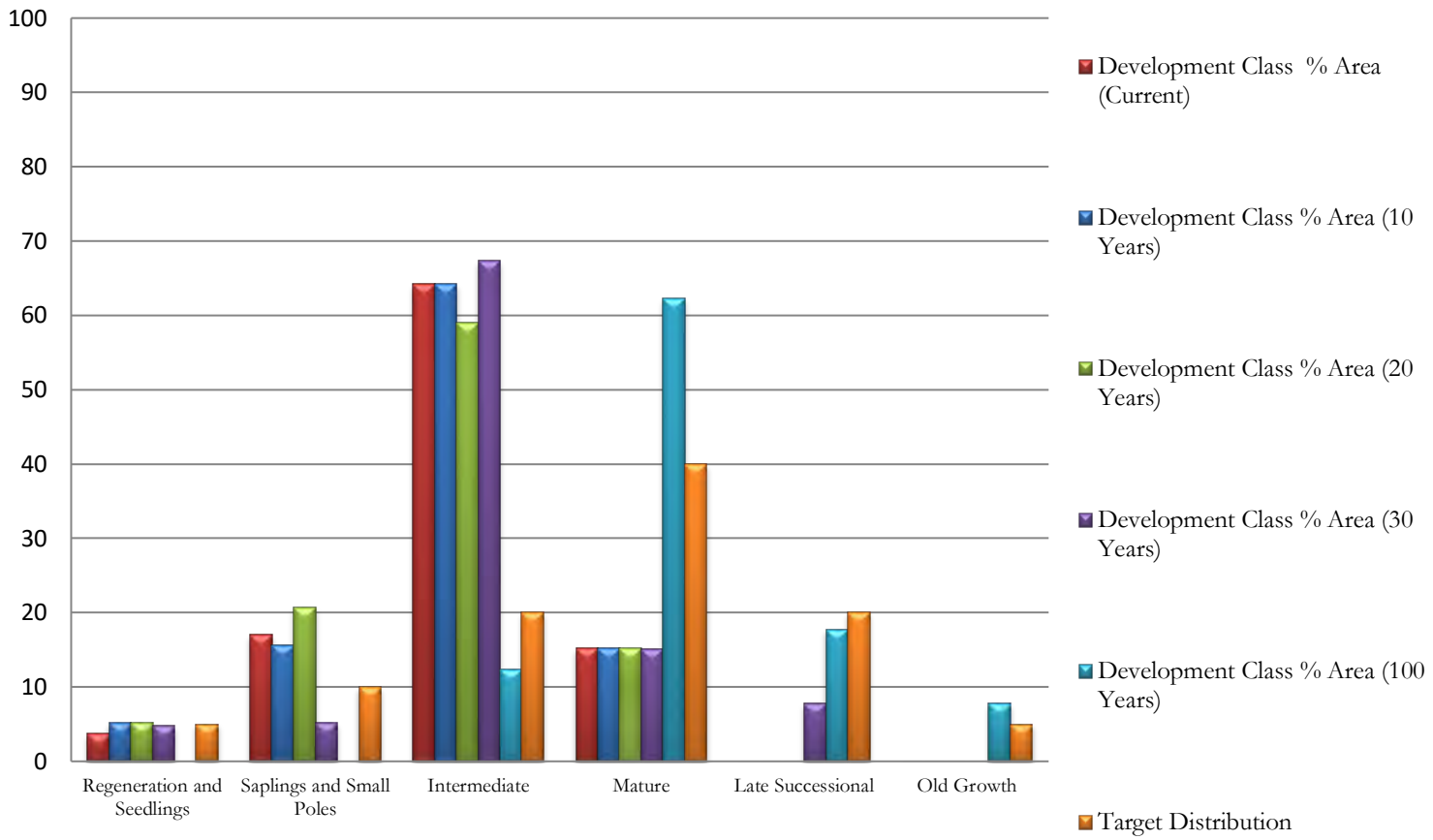

Figure 42: Development Class Distribution under Moderate Intensity Scenario and Included Stewardship Actions-This graphic summarizes the current development class distribution on the property and the projected 10, 20, 30, and 100-year development class distributions if the stewardship actions within this plan are fully implemented. The target development class distribution, which balances late successional and early successional habitat and timber production objectives, is also shown.

11.5.3 Intermediate and Crop Tree Treatments

The property contains an abundance of tree sapling and seedling regeneration; this mass of regeneration includes many species and stems that have the potential to develop into high value timber trees. Weeding, thinning, and crop tree release treatment are silvlcultural actions that can be implemented to shift growing resources to high value trees. Generally, species of high potential timber value (yellow birch, paper birch, red spruce, and sugar maple) are encouraged. Additionally, vigorously growing individuals, which can be indicative of superior genetic stock or better micro-sites, are selected for. Crop tree release treatments are eligible for NRCS cost-share, including Forest Stand Improvement (666)

In some area, crop trees can be identified at this time and stewardship actions to encourage these potentially high value trees are included in the compartment level descriptions and recommendations. Across much of the property, however, the forest is just beginning to reach the age of recovery and development where superior individuals will begin to outgrow their weaker competitors. In time, the superior stems will become increasingly apparent. Where crop tree are not currently recommended, the availability and distribution of future crop trees should be monitored and revaluated in 15-20 years.

11.5.4 Stewardship Actions

Based on the management regimes selected for each Ecosystem Management Compartment and the overall management intensity scenario for the property, the following major timber stewardship actions are scheduled for the next 30 years. As detailed in the compartment descriptions, smaller timber-related stewardship actions related to tending already growing trees are also scheduled and should be implemented simultaneous to these large actions. Additionally, many of these actions are contingent on availability of funding and the recovery of the forest from the last round of harvesting.

Table 26: Timber Stewardship Actions- The following actions and timeline are recommended to improve forest resources across the CJCF while also maintaining adequate levels of early successional habitat. Smaller, timber-related stewardship actions are also detailed in each compartment.

Date			Action
2016	-	2019	In Northern Slope and Southern Bowl Compartments, conduct Crop Tree Release.
2034	-	2036	Evaluate for potential crop tree release treatments. Priority should be given to areas with easy access and near other upcoming stewardship actions.
2034	-	2036	In Northern Slope Compartment, harvest 20 acres in Large Patch Cuts and Large Irregular Shelterwoods
2034	-	2036	In Western Shoulder Compartment, harvest 20 acres in Large Patch Cuts, Large Irregular Shelterwoods, and Small Clearcuts.
2044	-	2046	In Northern Bench Compartment, harvest 20 acres in Large Patch Cuts and Large Irregular Shelterwoods
2044	-	2046	In Northern Slope Compartment, harvest 20 acres in Large Patch Cuts and Large Irregular Shelterwoods.

Figure 43: Mature Forest-The property currently contains a limited amount of mature forest and a limited number larger, sawlog-sized trees suitable for timber harvest. Over the course of this plan cycle and the following decades, these conditions will become more widespread. Actions and recommendations included in this plan will help protect the remaining mature forest and expedite the development of younger, regenerating forest.

Figure 44: Regeneration-Young, head-high tree saplings are abundant throughout the property. These young trees include many future high value timber trees, but they will take decades to develop. Recommendations and actions included in this plan will help encourage these young forests to develop into healthy, high quality mature forests stocked with important timber and wildlife trees. In a few targeted areas, actions included in this plan will help perpetuate this early successional habitat.