

# Climate Change Strategies and Approaches

## *Analysis of the management plan of [Landowner]*

Review by Nancy Patch, Summer 2022

Climate change is expected to have numerous impacts on natural resources, at every possible scale. For those who own and manage land, it can be challenging to sort through projections and research to understand how climate change might impact a single parcel—or, conversely, what role the management of that single parcel can play in aiding with climate change adaptation or mitigation.

The [Northern Institute of Applied Climate Sciences \(NIACS\)](#) has put together an [Adaptation Workbook](#) intended to bridge this gap. The workbook lays out a set of [10 strategies](#), each that provides a different lens through which to evaluate land management as it pertains to a changing climate. NIACS has also assigned a series of approaches to land management that accompany each strategy.

Cold Hollow to Canada works in conjunction with the Vermont Department of Forests, Parks, and Recreation to review management plans to help landowners identify strategies and approaches that are *already present in their management plans*. This gives landowners a starting point, allowing them to understand the role their land currently plays with regard to a changing climate. From there, each landowner can evaluate if or how inclusion of additional strategies or approaches might fit in with their management goals.

It is worth noting that the NIACS workbook was compiled for use at a national scale. Because climate change impacts different parts of the country in very different ways, some approaches are not relevant in our region. The list of strategies and approaches should therefore be used with careful consideration of regional climate change needs *and* of the particular traits of a single parcel or site, rather than as a prescription of activities that should occur in all locations.

To learn more about climate change and forest adaptation in Vermont, the Vermont Department of Forests, Parks, and Recreation has put together a comprehensive guide of research and recommendations: [Creating and Maintaining Resilient Forests In Vermont: Adapting Forests to Climate Change](#).

### **Strategy 1: Sustain Fundamental Ecological functions**

#### **1.1.-Maintain or restore soil quality and nutrient cycling**

- Plan requires Acceptable Management Practices for roads and trail to be followed

- Legacy trees are retained which will become large coarse woody material adding to soil organic layer. Trees identified include large sugar and red maple, and some of the larger weeviled white pine
- Retain and add to coarse woody material during harvesting to build soil

### **1.2 -Maintain or restore hydrology**

- Stream crossing are kept to a minimum
- AMP's are followed for roads and trails, slowing and sinking water

### **1.3- Maintain or restore riparian areas.**

- A 100 foot minimal cut buffer is required to be placed on perennial streams, the pond and associated wetlands.
- A 50 foot minimal cut buffer on ephemeral streams and , in excess of AMP requirements

## **Strategy 2: Reduce the impact of existing biological stressors**

### **2.1-Maintain or improve the ability of forest to resist pests and pathogens**

- Species diversity is emphasized as a buffer to insect and disease
- Birch bark disease: resistant tree will be retained thorough biological life span
- Diseased trees that cause infection such as Eutypella will be removed during harvesting operations

### **2.2-Prevent the introduction and establishment of invasive plant species & remove existing invasives**

- Monitoring is recommended, specifically along edges and openings where plants establish
- One honeysuckle and one buckthorn were identified along the roads to be removed.
- A small patch of phragmites was observed in the corner of the wetland to be removed

### **2.3- Manage herbivory to protect or promote regeneration**

- Herbivory is identified as a potential problem, deer wintering areas have a greater impact and much of this parcel has been mapped as a deer yard
- Hunting is allowed and encouraged
- Tops are left whole during harvesting except along trails

## **Strategy 3: Protect forests from severe fire and wind disturbance**

**3.1-Alter forest structure or composition to reduce risk or severity of fire.** No fire risk at this time

**3.2 -Establish fuelbreaks to slow catastrophic spread of fire** No Fire risk at this time.

### **3.3-Alter forest structure to reduce severity or extent of wind and ice damage**

- Crop Tree release enhances crown and root development for increased resistance to wind and ice.
- Group selection develops a forest structure that responds to wind disturbance maintaining the future forest
- Regeneration is diverse and abundant throughout the property, providing resilience to storms

## **Strategy 4: Maintain or create Refugia**

### **4.1-Prioritize and protect existing populations on unique sites**

- Hemlock swamp is a rare natural community in VT and this stand has no activity scheduled. It does qualify for added protection in the Use Value Appraisal Program

#### **4.2-Prioritize and protect at-risk species or communities**

- Buffers around the pond will protect the Heron Rookery
- Vernal Pools have a 100 foot minimal cut buffer with an extended rotation around them and a 500 foot life zone where machinery will be limited and coarse woody material will be augmented
- Large diameter legacy trees have been identified that could develop cavities for den or nesting habitat that addresses habitat needs for several species of concern
- Interior Forest songbird habitat management recommended that address VT responsibility birds

#### **4.3-Establish artificial reserves for at risk and displaced species**

- Not applicable for private landowners

### **Strategy 5: Maintain and enhance species diversity and structural diversity**

#### **5.1- Promote age class diversity**

- Uneven-aged is the goal on this property with a diversity of age classes
- Structural diversity is highlighted through songbird habitat implementation
- Entry cycles and rest periods are prescribed, property was last harvested in the 1980's
- Trees are designated as legacies, ensuring a very old age cohort of trees to become established

#### **5.2-Maintain and restore diversity of native tree species**

- Mast trees have been identified and prioritized for management including beech, serviceberry, dogwood, yellow birch, black cherry red oak, pin cherry and hophornbeam

#### **5.3- Retain biological legacies**

- Larger diameter Maple , pine and hemlock are designated to be retained through their biological life span
- At a minimum 4 cavity and or future snag trees and both coarse and fine woody material will be retained
- Disease free beech will be retained through biological life span to provide seed source close resistant to the disease

#### **5.4-Restore fire to fire adapted ecosystems**

#### **5.5-Establish reserves to protect ecosystem diversity**

- Property is included in the Use Value Appraisal program keeping this as a working forest

### **Strategy 6: Increase ecosystem redundancy across the landscape**

#### **6.1-Manage habitats over a range of sites and conditions**

- Neotropical habitat management is implemented to create conditions across the landscape for greater abundance
- Property is part of a cross boundary peer to peer management group, The Bakersfield-Fletcher Woodlots program is designed to enhance redundancy

#### **6.2- Expand the boundaries of reserves to increase diversity**

- Cold Hollow to Canada member with land permanently conserved with Vermont Land Trust. This property is part of the goal to conserve 23,000 acres by 2030

### **Strategy 7: Promote landscape connectivity**

#### **7.1-Use Landscape level planning and partnerships to reduce fragmentation and enhance connectivity**

- The Reiner Trust property is part of the Cross boundary management within CHC Woodlots Group
- The property is located in a forest block of local priority and is important as a connecting landscape

#### **7.2-Establish and expand reserves and reserve networks to link habitats and protect key communities**

- Cold Hollow to Canada members with a vision to permanently conserve lands across the region

#### **7.3- Maintain and create habitat corridors through reforestation or restoration**

### **Strategy 8: Enhance genetic diversity**

#### **8.1 -Use seeds, and other genetic material from across a greater geographic area**

- Resistant beech, elm and in the future ash can be identified to be free of disease. These individual trees of cluster will be retained as legacies to ensure a seed source with a potential for resistance

#### **8.2-Favor existing genotypes that are better adapted to future conditions**

#### **8.3-Increase diversity of nursery stock to provide those species or genotypes likely to succeed**

### **Strategy 9: Facilitate community adjustments through species transitions**

#### **9.1-Anticipate and respond to species decline**

- Red spruce regeneration highlighted for release to encourage its persistence in the landscape

#### **9.2-Favor or restore native species that are expected to be better adapted to future conditions**

- Overstory Red oak is prescribed to be retained and released to allow for establishment of oak regeneration
- Red maple, white pine, red oak, red spruce, beech all have capacity to thrive in varied conditions. Healthy examples of these trees will be favored.

#### **9.3-Manage for species and genotypes with wide moisture and temperature tolerances**

- Maintaining the largest diversity of species allows for self adaptation

#### **9.4-Emphasize drought and heat tolerant species and populations**

- Red oak is being favored for retention

#### **9.5-Guide species composition at early stages of development.**

- Regeneration is considered in all treatments
- Pre-commercial treatments that guide species are implemented in portions of this property

#### **9.6-Protect future adapted regeneration from herbivory**

#### **9.7- Establish or encourage new mixes of native species**

#### **9.8- Identify and move species to sites that are likely to provide future habitat**

## **Strategy 10: Plan for and respond to disturbance**

### **10.1-Prepare for more frequent and more severe disturbances**

- Emphasis on healthy crowns and root systems through Crop Tree release will give trees strength to withstand some wind and ice events.
- Establishing canopy gaps will release regeneration which will be the replacement stems if overstory trees are lost to disturbance.

### **10.2-Prepare to realign management of significantly altered ecosystems to meet expected future environmental conditions**

### **10.3-Promptly revegetate sites after disturbance**

### **10.4-Allow for areas of natural regeneration after disturbance.**

- Sufficient regeneration currently is present in most area though herbivory is causing some damage.
- Natural regeneration is encouraged

### **10.5-Maintain seed or nursery stock of desired species for use following severe disturbance**

### **10.6 Remove or prevent establishment of invasives and other competitors following disturbance**

- Two honeysuckle along the trail and one buckthorn along the access road to the house have been identified for removal.

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*Resistance: Actions that improve the forest's defenses against anticipated changes or directly defend the forest against disturbance in order to maintain relatively unchanged conditions; effective in the short term. (Strategy 1, 2, 3, 4, 5)*

*Resilience: Actions that accommodate some degree of change, but encourage a return to prior conditions after a disturbance, either naturally or through management. Appropriate for short term or for areas that are buffered from climate change impacts. (Strategy 1, 2, 3, 5, 6, 7, 8)*

*Transition: Actions that intentionally accommodate change and enable ecosystems to adaptively respond to changing and new conditions. (Strategy 1, 2, 6, 7, 8, 9, 10)*