Assessment of the Sharon Town Forest / Hemlock Looper Damage

March/April 2023

In the summer of 2021, a forest pest showed up in the Monadnock region called Hemlock Looper. Since its initial appearance, the insect has affected the hemlock forest regionally on many private and public ownerships. The Annette State Forest, The Casalis State Forest, The David Wilson Land of the SPNHF, The Ralph Wales Preserve, and several forests have all seen their hemlock affected. This insect voraciously feeds on hemlock trees and killing needles. It has a 30-year period of dormancy and at certain times their population explodes. The New Hampshire Forest and Lands entomologist Kyle Lombard postulates that the combination of another pest, the Hemlock wooly adelgid has had a hand in the immense devastation. He believes that trees in their weakened state cannot survive the current invasion. On these affected trees the needles turn brown. When enough needles are dead, the trees lose their vigor and die. The looper attacks whole stands in the forest and it kills many acres of hemlock at a time.

In 2010 I wrote a forestry plan which made note of the hemlock stands due to their interior location and position in the forest we determined that this was a low priority for management. Now with the extent of the devastation, I am reviewing the hemlock stands to assess the loss, consider the options, and make recommendations for what to do.

I have conducted a systematic survey of the affected forest to determine the extent of the damage and to review options for what might be done. I recorded data at the points if there was any visible damage to the hemlock trees. Throughout the forest there is no damage. There are white pine and mixed hardwood stands that ring the upper elevations of the property that have no damage. In these areas even the hemlock in all its stages is healthy and fine.

The damage is in on about 275 acres in the deep interior, low elevation center part of the forest. Looking at a map, the there is a main drainage that forms called Meadow Brook that comes into the southeast end of the property in the vicinity of the old Sharon Arts Center, and it meanders in a northwesterly direction dropping about 240’ in elevation along the way. There are beaver ponds and slow-moving stretches of mostly flat area covered with hemlock and faster moving water where the stream contracts and falls. This stream is a key feature of the property. The hemlock looper infestation is mostly on the west side of the drainage.

The access to this area is difficult. Much of the Sharon Town Forest is remote interior land.

From the east, there is access from McCoy Road in the east near Route 123 which is in the upper elevation levels. The access road to the interior is wet and about 1.25 mile into where the heart of the damage is. If this way were chosen to access the interior, a serious bridge is required to get over Meadow Brook.

The best way into the infested area is from Street St. access it is about .7 miles with no serious water crossings but there is an elevation drop into the area of about 145’ from the west end to the Meadow Brook Buffer.

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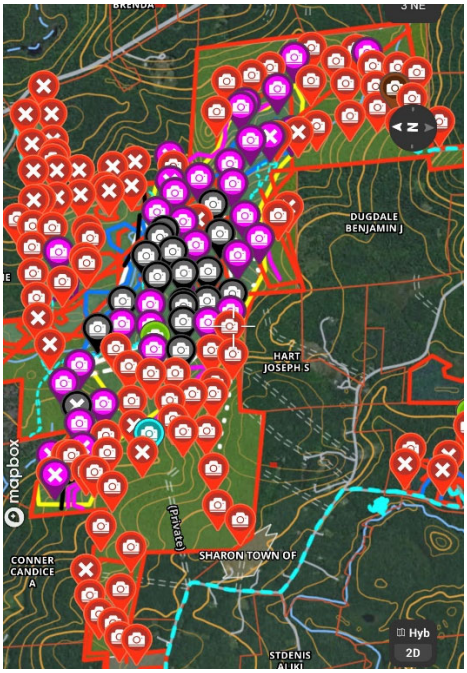
I measured the forest in the following way to get a handle on the volume of timber in areas where there was dead hemlock. At affected points, I used a 10 factor Basal Area angle gauge to determine first noticed the devastation in the fall of 2021 and feared for the hemlocks in the Sharon Town Forest. I recorded the species, diameter breast height (DBH), and height of the usable portion of the tree. I also looked at the regeneration at the point to determine what is coming back.

I took a representative photograph of the trees at each point which were geotagged to pin their location to the map. There are two levels of damage at one level, I marked on the map with a pink pin and a second level a black pin.



The pink pinned areas most of the hemlock is dead. These are mixed wood stands with hemlock residing in the understory with a mixed hardwood and white pine overstory. Often the hemlock at these points was a very dense dead understory with little weight or volume. There is a high risk that this is a flammable forest. The affected trees died 2 years ago, and the fine twigs are now crunchy and break easily as they have dried up.

The black pinned area are mature stands where there is little understory because it has been excluded by shade and the natural toxicity of the hemlock trees to seedlings and saplings. These areas have trees with wide open spacing. There are other species mixed in. Commonly red maple, red oak, white pine, and spruce. These black pinpoints are primarily these well-spaced mature hemlock stands.

We put forth the questions.

1. How much area was affected?
2. Where is it?
3. What is the pattern of damage?
4. Is the timber salvageable?

How much area was affected?

The Sharon town forest is 875 acres. The damage survey I determined that 275 acres are covered with dead hemlock. At each point, I put either a pink or a black marker. There are two distinct patterns of damaged forest.

Pink area 190 acres

The pink markers denote mixed hemlock forest. Usually this it primarily a hardwood overstory consisting of red maple, black birch, and red oak. In this forest there are scattered mature hemlocks and dense hemlock understory. Occasionally, in this mixed forest there are large white pines mixed in too. For those that are familiar with the giant pine near Benjamin Dugdale's southeast corner common with the Sharon Town Forest. The giant pine is still alive, but all the small hemlocks growing in dense skirt around the base are dead. This dead understory is made up of trees between 4 and 10 inches in diameter. The trees are without much salvageable mass. Furthermore, the hemlock trees have been dead long enough so they have dried up. In most cases the needles have fallen off.

There are several concerns about this type of damage. First, and greatest is potentially a high fire danger. If a lightning strike hits the forest when it is in this dry condition, it could ignite carrying the fire from the thick understory into the dead midstory and into the crowns. It will lucky if this does not happen. However, the large, affected area means that the chances are good that it could happen. If affected trees escape fire, they will fall within the next 10 years. Since they don't have much mass, they will deteriorate quickly leaving the forest to grow something else.

It is likely that a mix of black birch, red maple and beech will grow in place of the hemlock understory.

It is not feasible to harvest the salvage as hemlock timber is sold based on weight and these understory trees have dried up. It would be possible to conduct a harvest of the mixed forest and in doing so smash down the hemlock understory. This Is the best way to control the risk of the flammable understory. The harvest could be described as a group selection combined with a single tree selection in which the forest is left in an open state with the hemlock understory matted down on the ground in the process of logging. Good trees would be left to grow.

If this were done there could be a better chance of white pine regeneration because there is a heavy set of first year cones which will come ready to disperse seeds this year. Soil scarification comes along with logging. Without some soil scarification, few of these white pine seedlings will germinate. The logging option is beneficial for two reasons. It would smash down then risky fuel source and would scarify and prepare the soil for regeneration of the forest. As a timely note, white pines are set to have a bumper cone year. So doing a group selection in the pink pin damage areas would give the white pine seeds a chance to germinate and set the stage for white pine to be an important component of the forest in the future.

Other disease issues

In the pink area, there is a small component of white ash. While salvaging hemlock, most of this should be cut because it is infested with the emerald ash borer.

Black area 85 acres

The second area of damage, we will call the black area, is 85 acres within the larger block. It is in mature hemlock stands. The typical structure of the mature stands in their healthy state is very iconic and almost primeval. In this stand the trees are well spaced 8-24" in diameter with very little growing in the understory. There is a salvageable mass in this stand.

The fire concern mentioned previously is not as great because the crowns are spaced and there is little to carry a fire up. The concern with this stand is that these trees will break off and fall over. The trees are past the ideal salvageable condition as they have dried up. This is evident because the bark is falling off and woodpeckers are sloughing bark off the stems.

What can be expected next? As the trees deteriorate, the roots will rot, and the trees will be less able to stand up to the wind and weather. It is likely that there will be a widespread blowdown of dead trees. The volume of wood in this mature stand is high so when there is a blowdown, it will take a long time for the actions of forest decay fungus to break down all this wood. For this reason, it would be a good idea to salvage it. Within these 85 acres, all the hemlock in the overstory is over 75% dead. The hemlock understory is dead as well. There are some pockets of mature white pine and scattered red oak and red maple growing in amongst the dead hemlock. It would be a good idea to leave the mature white pine, red maple, red oak, and red maple as a seed source for the next forest. When this hemlock is salvaged, the forest should be widely opened with retained mature timber to act as a seed source.

If the black area is left alone, there will be no soil scarification. Without scarification, the stand will be replaced by primarily black birch and beech. With harvesting and scarification, the white pine has a chance of seeding in.

Wetlands buffer

As mentioned before, much of the damage follows along Meadow Brook as it descends through the property. It would be a good idea to buffer the flowage by at least 100 feet and let the trees fall and

deteriorate as they will. This will save impact to the sensitive riparian soil and allow for the fallen timber to be wildlife structure in the wetland buffer. Accessing the salvage from the west side will mean that the Meadow Brook and buffer can be left alone.

Invasive species and regeneration in cut areas

I kept a lookout for invasive species throughout the property as I was walking it. There was not any significant invasive species population. This was even the case in the openings cut in 2012 in the northeast part of the land.

It should be instructive that the patch cut areas of 2012 are coming back to red maple, white pine, birch, beech, and red oak. The white pine is doing very well in these openings.

Trails and recreation

If the hemlock is left to rot It will have a long-term impact especially on the Sullivan Loop Trail as it runs along the west side of Meadow Brook. The trail will be impassable within 6 or 7 years with broken trees. The giant pine trail will also be affected.

Can hemlock still be salvaged?

In the pink area, it can not be salvaged by itself. Despite the numbers of small dead hemlock trees with dead feathery limbs, there is not enough round wood mass. It must be knocked down in the process of doing a mixed group selection cut. The trees that will be harvested will be the mix of trees that are growing there, much of it is red maple, white birch, white pine, red oak should be favored to stay.

In the black area, hemlock can be harvested by itself, but it would be more feasible to do a harvest including mixed hardwood red maple and birch with a limited amount of red oak and white pine sawtimber. The hemlock is at the stage where it has been standing dead for over a year. It went through the heat of last summer. *The bark shows signs of sloughing. With another summer's heat, the hemlock will not be usable at all. It will dry up and rot more. I suggest that if this salvage is going to be done, it should be done early in the summer and not toward the end of it. By the end of the summer, it will not be usable at all.*

Assessment of the Sharon Town Forest / Hemlock Looper Damage

March/April 2023

Swift Corwin

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560 Windy Row

Peterborough, NH

NH Licensed Forester #141

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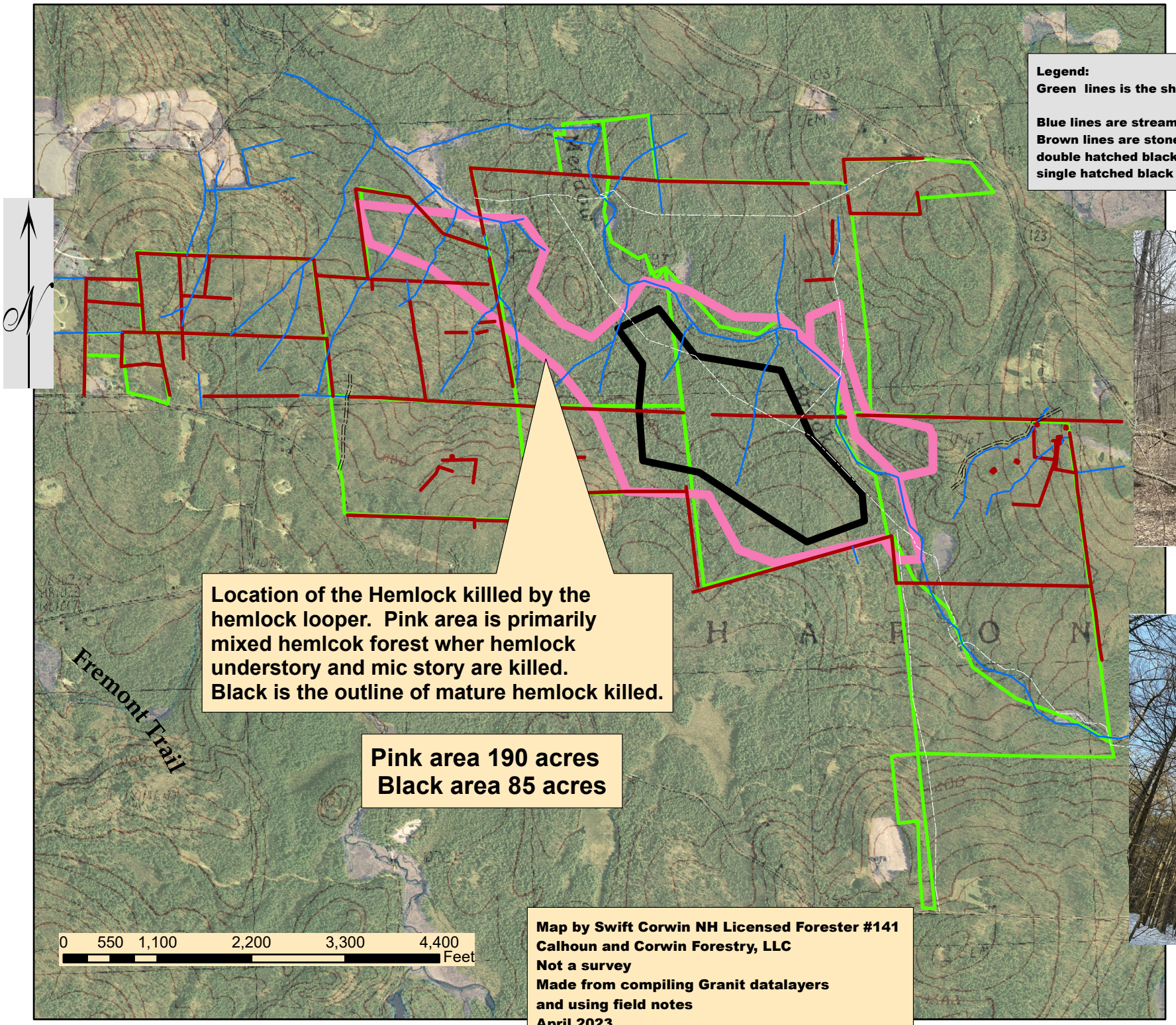
(603) 562-5620

APRIL 28, 2023


Legend:
Green lines is the sharon town forest
Blue lines are streams
Brown lines are stone walls
double hatched black are roads
single hatched black are trails
N
Location of the Hemlock killled by the hemlock looper. Pink area is primarily mixed hemlcok forest wher hemlock understory and mic story are killed. Black is the outline of mature hemlock killed.
Pink area 190 acres
Black area 85 acres
Fremont Trail
0 550 1,100 2,200 3,300 4,400
Feet
Map by Swift Corwin NH Licensed Forester #141
Calhoun and Corwin Forestry, LLC
Not a survey
Made from compiling Granit datalayers
and using field notes
April 2023

PINK

BLACK

STAND SUMMARY

STAND **Pink**

ACRES 191.0

STATISTICAL ANALYSIS

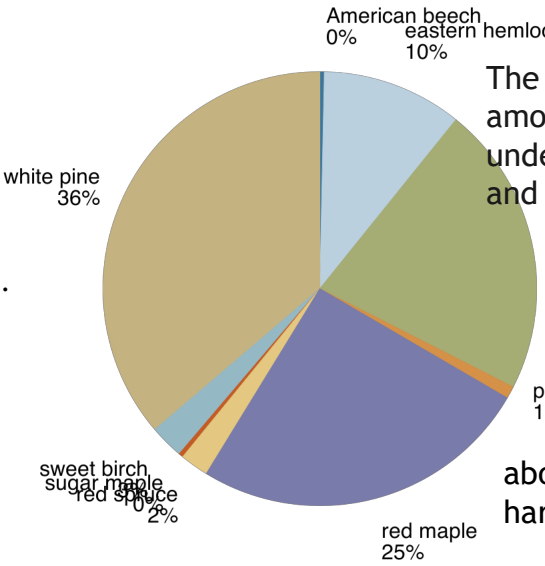
Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	108.8	244.8	9.0	32.2	4.55	35.10
Sampling Error	9.3%	19.3%			40.1%	20.7%
Probable Lower Limit	98.6	197.6			2.72	27.84
Probable Upper Limit	118.9	292.1			6.37	42.36

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	108.8		244.8	9.0	32.2	4.55	35.10	868.99	6,703.92
red maple	41.3	37.9%	94.7	8.9	32.5	0.19	17.54	35.81	3,350.90
white pine	22.5	20.7%	28.6	12.0	41.3	2.96	1.79	565.98	342.81
northern red oak	21.3	19.5%	37.5	10.2	31.5	1.21	6.07	231.16	1,159.02
eastern hemlock	15.0	13.8%	50.6	7.4	29.7		6.59		1,259.11
sweet birch	3.8	3.4%	12.2	7.5	32.0		1.91		364.08
paper birch	1.9	1.7%	9.6	6.0	24.0		0.69		131.72
red spruce	1.9	1.7%	6.7	7.2	32.0	0.19		36.04	
American beech	0.6	0.6%	1.8	8.0	24.0		0.25		48.04
sugar maple	0.6	0.6%	3.2	6.0	24.0		0.25		48.25

STAND SUMMARY

Total Volume by Species (MBF)

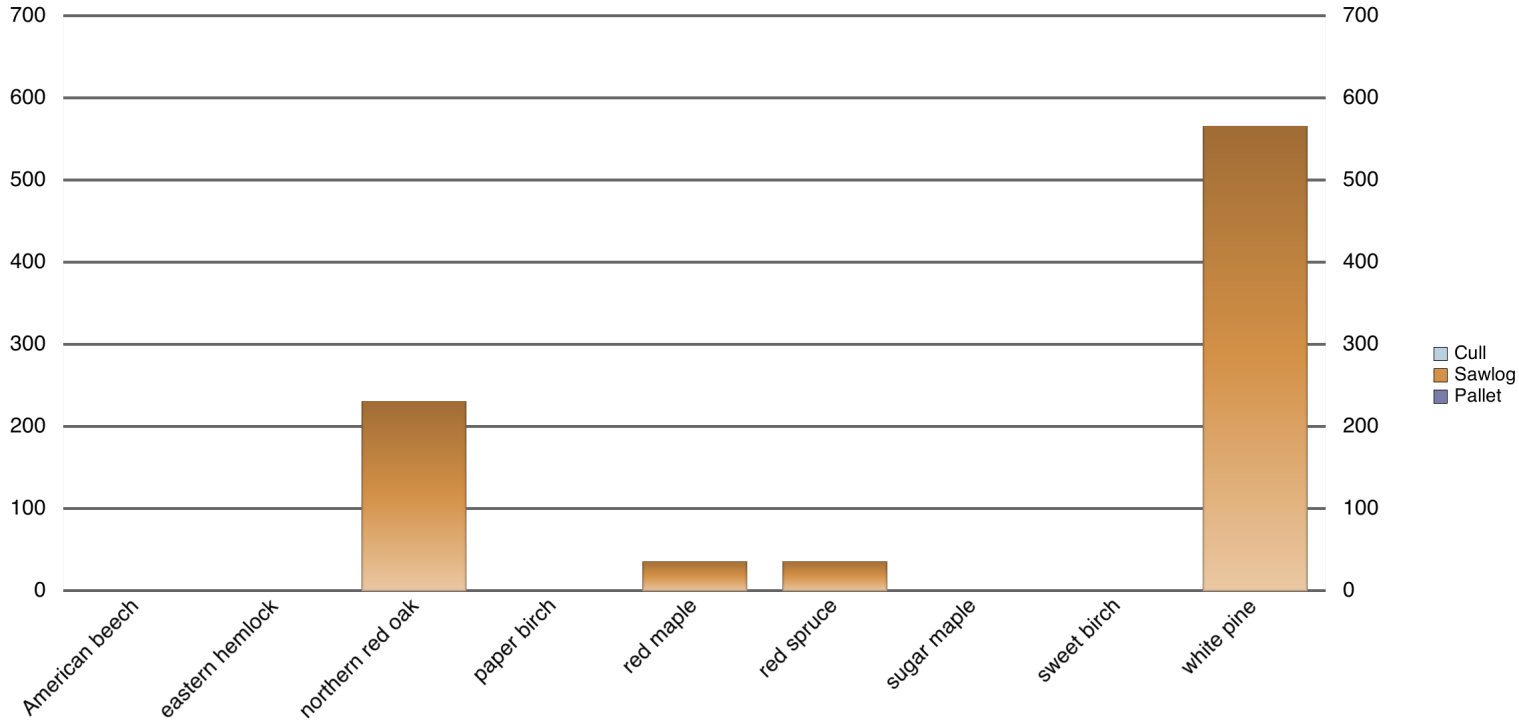


The hemlock appears to be a small amount but it is a large component in the understory and mid story. It is all dead and a fire hazzard.

About 1/3 of the white pine could be harvested.

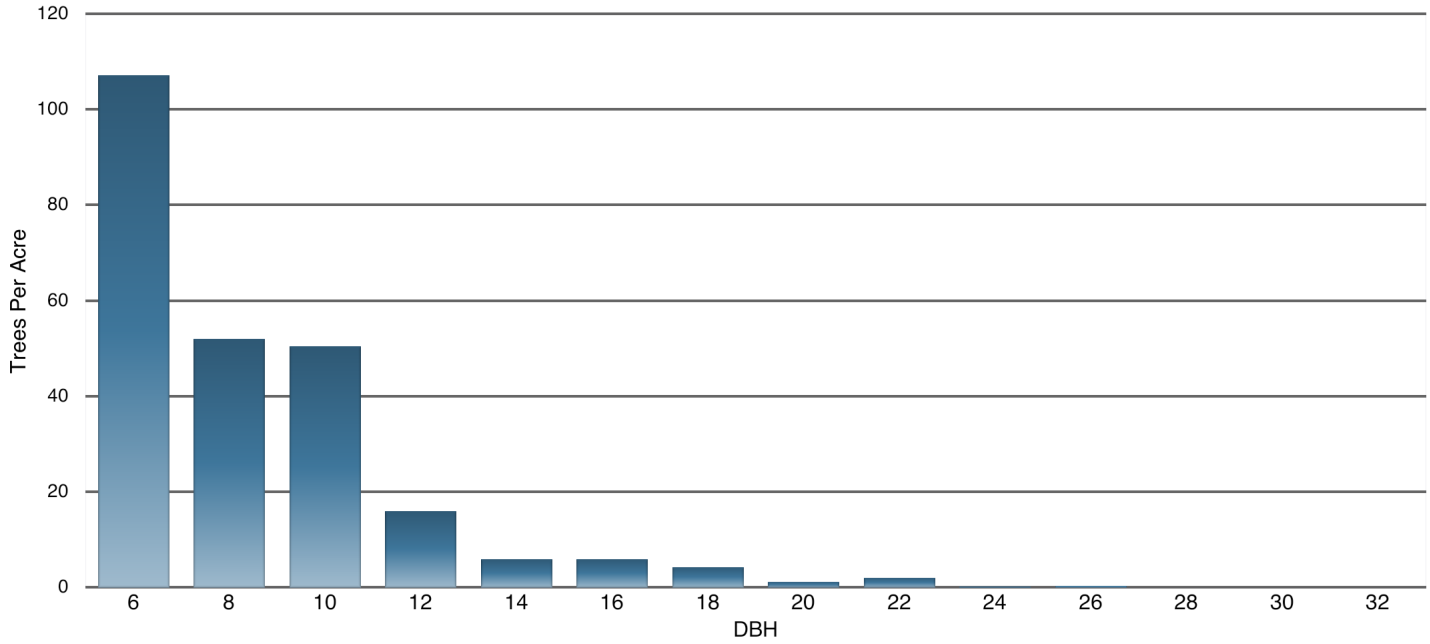
about 2/3 of the red maple could be harvested.

Total Sawtimber by Species (MBF)

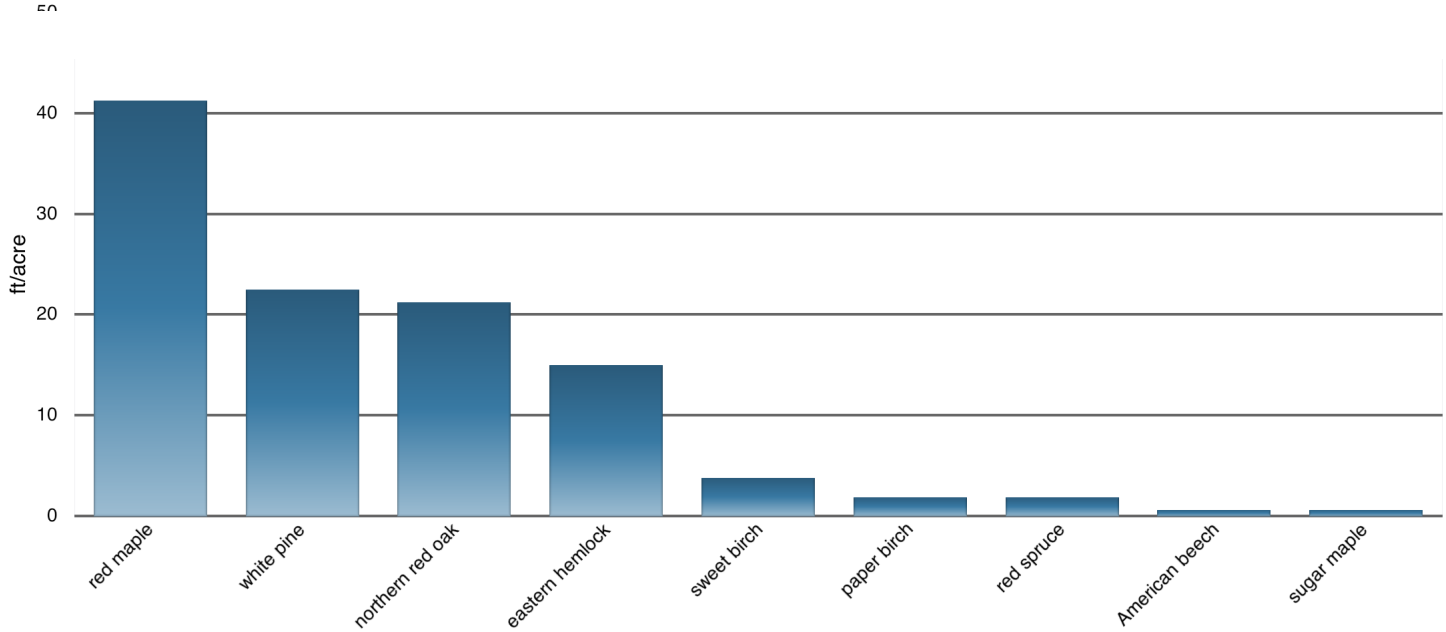


STAND SUMMARY

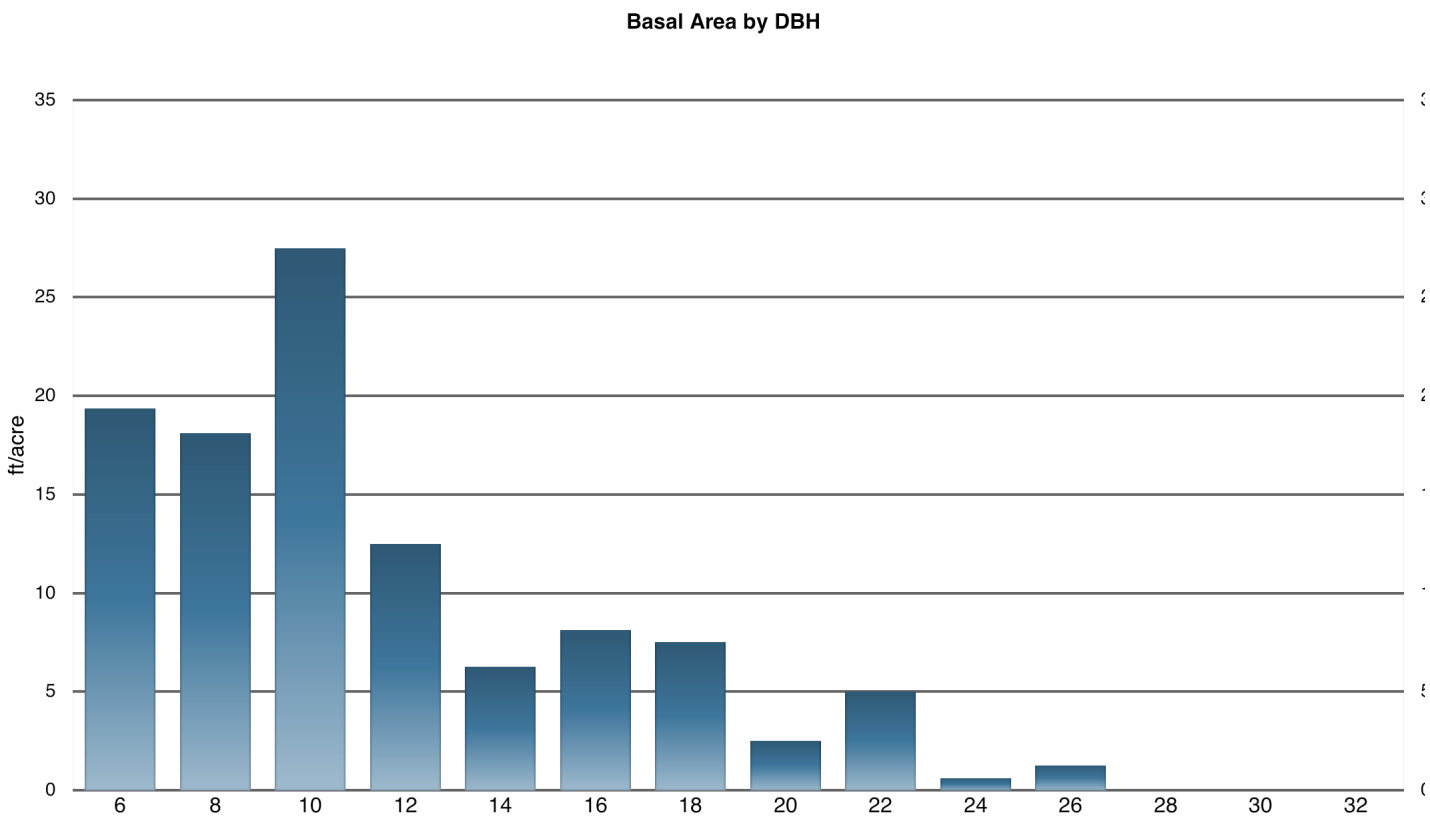
Diameter Distribution



Basal Area by Species



STAND SUMMARY



STAND SUMMARY

STAND **Black**

ACRES 85.0

STATISTICAL ANALYSIS

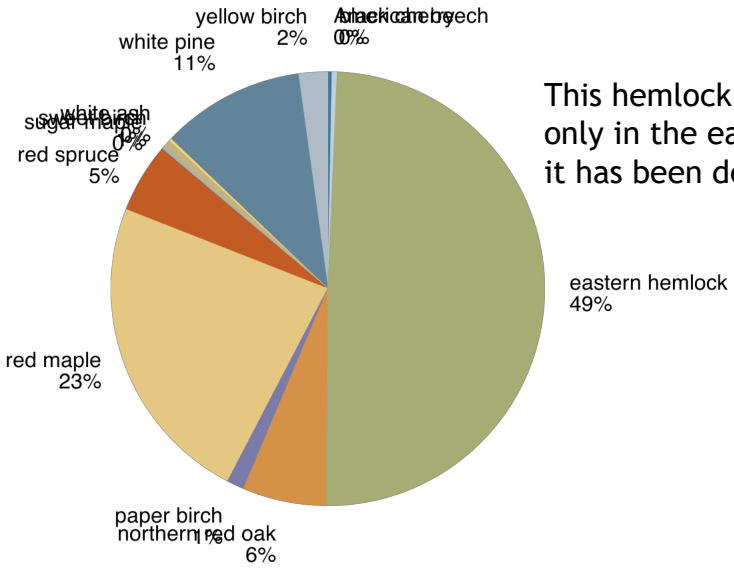
Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS
Average	121.4	260.4	9.2	35.1	2.41	51.14
Sampling Error	7.3%	14.5%			33.6%	10.0%
Probable Lower Limit	112.5	222.7			1.60	46.05
Probable Upper Limit	130.2	298.0			3.22	56.23

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE TONS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME TONS
	121.4		260.4	9.2	35.1	2.41	51.14	204.96	4,347.12
eastern hemlock	60.7	50.0%	136.6	9.0	36.5	0.28	30.10	23.63	2,558.36
red maple	36.2	29.8%	67.5	9.9	34.3	0.27	15.84	22.69	1,346.04
white pine	5.9	4.8%	7.0	12.4	44.7	0.93	0.31	79.26	26.56
northern red oak	5.2	4.3%	5.2	13.5	33.1	0.45	1.02	38.21	86.59
red spruce	5.2	4.3%	17.3	7.4	34.1	0.45	0.19	38.09	16.06
yellow birch	2.8	2.3%	5.5	9.5	36.0	0.04	1.39	3.09	118.27
paper birch	2.4	2.0%	8.3	7.3	28.6		1.00		85.17
sweet birch	1.0	0.9%	4.0	6.9	26.7		0.47		40.07
American beech	0.7	0.6%	3.5	6.0	20.0		0.24		20.27
black cherry	0.7	0.6%	2.7	6.8	28.0		0.30		25.30
white ash	0.3	0.3%	1.0	8.0	32.0		0.15		12.59
sugar maple	0.3	0.3%	1.8	6.0	24.0		0.14		11.85

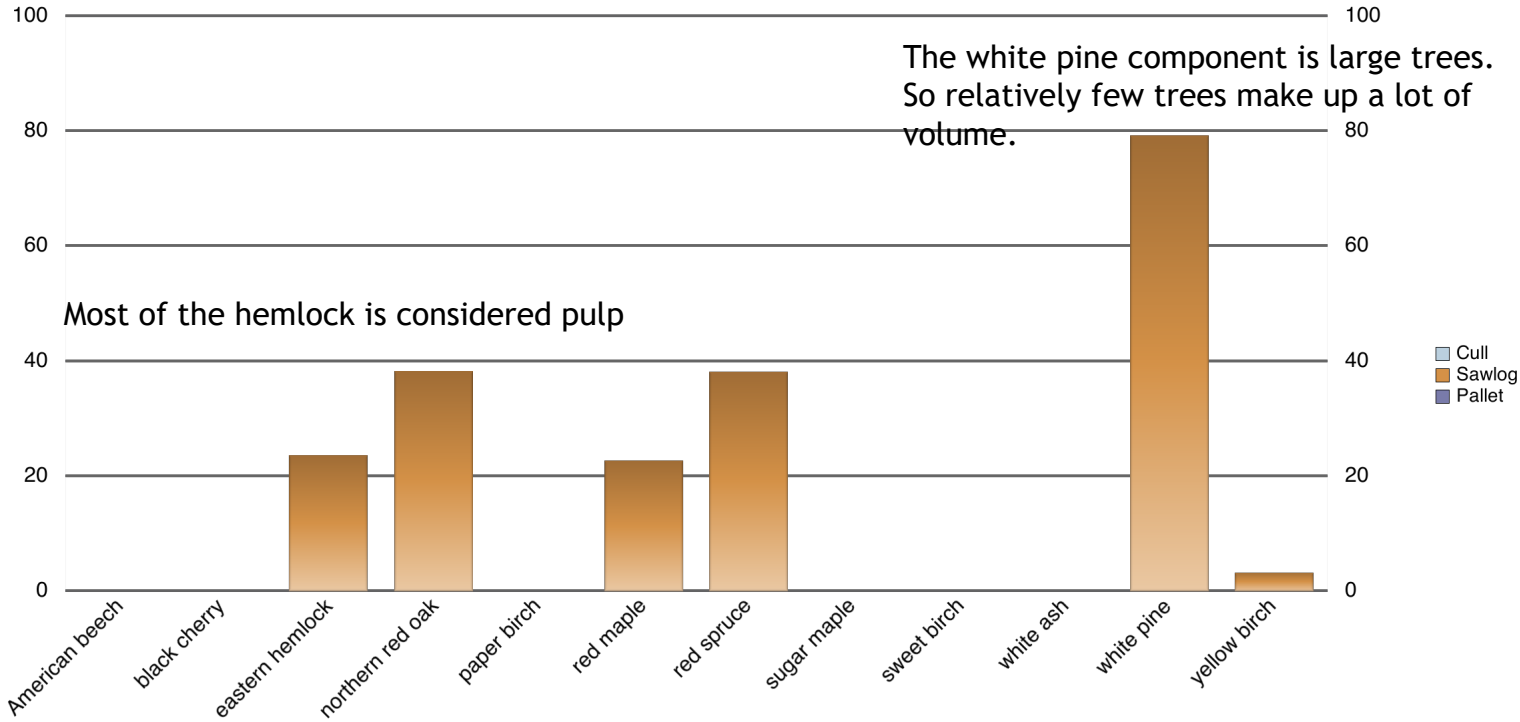
STAND SUMMARY

Total Volume by Species (MBF)



This hemlock is still salvageable but only in the early part of the summer it has been dead for 2 years.

Total Sawtimber by Species (MBF)

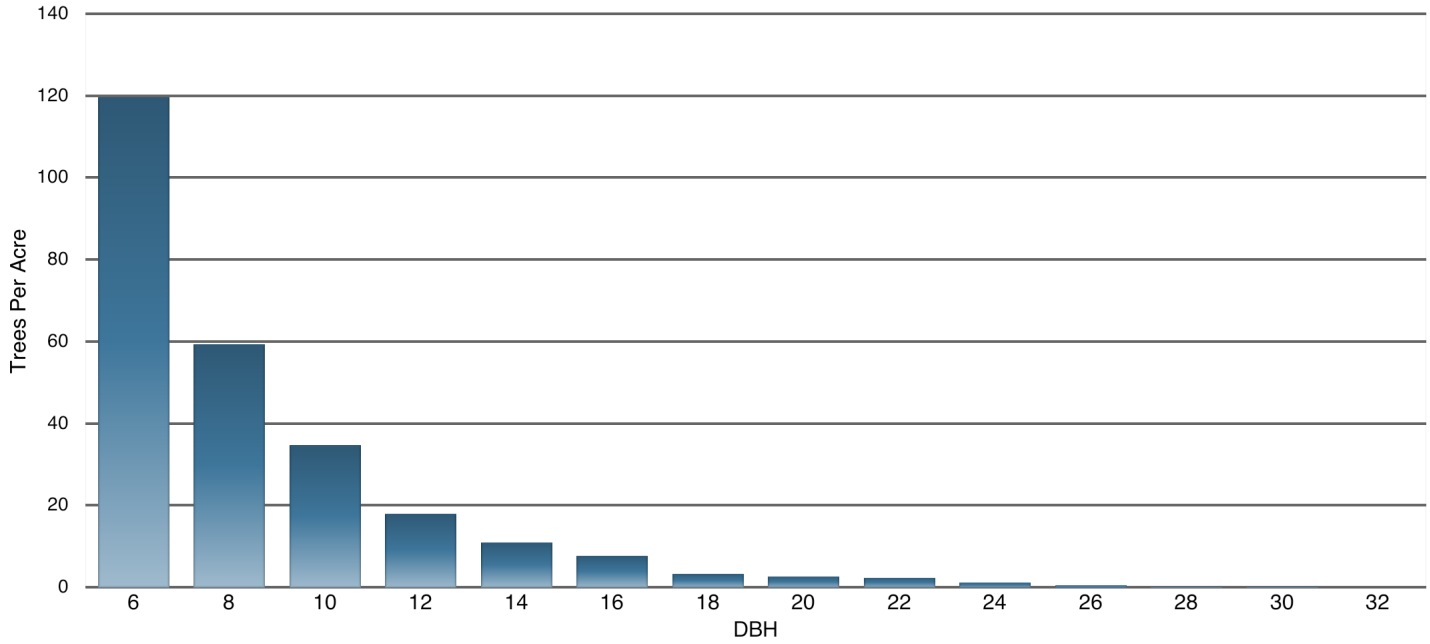


The white pine component is large trees. So relatively few trees make up a lot of volume.

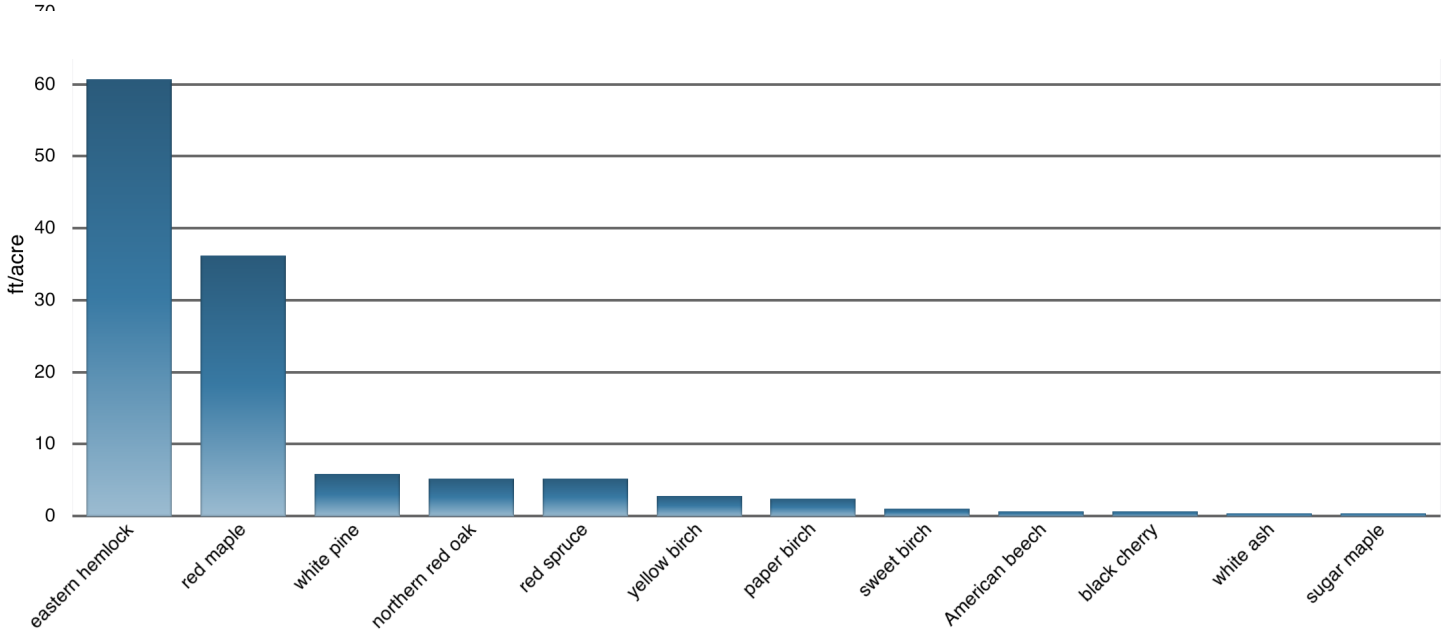
Most of the hemlock is considered pulp

STAND SUMMARY

Diameter Distribution

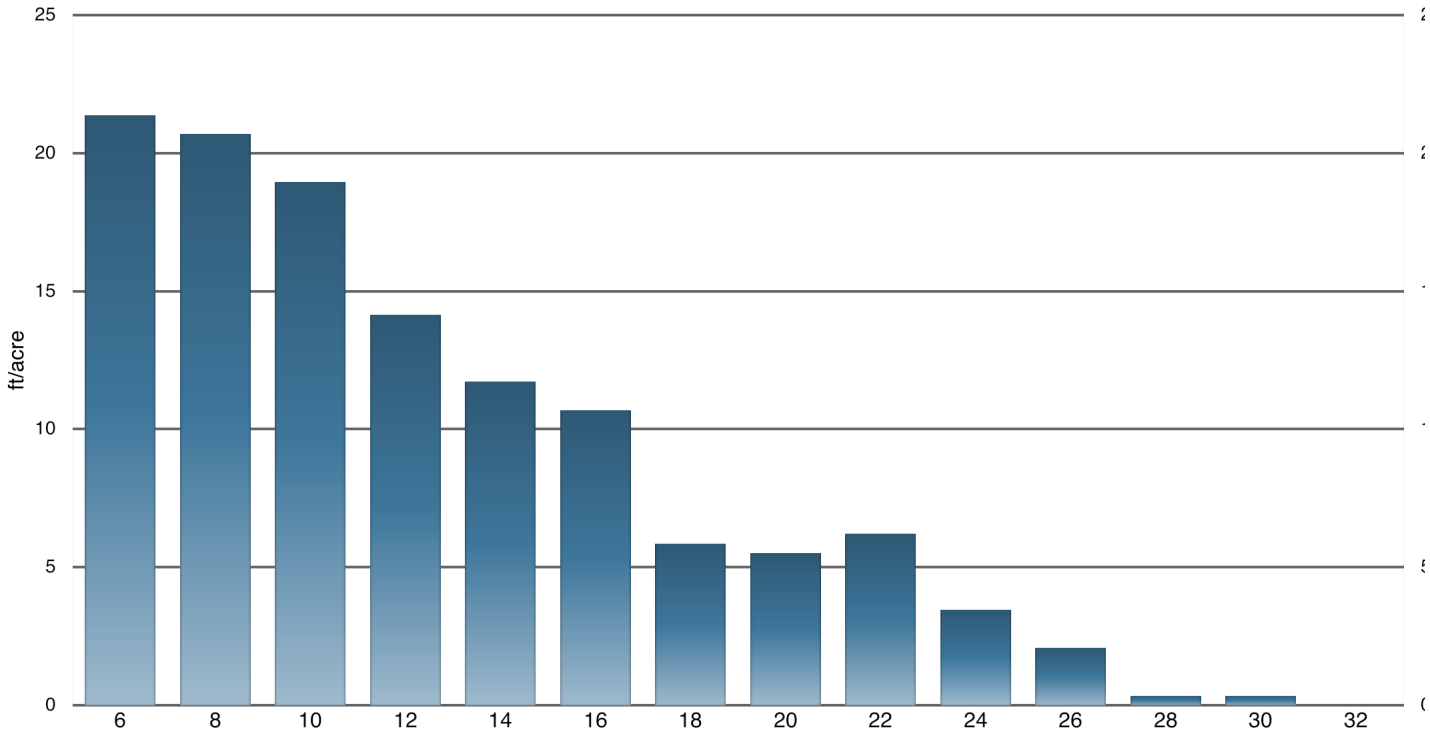


Basal Area by Species



STAND SUMMARY

Basal Area by DBH



BASAL AREA & TREES PER ACRE

STAND **Pink**

ACRES **191.0**

		TOTAL	6	8	10	12	14	16	18	20	22	24	26	28	30	32+
red maple	BA	41.3	5.0	9.4	15.6	6.9	2.5	1.3	0.6							
	TPA	94.7	26.9	26.9	28.6	8.8	2.3	0.9	0.4							
white pine	BA	22.5	1.9	1.3	1.9	3.1	1.9	3.1	3.1	1.3	3.1	0.6	1.3			
	TPA	28.6	9.5	3.6	3.4	4.0	1.8	2.2	1.8	0.6	1.2	0.2	0.3			
northern red oak	BA	21.3	1.9	2.5	6.3	1.9	1.9	1.9	2.5	0.6	1.9					
	TPA	37.5	10.9	7.2	11.5	2.4	1.8	1.3	1.4	0.3	0.7					
eastern hemlock	BA	15.0	6.3	2.5	2.5	0.6		1.9	1.3							
	TPA	50.6	36.0	7.2	4.6	0.8		1.3	0.7							
sweet birch	BA	3.8	1.3	1.3	1.3											
	TPA	12.2	6.4	3.6	2.3											
red spruce	BA	1.9	1.3							0.6						
	TPA	6.7	6.4							0.3						
paper birch	BA	1.9	1.3	0.6												
	TPA	9.6	7.8	1.8												
sugar maple	BA	0.6	0.6													
	TPA	3.2	3.2													
American beech	BA	0.6		0.6												
	TPA	1.8		1.8												
TOTAL	**BA**	**108.8**	**19.4**	**18.1**	**27.5**	**12.5**	**6.3**	**8.1**	**7.5**	**2.5**	**5.0**	**0.6**	**1.3**			
	TPA	**244.8**	**107.1**	**51.9**	**50.4**	**15.9**	**5.8**	**5.8**	**4.2**	**1.1**	**1.9**	**0.2**	**0.3**			

The hemlock trees are understory and midstory

The highlighted numbers show what could be harvested in order to address the dead hemlock understory.

BASAL AREA & TREES PER ACRE

STAND **Black**

ACRES **85.0**

		TOTAL	6	8	10	12	14	16	18	20	22	24	26	28	30	32+
eastern hemlock	BA	60.7	13.4	8.3	7.6	5.5	4.5	5.2	4.1	4.5	4.8	2.1	0.7			
	TPA	136.6	77.0	23.7	13.9	7.0	4.2	3.7	2.3	2.1	1.8	0.7	0.2			
red maple	BA	36.2	2.8	6.6	8.3	7.6	5.9	4.5	0.7							
	TPA	67.5	14.8	18.8	15.2	9.7	5.5	3.2	0.4							
white pine	BA	5.9	1.0						0.7	0.7	0.7	0.7	1.4	0.3	0.3	
	TPA	7.0	5.3						0.4	0.3	0.3	0.2	0.4	0.1	0.1	
red spruce	BA	5.2	1.4	2.8	0.7		0.3									
	TPA	17.3	7.8	7.9	1.3		0.3									
northern red oak	BA	5.2		0.3	1.0		1.0	0.7	0.3	0.3	0.7	0.7				
	TPA	5.2		1.0	1.9		1.0	0.5	0.2	0.2	0.3	0.2				
yellow birch	BA	2.8		1.0	1.0	0.3		0.3								
	TPA	5.5		3.0	1.9	0.4		0.2								
paper birch	BA	2.4	1.0	0.7	0.3	0.3										
	TPA	8.3	5.3	2.0	0.6	0.4										
sweet birch	BA	1.0	0.7			0.3										
	TPA	4.0	3.5			0.4										
black cherry	BA	0.7	0.3	0.3												
	TPA	2.7	1.8	1.0												
American beech	BA	0.7	0.3	0.3												
	TPA	3.5	2.5	1.0												
white ash	BA	0.3		0.3												
	TPA	1.0		1.0												
sugar maple	BA	0.3	0.3													
	TPA	1.8	1.8													
TOTAL	**BA**	**121.4**	**21.4**	**20.7**	**19.0**	**14.1**	**11.7**	**10.7**	**5.9**	**5.5**	**6.2**	**3.4**	**2.1**	**0.3**	**0.3**	
	TPA	**260.4**	**119.7**	**59.3**	**34.8**	**18.0**	**11.0**	**7.7**	**3.3**	**2.5**	**2.4**	**1.1**	**0.6**	**0.1**	**0.1**	

To the Sharon Conservation Commission

Projected salvage value in hemlock killed areas

Sharon Town Forest 2023

Recommended harvest method is cut to length.

Group selection in mixed stand with dead hemlock understory
Objective retain and grow vigorous good stems and mat down dead hemlock

Predicted harvest

		Sawtimber		A		Pulp		B
Pink area 190 acres	MBF		$/MBF	Value	Tons		$/Ton	Value
White pine	175	$	150	$ 26,250				
eastern hemlock					700	$	5	$ 3,500
Red Maple	10	$	100	$ 1,000				
paper birch					100	$	6	$ 600
Sweet birch					75	$	6	$ 450
beech					30	$	6	$ 180
Northern red oak	40	$	375	$ 15,000				

Black area 85 acres

Harvest all dead hemlock and selected red maple and white pine except along meadow brook buffer.

Hemlock					1600	$	5	$ 8,000
red maple					600	$	6	$ 3,600
white pine	15	$	150	$ 2,250				
paper birch					85	$	6	$ 510
				$ 44,500				$ 16,840
				Total Column A and B				$ 61,340

estimated		
Forestry fee	$	13,802
Value of salvage harvest	$	47,539

Note after July 20th this prediction will have to be reconsidered due to drying wood.

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