Wildlife Habitat Stewardship & Conservation Activity Plan

Distant Hill

Walpole and Alstead, New Hampshire
January 2022

Prepared by:
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SIGNATURE PAGE

Wildlife Habitat Stewardship and Conservation Activity Plan[1]

for the

Distant Hill Property

507 March Hill Road
Walpole, NH 03608

For the 10 years beginning January 2022

PREPARED BY: Jesse Mohr of Native Geographic, LLC

Property Owner(s):	Michael Nerrie	Mailing Address:	507 March Hill Road Walpole, NH 03608

Landowner Signature(s): _____ Date:_____

_____ Date:_____

_____ Date:_____

Preparer Signature: _____ Date:_____

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[1] This plan meets or exceed the New Hampshire NRCS standards for EQIP Fish and Wildlife Conservation Activity Plans

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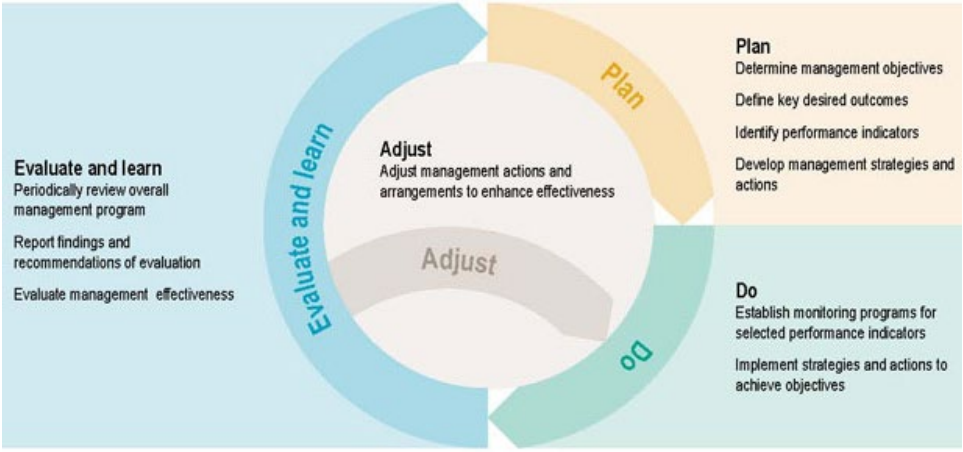
A wildlife habitat stewardship plan guides the long-term management and care of a property's wildlife habitats and other related natural resources. Stewardship plans ultimately culminate in prescriptive actions or prescribed "no actions" that are designed to protect, enhance, develop, or gain benefit 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 management of the property's wildlife and water quality resources. To a lesser extent, this plan also provides guidance on managing timber and potential recreation uses of the property. This plan provides guidance for the next 10 years.

1.1 What is in the Plan and How to Use it

This plan contains seven sections and has been organized to allow readers to engage in specific habitats of the property or specific stewardship recommendations/actions, without having to read the entire plan. After this introductory section, the plan starts with an overview of the property and recommendations (section 2), followed by management goals and objectives (section 3). Sections 4 and 5 include details on and an assessment of the property's broader landscape context, geology, and soils. Section 6 describes the property's wildlife habitats and wildlife usage. The plan ends, in Section 7, with a series of recommendations and actions designed to improve and/or maintain the quality of the property's wildlife habitat and wildlife resources. These specific actions and recommendations are developed in the context of the landowner's goals and objectives for the property. This section is not intended to be read in its entirety. Readers could direct themselves to the recommendation or action relevant to their area of interest. It may be helpful, but not necessary to read about the other recommendations.

1.2 Management Planning Its Role within the Adaptive Management Cycle

Developing a management 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. Adaptive management includes developing a plan, implementing the treatments, monitoring the outcomes of the treatment, and adapting future treatments and goals if needed. Conceptually, the adaptive management cycle looks like:



Completion of this plan signals a major transition in the adaptive management planning cycle: from planning to doing. This 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.

DISTANT HILL PROPERTY

2. Property Summary

Owner: Michael Nerrie Phone: (603) 756-4179 Email: mnerrie@gmail.com	Address: 507 March Hill Road Walpole, NH 03608
Approximate Property Acreage: Total: 155.2 acres Walpole: 113.96 acres Alstead: 41.26 acres	**Tax Map & Lot:** Walpole: 11-050-00, 11-059-00, 11-042-00 Alstead: 053-006-000, 053-011-000
Property Location: Street: 507 March Hill Road Town: Walpole and Alstead, NH	Ecoregion: Southwest NH Lowlands

Located between March Hill Road and Valley Road, the approximately 155-acre Distant Hill property spans the Alstead and Walpole town boundary. The property supports a diversity of forest, wetland, and open habitats. There are approximately 131-acres of upland forest, mostly older, maturing forest with smaller areas of younger and intermediate-aged forest. Hemlock - beech- oak - pine forest is the dominant forest type on the property and in the surrounding landscape. Within this matrix are areas of mostly pure hemlock forest and areas of mostly pure deciduous hardwood forest. In addition to forest, the property supports marsh wetlands and a pond with emergent herbaceous vegetation and open water, as well as swamps, seeps, and vernal pools under a mostly closed canopy of woody shrubs and/or trees. The property also has open upland habitats, including grassland fields, shrubland habitat, and a pollinator garden.

This variety of habitats supports a diverse array of wildlife and plant species, which are well suited to the landowner's management goals. The landowner's primary goal is to provide habitat for a diversity of wildlife and plant species. To sustain the property's diversity of habitats, I am recommending stewardship actions and practices to maintain high quality shrubland and old-field habitat, improve and diversify aquatic habitat associated with Great Brook, and to control the establishment and spread of invasive species. I am also recommending water bars and other erosion control be installed on some trail sections and the equipment crossing over Great Brook be upgraded and restored to protect the property's soil and water resources. The landowner already maintains a pollinator garden and, in some locations, protects understory herbs from deer browse. I am recommending the landowner continue with these actions and expand efforts to protect native hardwood seedlings and herbs from deer. Lastly, across most of the property, I am recommending the landowner continue to allow mature, older forest conditions to develop.

See Part I (Sections 1-6) for more information about the property's wildlife habitats and wildlife resources, geology, soils, broader landscape context, and management goals. See Part II (Sections 7-9) for more information on my recommended steward actions. A summary table and schedule of all my recommended stewardship actions is included in Section 8. The table in Section 9 is a subset of these recommendations; it includes details for recommended NRCS practices.

This plan was prepared by Jesse Mohr of Native Geographic, LLC (NG). The plan was drafted in November 2021, but data was collected throughout the summer and fall of 2021.

3. Goals and Objectives

Goals and objectives in this plan have been developed to inform and prioritize long-term management planning. Goals and objectives [2]in this plan have been developed at two scales: property goals and goals specific to a recommended stewardship action. Property goals are implemented across the entire ownership and include goals that may require management across multiple habitats or multiple stewardship projects to achieve. Within each recommended stewardship action, action-level goals and objectives are also addressed. Property-wide goals and objectives include:

Goal: Promote a diversity of WILDLIFE habitats and species. This includes the following objectives:

- maintain and improve quality of existing early successional young forest habitat
- maintain and improve quality of existing early successional old field habitat
- allow older, complex forests to develop on most of forest lands
- protect uncommon understory vegetation from deer browse in semi-rich forest
- strategically place woody material in Great Brook to increase in-stream habitat diversity
- continue to maintain pollinator garden
- continue to maintain forest buffers around vernal pools and wetlands

Goal: Encourage long-term stream and forest HEALTH and RESILIENCY. This includes the following objectives:

- maintain a diversity of tree species and age classes
- targeted herbicide treatment to control the spread and impact of non-native, invasive species
- strategically place woody material in Great Brook to increase floodplain access
- allow older, complex forests to develop on most of forest lands

Goal: Protect SOIL and WATER resources. This includes the following objectives:

- install waterbars and, where possible, out-slope forest trails
- upgrade Great Brook equipment crossing
- continue to maintain forest buffers around vernal pools and wetlands
- when building or maintaining access for management meet or *exceed Best Management Practices for Forestry: Protecting New Hampshire's Water Quality* (University of New Hampshire Cooperative Extension, 2005) and *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire* (State of New Hampshire, 2016)
- when building or maintaining trails for recreation meet or exceed Best Management Practices for *Erosion Control During Trail Maintenance and Conservation* (State of New Hampshire, 2017) and consider recommendations in *Trails for People and Wildlife*.

[2] Management goals are generally broad statements that describe a desired condition and aim of management. Typically, a collection of goals articulates an end vision, not necessarily the steps or means to get there. Objectives are specific outcomes or steps to achieve the broader goals.

4. The Surrounding Region

This section includes descriptions and management considerations based on the surrounding region and landscape. For the purposes of this analysis, I have defined the surrounding landscape as including all the surrounding lands within 1 mile of the property.

4.1 Ecoregion

The Distant Hill property and larger surrounding landscape are located along a large transition zone where three broad-scale divisions of climate, geology, soil, geomorphology, and vegetation intersect. The property sits within the Southwest NH Lowland ecoregion[3] but also shares characteristics of and is influenced by its proximity to the Monadnock-Sunapee Highlands and Connecticut River Valley.

Figure 2-Ecoregion Map: The Distant Hills property (red star) is in the Southwest Lowlands ecological region.

The Southwest Lowlands and Monadnock-Sunapee Highlands are both characterized by isolated hills and peaks of granitic rock covered in shallow and often coarse-grained tills. Small lakes and narrow valley streams are also abundant. The warmer and often low elevation climates of the Lowlands favor oak-pine forest types, while the slightly cooler Sunapee Highlands tends to support a mix of northern hardwoods, oak, and pine.

4.2 Landscape

The surrounding 1-mile landscape contains a mix of partially fragmented forestlands, farms, old fields, wetlands, and dispersed residences. In terms of state-level wildlife priorities, the surrounding landscape includes a diverse mix of habitats of varied biodiversity value[4], including some of the highest quality habitats in the state and many areas of lower quality habitat.

East of the property, large areas of Hemlock-Hardwood-Pine forest have been identified as some of the highest quality examples of this habitat type in the state or surrounding ecological region (New Hampshire Fish and Game Department, 2020). Remaining portions of the Hemlock-Hardwood-Pine forest in the surrounding landscape, including Distant Hill, have been identified as playing a supporting role in protecting and buffering this nearby highest quality habitat.

The property's fields and many of the surrounding fields are some of the highest quality grassland habitats in the Southwest Lowlands ecological region (New Hampshire Fish and Game

[3]An ecoregion is an area of similar climate, geology, geomorphology and broad-scale vegetation patterns.
[4] As identified in the 2020 NH Wildlife Action Plan.

Department, 2020). Much of state's best and highest quality habitat for grassland birds and other grassland species is in the nearby Connecticut River Valley.

The surrounding landscape also supports some of the highest quality riverine and riparian habitat in the state (New Hampshire Fish and Game Department, 2020), including habitats associated with Blanchard Brook to the north and Great Brook to the south. The upper reaches of Great Brook flow through the property.

Flora and fauna freely move between the Distant Hill property and adjacent ownerships and, as result, the property has the capacity to support some wide-ranging and area-sensitive wildlife species, including many of the Tier 1 species listed in the below table, but probably not the most - wide-ranging and area-sensitive species. The property is on the periphery of a larger 2,888-acre block of mostly continuous forest, wetland, and other open habitats. This larger block of habitat is partially fragmented by dispersed residences, residential roads, and unmaintained roads. Larger roads with more concentrated residential and occasionally commercial uses surrounded this block and separate it from other comparably sized adjacent habitat blocks. Flora and fauna may occasionally move between the Distant Hill block and adjacent habitat blocks, but overall, there is somewhat limited habitat in the surrounding landscape for the most wide-ranging and most area-sensitive species that require lots of space, like northern goshawk and bear, which may wander home ranges greater than 20 square miles. 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.

Photo interpretation of the surrounding 1-mile radius highlights what is likely an aging mix of intermediate and intermediate-to-mature forest. The landscape is also crossed by a major National Grid powerline that is maintained in a shrubby, early successional habitat. There are also ephemeral shrubby, early successional habitat associated with logging and land clearing in the surrounding landscape. Shrub swamps in the area also provide some early successional habitat. While difficult to access from aerial imagery, late successional or old growth forests are likely lacking in this area and broader region.

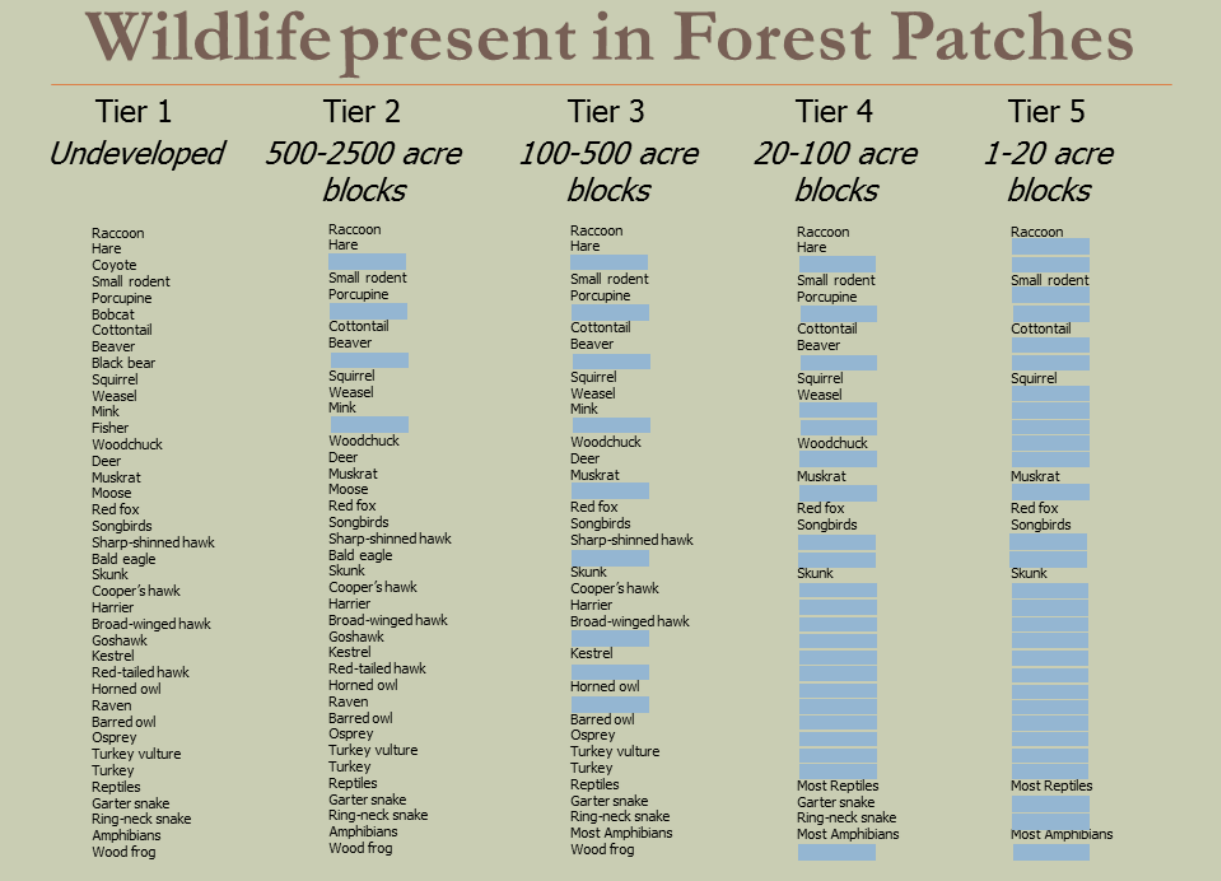


Figure 3: Wildlife Present in Different Sized Forest Patches- From Above and Beyond (2002) Campoli, J., Humstone, E., & MacLean, A. The blue bars indicating the species commonly lost as habitat block size shrinks.

4.3 Important Management Considerations Based on the Surrounding Ecoregion and Landscape

- The property and surrounding landscape support some area-sensitive species, including Species in Greatest Need of Conservation. On the property, habitat suitability for these species can best be maintained by keeping within-block habitat connectivity to the west. Avoid forest conversion and/or large habitat openings near the western boundary.
- The surrounding landscape has somewhat limited habitat for interior forest species, including Species in Greatest Need of Conservations. Habitat suitability for interior forest species can best be maintained by limiting the creation of new permanent or semi-permanent openings, such as scenic vistas or fields or shrublands within the forest interior.
- While recommendations for maintaining early successional habitats vary greatly, including maintaining from 3-15% of the landscape in this type of habitat, the surrounding landscape is likely to contain adequate amounts of early successional habitat for the next 10 years. At this time, prioritize maintaining existing patches of early successional habitat. Re-evaluate in 2031.
- Older, later successional forests 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 would benefit numerous wildlife species.
- The surrounding landscape includes some of the highest quality grassland habitat in the state. This is likely to increase the value of the property's fields for grassland birds.
- Downstream of the property, Great Brook becomes a highest ranked riverine habitat. The property's wetlands and riparian habitat are an important headwater for this stream.

5. Soils, Terrain, and Hydrology of the Property

5.1 Soils and Terrain

The property spans two different landforms—upland slopes and valley bottom-- with different soils and management considerations. Most of the property sits on sloping terrain overlooking Great Brook. This upland landform is mantled in till-derived soils, mostly with a silty loam matrix. The Cardigan-Kearsarge soil complex is relatively widespread in these areas; these till-derived soils have frequent rocky and shallow-to bedrock areas and typically produce slightly acidic growing conditions, although the property has some enriched soil inclusions. The Great Brook valley is lined with wet till-derived soils, more recent alluvial soil deposits, and accumulations of partially decomposed organic matter. This landform supports predominately hydric soils. The property's soils and their management considerations are summarized below.

See Soil and Water Resources Map for more details.

Table 1: Major Soils of the Property- Note that soils with less than 2% coverage on the property are not included.

Soil Series (% of Area)	NRCS Soil Ratings	Management Considerations
Cardigan-Kearsarge complex, 8 to 15 percent slopes (19%)	Highly Erodible Land, Minor Component of Hydric Soil	**Moderate management limitations.** Soil is moderately suited for heavy equipment. Combination of soil and slope has a risk of soil loss and erosion when cleared. Slight windthrow hazard. Depressions may include hydric soils.
Cardigan-Kearsarge complex, 15 to 25 percent slopes (19%)	Highly Erodible Land, Minor Component of Hydric Soil	**Moderate management limitations.** Soil is moderately suited for heavy equipment. Combination of soil and slope has a severe risk of soil loss and erosion when cleared. Slight windthrow hazard. Depressions may include hydric soils.
Bernardston silt loam, 25 to 50 percent slopes, very stony (14%).	Highly Erodible Land, Minor Component of Hydric Soil	**Severe management limitations.** Soil is poorly suited for heavy equipment. Severe risk of rutting and compaction during wet conditions. Severe windthrow hazard. Combination of soil and slope has a severe risk of soil loss and erosion when cleared. Gentler slopes have moderate management limitations. Depressions may include hydric soils.
Pittstown silt loam, 3 to 8 percent slopes, very stony (13%)	Minor Component of Hydric Soil, Maybe Highly Erodible Land	**Moderate management limitations.** Soil is moderately suited for heavy equipment. Combination of soil and slope can have risk of soil loss and erosion when cleared; the steeper the slope, the higher the risk. Moderate windthrow hazard.
Dutchess silt loam, 8 to 15 percent slopes, very stony (11%).	Highly Erodible Land, Minor Component of Hydric Soil	**Moderate management limitations.** Soil is moderately suited for heavy equipment. Severe risk of rutting and compaction during wet conditions. Combination of soil and slope has a risk of soil loss and erosion when cleared. Steeper slopes have higher risk of erosion. Slight windthrow hazard
Borohemists, ponded (5%)	Hydric Soil	**Severe management limitations.** Soil is poorly suited for heavy equipment. High water table and areas of standing water severely limits access and operability.
Dutchess silt loam, 15 to 25 percent slopes, very stony (5%).	Highly Erodible Land, Minor Component of Hydric Soil	**Moderate management limitations.** Soil is moderately suited for heavy equipment. Severe risk of rutting and compaction during wet conditions. Combination of soil and slope has a severe risk of soil loss and erosion when cleared. Slight windthrow hazard
Limerick silt loam (5%)	Hydric Soil	**Moderate management limitations.** Moderately suited for heavy equipment because of low strength and potential for rutting. Very limited suitability for recreation trails because of high water table, flooding and dustiness. severe windthrow hazard.

5.2 Surface Waters and Wetlands

The property supports approximately **10.5 acres of wetlands and over 1,800 feet of frontage on Great Brook.** The property's largest wetland, a 3.8-acre *marsh wetland* in the northeast corner of the property, is part of a much larger 25-acre wetland complex, mostly on the adjacent ownership. These wetlands are further detailed in section 6.2. The property is also drained by an additional **4,800 feet of small, ephemeral streams and has eight vernal pools.**

Wetlands and vernal pools provide important habitat for amphibians and other wetland and aquatic species. They are also critical for many species that live in upland areas, as they provide a cool humid-micro-climate, drinking water, and foraging opportunities. Intact forest cover helps to protect these important functions.

Streams provide important aquatic habitat for fish, amphibians, and macro-invertebrates, including many Species of Great Conservation Need (New Hampshire Fish and Game Department, 2020). The greatest threat to fish and other aquatic organisms is the destruction or degradation of their

habitat. Reduced habitat complexity, poor water quality, and/or lack of upstream, downstream, and floodplain connectivity can degrade the quality and function of aquatic habitat for fish. Historically, in northeast, abundant natural wood within the channel helped maintain this complexity and quality.

See Soil and Water Resources Map for more details.

5.3 Management Recommendations for Soil and Water Resources

- The property contains wetlands, vernal pools, streams, and hydric soils. To limit potential impacts to these sensitive features, management operations should meet or *Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005), Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016),* and *Best Management Practices for NH Trail Construction and Maintenance (State of New Hampshire, 2017).*
- The property is partially underlain by highly erodible soils and slopes. To limit potential soil erosion, management operations should meet or exceed *Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005), Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016),* and *Best Management Practices for NH Trail Construction and Maintenance (State of New Hampshire, 2017).*
- To improve Great Brook's in-stream habitat complexity and floodplain connectivity, I recommend strategically placing logs and branches in the Great Brook channel. See Stewardship Action 7.6.
- To protect Great Brook's habitat and water quality, I recommend upgrading the current stream crossing. See Stewardship Action 7.3.
- To stop on-going trail erosion and prevent future trail erosion while also maintaining management access, I am recommending water bars and other erosion control measures for some sloped trail sections. See Stewardship Action 7.5.

6. Wildlife and Wildlife Habitats of the Property

This section includes a description of the property's major wildlife habitats and wildlife resources. It is broken down into subsections corresponding to each of the three major habitat types found the property: forest, wetland, and open habitats. Within each major habitat, there are a smaller minor habitats and habitat features which are further described below. Acreage for each major and minor habitat are listed in the table below.

Table 2: Wildlife Habitats of the Property

Habitats	Acres	Map Label
Forest	**131.2**	**F**
Hemlock -Beech- Oak - Pine Forest	116.2	F-1
Hardwood Forest	6.7	F-2
Open Hardwood and Young Forest	5.6	F-3
Semi-Rich Forest	2.7	F-4
Wetland	**10.5**	**W**
Forest Seep	0.5	W-1
Vernal Pool	0.9	W-2
Red Maple-Black Ash Swamp	0.4	W-3
Shrub Wetland	2.1	W-4
Marsh Wetland	5.5	W-5
Pond	0.1	W-6
Fen	1	W-7
Open	**13.5**	**O**
Grassland Field	6.8	O-1
Shrubland	5.8	O-2
Pollinator Garden and Open	0.9	O-3
Grand Total	**155.2**	

6.1 Forest Habitats

The property supports 131-acres of upland forest, mostly older, maturing sawtimber forest[5] with smaller areas of intermediate, two-aged forest and sapling undergrowth *Hemlock -beech- oak - pine forest*[6] is the dominant forest natural community type on the property and in the surrounding landscape. Within this forest type, are areas of mostly pure hemlock forest and areas of mostly pure deciduous hardwood forest, predominately beech, red maple, birch, and oak. Cooler sites, seepier sites, and/or deeper soils may grade into hemlock-oak-northern hardwood forest.

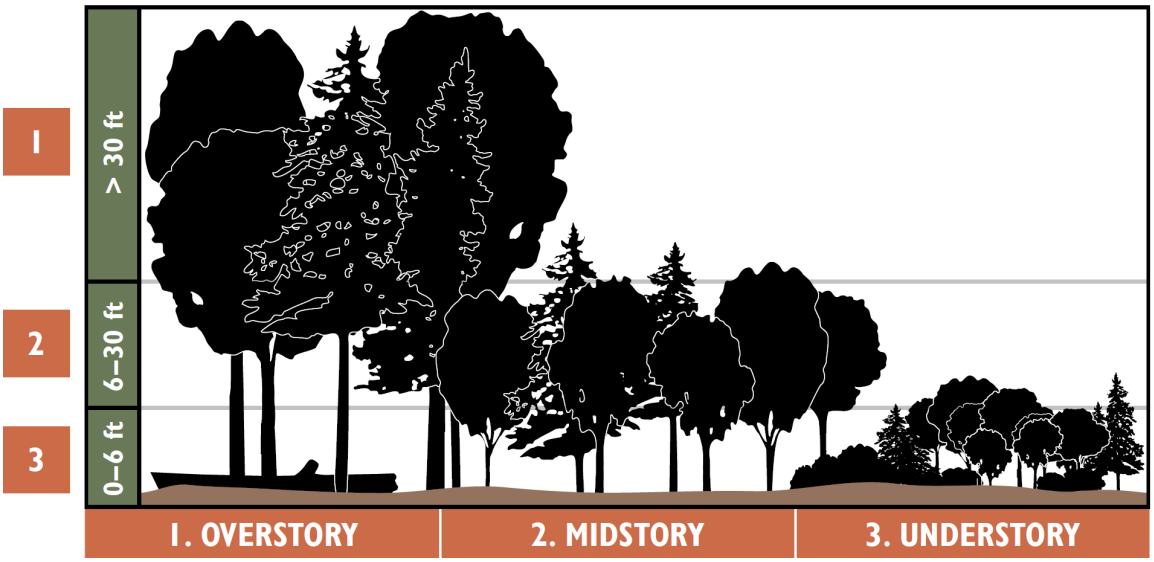


Figure 4: Forest Canopy Layer-Illustration of forest canopy layers. From Forestry for Maine Birds: A Guidebook for Foresters Managing Woodlots "With Birds in Mind" (Gallo et al., 2017)

A varied *hemlock -beech- oak - pine forest* grows across most of the property, primarily an older, maturing forest with an overstory of large and small sawlog-sized[7] trees. There are inclusions of younger intermediate-aged forest and older, complex forest. In addition to eastern hemlock, American beech, red oak, white pine, and red maple are also abundant in the overstory and midstory. Black birch is present on warmer and drier sites, while yellow birch is more typical in the sites with seepage, deeper soils, cooler aspects, and/or near enrichment.

The mostly well-developed midstory includes a mix of tree saplings and often striped maple. Other woody shrubs, including witch hazel, viburnum species, and glossy buckthorn are also occasional in the midstory. Woody understory vegetation is more limited, mostly the same woody shrubs and patches of tree seedlings associated with canopy gaps and areas of partial canopy cover. Understory herbaceous cover is patchy and across much of *hemlock -beech- oak - pine forest* is relatively sparse. Common understory herbs at the time of visit included star flower, Canada mayflower, wild sarsaparilla, hay-scented fern, and wood fern species. The abundance of

[5] See Forest Habitat Age and Structure Classes in Appendix 11.3
[6] Habitats listed in italics correspond with minor habitats depicted in the accompanying Wildlife Habitat and Resources Map. Habitat names generally correspond with the New Hampshire Wildlife Action Plan (NH Fish and Game Department, 2015) and/or Natural Communities of Hampshire: Second Addition (Sperduto and Nichols, 2012).
[7] See Tree Size Classes in Appendix 11.2

eastern hemlock and hardwoods varies greatly within this habitat. See the Forest Wildlife Habitat Evaluation Table for more details.

Figure 5: Mature Hemlock-Beech-Oak-Pine Forest- This is the dominant forest type on the property and in the surrounding landscape. On property, mature forest conditions like pictured above are relatively common.

Within this matrix of *hemlock -beech- oak - pine forest* are smaller areas dominated by deciduous-hardwood trees, mostly in areas with deeper and more productive soils, mineral enrichment, seepage, and/or where past land use has encouraged hardwoods. Two larger patches of *hardwood forest* have been separately mapped, but there are more inclusions. Both patches have an older, maturing forest structure[8] with an overstory of large and small sawlog-sized[9] trees. The northern patch, near Great Brook, has a mixed overstory of sugar maple, red maple, ash, yellow birch, and paper birch. It also has the occasional hemlock. This patch has some seepy inclusions and other areas seasonally flooded by Great Brook.

The southern patch of *hardwood forest* is part of a larger, former sugar bush. While land use has certainly encouraged sugar maple and other hardwoods in this area, it also appears to be underlain by more productive soils relative to the surrounding matrix forest. The overstory includes a mix of sugar maple, red maple, oak, beech, birch, black cherry, and ash. Also, the occasional hemlock and white pine. Relative to the surrounding *hemlock -beech- oak – pine forest,* this a more productive and richer site, but it mostly lacks calciphile understory species that

[8] See Forest Habitat Age and Structure Classes in Appendix 11.3
[9]See Tree Size Classes in Appendix 11.2

thrive in rich, limy soils. See the Forest Wildlife Habitat Evaluation Table for more details on the *hardwood forest* habitat.

The other part of the former sugar bush was heavily thinned in 2012, creating an *open hardwood and young forest* habitat. This area has an open woodland structure with canopy cover ranging from 5-70%. The southern part of the habitat is more open, mostly in the range of 5-30% overstory cover. A dense understory of young trees and shrubs developed under this open overstory. This dense layer of young trees is now starting to grow up into the midstory. This process of cutting and understory release created a two-aged structure[10], mostly with large and small sawlog-sized trees growing over a second age class of saplings and seedlings[11]. The residual overstory in this area is dominated by sugar maple. Other hardwoods are occasional. The understory and midstory, however, are dominated by beech suckers with the scattered oak, sugar maple, red maple, ash, and birch. Hay-scented fern is widespread in this habitat, frequently carpeting the low understory. Like the *hardwood forest*, this a more productive site, but it mostly lacks calciphile understory species that thrive in rich, limy soils. See the Forest Wildlife Habitat Evaluation Table for more details on the *open hardwood and young forest* habitat.

Across the property, there are inclusions of calcium-rich bedrock, pockets of calcium-rich till fragments, seepy areas with mineral enrichment, and cove sites that topographically accumulate soils and nutrients. The processes of enrichment are slightly different, but these areas tend to support understory herbs that thrive in and are sometimes restricted to calcium-rich soils, including, but not limited to, jack-in-pulpit, bloodroot, trillium, blue-stemmed goldenrod, baneberry, maiden-hair fern, and hepatica. Across the property, these areas have been mapped as *semi-rich forests* and mostly have an older, maturing forest structure with an overstory of small sawlog-sized trees[12] and the occasional larger sawlog-sized trees.

The large eastern patch of *semi-rich forest* is an upland site that is underlain by a vein of semi-rich bedrock and, in some areas, also has calcium-rich rock fragments in the soil. The forest overstory and midstory includes a mix of maple, oak, beech, birch, hophornbeam, and scatted hemlock. The other *semi-rich forest* patches are mostly near seepage where emerging ground water is bringing some mineral enrichment to or near the soil surface. Some of these patches are also in cove sites, where nutrients accumulate through downslope movement and settling of soils. These westerly and smaller patches of *semi-rich forest* have a greater abundance of yellow birch and ash growing in mix with red maple, sugar maple, hemlock, and oak. See the Forest Wildlife Habitat Evaluation Table for more details on the *Semi-Rich Forest* habitat.

See “Wildlife Habitat and Resources Map” for habitat locations.

[10] See Forest Habitat Age and Structure Classes in Appendix 11.3
[11]See Tree Size Classes in Appendix 11.2
[12]See Forest Habitat Age and Structure Classes in Appendix 11.3

Table 3: Forest Wildlife Habitat Evaluation Table

Forest Wildlife Habitat Evaluation						
Desired Condition	Hemlock-Beech-Oak-Pine Forest		Hardwood Forest and Semi-Rich Forest		Open Hardwood and Young Forest	
	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations
Forest Habitat Age and Structure Class	Older, Maturing Small Sawtimber		Older, Maturing Small Sawtimber		Intermediate Two-aged, Sawtimber over Sapling	
Overstory Canopy Closure-% cover layer	70-100%		70-100%		5-70%	
Overstory Canopy Height-Average height of dominant and co-dominant trees	> 60 feet		> 60 feet		> 60 feet	
Midstory Canopy Closure-% cover of layer	30-70%		30-70%		70-100%	
Understory Canopy Closure-% cover of layer	5-30%		30-70%		30-70%	
Small Forest Openings-Forest has small (0.1-0.25 acre) canopy openings with understory growth	Fair		Fair		Good	E
Large Forest Opening-Forest has large (1-5 acre) canopy opening with understory growth	Poor		Poor		Good	E
Midstory and Understory Vegetation-Forest has areas of dense and/or moderately dense shrubs and saplings	Fair	G	Good	G	Excellent	E
Large Diameter Trees- Forest has some hardwood trees ≥ 24 inches diameter and/or softwood tree ≥ 20 inches diameter.	Good	C	Good	C	Good	
Vertical Structural Diversity- Forest has a multi-layered canopy with multiple age-classes and occasional supra-canopy trees. Ideally forest has ≥ 3 canopy layers.	Fair	G	Fair	G	Poor	
Snags and Cavity Trees-Forest has abundant current and future snags and cavity trees >6 feet tall. Ideally at least six snags or cavity trees per acre, with one ≥ 18 inches diameter, and three ≥ 12 inches diameter	Fair	A, B	Fair	A, B	Fair	B
Mast-Forest has mature, large diameter mast producing trees in overstory and/or abundant mast producing shrubs in the understory.	Excellent	D	Good	D	Poor	
Coarse Woody Material-Forest has abundant woody material > 6 inches diameter and > 4 feet long.	Fair	A, B, C	Fair	A, B, C	Poor	
Fine Woody Material-Forest has abundant aggregates or piles of small branches/tops/slash.	Fair	A, B, C	Fair	A, B, C	Poor	
Invasive Species-Non-native invasive species are absent or limited. If present, they are not suppressing native species.	Good	F	Good	F	Good	F
Leaf Litter and Duff-At least 60% of the soil surface has leaf litter > 1 inch thick. Trails and access roads occupy less than 10% of the forest	Fair		Fair		Good	
Native Species Diversity-Forest has diversity of native species in all canopy layers. Inferring vegetation is limited. If present, they are not suppressing native species diversity.	Good	F	Fair	F, G	Good	F
Water Resources-Seeps, streams, vernal pools, wetlands, and/or other water bodies are buffered by intact riparian forests	Excellent	D	Excellent	D	Excellent	D
Recommendations						
A-Continue to increase abundance of snags and future downed by girdling trees						
B-Maintain existing snags and cavity trees during future management operations						
C-Continue to allow mature forest conditions and structures to develop						
D-Continue to maintain existing riparian tree cover						
E-Maintain young forest early successional habitat						
F-Monitor for early detection and rapid response to non-native, invasive species						
G-Protect native tree seedlings and understory from deer						

6.1.1 Wildlife Usage

Bats

During acoustic bat surveys, northern long-eared, little brown, red, and big brown bats were recorded in or above the *open hardwood and young forest*. Northern long-eared bats are a threatened species under the federal Endangered Species Act. Northerns and little browns bats are listed as endangered in New Hampshire. In addition to these species, silver-hair bats were also recorded at the nearby *pond.* All these bats are likely to forage in or above the forest. These species or a segment of the species population are also likely to use the property's forests for roosting. See Section 6.4 Rare Species, Species of Greatest Conservation Need, and Exemplary Natural Communities.

Deer

Deer sign is ubiquitous throughout the forest. Deer trails meander throughout most of property and sign of browse is widespread. The property's forests used in combination with nearby open and wetland habitats are likely to provide year-round cover and forage.

Birds

Moosewood Ecological LLC conducted breeding bird surveys throughout the property. While a full write-up of their findings was not available when preparing this report, NG was able to review raw data. Generally, the forest supports a diversity of bird species typical of maturing forest conditions, including the following Species of Greatest Conservation Need: veery, Canada warbler, scarlet tanager, and wood thrush. The property's forest habitats support bird species that use a variety of different structures and canopy layers for nesting, including birds that prefer nesting in cavities, high in the overstory canopy, in the midstory, down in the brushy understory, or even directly on the ground.

The *open hardwood and young forest* supports many of these same generally mature-forest species as wells chestnut-side warbler, a bird that uses early successional and young forest habitats. This bird likes dense patches of shrubs and young trees and will use large tree-free shrublands as well as larger forest gaps.

6.1.2 Important Resources and Resource Concerns

Deer over abundance

Deer are overabundant on the property and excessive deer browse is reducing the growth, diversity, and regeneration of native trees, shrubs, and herbs. Because of heavy deer browse, understory vegetation and habitat are limited and often absent in many forested areas. Areas with understory vegetation and habitat are also being heavily impacted by deer.

Preferential browsing by deer can encourage and release non-invasive species that they avoid browsing. Similarly, it can encourage and release non-preferred native species to such an extent that they also interfere with other native vegetation. Preferential deer browse is likely favoring an abundance of beech suckering and hay-scented fern throughout much of the *open hardwood* and *hardwood forest*. To limit the impacts of deer browse in the *semi-rich forest*, I am recommending the landowner protect a small area with deer exclusion fencing and use tree shelters to protect native trees, shrubs, and herbs outside of the fenced area. See Section 6.1.3 Forest Management Recommendations for more details.

Young forest and shrubby habitat

Young forest and shrub dominated areas provide important nesting habitat for many bird Species of Greatest Conservation Need, but are used by an even wider range of species for foraging and cover. Without management or disturbance, the wildlife value of these habitats declines over time

as young trees get tall enough to shade out and reduce the density and vigor of shorter shrubs, tree seedlings, and herbs.

The understory of the *open hardwood and young forest* is used by chestnut-sided warbler and other birds that prefer shrubby early successional conditions, but the quality and function of this habitat is declining as tree saplings have reached the midstory in many locations. The value of this young forest habitat is likely enhanced by the nearby *shrubland* ROW. I am recommending Stewardship Action 7.1, an early successional habitat maintenance practice, to maintain the quality and function of this young forest habitat.

Figure 6: Young Forest Habitat-Under the open hardwood wood overstory is a dense layer of saplings in the midstory and understory. This provides valuable young forest habitat for shrub-nesting birds. It is also important foraging habitat for northern long-eared bats,

Northern long-eared and other bat roost trees

In the summer, migratory and non-migratory bats sleep and raise young in roosts. Roosts vary depending on species and function. Cavities, crevices, and hollows in dead and declining trees and under exfoliating bark may function as roosts for northern long-eared, silver-haired, and non-maternal little and big brown bats. Except for hoary bats and eastern small-footed bats, New Hampshire's bats generally prefer to roost in hardwood and/or mixed-wood forest types. Forest roosting bats also tend to prefer roosting in more mature forests, on warmer aspects, and being closer to suitable surface waters for drinking and foraging, a common combination in the project area. Many species also show some preference for roosting in larger trees and larger snags.

Northern long-eared bats and little brown bats were acoustically detected on the property and may roost in trees on the property. When trees are cut, there is some risk that a roost tree could be cut or otherwise disturbed. If bats are in the roost tree, especially young pups not yet capable of fight, this could result in mortality. For northern long-eared bats, concern for potential impact is greater as roost trees could support a colony of northern long-eared bats.

Potential roost trees for northern long-eared bat are widespread across the property's forests. Northern long-eared bats show some preference for roosting in maples, yellow birch, oaks, white pine with exfoliating bark, and other long-lived hardwoods, most often within hardwood and mixed-wood forest types. To avoid potentially impacting roosting northern long-eared bats I am recommending time of year tree cutting restrictions. See Section 6.1.3 Forest Management Recommendations for more details.

6.1.3 Forest Habitat Management Recommendations

- Limit tree cutting to after November 1 and before April 1 to minimize and avoid impacts to northern long-eared bat and other forest roosting bats.
- Protect native hardwood tree regeneration from deer browse with tree shelters. Prioritize protection of seedlings in the semi-rich forest. As they become established, place 3-4-foot-tall tree shelters over maple, birch, oak, and if found, hickory seedlings.
- Construct and maintain deer exclusion fencing on part of semi-rich forest on Rattlesnake Knoll to protect native plants and hardwood tree regeneration from deer browse. Use exclusion to demonstrate and study impacts of deer browse on semi-rich natural community.
- Allow older, complex forest conditions and structures to develop across most of the property's forests.

6.2 Wetland Habitats

The property supports *marsh wetlands*[13] and a *pond* with emergent herbaceous vegetation and open water, as wells swamps, seeps, and vernal pools under a mostly closed canopy of woody shrubs and/or trees. There is also a small *fen.* The largest and most of the open wetlands are along Great Brook. These dynamic wetlands are primarily the result of beaver impoundment, stream-related disturbances, and seasonal inundation. The property's swamps[14], *vernal pools*, and *seeps* are mostly found in poorly draining topographic basins and/or near groundwater seepage within larger areas of upland forest.

There are two *marsh wetlands* along the Brook. These areas are dominated by wetland sedges, rushes, and grasses with the occasional broad-leaf plant and shrub. These wetlands are also ringed by thick shrub cover, including a mix of native wetland and invasive shrubs, predominately glossy buckthorn mixed with alders, dogwoods, and willows. Depending on beaver activity, these areas may have standing water. The vegetation of these dynamic wetlands may change with cyclical use and abandonment by beavers. See the Wetland Wildlife Habitat Evaluation Table for more details on the *marsh wetland* habitat.

Figure 7: Marsh Wetland-There are a series of open marsh wetlands along Great Brook, mostly the product of beaver.

In the far northeast corner of the property, there is a 2-acre *shrub wetland* spanning Great Brook. This wetland sits in a poorly draining basin with a high-water table and seepage. Parts of the wetland are also seasonally flooded by the Brook. Shrub cover is nearly continuous. Glossy buckthorn is locally abundant within the wetland, but native alder, dogwoods, and other shrubs are also present. The occasional red maple and ash tree emerge above this shrub layer. Along the wetland margins, trees become increasingly abundant. See the Wetland Wildlife Habitat Evaluation Table for more details on the *shrub wetland* habitat.

The *red maple-black ash swamps* are forested wetlands with poor drainage and groundwater seepage. Besides black ash and red maple, hemlock is widespread in and overhanging the wetlands. There are also scattered yellow birch. These wetlands have a maturing forest structure[15] with a patchy understory of herbs, ferns, and woody shrubs. Seasonally, these swamps may have standing water and exposed wetland soils. Invasive species are absent or limited on these wetlands. See the Wetland Wildlife Habitat Evaluation Table for more details on this habitat.

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[13] Habitats listed in italics correspond with minor habitats depicted in the accompanying Wildlife Habitat and Resources Map. Habitat names generally correspond with the New Hampshire Wildlife Action Plan (NH Fish and Game Department, 2015) and/or Natural Communities of Hampshire: Second Addition (Sperduto and Nichols, 2012).

[14] A swamp is wetland with greater than 60% tree cover

[15] See Tree Size Classes in Appendix 11.2

The property's *forest seeps* have a similar composition and structure to the *red maple-black ash swamps* but lack the seasonal standing water. Here a maturing forest overhangs areas of wet soils and seeping groundwater. These areas can contain a mosaic of upland, wetland, and marginally wetland conditions, but generally don't have standing water. Areas of exposed wet soils are interspersed with herbs, ferns, and occasionally shrubs. See the Wetland Wildlife Habitat Evaluation Table for more details on the *forest seep* habitat.

Vernal pools that support breeding of vernal-pool dependent amphibian species are relatively widespread on the property. There are eight vernal pools on the property. They all have small, ephemeral pools of standing water surrounded by mature *hemlock -beech- oak - pine forest*. Invasives are absent or limited at the pools, although not all vernal pools were visited. See the Wetland Wildlife Habitat Evaluation Table for more on the *vernal pools*.

Figure 8: Vernal Pools-The property supports eight pool that are used by breeding wood frogs and/or spotted salamanders.

There is also a small approximately 1-acre peatland wetland system on the property, in an area of stagnate drainage near March Hill Road. The peatland system has been mapped as a *fen* in the Wildlife Habitat and Resources map, but this area includes a few different smaller ecosystems, including areas of intermediate or poor fen, a peaty cattail marsh, and a small area of open water. The fen proper is traversed by a small trail. See the Wetland Wildlife Habitat Evaluation Table for more details on the *fen* habitat.

See "Wildlife Habitat and Resources Map" for habitat locations.

Wetland Wildlife Habitat Evaluation								
Desired Condition	Red Maple-Black Ash Swamp and Forest Seep		Shrub Wetland and Marsh Wetland		Fen		Vernal Pool	
	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations
Aquatic Organism Passage-Riverine wetland and associated river/stream is free of barriers that restrict or impede movement of aquatic organisms.	NA		Fair	D	NA		NA	
Intact Hydrologic Regime-Water flows through wetland without being constricted, blocked, or altered	Excellent		Excellent		Excellent		Excellent	
Water Quality-Water quality of the wetland has not been degraded by surrounding land uses. No evidence of excess sediment, nutrients, or other pollutants.	Good	A	Good	A	Fair	A	Good	A
Deep Water Habitat-Open wetland has water ≥ 6' deep	NA		NA		NA		NA	
Permanent Shallow Water Habitat-Open wetland has persistent water ≤ 5'deep.	NA		Fair		Good		Good	
Fish Free Amphibian Breeding Habitat- Wetland has ephemeral shallow water habitat or fish free habitat that supports or can support amphibian breeding	NA		Fair		Far		Excellent	
Mature Forest Structure Diversity: Forested wetland has mature multi-layered canopy with multiple age-classes and occasional supra-canopy trees.	Good	A	NA		NA		Good	A
Snags and Cavity Trees-Forested wetland has abundant current and future snags and cavity trees.	Good	A	Good	A	Fair	A	Good	A
Downed Woody Material-Forested wetland abundant fine and coarse woody material, including logs, branches, tree tops.	Good	A	NA		NA		Good	A
Invasive Species-Non-native invasive species are absent or limited and unlikely to degrade wetland habitat.	Good	D	Poor	B, C	Fair	C	Good	C
Species Diversity-Inferring vegetation, including native and non-native species, are absent or limited and not suppressing native plant, tree, and/or shrub diversity	Excellent		Fair		Fair		Excellent	
Forested Riparian Buffers-Surrounding riparian buffers are forested or primarily forested	Excellent	A	Excellent	A	Excellent	A	Excellent	A
Recommendations								
A-Allow mature forest conditions and structures to develop in wetland and/or riparian buffer. Maintain existing riparian tree cover								
B-Control invasive species with herbicide or mechanical treatment								
C-Monitor for early detection and rapid response to non-native, invasive species								
D-Upgrade stream crossing								

6.2.1 Wildlife Usage

Beaver

Beavers periodically create small impoundments along Great Brook, helping to maintain the dynamic mosaic of temporary ponds and *marsh* and *shrub wetlands* along the small waterway. Beavers also forage in the nearby upland, likely encouraging greater conifer cover in the immediately surrounding forest. During visits for this plan, beaver dams were not actively maintained.

Amphibians

The landowner has surveyed all the *vernal pools* for egg masses and amphibians. All mapped *vernal pools* support breeding of spotted salamander and/or wood frog. One pool also supports Jefferson salamanders.

Bats

During acoustic bat surveys, little brown, red, silver-haired and big brown bat were recorded at the *pond.* Northern long-eared bats were recorded in the nearby forest. See Section 6.4 Rare Species, Species of Greatest Conservation Need, and Exemplary Natural Communities. All these species are likely to use the pond for foraging and potentially drinking. Additional wetland habitats were not surveyed, but these species are also likely to forage over and potentially roost near the property's other wetlands.

Other species

Mink, coyote, fox and raccoon tracks were observed in and along the periphery of the marsh wetlands on Great Brook. These species are likely to forage in and near the property's wetlands.

6.2.2 Important Resources and Resource Concerns

Preferred foraging and roosting for northern long-eared and other bats

All of NH's bats are Species of Greatest Conservation Need and forage entirely on insects. They prefer foraging in the air-space above wetlands and riparian areas; these areas generally support a greater mass and diversity of insects.

Additionally, riparian forests adjacent to wetlands and streams are a preferred roosting area for northern long-eared bat and most other bat species. Riparian areas are particularly important for nursing mothers and young pups with relatively high calorie demands and poor flying technique, respectively. Riparian roosts are closer to feeding and drinking, so less energy is spent traveling between roosting and foraging areas.

To maintain wetland and riparian habitat. I am recommending a series of series of wetland and riparian buffers during any future management operations and trail building. To avoid potentially impacting roosting northern long-eared bats, I am also recommending time of year tree cutting restrictions. See Section 6.2.3 Wetland Management Recommendations for more details.

Wetland functions

The NH Department of Environmental Services recognizes that wetlands are capable of providing the following functions and services:

1. Water Storage for Flood Water and Storm Runoff
2. Surface and Ground Water Protection
3. Fisheries Habitat
4. Wildlife and Migratory Bird Habitat
5. Hydrophytic Vegetation Habitat
6. Threatened and Endangered Species Habitat

7. Education and Research in Natural Sciences
8. Recreational Value and Economic Benefits
9. Open Space and Aesthetics
10. Erosion Control Through Binding and Stabilizing

These functions are essential to numerous species of wildlife that utilize the property. Many are also of direct and indirect benefit to humans. These functions are often best sustained by avoiding any activities that could introduce or result in: increased invasive species, alterations to wetland hydrology; increased sedimentation or otherwise impaired water quality; soil compaction; and loss of wetland vegetation. To maintain these wetland functions, I am recommending a series of wetland buffers during any future management operations and trail building. See Section 6.2.3 Wetland Management Recommendations for more details.

Amphibian breeding

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 have much greater breeding success in fish-free waters. 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 adapted to utilize a wider range of wetlands including pond shorelines, shrub and emergent wetlands, and forest swamps.

The property's *vernal pools* are fish-free and are used by breeding amphibians, including wood frogs and spotted salamander. To maintain these amphibian breeding areas, I am recommending a series of series of pool buffers during any future management operations and trail building. See Section 6.2.3 Wetland Management Recommendations for more details.

Exotic invasive species

Exotic buckthorn and other non-native invasive species are abundant in the *shrub wetlands* near Valley Road. These species can have significant detrimental impacts on wildlife habitat condition and quality, native biodiversity, and critical forest and wetland processes. I am recommending a series of herbicide treatments with follow-up monitoring to control the impacts of exotic invasive species in these wetlands. Initial treatment and long-term monitoring will be needed to address invasives species on the property as invasives are also abundant in the surrounding landscape, so seed sources are likely to persist. See Stewardship Action 7.5 for more details.

6.2.3 Wetland Habitat Management Recommendations

- Limit tree cutting to after November 1 and before April 1 to minimize and avoid impacts to northern long-eared bat and other forest roosting bats.
- Retain as many riparian and wetland snags and cavity trees as possible. Prioritize retention of larger diameter, supra-canopy, and cavity trees.
- Avoid discharging trail runoff and/or ditching directly into wetlands, streams, and/or vernal pools.
- Avoid forestry operations and trail building within 25 feet of wetlands, streams, and vernal pools unless there are no reasonable alternatives.
- Minimize trail construction within 100 feet of all vernal pools. Cross this buffer only when necessary and limit overall area of disturbance.

- Within 100 feet of the streams, wetlands, and vernal pools, maintain natural vegetation cover with >75% canopy closure.
- Within 450 feet vernal pools, maintain natural vegetation cover with >50% canopy closure.
- Strategically place logs and branches in the Great Brook channel to improve Great Brook's in-stream habitat complexity and floodplain connectivity. See Stewardship Action 7.6.
- Upgrade the current stream crossing over Great Brook to protect aquatic habitat and water quality. See Stewardship Action 7.3.
- Series of herbicide treatments to reduce the amount, impact, and spread of invasive species. See Stewardship Action 7.4.

6.3 Open Habitats

In addition to open wetland habitats, which are detailed in the preceding section, the property also has upland shrub, grass, and/or herb dominated areas; this includes two *grassland fields*[16] near Valley Road, a long linear patch of *shrubland* habitat within the National Grid powerline ROW, and a *pollinator garden.*

There are two *grassland fields*, a 4.2-acre field near the Valley Road and a 2.4-acre field south of Great Brook. Both fields were hayed by the previous landowner and now support a mix of native and naturalized grasses and herbs, and occasionally pockets of wetland sedges. The smaller field has patches of young shrubs, including buckthorn, and seedlings mowed close to the ground. These open habitats are mostly transitional in nature. Without continued management, they will eventually succeed to a forested condition. See the Open Wildlife Habitat Evaluation Table for more details on the *grassland field* habitat.

Figure 9: Open Habitats-The property has two grassland fields (upper photo) near Valley Road. The property is also bisected by a large National Grid powerline ROW with shrubland habitat (lower photo).

The property is crossed by a National Grid powerline ROW that is maintained in a *shrubland* condition. The ROW is approximately 250-feet wide. This area is dominated by early successional, invasive and occasionally wetland shrubs, including, but not limited to glossy buckthorn, viburnums, spirea, choke cherry, alder, dogwoods, and young, regenerating tree saplings interspersed with areas of herbaceous vegetation. This linear corridor crosses Great Brook and occasionally small wetland depressions. This shrubby vegetation is transitional in nature and without the on-going utility line maintenance, this will mostly succeed into forested covers. See the Open Wildlife Habitat Evaluation Table for more details on the *shrubland habitat*.

[16] Habitats listed in italics correspond with minor habitats depicted in the accompanying Wildlife Habitat and Resources Map. Habitat names generally correspond with the New Hampshire Wildlife Action Plan (NH Fish and Game Department, 2015) and/or Natural Communities of Hampshire: Second Addition (Sperduto and Nichols, 2012).

In 2016-2017, the landowner planted and created a *pollinator garden*. The *garden* has a long bed (approximately 1/10th-acre) of native flowering herbs. This bed of native herbs is complimented by a band of native shrubs along the wetland margin, young trees along the forest margin, and interspersed with areas of native grasses and bare soil. The approximately 1-acre area mapped as *pollinator garden and open* also includes trails and other open spaces. See the Open Wildlife Habitat Evaluation Table for more details on the *pollinator garden* habitat.

6.3.1 Wildlife Usage

Bats

During acoustic bat surveys, little brown, red, silver-haired and big brown bat were recorded in the *shrubland* ROW. See Section 6.4 Rare Species, Species of Greatest Conservation Need, and Exemplary Natural Communities. All these species are likely to forage in and along edge of the property's open habitats.

Birds

Moosewood Ecological LLC conducted breeding bird surveys throughout the property. While a full write-up of their finding was not available when preparing this report, NG was able to review raw data.

Chestnut-side warbler, common yellow-throat and eastern towhee were observed in the large patch of *shrubland habitat* in the National Grid ROW. These species like to nest in dense patches of shrubs and young trees. Towees are a Species of Greatest Conservation Need. Forest bird species were also observed in this area.

Other species

Deer sign was generally present throughout all the open habitats, regularly feeding within the openings and along the edges. These open habitats tend to support more abundant small mammals and prey species, which, in turn, makes these habitats important foraging areas for predators. Coyote and fox sign was also observed in and along the edge of some open habitats.

6.3.2 Important Resources and Resource Concerns

Early successional shrubby habitat

Shrub dominated areas provide important nesting habitat for many bird Species of Greatest Conservation Need, but are used by an even wider range of species for foraging and cover. Without management or disturbance, the wildlife value of these habitats declines over time as young trees get tall enough to shade out and reduce the density and vigor of shorter shrubs, tree seedlings, and herbs.

The *shrubland* habitat found in the ROW is used by eastern towhee, a Species of Greatest Conservation Need, and by other early successional shrubland bird species, including chestnut sided warbler. The understory of the *open hardwood and young forest* is also used by chestnut-sided warbler and other birds that prefer shrubby early successional conditions. The high quality shrubland habitat found in the ROW likely increases the values of the *open hardwood and young forest* for these early successional species. I am recommending the landowner maintain the *open hardwood and young forest habitat* (see Stewardship Action 7.1)

Table 4: Open Habitat Evaluation Table

Open Wildlife Habitat Evaluation						
Desired Condition	Grassland Field		Shrubland		Pollinator Habitat	
	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations	Existing Condition	Recomm-endations
Forest Habitat Age and Structure Class						
Overstory Canopy Closure-% cover of canopy layer	0%		0%		0%	
Midstory Canopy Closure-% cover of canopy layer	0%		5-30%		0%	
Understory Canopy Closure-% cover of canopy layer	70-100%		70-100%		70-100%	
Size: Shrubland patch is ≥5 acres or is < 1,000 feet from similar habitat of at least 5 acres. Grassland or old field patch is ≥10 acres or is < 1,000 feet from similar habitat of at least 10 acres.	Fair	B	Good		Fair	A
Vegetation Age and Vigor: Shrublands are 6-15 years since disturbance and/or dominated by vigorously growing shrubs and young trees. Grasslands and old fields are annually or periodically mowed and/or dominated by vigorously growing herbaceous vegetation	Good	B	Excellent		Excellent	A
Vegetation Structure- In shrubland, woody shrubs or young trees form a dense lower canopy with ≥60% cover. Shrubland vegetation is < 20 feet tall. In open habitat, herbaceous vegetation dense and continuous or nearly continuous.	Good	B	Good		Good	
Vegetation Diversity-Habitat diversity of native herbs and/or trees shrubs. Inferring vegetation is limited. If present, they are not suppressing native species diversity.	Fair	B	Good		Excellent	A. E
Emergent Trees-Shrubland or open habitat has occasional emergent overstory trees within patch or along margin of smaller patches. Ideally, 5-15 trees per acre	Good		Good		Good	
Flowering Plants- Habitat has diversity of flowering plants.	Poor	B	Fair		Excellent	E
Mast-Habitat support abundant mast producing shrubs	NA		Good		NA	
Invasive Species-Non-native invasive species are absent or limited. If present, they are not suppressing native species.	Fair	C, D	Poor	C, D	Excellent	D
Water Resources-Seeps, streams, vernal pools, wetlands, and/or other water bodies are surrounded and buffered by intact riparian forests	NA		Poor		NA	
Recommendations						
A-As needed, cut back older shrubs and/or young trees to maintain habitat						
B-Annually or semi-annually mow to maintain habitat						
C-Control invasive species with herbicide or mechanical treatment						
D-Monitor for early detection and rapid response to non-native, invasive species						
E-Release native shrubs and herbs from interfering vegetation						

Insects, pollinators, and foraging bats/birds

Open habitats with a diversity of plants species can provide a sustained food source for pollinators and other insects throughout the spring, summer, and early fall. Throughout, the growing season insects and pollinators feed on the succulent herbaceous vegetation and flowering plants common to the *pollinator garden, grassland field, and shrubland* habitats. Each plant has their own window of flowering and palatability. Typically, the greater diversity of plants within and along the edge of an open habitat, the more likely an insect food source is available at any given time and the

greater the diversity and mass of insects and native pollinators. In turn, many pollinators and insects associated with these opening are important prey for bats and birds.

To maintain a diversity of flowering plants and habitats for insect and pollinators, I am recommending that the southern *grassland field* be semi-annually mowed for old field habitat (see Stewardship Action 7.2), the northerly *grassland field* continue to be hayed, and the landowner continue to maintain the *pollinator garden*. See Section 6.3.3 Open Management Recommendations for more details.

Exotic invasive species

Exotic buckthorn and other non-native invasive species are abundant in the *shrubland* habitats. These species can have significant detrimental impacts on wildlife habitat condition and quality and native biodiversity. To reduce the amount, impact, and spread of invasive species in the shrubland habitat near Valley Road, I am recommending a series of herbicide treatments. See Stewardship Action 7.4. I also recommend the landowner work with National Grid to control invasive species in the ROW. See Section 6.3.3 Open Management Recommendations for more details. Initial treatment and long-term monitoring will be needed to address invasives species on the property as invasives are also abundant in the surrounding landscape, so seed sources are likely to persist.

Glossy buckthorn is also beginning to establish in the *grassland fields*, especially the southern field. To keep invasives in check while nearby seed sources are being treated (See Stewardship Action 7.4), I am recommending that these fields be annually or semi-annually hayed or mowed. See Section 6.3.3 Open Management Recommendations for more details.

6.3.3 Open Habitat Management Recommendations

- Series of herbicide treatments to reduce the amount, impact, and spread of invasive species. See Stewardship Action 7.4.
- Keep haying northern *grassland field* near Valley Road to maintain grassland habitat and keep invasives in-check.
- Brush-hog southern *grassland field* near Valley Road every 2-3 years to maintain old field habitat and to prevent further establishment of invasives. See Stewardship Action 7.2.
- Work with National Grid to treat invasives within the *shrubland* ROW.
- Continue to maintain *pollinator garden*. As needed, control competing vegetation from within the garden and along garden margins. Mechanical treatment (cutting, pulling) is the preferred method for control and removing competing vegetation, but herbicide treatment may be appropriate for some vegetation control, such as large areas of crab grass. Monitor and as needed cut back saplings and overhangng trees along the garden-forest edge.

6.4 Rare Species, Species of Greatest Conservation Need, and Exemplary Natural Communities

The New Hampshire Natural Heritage Bureau maintains a database on rare, threatened, and endangered species occurrences. The Natural Heritage Bureau database review is included as Appendix 11.5. The New Hampshire Natural Heritage Bureau database **does not contain any *known* rare, threatened, or endangered wildlife or plant species occurrences on the property or in the surrounding 1-mile landscape.** However, in the summer of 2021, NG conducted acoustic bat surveys on the property. During this survey, northern long-eared bats and little brown bats were detected on the property. Northern long-eared bats are a threatened species under the federal Endangered Species Act. Northerns and little browns bats are listed as endangered in New Hampshire. Based on these acoustic survey results, **the property is likely to support rare, threatened, and endangered bat species**.

6.4.1 Species of Greatest Conservation Need

The Wildlife Action Plan (New Hampshire Fish and Game Department, 2020) is a statewide wildlife assessment and plan that identifies which species should be a priority for protection and management; these priorities species are called Species of Greatest Conservation Need. The Wildlife Action Plan also prioritizes habitats that are critical to long-term viability of Species of Greatest Conservation Need. The priority habitats and the Species of Greatest Conservation Need likely to occur on the property were treated as priorities while identifying focal species and developing management goals for the property.

There have been multiple biological surveys on the property. During these surveys or during site work for this plan, the following Species of Greatest Conservation Need were documented on the property: northern long-eared bats, little brown bats, big brown bats, red bat, silver-haired bats, blue-spotted/Jefferson salamander complex, veery, Canada warbler, scarlet tanager, wood thrush, and eastern towhee. See the Appendix 11.4 for the complete Species of Greatest Conservation Need list.

6.4.2 Exemplary Natural Communities

Natural communities[17] (Sperduto and Nichols, 2011) were mapped across the property by Moosewood Ecological in 2021. Based on their assessment and consultation with the New Hampshire Natural Heritage Bureau, the property **does not contain any state exemplary natural community occurrences.** The New Hampshire Natural Heritage Bureau also maintains a database of known exemplary natural community occurrences. The Natural Heritage Bureau review is included as Appendix 11.5. The New Hampshire Natural Heritage Bureau database **does not contain any state exemplary natural community occurrences in the surrounding 1-mile landscape.**

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 NH, there is a tremendous disparity in the relative rarity or commonness of the community types. Some natural community types, like Rich Northern

[17] 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. Natural community types vary with changes in physical settings, resulting in predictable patterns across the landscape.

Hardwood Forests, are often bound to uncommon combinations of substrate, landscape position, and climate. Rich Forests, for example, grow on calcium rich bedrock, an uncommon feature in northeast. Other natural community types, like Northern Hardwood 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 NH Natural Heritage Bureau. The ranks are on a scale of 1-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.

Natural community significance is assessed at the occurrence level and is determined through a combination of the occurrence's natural community type's state rarity rank and quality. An occurrence may be considered significant either because it is of a rare type, or because it is of a common type but exhibits some exceptional characteristics, such as old growth structures or large size. The quality of each natural community occurrence is evaluated using three factors: size, condition, and landscape context. For a given natural community occurrence, each of the three evaluation factors is ranked on a scale of A-D (A = excellent; B = good; C = marginal; D = poor). These three ranks are then combined into an overall rank for the occurrence. This overall rank represents the estimated quality for the occurrence. The NH Natural Heritage Bureau has defined specific criteria for state exemplary status. An exemplary natural community occurrence includes:

- S1 or S2 natural community types, with an occurrence rank of A, B or C
- S3 natural community types with an occurrence rank of A or B
- S4 and S5 natural community types with an occurrence rank of A

For the purposes of this property, occurrences of rare or uncommon natural communities or state exemplary natural community occurrences were considered a priority for management and were assessed during inventory work for this plan. Additionally, areas that have the potential to develop uncommon or natural community occurrences were also treated as a priority

6.4.3 Rare Species, Species of Greatest Conservation Need, and Exemplary Natural Communities and Management Recommendations

- Limit tree cutting to after November 1 and before April 1 to minimize and avoid impacts to northern long-eared bat and other forest roosting bats.

7. Stewardship Actions and Practices

The following section includes a series of recommended actions and practices to maintain or improve wildlife habitat on the property. These recommendations and actions are based on the previously stated goals and objections (see Section 3) and the property's current condition, ecological capacity, and operational constraints. A summary table and schedule of all my recommended stewardship actions is included in Section 8. The table in Section 9 is a subset of these recommendations; it includes details for recommended NRCS practices.

7.1 Early Successional Young Forest Habitat Maintenance

NRCS Resource Concerns: Terrestrial habitat for wildlife and invertebrates

NRCS Practices and Amounts

647-Early Successional Habitat Management (Light Mechanical):3.5 acres

Access: Adequate. Project area can be accessed on foot or with ATV from landowner's current trail system.	**Equipment/Labor:** Contractor with hand crew. Brush saws and chainsaws.

7.1.1 Overview

In 3.5-acres of the *open hardwood forest*, use chainsaws and brush-cutters to cutback understory and midstory saplings and poles while maintaining the partial overstory of mature trees. Cut back all saplings and small poles ≤ 4 inches in diameter to encourage a dense flush of understory growth. Where possible, retain native shrubs, oak saplings, and hickory saplings. Treatment should happen outside of bird nesting season, April 15th -August 1st.

The entire *open hardwood forest* habitat is 5.6 acres. Across this acreage, overstory canopy cover is highly variable, generally ranging from 5-70% closure. With this practice, focus on treating 3.5 acres with the least amount of overstory canopy cover, mostly the central and southern parts of the habitat.

Using a hand crew, this project is best implemented in in the summer, although it could potentially be done in another season. Cutting in the summer should reduce the amount of resulting beech suckering and foster greater tree and shrub diversity. Operating within the project will require crossing the property's public recreation trail system. Brush should not be piled in the trail.

7.1.2 Action Goals

- Maintain understory early successional habitat for birds and foraging bats
- Maintain legacy overstory trees and snags for nesting birds and roosting bats

7.1.3 Resource Concerns and Project Need

Terrestrial habitat for wildlife and invertebrates

Shrubland habitats are important for shrub-nesting birds and provide cover and forage for many other Species of Greatest Conservation Need (New Hampshire Fish and Game Department, 2020). Without management or disturbance, the wildlife value of shrub habitats declines over time as young trees get tall enough to shade out and reduce the density and vigor of shorter shrubs, tree seedlings, and herbs. While the project area's understory is still used by shrubland birds, the function of this habitat is likely declining. The project area's midstory tree saplings and poles are beginning to shade out denser understory growth. I am recommending this practice to maintain the project area's understory shrubland habitat function.

7.1.4 Sensitive Features

To minimize and avoid impacts to nesting birds, early successional habitat maintenance should happen after August 1.

Northern long-eared bats have been acoustically detected in the habitat and may roost in the habitat. This species primarily uses trees larger than 6 inches in diameter. To avoid impacts to northern long-eared bats, no stems larger than 4 inches in diameter will be cut.

7.1.5 Schedule of Activities

Task	Personnel	Timing
Layout and mark early successional habitat management areas	NG	Prior to Spring 2023
Obtain contractor cost proposals and develop service agreement	NG and landowner	Spring 2023
Conduct early successional habitat management	Contractor. With oversite from NG and landowner	Winter 2023-2024
Closeout meeting with landowner and NRCS	NG and landowner	Winter 2023-2024

7.1.6 Permitting

None required.

7.1.7 Monitoring and Maintenance

Landowner should visually inspect at least once every year. Monitor for revegetation problems and the establishment of invasive species. NRCS and NG should be contacted if it takes more than 3 years for young woody vegetation to emerge or invasive species become established.

7.2 Early Successional Old Field Habitat Maintenance

NRCS Resource Concerns: Terrestrial habitat for wildlife and invertebrates

NRCS Practices and Amounts

647-Early Successional Habitat Management (Light Brush hogging): 2.6 acres

Access: Long-term access from Valley Road needs improvement. Field can currently be access with ford. Ford should be upgraded (see Stewardship Action 7.3)	**Equipment/Labor:** Tractor with brush-hog. Landowner or contractor

7.2.1 Overview

Maintain early successional old field habitat and prevent further establishment of invasive shrubs by brush-hogging 2.6 acres of former hayfield. The area should be mowed every 2-3 years to prevent establishment of woody vegetation and encourage succulent herbaceous growth. The project area field margins are lined with invasive shrubs, primarily glossy buckthorn. Young buckthorn seedlings are also present in the field. Until invasives are better under control (see Stewardship Action 7.4), the field should be mowed to stop establishment and encroachment of buckthorn and other invasives. The area should be mowed after October 15 to minimize impacts on pollinators and birds that may forage, nest, and/or otherwise utilize the open habitat. Additional project details include:

- The mower deck height should be set at 6 inches or higher
- Small patches of dense shrub thickets may be maintained as inclusions within the field but only if they support native species. Maintain no more than 10-20% of the mowed area in woody cover inclusions. Soft mast producing shrubs should be favored.

7.2.2 Action Goals

- Maintain understory early successional old field habitat for pollinators and ground nesting birds
- Maintain understory early successional old field habitat for foraging bats and birds
- Stop the establishment and encroachment of buckthorn and other invasives

7.2.3 Resource Concerns and Project Need

Terrestrial habitat for wildlife and invertebrates

Old field habitats are important for ground-nesting birds, small mammals, and pollinators (New Hampshire Fish and Game Department, 2020). Old field habitats provide important forage for an even greater number of Species of Greatest Conservation Need, such as bats, turtles, and bobcat. Without periodic mowing or grazing, the quality of old field habitat declines as woody vegetation becomes established and eventually dominant. Without mowing this area will likely become forested and/or dense with invasive shrubs. I am recommending this practice to maintain the condition and quality of the old field habitat.

Plant Pest Pressure

Exotic buckthorn is abundant along the margins of the project area and young seedlings are present within the project area. This species and the other exotic invasive species can have significant detrimental impacts on wildlife habitat condition and native biodiversity. Mowing is preventing new buckthorn from establishing and spreading within the field. Until the invasive seed sources are reduced (see Stewardship Action 7.4), this field is vulnerable to buckthorn establishment and encroachment. I am recommending this practice to prevent the further establishment of invasive shrubs while maintaining the condition and quality of the old field habitat.

7.2.4 Sensitive Features

Access to the field requires crossing Great Brook. The crossing is currently a ford that should be upgraded (See Stewardship Action 7.3). When crossing Great Brook, management operations should meet or exceed Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005) and Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016).

7.2.5 Schedule of Activities

Task	Personnel	Timing
Brush hog field	Landowner or contractor	Post October 15 2023
Brush hog field	Landowner or contractor	Post October 15 2025
Brush hog field	Landowner or contractor	Post October 15 2027
Brush hog field	Landowner or contractor	Post October 15 2029

7.2.6 Permitting

None required.

7.2.7 Monitoring and Maintenance

Landowner should visually inspect at least once every year. Monitor for any signs of surface soil erosion and evaluate the mowing frequency, as site conditions may allow for less frequent mowing Invasive species presence should also be monitored. NRCS and NG should be contacted if there is on-going soil erosion or if invasive species become established.

7.3 Upgrade and Restore Great Brook Stream Crossing

NRCS Resource Concerns: Sediment transported to surface water

NRCS Practices and Amounts

NRCS Practice 578-Stream Crossing: Component and square footage TBD.
NRCS Practice 342-Critical Area Planting (Native or Introduced Vegetation, Moderate Grading): Final acreage TBD. Approximately 0.04 acres.
NRCS Practice 484-Mulching (Straw or Hay, Manual Application): Final acreage TBD. Approximately 0.04 acres.

Access: Adequate. Access through field on Valley Road. Project will improve access for management and other practices.	**Equipment/Labor:** Contractor to construct bridge. Additional design and permitting TBD.

7.3.1 Overview

Landowner lacks adequate, long-term access for managing one of the property's *grassland fields* and implementing other practices in this plan, including maintaining the field's old field early successional habitat and limiting the spread of invasive species (See Stewardship Action 7.4). Accessing the southern field off Valley Road requires crossing Great Brook. There is an old bridge at the crossing that is no longer useable, and the field is currently accessed by fording the stream. For long-term management, water and habitat resource protection and implementation of practices in this plan, I recommend removing the old bridge, restoring the ford, and installing a new bridge or other improved crossing structure.

Additional engineering expertise and site work are needed to determine bridge or improved crossing design, size, and construction. A channel spanning bridge with abutments placed above and outside the channel top-of-bank, could be 20-25 feet long. Minimally, a new bridge should be designed and constructed to support a tractor with brush-hog, livestock, and smaller farm equipment. The old bridge has sloped earthen approaches. Placing the new bridge in the same location and using the same approaches should be evaluated.

Figure 10: Great Brook Crossing- Upper photo shows existing equipment forest through brook. Lower photo shows former bridge.

Once the new bridge or improved crossing is constructed, the construction site and the ford should be restored. The ford is rutted. These ruts and any construction-related ruts should be smoothed. The ford approach and construction site should be seeded (Critical Area Planting) and mulched. The size of the Critical Area Planting and Mulching practices should be re-evaluated when the bridge design is finalized. The seed mix for the Critical Area Planting to be determined with NRCS. Mix should include species suited to riparian conditions and capable of providing rapid soil stabilization. The Critical Area Plantings should be mulched with straw or straw blankets immediately after seeding.

7.3.2 Action Goals

- Restore current equipment ford and remove old bridge over Great Brook
- Install new bridge or other improved crossing for equipment access over Great Brook
- Protect water resources

7.3.3 Resource Concerns and Project Need

Sediment transported to surface water

The ford approach and stream bank are underlain by soft Limerick silt loam soils, which are easily rutted and compacted by equipment. The approach is developing ruts that now concentrate water flow and are eroding, washing sediment into Great Brook. When offsite sediments are transported to and deposited into surface waters, they can degrade water and habitat quality and cause stream channel instability. Installing a new bridge and restoring the ford will reduce the amount of sediment transported to Great Brook at this crossing location.

7.3.4 Sensitive Features

This project crosses Great Brook. To limit potential impacts to this stream, the bridge design, construction, and project closeout should meet or exceed Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005) and Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016).

7.3.5 Schedule of Activities

Task	Personnel	Timing
Determine bridge or improved crossing design, size, and construction	NRCS, Landowner, and as needed Contractor	2022
Obtain contractor estimate for bridge construction and removal	Landowner, and as needed, NG	2023
Obtain appropriate permits	Contractor and Landowner. As needed, NG	2023
Construct new bridge, remove old bridge, smooth/grade construction site and ford	Contractor	2024
Install critical area planting and mulch	Landowner, Contractor, and/or, NG	Immediately post-construction

7.3.6 Permitting

A permit or permit-by-notification from the NHDES Wetlands Bureau will be required to construct a bridge or other improved crossing and, potentially, for the removal of the old bridge and regrading of the ford.

7.3.7 Monitoring and Maintenance

Minimally, landowner should visually inspect bridge or improved crossing every spring and after significant storm events. Landowner should look for damage to decking, stringers, sills/abutments, and other related structures and look for any erosion or deterioration of the stream bank or channel. As needed, remove storm debris from bridge or crossing. NRCS and NG should be contacted if there are any concerns with the bridge, crossing, or stream channel.

Throughout the Critical Area Planting establishment period, landowner should regularly monitor and as needed, maintain any areas requiring seed and mulch. Critical Planting Area should be visually inspected after the first significant rain event to ensure adequate coverage of seed and mulch. As needed, replenish seed and mulch until exposed soil is at least 60% revegetated. NRCS and NG should be contacted Planting Areas fails to revegetate.

7.4 Invasive Species Control

NRCS Resource Concerns: Plant pest pressure

NRCS Practices and Amounts

NRCS Practice 314-Brush Management (Chemical Moderate Control):6.3 acres.

NRCS Practice 314-Brush Management (Chemical Light Control):6.3 acres.

Access: Currently suitable. Off road parking available in field. Field margin ATV and tractor accessible.	**Equipment/Labor:** Contract licensed herbicide applicator required. Backpack sprayer and equipment mounted sprayer

7.4.1 Overview

Treat 6.3 acres of woody invasive shrubs using a mix of foliar and cut-stem herbicide treatments. The project area includes two field margins, road frontage along Valley Road, and a nearby *Shrub Swamp*. The project area includes a mix of upland and wetland conditions. Glossy buckthorn grows abundantly along the field margins. It is also present in lower in abundance in the immediately surrounding forest and nearby swamp. As a whole, the project area is being recommended for an initial Chemical Moderate Control NRCS practice, but it includes areas of difficult and light control. In addition to buckthorn, there are also scattered barberry and honeysuckle. Asiatic bittersweet is very likely.

After initial treatment, the project area should be evaluated and as needed, re-treated for invasives. I am recommending two follow-up Chemical Light Control practices at two- and four-years post implementation. The follow-up treatment can eradicate mature shrubs not killed by the initial treatment and newly emerging invasive shrubs.

7.4.2 Action Goals

- Reduce current abundance of glossy buckthorn and other exotic invasive species
- Eradicate largest seed producing buckthorn shrubs

7.4.3 Resource Concerns and Project Need

Plant Pest Pressure

Exotic buckthorn is abundant in the project area. This species and the other exotic invasive species present in the project area can have significant detrimental impacts on wildlife habitat condition and quality, native biodiversity, and critical forest and wetland processes. I am recommending this practice to reduce the amount, impact, and spread of invasive species.

7.4.4 Sensitive Features

There are wetlands in the project area. To protect the property's wetlands and remain in compliance with the Wetland Protection Act, herbicides should only be applied under the supervision of a licensed herbicide applicator.

7.4.5 Schedule of Activities

Task	Personnel	Timing
Obtain contractor cost proposals	Landowner, and as needed, NG	2022

Initial invasive control treatment, chemical-moderate	Contractor. Landowner, and as needed, NG	2023
1st Follow-up invasive control treatment, chemical-light	Contractor. Landowner, and as needed, NG	2025
2nd Follow-up invasive control treatment, chemical-light	Contractor. Landowner, and as needed, NG	2027

7.4.6 Permitting

The property's wetlands fall under the jurisdiction of the Wetland Protection Act and treatment of any invasives in the wetlands may require a permit, this includes the recommended chemical methods.

7.4.7 Monitoring and Maintenance

Landowner should visually inspect the first three years post-implementation. During monitoring, look for persistent invasive shrubs surviving treatment, newly emerging invasive species, and revegetation problems. NRCS and NG should be contacted if it takes more three years for other vegetation to emerge or invasive species become re- established.

7.5 Install Waterbars and Erosion Control on Forest Trails

NRCS Resource Concerns: Sheet and rill erosion, classic gully erosion	
NRCS Practices and Amounts	
NRCS Practice 655-Forest Trails and Landing: 1,070 feet. Primarily Trail Erosion Control w/o Vegetation, Slopes < 35%, but may also include Trail Erosion Control w/o Vegetation, Slopes > 35%	
Access: Multiple access locations Access through field on Valley Road with short ford over Great Brook. Or access from near landowner	**Equipment/Labor:** Contract excavator operator. The eastern trail potentially done with a smaller excavator. Full size machine for western trail

7.5.1 Overview

On two separate access trails, install water bars and as needed, regrade trail to establish out-slope or smooth eroded trail sections. I am recommending 1,070 feet of erosion control. Erosion control is recommended for trail sections with on-going erosion and for sloped trail sections that currently lack erosion but are vulnerable to future erosion.

The landowner uses the eastern trail included in this recommendation to access and manage the property's forest and the fields along Valley Road. This trail lacks current erosion but is vulnerable to future erosion. 520 feet of this access trail needs erosion control, including a combination of waterbars and out-sloping. The trail section has slopes less than 35%. To accommodate on-going management access, waterbars should be sized at the shallow end of state BMPs for erosion control. State BMPS for waterbars on forest trails range from 12-24 inches in total depth.

Figure 11: Soil Erosion-The western trail section has on-going soil erosion from the previous and abutting landowner,

The western trail section, 550 feet, has on-going soil erosion and loss that needs to be stabilized. This section lacks any current erosion control and needs water bars. Where necessary, gullies should be re-graded to slow soil loss and erosion. This trail was used by previous landowners for management but no longer provides this function. Most of the western trail section has slopes less than 35%, but there are likely pitches that exceed 35%. To maximize function and minimize maintenance, waterbars for this section should be sized at the deep end of state BMPs.

Follow guidelines for waterbars, out-sloping, and other erosion control devices in Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016) and Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005).

7.5.2 Action Goals

- Stabilize on-going erosion and prevent future erosion on access trails
- Protect soil and water resources

7.5.3 Resource Concerns and Project Need

Sheet and Rill Erosion and Classic Gully Erosion

The trail sections recommended for this practice descend highly erodible land that is inherently vulnerable to erosion and soil loss when vegetative cover is removed. These trail sections exacerbate the risk of erosion by concentrating and longitudinally funneling water down the trail. Without water bars, out-sloping or other erosion control, risk of erosion in these areas is likely to increase over the long-term as gullies form, increase in size, and further concentrate flows and erosive power. Risk of erosion is also likely to increase in these areas as the severity and frequency of intense storm events increases. On the western trail section, there is some concern that eroding soils could be deposited into a small stream. I am recommending this practice to remediate on-going soil erosion concerns and prevent future soil erosion concerns.

7.5.4 Sensitive Features

The project is underlain by highly erodible soils and will involve disturbing these soils, increasing the short-term risk for erosion on the recommended trail sections. To limit short-term erosion, mulch and seed high risk areas in accordance with Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005) and Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016).

The western trail section approaches but does not cross an ephemeral stream. To limit potential impacts to this stream, management operations should meet or exceed Best Management Practices for Forestry: Protecting New Hampshire's Water Quality (University of New Hampshire Cooperative Extension, 2005) and Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire (State of New Hampshire, 2016). Potentially the most pertinent BMP to this project, waterbar ditching should not be discharged directly into streams.

7.5.5 Schedule of Activities

Task	Personnel	Timing
Flag and layout waterbars and other erosion control	NG or NRCS	2022
Obtain contractor estimate	Landowner, and as needed, NG	2022
Install waterbars and other erosion control	Contractor	2023

7.5.6 Permitting

None. There are no stream or wetland crossings.

7.5.7 Monitoring and Maintenance

All trail sections should be visually inspected after the first significant rain event to ensure proper waterbar and out-slope functioning. Landowner should also visually inspect trail sections in the first spring after implementation to check on water bars and out-slope. After initial inspection, at a minimum, waterbars should be re-inspected every 10 years. Landowner is also recommended to check on and as needed maintain trail sections after significant storm events. NRCS and NG should be contacted if soil erosion continues.

7.6 Stream Woody Additions

NRCS Resource Concerns: Aquatic Habitat for Fish and Other Organisms

NRCS Practices and Amounts

NRCS Practice 395-Stream Habitat Improvement and Management (Mechanical instream wood placement): Acreage TBD. 1,680 feet of linear stream channel.

Access: Use ROW through abutter's parcel to access property near power line. Adequate for hand crews to access project area on foot.	**Equipment/Labor:** Contract hand crew with chainsaws and winches.

7.6.1 Overview

Hand-crews should cut native logs on-site and using winches, grip-hoists, and other mechanical levers, strategically place logs and branches in the Great Brook channel to improve in-stream habitat and floodplain access. Additional assessment is needed to document existing woody structures and determine the size, frequency, and placement of the stream woody additions needed. Placement, design, and frequency of the woody additions should follow recommendations in NRCS "Practical Guide to Adding Wood to Streams in NH", which generally includes:

- Having at least four pieces of large woody material in every 100 feet of stream, with at least two of these structures creating a pool-riffle/cascade complex. If the 100-foot stretch already has one pool-riffle complex, then add wood in two or three locations. If it has none, add wood in four locations.
- Having one or two locations in every 100 feet of stream with in-stream logs oriented perpendicular to the flow.
- Having one or two locations in every 100 feet of stream with several logs and branches crisscrossed in the channel.
- Having one larger channel-spanning strainer in every 300 feet of stream. The larger strainer should be constructed of multiple logs and branches and place near bankfull elevation.

This is practice recommended for 1,680 linear feet of channel. NRCS contracts and rates for this practice, however, are based on acres. The acreage of this practice is still to be determined.

7.6.2 Action Goals

- Place wood in channel to improve and diversify in-stream aquatic habitat
- Place wood in channel to increase floodplain connectivity and access

7.6.3 Resource Concerns and Project Need

Aquatic Habitat for Fish and Other Organisms

Streams provide important aquatic habitat for fish, amphibians, and macro-invertebrates, including many Species of Great Conservation Need (New Hampshire Fish and Game Department, 2020). The greatest threat to fish and other aquatic organisms is the destruction or degradation of their habitat. Reduced habitat complexity, poor water quality, and/or lack of upstream, downstream, and floodplain connectivity can degrade the quality and function of aquatic habitat for fish. Historically, in northeast, abundant natural wood within the channel helped maintain this complexity and quality. I am recommending adding woody material to Great Brook to improve instream habitat complexity, increase the amount of available cover, and enhance floodplain connectivity.

7.6.4 Sensitive Features

This project involves placing logs and brush into Great Brook, a 1st order stream as flows past the project site. The brook frequently lined by soft and seepy soils. To limit potential impacts to this stream and soft soils, the project should be implemented by hand crews using chainsaws and winches. Heavy equipment will not be used.

Northern long-eared bats have been acoustically detected on the property may roost in the project area. To avoid potential impacts to northern long-eared bats, tree cutting should happen after November 1 and before April 15 OR potential roost trees should be identified and avoided during cutting.

7.6.5 Schedule of Activities

Task	Personnel	Timing
Evaluate existing stream channel condition and determine number, frequency and design of woody additions needed. Determine practice acreage.	NRCS and/or NG	2023
Obtain contractor estimate for stream woody additions	Landowner, and as needed, NG	2024
Obtain appropriate permits	Contractor and Landowner. As needed, NG	2024
Install stream woody additions	Contractor	2025

7.6.6 Permitting

A permit or permit-by-notification from the NHDES Wetlands Bureau is required. A permit may also be required by the U.S. Army Corps of Engineers.

7.6.7 Monitoring and Maintenance

Minimally, project area should be inspected the first summer after implementation to verify that wood additions are still mostly in place. Movement of some wood additions is expected. Sometimes, woody additions can be reset or re-oriented to improve their stability and function. After initial inspection, landowner should visually inspect project area every 1-2 years to check on woody additions and monitor stream channel changes. NRCS and NG should be contacted if woody additions have been washed away or need to be reset or re-oriented. NRCS and NG should also be contacted if there are any new areas of rapid stream channel erosion or migration.

8. Table and Schedule of All Stewardship Actions

2022	2023	2024	2025-2026	2026-2031	Stewardship Actions Table
	X				Trail erosion control. Install water bars and, as needed, regrade trail to establish out-slope and reduce gully erosion. There are 1,070 total linear feet of NRCS Practice 655-Forest Trails and Landings.
	X		X	X	Invasive shrub control. Herbicide foliar and cut-stump treatment of invasive shrubs, primarily buckthorn. Includes a mix of difficult and light sites 6.3 acres of NRCS Practice 314-Brush Control (Chemical Moderate). As needed, follow-up Chemical Light Control practices at two- and four-years post implementation.
	X		X	X	Old field habitat maintenance. Brush-hog former hayfield every 2-3 years to maintain old field habitat and to prevent invasives. 2.6 acres of NRCS Practice 647-Early Successional Habitat Development (Light Brush Hogging)
		X			Young forest habitat maintenance. Under Open Hardwood Forest, use chainsaws and brush-cutters to cutback understory and midstory saplings and poles while maintaining the partial overstory canopy. 3.5 acres of NRCS Practice 647-Early Successional Habitat Development (Light Mechanical)
		X			Upgrade and restore stream crossing. Construct bridge or other improved crossing over Great Brook. Remove old bridge. Smooth and restore ford. Crossing size and design TBD for NRCS Practice 578-Stream Crossing. Approximately 0.04 acres of NRCS Practice 342-Critical Area Planting (Native or Introduced Vegetation, Moderate Grading) and NRCS Practice 484-Mulching (Straw, Manual Application).
			X		Stream woody additions. Strategically place logs in Great Brook channel to improve habitat and floodplain access. Hand-crew with chainsaw and winches. 1,680 linear feet of channel. Acreage TBD for NRCS Practice 395-Stream Habitat Improvement and Management (Mechanical instream wood placement)
X	X	X	X	X	Protect hardwood seedlings with tree shelters. Use 4-foot-tall tree shelters to protect hardwood seedlings, except for beech. Favor the maples, oaks, hickories.
X	X	X	X	X	Keep haying northern grassland field near Valley Rd.
X	X	X	X	X	Continue to maintain pollinator garden
		X	X	X	Protect hardwood seedlings and native plants with deer exclusion fencing. Construct and maintain deer exclusion fencing on part of Rattlesnake Knoll. Demonstrate and study impacts of deer browse.

	2021 NRCS EQIP Practice. Action includes an NRCS approved practice that may be eligible for technical or financial support. See following NRCS practice table.

9. Table and Schedule of NRCS Practices

Practice Code/Practice Name/Practice Component	Practice Unit	Unit Cost	Planned Amount	Season	Year	Practice Estimated Cost
655 Forest Trails and Landings Trail Erosion Control w/o Vegetation, Slopes < 35%	Ft	$2.59	1,070	Summer	2023	2771.3
314 Brush Management Chemical Moderate	Ac	$318.94	6.3	Spring-Fall	2023	2009.322
314 Brush Management Chemical Light	Ac	$192.42	6.3	Spring-Fall	2025	1212.246
314 Brush Management Chemical Light	Ac	$192.42	6.3	Spring-Fall	2027	1212.246
647 Early Successional Habitat Development-Mgt Light Brush hogging	Ac	$109.42	2.6	Fall	2023	284.492
647 Early Successional Habitat Development-Mgt Light Brush hogging	Ac	$109.42	2.6	Fall	2025	284.492
647 Early Successional Habitat Development-Mgt Light Brush hogging	Ac	$109.42	2.6	Fall	2027	284.492
647 Early Successional Habitat Development-Mgt Light Brush hogging	Ac	$109.42	2.6	Fall	2029	284.492
647 Early Successional Habitat Development-Mgt Light Mechanical	Ac	$292.28	3.5	Winter	2024	1022.98
578 Stream Crossing Pr_Timber Bridge with Block Abutments	SqFt	$62.33	TBD	Summer	2024	
342 Critical Area Planting Native or Introduced Vegetation - Moderate Grading (Organic and Non-Organic)	Ac	$472.77	0.04	Summer	2024	18.9108
484 Mulching Straw or Hay, Manual Application	Ac	$306.13	0.04	Summer	2024	12.2452
395 Stream Habitat Improvement and Management Mechanical instream wood placement	Ac	$14,689.19	TBD	Summer	2025	

Total Estimated Cost for All Planned Practices **$9,397.22**

Notes:

10. References

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11. Appendices

11.1 Tree Size Classes

Class	Size Range in Inches
Seedling	Medial DBH ≤1
Sapling	1< Medial DBH ≤4. 5
Pole	4.5< Medial DBH ≤10.5 DBH
Small Sawlog	10.5< Medial DBH ≤16.5 DBH
Large Sawlog	Medial DBH ≥16.5

11.2 Forest Habitat Age and Structure Classes

STAND STRUCTURE CLASS			
HABITAT AGE CLASS	**#**	**CLASSIFICATION NAME**	**DETAILS**
Young	1	Seedling	0–10 years, <1" DBH, >80% understory
	2	Sapling	10–25 years, 1–5" DBH, 10–30', >80% midstory ,<30% overstory
Intermediate	3a	Single-aged Poletimber	20–70 years, 5–10" DBH, 30–70% overstory, <30% midstory
	3b	Two-aged Poletimber with Partial Overstory	Variable age, 5–10" DBH, 30–70% overstory, >30% midstory
Older	4	Maturing/Small Sawtimber	70–100 years, 10–16" DBH dominant trees, >70% canopy cover
	5	Older Complex/ Large Sawtimber	>100 years, >16" DBH dominant trees, >70% canopy cover, multiple layers common

From Forestry for Maine Birds: A Guidebook for Foresters Managing Woodlots "With Birds in Mind" (Gallo et al., 2017)

11.3 Wildlife and Habitat Inventory Methods

There were three general areas of wildlife and habitat data collection: remote mapping and assessment of habitats and habitat features; field assessment of habitats and habitat features; and wildlife surveys.

Habitat mapping and assessment was an iterative process. First, habitats, wetlands, streams, and other larger-scale habitat features were remotely mapped and qualitatively assessed across the property. Remote mapping and assessment were conducted in ArcGIS Pro using a mix of aerial imagery and publicly available terrain, soils, wetland, and stream data. New Hampshire Wildlife Action Plan data, New Hampshire Nature Heritage Bureau, and natural community mapping from Moosewood Ecological were also consulted during remote mapping and assessment. Next, a more detailed field assessment was conducted to refine remote mapping, evaluate habitat condition, species assemblages, and map smaller scale habitats and habitat features, such as vernal pools and ephemeral streams.

Field assessment of habitats occurred in May-September of 2021 Sampling was stratified by habitat. Within each habitat type, one or more inventory plots were established to assess habitat composition, quality, and condition. Plot-level data collection and assessment was based on a combination of the NH NRCS Wildlife Habitat Evaluation Guides and Vermont Audubon's Forest Bird Habitat Assessment (Hagenbuch et al.,2011).

Wildlife data was also compiled for each habitat type. Wildlife data came from a variety of sources, including observations of wildlife and wildlife sign made during site visits, the landowner, New Hampshire Heritage Bureau, and the New Hampshire Fish and Wildlife Department.

Bats

In 2021, NG conducted passive acoustic bat surveys to determine the property's bat population. Surveys were done in accordance with the 2021 USFWS Range-wide Indiana Bat Summer Survey Guidelines. The bat survey results and methodology are detailed in the Distant Hills Acoustic Bat Survey report.

Birds

Moosewood Ecological LLC conducted breeding bird surveys throughout the property in 2021. While a full write-up of their finding was not available when preparing this report, NG was able to review raw data. It is assumed Moosewood Ecological followed standard breeding bird survey methodology for the bird survey.

11.4 Species of Greatest Conservation Need

Included below is a New Hampshire's Species of Greatest Conservation Need as identified in the 2020 New Hampshire Wildlife Action Plan. Plant Species of Greatest Conservation Need are not included in the below appendix.

New Hampshire Wildlife Action Plan
Species of Greatest Conservation Need

Species of Greatest Conservation Need are those in serious trouble – declining numbers, with smaller patches of habitat, and/or threatened by a host of issues

Mammals
American Marten
American Water Shrew (Eastern)
Big Brown Bat
Canada Lynx***
Eastern Red Bat
Eastern Small-footed Bat**
Eastern Wolf****
Hoary Bat
Little Brown Bat**
Long-tailed Shrew
Moose
New England Cottontail**
Northern Bog Lemming
Northern Long-eared Bat***
Rock Vole
Silver-haired Bat
Southern Bog Lemming
Tri-colored Bat**

Birds
American Black Duck
American Kestrel
American Pipit
American Three-toed Woodpecker
American Woodcock
Bald Eagle
Bank Swallow
Bay-breasted Warbler
Bicknell's Thrush
Black-billed Cuckoo
Blue-winged Warbler
Bobolink
Brown Thrasher
Canada Warbler
Cape May Warbler
Cerulean Warbler*
Chimney Swift
Cliff Swallow*
Common Gallinule
Common Loon*
Common Nighthawk**
Common Tern*
Eastern Meadowlark*
Eastern Towhee
Eastern Whip-poor-will
Field Sparrow
Golden Eagle**
Golden-winged Warbler
Grasshopper Sparrow*
Horned Lark
Least Tern**
Least Bittern
Marsh Wren
Nelson's Sparrow
Northern Goshawk
Northern Harrier**
Olive-sided Flycatcher
Peregrine Falcon*
Pied-billed Grebe*
Piping Plover***
Prairie Warbler
Purple Finch
Purple Martin*
Purple Sandpiper
Red Knot*
Roseate Tern****
Ruddy Turnstone
Ruffed Grouse
Rusty Blackbird
Saltmarsh Sparrow
Sanderling
Scarlet Tanager
Seaside Sparrow
Sedge Wren
Semipalmated Sandpiper
Sora
Spruce Grouse
Upland Sandpiper**
Veery
Vesper Sparrow
Whimbrel
Willet
Wood Thrush

Reptiles
Blanding's Turtle**
Eastern Box Turtle**
Eastern Hog-nosed Snake**
Eastern Ribbonsnake
Northern Black Racer*
Smooth Green Snake
Spotted Turtle*
Timber Rattlesnake**
Wood Turtle

Amphibians
Blue-spotted/Jefferson Salamander complex
Fowler's Toad*
Marbled Salamander**
Mink Frog
Northern Leopard Frog

Fish
Alewife
American Brook Lamprey**
American Eel
American Shad
Atlantic Sturgeon*
Banded Sunfish
Blueback Herring
Bridle Shiner*
Brook Trout
Burbot
Finescale Dace
Lake Trout
Lake Whitefish
Northern Redbelly Dace
Rainbow Smelt
Redfin Pickerel
Round Whitefish*
Sea Lamprey
Shortnose Sturgeon****
Swamp Darter

Butterflies & Moths
Barrens Itame
Barrens Xylotype
Broad-lined Catopyrrha
Cora Moth (Bird Dropping Moth)
Edward's Hairstreak
Frosted Elfin**
Graceful Clearwing
Hessel's Hairstreak*
Karner Blue Butterfly****
Monarch
New Jersey Tea Span Worm
Noctuid Moth
Persius Duskywing Skipper**
Phyllira Tiger Moth
Pine Pinion Moth*
Pinion Moth
Sleepy Duskywing
Twilight Moth
White Mountain Arctic*
White Mountain Fritillary**
Zale sp. 1 nr. lunifera

* State Threatened
** State Endangered
*** State Endangered, Federally Threatened
**** State Endangered, Federally Endangered

Tiger Beetles
Appalachian Tiger Beetle
Cobblestone Tiger Beetle**
Margined Tiger Beetle
Puritan Tiger Beetle***

Bumblebees
American Bumble Bee
Rusty-patched Bumble Bee****
Yellow Bumble Bee
Yellowbanded Bumble Bee

Dragonflies & Damselflies
Coppery Emerald
Kennedy's Emerald
Lyre-tipped Spreadwing
Ocellated Emerald
Pine Barrens Bluet
Rapids Clubtail
Ringed Boghaunter*
Ringed Emerald
Sedge Darner
Skillet Clubtail

Freshwater Mussels
Alewife Floater
Brook Floater**
Creeper
Dwarf Wedgemussel****
Eastern Pearlshell
Eastern Pondmussel*
Triangle Floater

Marine Wildlife
American Oyster
Atlantic Sea Scallop
Horseshoe Crab
Northern Shrimp
Softshell Clam
Fin Whale
Humpback Whale
North Atlantic Right Whale

New Hampshire Natural Heritage Bureau

DNCR - Division of Forests & Lands
172 Pembroke Road, Concord, NH 03301
Phone: (603) 271-2214 Fax: (603) 271-6488

To: Jesse Mohr
Native Geographic, LLC
177 Fairview Street
Fairlee, VT, 05045

From: NH Natural Heritage Bureau
Date: 2020-11-03
Re: Review by NH Natural Heritage Bureau of request dated 2020-10-23

NHB File ID: 3603
Project type: Landowner Request
Town: Walpole, NH
Location: 11-045-00, 11-050-00, 11-051-00, 11-059-00; Alstead 053-006-000 (Distant Hills)

We have searched our database for records of rare species and exemplary natural communities on the property(s) identified in your request. Our database includes known records for species officially listed as Threatened or Endangered by either the state of New Hampshire or the federal government, as well as species and natural communities judged by experts to be at risk in New Hampshire but not yet formally listed.

NHB records on the property(s): **None**

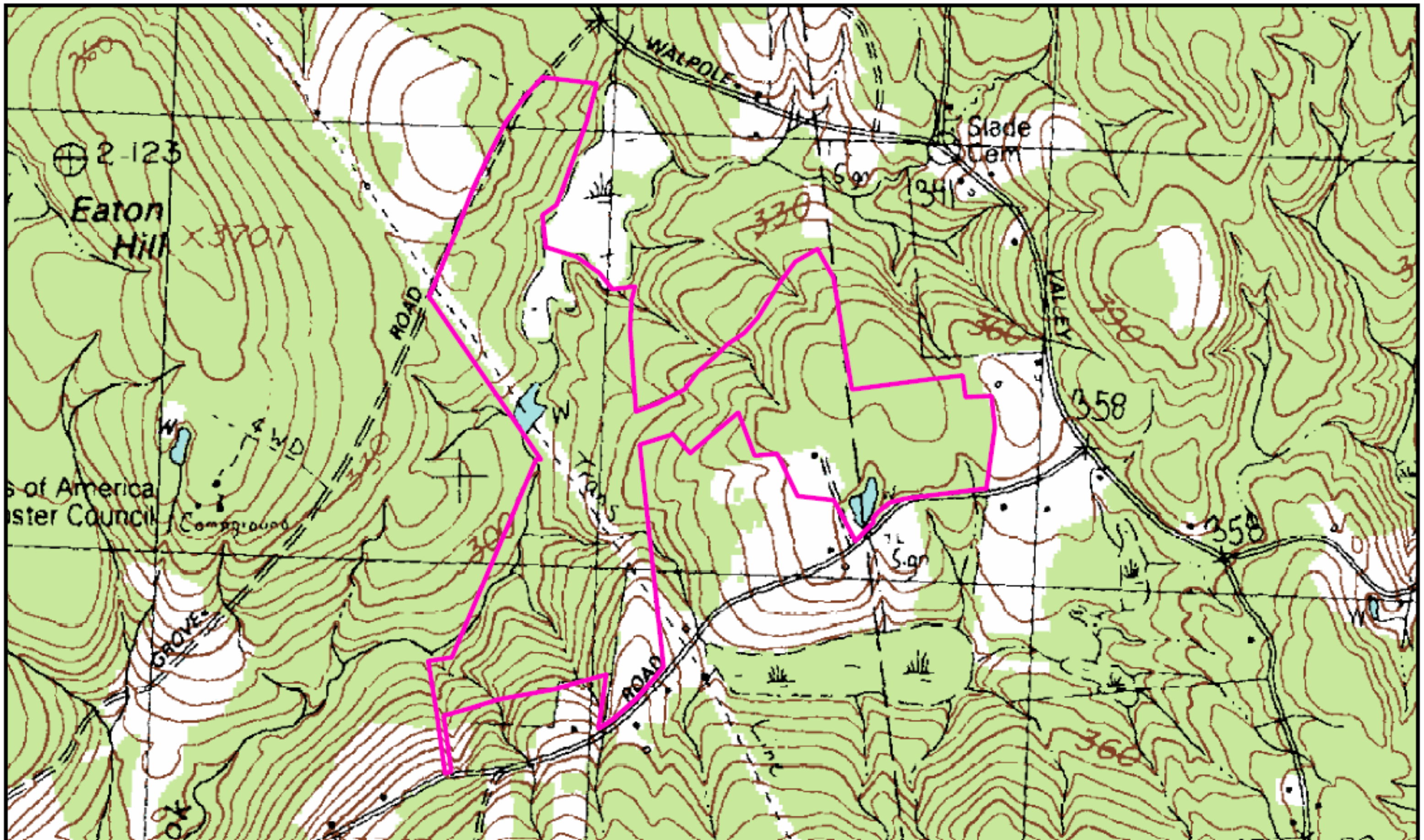
NHB records within one mile of the property(s):

	Last Reported	Listing Status		Conservation Rank	
Plant Species		**Federal**	**NH**	**Global**	**State**
showy orchid - *Galearis spectabilis*	2010	--	T	G5	S2

Listing codes: T = Threatened, E = Endangered SC = Special Concern
Rank prefix: G = Global, S = State, T = Global or state rank for a sub-species or variety (taxon)
Rank suffix: 1-5 = Most (1) to least (5) imperiled. "--", U, NR = Not ranked, B = Breeding population, N = Non-breeding. H = Historical, X = Extirpated.

A negative result (no record in our database) does not mean that no rare species are present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

NOTE: This review *cannot* be used to satisfy a permit or other regulatory requirement to check for rare species or habitats that could be affected by a proposed project, since it provides detailed information only for records actually on the property.



Natural Heritage Bureau
Landowner Report

Project ID Number: 3603

NOTE: Any rare species and/or exemplary natural communities in this area are not shown unless they occur, at least in part, within the property bounds.

0 0.1 0.2 Mile

Property Bounds	*# of Records*
Plant Occurence:	*0*
Animal Occurence:	*0*
Natural Community:	*0*
Ecological System:	*0*