Town of Rowe
Pelham Lake Park

Climate-Smart Forestry
Operational Plan for Group Selections with Reserves

Stand 1 at Pelham Lake Park- maturing northern hardwoods with inadequate regeneration

Alex Barrett
MA Licensed Forester #460

June 20, 2023

Long View Forest
31 Ferry Road
Hartland, VT 05048
abarrett@longviewforest.com
802-428-4050

Long View Forest

Table of Contents

Executive Summary

This operational plan outlines the steps, budgets, and operational requirements for implementing a Climate-Smart regeneration harvest at Pelham Lake Park. Having a healthy future forest with a diverse array of species at Pelham Lake is the single most important climate-adaptation step for the management of this land and this step requires securing and then nurturing a new cohort of young trees under changing and adverse regeneration conditions.

The central practice here is to install 2, 2 acre group selections with reserves (strategically retained trees in an otherwise clear-cut area) on either side of the Davis Mine Trail, close to the parking lot on Davis Mine Road. One of these Groups will then be surrounded with a slash wall, a large wall of woody material, to exclude deer and protect young trees. While Group Selections are a routine and proven regeneration method, adding in reserves and then using a slash wall are both relatively novel practices that we believe will make this project successful for the project's central Climate-Smart goal: securing tree regeneration that will become the future, climate-adaptable forest.

Operationally, this is a challenging project that will deploy cutting-edge logging and site-work techniques to minimize soil disturbance, to maximize on-and off-site shorter- and medium-term carbon storage, and to develop accounting and financial mechanisms that allow us to shift traditional, extractive logging practices toward a service-based system that can better address climate concerns and maximize climate and carbon benefits for forest-based mitigation and adaptation practices.

Project History and Overview

Pelham Lake Park is a ~1,250-acre forest surrounding the iconic Pelham Lake that features a diverse array of forest types, wetlands, and streams. It is a treasured community resource boasting ~20 miles of multi-use recreational trails.

Beginning in 2020, the Town of Rowe started a forest management planning process for the Park. Out of this process, the community of stakeholders, managers, consultants, and elected officials identified and embraced a set of guiding management principles which included the central idea of protecting, maintaining, and enhancing the overall resilience of this forest to the threats posed by climate change. This public consultation process has involved surveys, woods walks, listening sessions, and public review of planning documents. We hope that by engaging with the stakeholders here we will build a supportive coalition of people centered around the shared goal of making this forest as resilient as possible.

One recommendation in the property's Forest Stewardship Climate Plan is to begin purposefully securing a new cohort of young trees to build a more resilient forest better capable of responding to the threats posed by climate change. Trees established now likely give us 100-300 more years of forest cover and it behooves us to make sure we have that new cohort in place as the forest experiences the increased stresses of climate change at a rapidly increasing pace.

The desired outcome here is a 2-4 acre area flush with a diverse array of thriving young trees. Given the herbivory pressure from deer, we need a way to keep them away from young trees until the trees attain heights of 4-6'. To do this efficiently, and in a climate-smart way, we will build a wall out of felled trees- trunks and branches- to protect the future forest while it establishes. This slash wall will degrade over time- slowly releasing carbon as the material decomposes, building soil, and providing wildlife habitat in the interim.

Practice Description

In order to secure regeneration of northern hardwoods with a red oak component in Stand 1, we will install 2, side-by-side group selection harvests of ~2 acres each with reserve trees interior to each group. Reserve trees are pre-selected, individual trees retained as seed sources, legacy trees, and wildlife habitat or food provisioning sources. Together, this 4-acre area will allow sufficient light to reach the forest floor so that maples, birches, ash, red oak, basswood, red spruce, and an occasional pine will all be able to thrive. Furthermore, we will use the slash and low-grade material from all 4 acres to build a slash wall around the southern 2-acre group to exclude deer. This will set up a paired demonstration where the Town can watch the two groups develop over time.

Slash walls are becoming an increasingly popular way to protect a regenerating forest from deer browse. Deer populations are high in our area and warmer winters with less snow are likely allowing their populations to thrive. Also, less snow leaves tree seedlings more vulnerable to browse in the winter. Experimental work at Cornell University, and on State and Watershed lands in CT and MA, shows that slash walls can be economically constructed in the woods and are a better option than large scale metal or plastic fencing. More information on these walls can be found at: https://blogs.cornell.edu/slashwall/

Table 1: Slash Wall Overview

This project includes both industry standard and experimental forest operations processes and considerations. Slash walls are a relatively new tool in the forestry toolbox.

Advantages	**Disadvantages**
Made of natural material sourced on site	Large and very visible for longer period of time
Using slash and low grade wood on site stores carbon for 5-20 years (as opposed to burning it for fuelwood or using it as shorter-lived products like paper)	Takes machinery time and diesel fuel to construct
Low maintenance over time when compared to fencing	Reduced revenue for landowner
No clean-up costs	Physical barrier to human or large wildlife passage
Significant wildlife habitat value for birds, small mammals, insects, and others	

The slash walls will have a 20-25'' wide base and be 10' tall. During marking, paint will be sprayed on perimeter trees at 10' to aid in wall construction. The bottom 4-6' will be nearly entirely wood stacked in a close pick-up-sticks configuration. Finer material will be piled on top of this base. If desired, a gate could be installed to allow research or forest tour access but not regular, recreational access.

Operations

In order to maximize potential climate benefit, this harvest will employ a set of Climate Informed Forest Access and Forestry Operations Practices. These are above-and-beyond standard practice forest management approaches that focus on accessing and working the forest with the recognition that while access and management can have climate downsides, some level of work in the forest is necessary and important to help promote adaptable forest conditions. The forest industry is uniquely positioned with the tools and expertise necessary to do this work well and can evolve and tailor their approaches to fit with this developing reality. Some of these practices are standard on high-quality logging jobs; others are novel and will be tested here to assess and judge their climate benefits.

Protecting the recreational infrastructure on site is important for these operational requirements. During the project, the trail that bisects the two areas will be closed. Afterwards, the close out of the project will restore the trail which will in turn benefit park patrons.

The selected site features:

- Simple, already-established access close to a well-sized landing on a Town maintained road
- A quality, existing forest road that bisects the treatment area
- No intermittent or perennial streams within 50'
- No wetlands, seeps, or vernal pools
- Relatively gentle slopes and stable ground
- Millsite-Westminster soils with severe rutting hazard and Medium Soil Compatibility Risk that will need to be monitored closely during operations
- Abundant woody material for equipment path armoring and slash wall construction
- A good location for stakeholders to see, observe, critique, and engage with this work
- Park and Town staff, Park Commissioners, and a Consulting Forester who can monitor the project over time

Table 2: Operational Requirements

Practice	**Considerations and Requirements**
Minimize Soil Disturbance	Operations only in dry or fully frozen conditions No ruts of >6" for a run >60" Use cut-to-length logging system to forward wood to landing site If dry, but not frozen ground is present, forwarder will drive "barefoot," that is, without tire chains. Finer branch material will be processed and used as a temporary road bed for machinery to keep them up and off the ground Spring/early summer time will be off-limits. This is because bark slippage thar occurs this time of year makes running without chains challenging.

Practice	Considerations and Requirements
Convert high quality wood into long-lived durable wood products	Sawlogs and any veneer logs will be extracted and sold to regional buyers. Storing this carbon in 100-300 year lifespan products is a smart carbon storage technique.
No firewood or pulp production	This material will instead be retained in the slash wall or on the ground to provide a slow carbon release with interim wildlife/regeneration benefits
Retain all woody material outside of select sawlogs and minimally process this material.	Most will get utilized for slash walls and will slowly decompose while providing wildlife benefit and deer exclusion Any additional material will be retained on site to slowly rot and build up soil carbon Tops and other materials will be minimally processed to reduce ground contact and slow decomposition.
Employ high efficiency logging equipment	Use cut-to-length logging system Use state-of-the-art diesel emissions systems where possible Minimize chainsaw and brushsaw use Minimize hauling distance and time to landing via good site selection and smart landing design
Retain structural elements within the groups	5-10 larger, live trees of diverse species will be retained in each group. Snags will be retained and additional snags may be created for wildlife habitat value
Maintain a mid-sized excavator on site during the course of the operation	Haul road will be waterbarred ahead of any precipitation event during operations Excavator will aid in slash wall construction as needed

Table 3: Project Order of Operations and Tradeoffs

Order of Operations	**Activity**	**Benefits**	**Tradeoffs**
1	Project Layout and Marking	Careful planning yields better and more predictable results	Consultants add expense
2	Showing	Allows contractors to fully assess project	Vehicle mileage and added consultant time
3	Contracting	A sound contract will make project predictable and properly allocate risk while clearly spelling out climate-smart performance requirements	Time consuming and potentially off-putting for contractors unaccustomed to new, unorthodox contract requirements.
4	Site Preparation and Staging	Beech will be controlled in harvest area to facilitate diverse regeneration establishment Pre-harvest Haul Road and Landing set up will allow disturbed earth to settle before the operation and allow any operational trouble spots to be fixed early	Immediate cessation of beech carbon sequestration Minor soil disturbance along 1 haul road
5	Felling and Partial Extraction	Create growing space for new trees Store carbon in long-lived and stable wood products	Immediate, but temporary cessation of carbon sequestration by current forest
6	Trucking	Deliver high value logs to secondary manufacturing facilities	Diesel Fuel consumption

Order of Operations	Activity	Benefits	Tradeoffs
7	Slash Wall Construction	Protect regeneration from deer browse Short- and Medium-term carbon storage of woody material up off ground Ground scarification from extra excavator tracking, promoting regeneration	Diesel fuel consumption Ground scarification from extra excavator tracking resulting in potential additional soil carbon loss (Note the pros and cons of increased scarification)
8	Close Out	Proper close out protects soil integrity and soil carbon Repair (improvement?) of recreational trail Seeding/erosion control?	Enhanced BMPs are expensive and installation requires more diesel fuel consumption

Table 4: Project Timing and Constraints

Logging operations and slash wall building are both complex operations with variable and unpredictable timing. Weather adds another layer of complexity. However, to aid in project planning and assessment, I present the following idealized timeframe. Set up and planning this work can be done in 1 week. Felling, partial extraction and slash-wall building will take 1-2 weeks. Then, close out work will take 1-2 days.

Order of Operations	Activity	Timing	Constraints
1	Project Layout and Marking	6-12 hours Anytime pre-harvest	Consultant Availability Weather (can't paint in the rain)
2	Showing	2 hours Anytime pre-harvest	Contractor Availability
3	Contracting	2 hours Anytime pre-harvest	None
4	Site Preparation and Staging	12 hours precutting 4 hours excavator site prep and mat staging Pre-harvest	July and August for Beech Control Dry and not frozen conditions for staging and haul road work
5	Felling and Partial Extraction	24 harvester hours 8 forwarder hours Harvest	Dry or frozen conditions

Order of Operations	**Activity**	**Timing**	**Constraints**
6	Trucking	Variable and concurrent with harvest	Town Roads open for trucking
7	Slash Wall Construction	12 forwarder hours 12 excavator hours Concurrent with harvest	Dry or frozen conditions
8	Close Out	6 excavator hours	End of harvest Ideally dry or frozen conditions although this will be variable

Equipment

Three pieces of machinery will complete this project.

1. A tracked or wheeled dangle-head harvester which will fell and process trees as needed.
2. A wheeled forwarder will extract some material destined for long-lived wood products and carbon storage. The forwarder will also aid in slash wall construction.
3. A tracked, mid-sized excavator will aid in slash wall construction and in interim and final Best Management Practices like waterbars.

Other tools will include chainsaw, brushsaw, seeder, mulcher spreader, and potentially a small, tracked forestry machine with attachments.

We expect petroleum-based fuel consumption for this harvest to look like the following:

Harvester	120 Gallons	Diesel Fuel
Forwarder	70 Gallons	Diesel Fuel
Excavator	66 Gallons	Diesel Fuel
Chainsaw and Brushsaw	2 Gallons	50:1 Chainsaw fuel

Project Budgeting

Rowe- Pelham Lake Park Operational Plan Budget for Group Selections with Reserve and 2 acre slash wall perimeter						
Item	Estimated Quanity		Estimated Rate		Estimated Total	
Harvester- Felling	24	hrs	$ 250.00	/hr	$	6,000.00
Forwarder- Hauling	8	hrs	$ 200.00	/hr	$	1,600.00
Forwarder-Slash Wall Building	12	hrs	$ 200.00	/hr	$	2,400.00
Excavator-Slash Wall Building	12	hrs	$ 150.00	/hr	$	1,800.00
Excavator Close-Out/BMP Implementing	10	hrs	$ 150.00	/hr	$	1,500.00
Chainsaw and Other Labor	16	hrs	$ 90.00	/hr	$	1,440.00
Site Preparation- Beech Control with Brushsaw	12	hrs	$ 90.00	/hr	$	1,080.00
Consulting and Planning	30	hours	$ 100.00	/hr	$	3,000.00
Machinery Mobilization	3	moves	$ 1,000.00	/move	$	3,000.00
Crew Truck Mileage	1500	miles	$ 1.35	/mile	$	2,025.00
Install observation gate in slash wall	1		$ 400.00	/gate	$	400.00
					$	24,245.00
Sawlog: Landing Value less marketing fee	16	mbf	$ 500.00	/mbf	$	8,000.00
			Total Estimated Cost		$	16,245.00

Alternatives

This Operational Plan outlines the preferred treatment and set of practices to get the desired result: a diverse cohort of young trees protected from deer browse so that they can grow and become the future resilient and climate-adapted forest. However, there are alternatives worth considering.

Alternative 1 Complete the harvest as outlined above and then install an 8' heavy duty woven wire orchard fence around some or all of the regeneration areas. This could be done in contrast to a slash wall to demonstrate the two practices side by side. A rough estimate of installed fencing in the forest is $25-$30 per linear foot. If we assume that we want to fence 2 acres, this is ~1200' of fence for an initial cost of $30,000-$36,000 in addition to any logging or slash wall building costs. Subsequent maintenance and monitoring costs would also add up.

Alternative 2 Complete the harvest as outlined above and substitute enrichment plantings with tree tubes to secure regeneration. Or cage and protect natural regeneration as it establishes. I think you could plant 150-200 seedlings per acre after the harvest and perhaps keep this practice cost-competitive with the slash wall. There are many disadvantages, however. The main disadvantage is that the herbaceous layer of the forest gets no protection from deer browse under this scenario. It further involves lots of plastic and metal in the forest and a small amount of risky regeneration relative to the thousands of seedlings in intimate mixture that nature would give us here. And the maintenance cost for

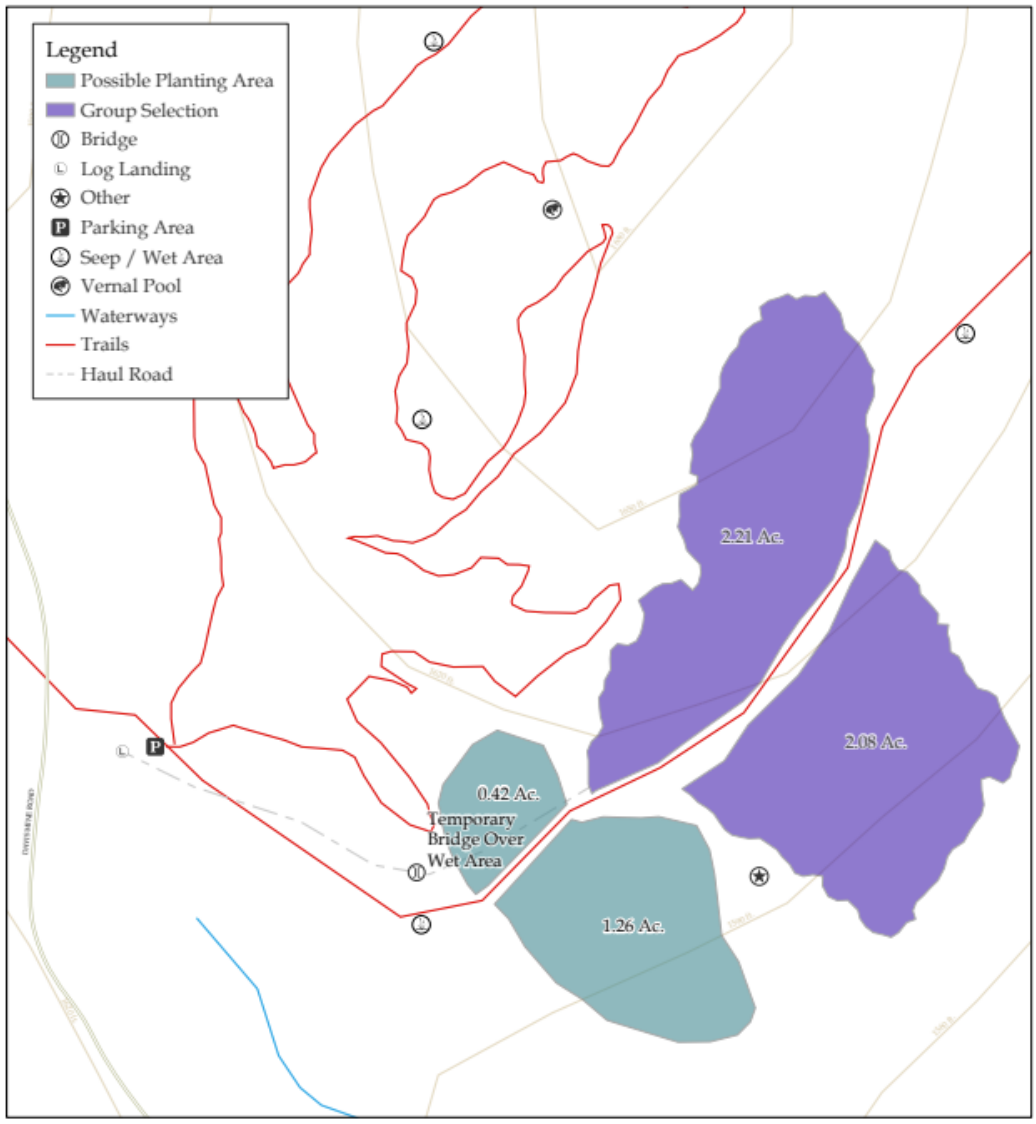
cages/tree tubing are quite high over time making this hard to implement and replicate in a demonstration setting.

Project Monitoring

Pelham Lake Park is in a unique position where it has a Park Manager, summer seasonal staff, and a Consulting Forester to answer questions and monitor practices. Any budgeting for this work should include at least 5-8 years of monitoring budgeting.

Year	Task	Recurrence
1	Monitor slash wall and make repairs	1-3 hours monthly
2	Monitor slash wall and make repairs	1-3 hours monthly
3	Monitor slash wall and regeneration	1 hour bi-monthly
4	Monitor slash wall and regeneration	1 hour bi-monthly
5	Monitor slash wall and regeneration	1 hour bi-monthly
6	Monitor slash wall	1 hour quarterly
7	Monitor slash wall	1 hour quarterly
8	Monitor slash wall	1 hour quarterly
	Total Expected Hours	**80 hours over 8 years**

Project and Practices Map



N
W E
S

Climate Smart Practices Map
for lands belonging to
The Town of Rowe - Pelham Lake Park
Rowe, MA

0 150 300 600 US Feet

Long View Forest
MANAGEMENT