

OCCASIONAL REPORT 61

JANUARY 1984

LOBLOLLY PINE RELEASE STUDY

REPORT NUMBER

2



Virginia Division of Forestry

Department of Conservation and Economic Development



RESULTS OF A LOBLOLLY PINE RELEASE STUDY
RELEASE REPORT NUMBER 2

by

Thomas A. Dierauf

ABSTRACT

A release study was installed in an area where all hardwoods had been hand-chopped close to the ground during the fifth growing season. An unreleased check area was left. Hardwood competition at time of release was not severe, and most seedlings were free to grow. At age 18, the released plots had 16 percent more basal area and 27 percent more volume (in standard cords).

INTRODUCTION

This is the second in a series of Occasional Reports we will publish over the next five years or so, that will report the results of studies in which loblolly pine seedlings were released from hardwood competition. This particular study was installed on the Buckingham State Forest, in Stand 43 of the Jamison 6 management unit. Prior to harvest, the area supported a stand of mixed hardwoods with various species of oaks predominating. The area was prescribed burned (without prior drum chopping) in the summer of 1964. The fire was very hot and killed all residual hardwoods back to the ground. In the spring of 1965 the area was hand planted with loblolly pine seedlings at a rate of about 1,100 per acre, and subsequent seedling survival was unusually good.

In the summer of 1969, during the fifth growing season, half of the stand was released by hand-chopping all hardwoods close to the ground. Competition from hardwood sprouts was not severe. Permanent growth plots were not installed at the time of release, but we did sample stocking and seedling height by taking 100 mil-acre sample plots in both the check and released areas. These mil-acre plots were evenly distributed on either side of the boundary between the released and unreleased portions of the tract, in the area where permanent growth plots were later installed. The estimates of stocking based on these mil-acre plots were $1,030 \pm 52$ loblolly seedlings per acre on the released area and $1,090 \pm 48$ on the check area. The seedlings on the mil-acre plots averaged 10.7 and 11.2 feet on the released and check areas respectively.

Plot Installation

pine seedlings made up all of the pine stocking.



The diameter at breast height of each loblolly pine was measured to the nearest inch, and a sample of dominant and co-dominant trees were measured for total height. We estimated that 79 percent of the loblolly pine on the check plots and 86 percent on the released plots were free-to-grow (in our judgment, hardwood competition would not prevent them from achieving a place in the future pine canopy). On the check plots about 70 percent of the hardwood competition was from oak sprouts and 20 percent from red maple. On the released plots it was about 60 percent and 30 percent from oak and maple sprouts respectively. Hickory, dogwood, and yellow poplar made up most of the remaining hardwood competition.

Remeasurement

The plots were remeasured at age 14, by which time the pine canopy had closed, even on the check plots, and most hardwoods were over-topped. A final measurement was made at age 18, at which time basal area and length of live crowns indicated that thinning was needed. At this final measurement we tallied all hardwoods over 1.5 inches DBH. On the released plots all hardwoods were over-topped, but there were still a few intermediate and co-dominant hardwoods on the check plots.

RESULTS

The results of the measurements at ages 10, 14 and 18 are presented in Table 1. The released and unreleased plots started out with about the same number of loblolly pine per acre (with perhaps a few more on the check plots). Average site index, based on average height of dominant and co-dominant trees at age 18, is similar for the released and unreleased plots. At age 18 the released plots, on the average, contained 21 square feet more basal area (16% more) and 5 more cords (27% more) than the check plots.^{1/}

Table 1. Average number of loblolly, average DBH, basal area, standard cords and height of dominant and co-dominant trees at ages 10, 14, and 18.

	<u>Released</u>			<u>Check</u>		
	<u>10</u>	<u>14</u>	<u>18</u>	<u>10</u>	<u>14</u>	<u>18</u>
Number loblolly	1,091	1,075	1,004	1,080	1,041	969
Ave. DBH	3.81	4.49	5.14	3.56	4.27	4.83
Basal area	92.2	126.0	152.4	80.5	110.7	131.1
Standard cords	-	12.6	23.6	-	9.9	18.6
Height	29.2	38.4	45.8	30.0	38.9	46.0

^{1/} Differences in basal area and standard cords per acre at age 18 were subjected to a paired T-test. The differences were statistically significant (probability of a larger value of T = .0005 and .001 for basal area and standard cords respectively).

The response to release continued through age 18, as illustrated in Figure 2 using basal area. The released plots had 11.7, 15.3, and 21.3 square feet of basal area more than the check plots at the 10, 14 and 18 year measurements respectively.

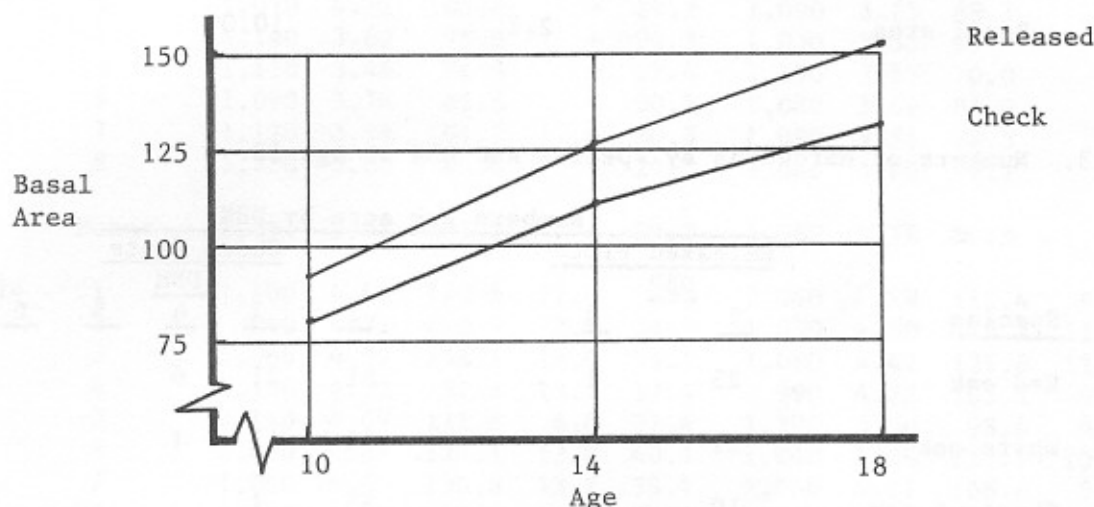


FIGURE 2. Basal area per acre of loblolly pine at each measurement.

Numbers of hardwoods over 1.5 inches DBH were tallied by DBH, species, and crown class at the 18 year measurement. This data is presented in Tables 2 and 3. All hardwoods on the released plots were overtopped, and on the check plots there were only an average of 20 intermediate and 2 co-dominant hardwoods per acre at age 18.

Table 2. Numbers of hardwoods by crown class and basal area per acre, for stems over 1.5 inches DBH at age 18.

	Number of stems per acre	
	Released Plots	Check Plots
Number overtopped	91	341
Number intermediate	0	20
Number co-dominant	0	2
Basal area	2.1	10.0

Table 3. Numbers of hardwoods by species and DBH at age 18.

Species	Numbers per acre by DBH							
	Released Plots			Check Plots				
	DBH			DBH				
	2	3		2	3	4		5
Red oak	25	1		81	21	6		
White oak	22			91	11	1		
Chestnut oak	19			35	1			
Red maple	12			62	12			
Yellow poplar	8	1		2				1
Dogwood	2			26				
Hickory				8	1			
Black cherry					1			
Totals	88	2		305	47	7		1

Individual plot data for the 10, 14 and 18 year measurements are presented in Table 4.

Table 4. Number of loblolly, average DBH, basal area, standard cords, and average height of dominant and co-dominant trees for each plot at the 10, 14, and 18 year measurements.

Age	Plot	Released <i>Tct=0</i>					Check <i>Tct=1</i>					Plot
		No.	DBH	B.A.	Cds.	Ht.	No.	DBH	B.A.	Cds.	Ht.	
10	1	1,110	3.87	95.8	-	28.8	1,060	3.61	81.3	-	29.7	9
	2	980	3.96	89.7	-	29.0	1,060	3.82	88.9	-	29.9	10
	3	1,070	4.11	103.0	-	29.2	1,090	3.75	89.1	-	30.0	11
	4	1,140	3.82	95.0	-	29.2	1,030	3.38	69.7	-	30.0	12
	5	1,110	3.46	76.8	-	27.4	1,190	3.13	70.0	-	29.0	13
	6	1,090	3.74	91.6	-	30.3	1,080	3.69	86.9	-	29.9	14
	7	1,120	3.94	101.1	-	30.3	1,090	3.51	78.5	-	30.2	15
	8	1,110	3.60	85.0	-	29.0	1,040	3.60	79.7	-	31.5	16
	Means	1,091	3.81	92.2	-	29.2	1,080	3.56	80.5	-	30.0	
14	1	1,100	4.48	127.5	12.0	38.2	1,040	4.29	112.4	9.4	36.0	9
	2	940	4.71	120.8	12.9	38.5	1,030	4.50	119.2	11.0	37.5	10
	3	1,060	4.77	138.1	16.0	39.1	1,080	4.42	122.8	11.7	38.9	11
	4	1,160	4.52	137.6	13.3	37.4	990	4.22	103.1	9.1	39.1	12
	5	1,140	4.09	111.8	8.0	37.4	1,100	3.90	98.4	6.5	38.7	13
	6	1,040	4.48	124.1	13.4	40.1	1,040	4.28	112.7	10.6	39.4	14
	7	1,090	4.55	130.8	13.2	38.1	1,050	4.21	108.6	9.9	39.7	15
	8	1,070	4.29	117.1	11.7	38.8	1,000	4.31	108.3	11.3	41.7	16
	Means	1,075	4.49	126.0	12.6	38.4	1,041	4.27	110.7	9.9	38.9	
18	1	1,030	5.15	155.9	24.0	45.3	990	4.66	125.8	15.2	45.6	9
	2	880	5.43	148.4	25.5	46.5	970	4.99	137.4	19.1	44.7	10
	3	960	5.50	164.0	27.0	45.5	990	5.07	147.7	23.4	46.8	11
	4	1,090	5.08	161.8	24.8	46.4	940	4.76	124.4	17.7	45.3	12
	5	1,040	4.83	141.6	19.4	45.4	1,000	4.63	124.1	15.5	45.5	13
	6	990	5.02	146.1	21.2	43.9	910	4.89	126.4	18.3	46.0	14
	7	1,030	5.16	158.0	24.2	46.4	990	4.75	128.6	17.7	45.7	15
	8	1,010	4.91	143.4	22.4	47.1	960	4.90	134.6	21.6	48.1	16
	Means	1,004	5.14	152.4	23.6	45.8	969	4.83	131.1	18.6	46.0	