

TIMBER SURVEY - HATTERAS WOODS

(9-3-37)

(Buxton Woods)

The woods tract known as Hatteras Woods is a timbered tract of approximately 5500 acres that is located on Hatteras Island along the sand banks of North Carolina. The area in itself is bounded on the north by the waters of Pamlico Sound, on the east by the Atlantic Ocean, on the south by a sandy waste that forms the shore line along the Atlantic Ocean, and on the west by a narrow strip of land near the recently abandoned Creeds Hill Coast Guard Station. Included within this woodland tract are the two communities of Buxton and Frisco, the North Carolina State Park known as Cape Hatteras State Park, and the old Cape Hatteras Light House which was recently taken over by the Park Service. In connection with the two previously mentioned communities, Buxton the larger, has between sixty-five and seventy homes and Frisco has about twenty homes. The town of Buxton spreads out over an area that is three miles long, (east and west), and about one-half of a mile wide, (north and south). Since the main means of a livelihood in this part of the country is fishing none of the dwellings have more than an acre under cultivation. There are several areas of larger than ten acres that have been fenced off for cattle grazing, but no improvements have been made to this land.

As a general rule most of the natives have little flower gardens surrounding their dwellings consisting in the main of various flowering shrubs, such as flowering pomegrante, crape myrtle and chinaberry. These exotic species thrive very well and in many cases are growing in the woods as escapes from cultivation. I could not determine the length of time these plants have been growing in this section but I do believe that they could almost be considered as native species. A great many of the homes have fig orchards which thrive very well in this climate.

This part of the sand banks suffered a great deal from the hurricanes of 1933 and 1936, and as a result several homes have been abandoned and several people from the community of Hatteras are building along the woodland ridges in the vicinity of Buxton. Many of these new homes are of modern design and generally are larger than most of the old dwellings. Another result of the hurricane has been the untimely death of the loblolly pine that were growing in the flooded areas. This point will be taken up in greater detail in a later part of the report.

This area was logged between thirty and forty years ago by outside interests. According to natives who lived in this part of the country at that time the merchantable timber consisted of almost one hundred percent loblolly pine. Some of the trees that were present exceeded a circumference of fifteen feet, in fact they were so large that they were not logged by the lumber operators but they have died since that time due to insect infestations that followed the logging operation. During this logging, a tram road was built on which a little engine operated that hauled the logs to Hatteras. At the present time most of this tram road remains open and is still used as a truck trail. Perhaps it is no idle dream that in a matter of thirty years the area will once more support a stand of timber that will rival the stand that was cut in the early part of this century.

From a fire standpoint the woods have been comparatively free from fire the past few years, mainly due to the work of the Park Service, either with the CCC men or the employees of the Beach Erosion Control Project. Since the natives do not depend upon the woods for a livelihood they pay little or no attention to forest fires. However, it is my idea that with the coming of a National Seashore Park it will be necessary to maintain an effective fire lookout and also a set of truck trails that will bring the entire woodland area under an hour control system. It has to be realized that in several years, either the CCC Camp or the WC Camp will be gone or even both of them may have been closed down, and at that time it will be necessary to depend upon local help for fire fighters. With that being the case a rapid detection system will be essential. In my mind there are two possibilities for a good detection system, the use of the tower at the new Hatteras Point Coast Guard Station, or the use of the old lighthouse which is now being administered by the Park Service. Whichever unit is to be used, it will be necessary to determine the location in the near future if adequate fire plans are to be made. In line with an adequate protection system it is necessary to plan the construction of enough truck trails to get to any spot in the woods in the fastest possible time. However, it will also be necessary to make sure that the construction of these trails will in no way cause any harm to the aesthetic value of the woods. I believe that if the road, called the Doctor's Road, which runs North and South through the woods could be built up so that it will be passable at all times of the year it would provide ample means of getting to the timber along the beach. The road, labeled on the map as the Old Tram Road is open almost all the way between Buxton and Frisco. There is between a mile and a quarter and a mile and a half of old trail that needs to be opened up. From a construction standpoint this will be very easy as there are only two small stretches, one of eight feet and the other of about thirty feet that need any fill due to water that is present. Since this road is on highland most of the way and it is at least a half of a mile from the sound it would also make a fine emergency road in case of a hurricane which may cause the present main thoroughfare between Buxton and Hatteras to flood over. I believe that with the repair and maintenance of these two roads, the Doctor's Road and the Old Tram Road, and the use of an adequate detection unit the fire protection of these woods from a presuppression angle would be well taken care of.

In discussing the timber types I have used the same system as I have used on the past reports, that is, a combination of the California Range and Experiment Station tally sheets and a set of sheets that I devised myself based on Sample Plot Data Sheets of the U. S. Forest Service. There are in all, five distinct timber types in these woods, with four variations of the loblolly pine highland type. Besides the timber types there are several fresh water intermittant lakes, and two types of untimbered swamps. The acreage of the lakes varies directly with the rainfall. The untimbered swamps consist of a marsh meadowland in which the dominating species are rushes and sedges, while in the second type the dominating species are silverling, (*Baccharis halimifolia*), water bush, (*Iva frutescens*), wax myrtle, (*Myrica cerifera*), and black (?) willow, (*Salix nigra*). From a timber standpoint neither of these two types are important and on the map they are designated by only one symbol. Table one shows the acreage of the various

types and the symbols used on the map when referring to these types.

TABLE 1 - TYPES PRESENT IN HATTERAS WOODS AND ACREAGE OF EACH TYPE.

<u>NAME</u>	<u>SYMBOL</u>	<u>ACREAGE</u>
Mixed hardwood(pine,dogwood,live oak,bay	MB	339
Loblolly Pine reproduction	7A	20
Loblolly Pine Sapling	7B	64
Loblolly Pine Pole	7C	69
Loblolly Pine Saw-Log	7S	2006
Loblolly Pine Swamp Saw-Log	7SW	273
Intermittent Lake	ILD	69
Swamp	SW	2164
Yaupon, Live Oak, Persimmon	IV, QV, DV	351
Mixed hardwood swamp sapling	MBW	9
Total -		5364

Before I go into a discussion of the timber types and the recreational possibilities of this woodland area it is best to understand that due to the presence of mosquitoes and other insect pests it is almost impossible to stay in any one spot in this woodland tract for over five minutes at a time, except during the winter season. It has been my experience that even as late as November 11th, there are a great deal of mosquitoes present. Since there have been very few cases of malaria recorded for Hatteras Island the mosquitoes are just a source of annoyance and not of disease. However, if this area is to be used by the public when the National Seashore Park becomes a reality it should be kept in mind that an adequate mosquito control program should be carried out. In setting plans for this type of work it should be checked by the Wild Life Division so that a dust or spray should be used that would not harm any of the present wild life that inhabit these woods. According to Mr. Dave Driskill, Airplane Pilot for the National Park Service, it would be a rather easy matter to dust the swamps from a plane. Since various governmental organizations, notably the TVA are faced with the same problem in connection with their recreational activities, I believe that a close examination of their control policies should be made.

Another factor to be taken into account is the possibility of building dykes and a system of drainage canals to prevent the overflow of waters from the sound during exceptional high tides. This system should be worked out keeping certain factors in mind, notably the effect of the new lakes on the wild fowl, the relationship to increasing or decreasing the amount of insect pests, and finally the effect on existing vegetation. I do believe that this project should be undertaken but all divisions that are interested in the final outcome should be consulted so that a harmonious arrangement would be agreed upon.

The timber in the Hatteras woods grow on ridges that run in a North and South direction, anywhere from one mile to seven miles long, and they extend in width from 50 feet to one-half mile. The longest ridge is the one that lies closest to the ocean, it is approximately seven miles long and averages a quarter of a mile in width. Illustration number one, taken near

The point where the Doctor's Road comes out at the beach is typical of that ridge. The other ridges have trees that reach a much greater height and diameter growth. Since this ridge is the one that is the most exposed to the ocean it is natural that the most stunted growth should be found present. In some cases, especially in the vicinity of the Creeds Hill Coast Guard Station that was abandoned some ten to fifteen years ago, experimental plantings of certain native shrubs, i.e., *Callicarpa americana* have been made by the Park Service. The shrubs that were planted in these exposed sites, where there had been no fencing, hardly survived. Of a random count of one hundred shrubs there were but five alive, however, the grass that was brought along with these shrubs is growing nicely and is taking a good hold in the sand. The individuals in charge of the planting told me that in twenty-four hours after the shrubs were imbedded in the sand, the sand was blown away and just the root ball remained. With this in view I believe that before any further shrub planting should take place it should be ascertained whether the wind velocity in that locality is too great for a successful survival, otherwise the land should be grassed or fenced prior to the actual planting. The new type of panel fences that have been made of scrap wood and have been laid down in a more or less checkerboard, (Figure #2), fashion may go a long way toward the solving of this problem.

From a forestry angle the most important type is the loblolly pine saw-log type, 7S on the map, there are 2006 acres of this type, which makes it the largest timber type in the area. In photographs three, four and five, typical views of this type are shown. The age of the trees run between 21 and 40 years with some few trees, mostly fire scarred and bug-ridden, running as high as sixty years old. The timber is found growing along ridges and is surrounded on both sides by swamps, either timbered or un-timbered. In some cases the underbrush is very thick and it is almost unpenetrable but as a general rule these ridges are almost park like. Tables two, through six show the distribution of species, the stand by diameters, the stand by heights, the number of seedlings and the ground cover.

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TABLE 2 - DISTRIBUTION OF SPECIES IN LOBLOLLY PINE SAW-LOG TYPE			
<u>Common Name</u>	<u>Scientific Name</u>	<u>No. per Acre</u>	<u>No. on Type</u>
Loblolly Pine	<i>Pinus taeda</i>	335	672,010
Persimmon	<i>Diosporus virginiana</i>	98	196,588
Flowering Dogwood	<i>Cornus florida</i>	26.67	53,500
Blue Beach	<i>Carpinus caroliniana</i>	15	30,900
Yaupon, (larger than 10')	<i>Ilex vomitoria</i>	8.67	17,392
Bay	<i>Persea species</i>	7.67	15,396
Holly	<i>Ilex opaca</i>	5.67	11,390
Prickly Ash	<i>Xanthoxalum clavi-herculis</i>	4.67	9,368
Mulberry	<i>Morus rubra</i>	.67	1,344
Total -		517.02	1,037,168

DISTRIBUTION OF SEEDLINGS IN LOBLOLLY PINE SAW-LOG TYPE			
<u>Common Name</u>	<u>Scientific Name</u>	<u>No. per Acre</u>	<u>No. on Type</u>
Loblolly Pine (1-year)	Pinus taeda	492	986,952
Pine, 2 to 3 years	Pinus taeda	63	126,378
Yaupon, (less than 10')	Ilex vomitoria	56	112,336
Persimmon	Disoporus virginiana	14	28,084
Live Oak	Quercus virginiana	21	42,126
Bay	Persea Species	12	24,072
Dogwood	Cornus florida	7	14,042
Holly	Ilex opaca	2	4,012
Blue Beech	Carpinus caroliniana	2	4,012
Prickly ash	Xanthoxylum clavi-heculis	.33	502
Total -		669.33	1,342,014

TABLE 4 - STAND TABLE OF PINE SAW-LOG TYPE BY DIA. CLASSES

<u>Diameter in inches</u>	<u>No. per Acre</u>	<u>Diameter in in.</u>	<u>No. per Acre</u>
.5	139	15	0.
1.	75	16	7.
2.	48	17	.33
3.	21	18	4.
4.	15	19	0.
5.	10	20	1.
6.	24	21	0.
7.	17	22	.67
8.	23	23	0.
9.	24	24	.33
10.	35	25	0.
11.	1	26	0.
12.	32	27	.67
13.	0	28	0.
14.	19	29	0.
		32	.33
Total - 505			
Average diam. 4.08		Average diam. trees larger than 7" - 10.9	

TABLE 5 - STAND TABLE OF LOBLOLLY PINE SAW-LOG BY HEIGHT CLASSES

<u>Height in feet</u>	<u>No. per Acre</u>	<u>Height in feet</u>	<u>No. per Acre</u>
5	246	45	64.3
15	26.4	55	52.
25	41.8	65	19
35	41.5	75	3
Total	494	Average height	22.4

TABLE 6 - DISTRIBUTION OF SPECIES IN PERCENT FORMING GROUND COVER IN
LOBLOLLY PINE SAW-LOG TYPE

Common Name	Scientific Name	%	Common Name	%	Scientific Name
Yaupon	<i>Ilex vomitoria</i>	19.08	Live Oak	1.91	<i>Quercus virginiana</i>
Loblolly Pine	<i>Pinus taeda</i>	19.08	Blue Beech	2.50	<i>Carpinus</i>
Amer. Beauty Bush	<i>Callicarpa Amer.</i>	11.48	Blackberry	1.16	<i>Rubus</i>
					<i>allegheniensis</i>
Persimmon	<i>Diosporus virginiana</i>	8.59	Holly	1.08	<i>Ilex opaca</i>
Smilax briars	<i>Smilax species</i>	6.75	Fern	.50	
Litter		5.67	Bare	.41	
Grapevine	<i>Vitis species</i>	5.25	Annual	.41	
Wax Myrtle	<i>Myrica cerifera</i>	3.83	Prickly ash	.33	<i>Xanthoxylum</i>
					<i>claviherculis</i>
Lowbush Huckelberry	<i>Vaccinium Sp.</i>	3.16			
Grass	<i>Graminae</i>	2.83	Unknown	.08	
Bay	<i>Persea Sp.</i>	2.50			
Flowering Dogwood	<i>Cornus florida</i>	3.41	Total	100%	

In making the timber survey of this area I found a great deal of snags and disease trees, the former averaged 12 to the acre, and the latter averaged 7 to the acre. Considering that there have been a considerable number of snags removed in the last year by both WC and CCC crews this figure is rather high. I attempted to discover the organism if any that was causing the death of the pine trees. Since the high water caused by the storms of 1933 and 1936 killed off a good many trees and left many in a weakened condition it was thought that this was the cause of the death of these trees. I discovered in the early part of this summer that many of the trees that were on the tops of the ridges, away from the high water line, were dying out in isolated patches. With the aid of Mr. H. Gluck, my compassman, I took bark and insect samples from the tree shown in illustration number six. These insects were later identified by the Bureau of Plant Quarantine and Entomology at Asheville, N. C. as being turpentine bark beetles, (*Dendroctonus terebrans*), which according to Farmer's Bulletin #1586, entitled "The Southern Pine Beetle", "should cause little alarm as they seldom, if ever, kill trees". (Pictures 6 & 7)

On a later occasion I went to another ridge accompanied by Mr. Jack Clark, Sr. Foreman (L.A.) of the Cape Hatteras S.P., N.C.S. P-6, and with a crew of four CCC men, we cut down a tree near the Buxton schoolhouse and carefully examined it for insects. This tree had recently died as evidenced by the presence of some green needles and of some sap in the trunk. In pictures eight and nine the crew of men doing this investigation are shown at work. The specimens collected were sent to Mr. B.H. Wilford, Associate Entomologist of the Bureau of Plant Quarantine and Entomology at Asheville. The insects were identified and the following were found to be present, *Hypophloeus sp.*, *Dendroctonus terebrans*, *Ips avulsus*, *Ips grandicollis*, *Monochamus sp.*, *Cleridae*, *Rhagium* and Larvae of either *Dendroctonus terebrans* or *Dendroctonus valens*. Accordingly no specimens of the southern pine beetle, *Dendroctonus frontalis* were found. However, according to a monograph written by R. A. St. George, Division of Forest Insect investigations, entitled the "Ips Engraver Beetles" it is most likely that the trees that are being killed off by insects are dying as a result of an attack of the *Ips* beetle. To quote from this monograph, "The *Ips* beetles breed in green felled timber, fresh pine slash, or pines in a dying condition. When, however, large numbers of trees have been effected by storms, fire, drought, and other mishaps of untoward conditions, and thus materially

Weakened, these insects may increase to such proportions that they become a menace to healthy trees. -----When the beetles have increased until they are present in large numbers, and when no slash, logs or weakened trees are available for them they will attack healthy trees and sometimes cause considerable injury".

While the crews from the WC Camp at Hatteras were taking out some dead and dying trees in the vicinity of the camp, I once more made a collection of beetles and sent them with a letter of explanation to Mr. Wilford. In his reply he stated, "two of the insects will be sent to Washington for specific information, (which as yet I have not received), the other two were determined as *Ips grandicollis* and *Mesites subcylindricus*.----Since you are finding trees dying in patches, although none of the insects sent in by you thus far this year were southern pine beetles, it will be a good plan to practise control, following the instructions given in Bulletin 1586. I wish to emphasize, however, that whatever method of control you use be sure all the trees containing living bark beetles are destroyed. Some of the infested trees may still be green, however, the pitch tubes and boring dust on the bark are characteristic of attack. In those instances where the foliage has turned brown, excepting in late fall the brood has emerged". To carry out the plan advised by Mr. Wilford it will be necessary to obtain permission from local landowners to cut out those trees which contain the bark beetles, and have it understood that they will cart away the diseased timber immediately or allow the Park Service to dispose of the timber according to whatever control measures are used. Before any plans to remove the diseased timbers are made it will be necessary to gain the cooperation of the Wild Life Division of the Park Service so that there will be no misunderstanding as to the control measures finally adopted.

Accordingly, it is my opinion that a project be set up to scout over this area and determine those places where the insects are present. Then determine those trees which have beetles present and remove them. The limbwood can be hauled out to the beach and be used as a brush blanket, the remainder of the tree should be barked and then exposed to the sun, otherwise take the logs and haul them in to be bucked up for firewood or fence posts. Since at the present time there are approximately fifteen patches running from 1/4 to 5 acres in extent that are dying off as a result of insect infestations I believe that this control work should start as soon as possible. The only area that I would not attempt to do any control work is the last ridge which fronts the ocean. Since this is the main barrier against the shifting sands it would be unadvisable to remove any trees and thus weaken the defense.

From a recreational standpoint the type in itself contains many features of interest to the public. There is wild life present in the form of deer, wild hogs, and wild fowl. I do not believe it would be worth while to utilize the woods for any form of recreational development such as cabins, shelters, etc. As long as the mosquitoes, ticks, and other forms of insect pests are present it is almost impossible for the general public to use these woods for any type of recreation. With this in view it would be wise to consider the point I made in the early part of the report in reference to the working out of a mosquito control program.

In regards to the reproduction that is growing in this type the number of one year old pine seedlings vary from 24 per acre to 1972 per acre, with an average of 492 per acre, (Table 3). This wide variation is caused by the fact that those areas that have been grazed up until last season show a tremendous new growth, especially of young pine, while those areas that are still fenced in for grazing show very poor reproduction. The number of pine seedlings that are two to three years old vary in from none per acre to 100 per acre with an average of 63 per acre, this variation is also due to the effects of grazing in the open woods. In picture three, taken in the area near the Buxton School House, shown on the map as 7s/7a, the large amount of young trees that are coming in is clearly brought out. These young trees which average five years in age are not in any way affected by insects and they provide an adequate understory for the stand. In this table, (Table 3), the Yaupon bushes that are listed as seedlings are not seedlings in the true sense of the word but are in reality a tabulation of the Yaupon bushes that are less than ten feet tall.

In getting an estimate of the board feet in the area I did not attempt to determine a cull percent, and I used total heights instead of merchantable heights. As I could not find an adequate volume table based on the "Doyle" Rule, which is the log rule that is commonly used in this vicinity, that would cover total heights, I used a table based on the Scribner Decimal C, (Table 7, Miscellaneous Publication No. 50, U.S.D.A.). From this table I determined that there is an average of 10,200 B.F. per acre, based on trees seven inches or greater in diameter and forty feet or taller in height, with a total of 20,461,200 B.F. on the type. This figure is of no value to a prospective timber operator since it does not take in account the large amount of cull due to fire scars on butt logs.

As I mentioned in an earlier part of the report the question of presuppression in regards to fire-fighting could be solved by the planning of an educational program for the natives in regards to the evils of forest fires, the use of a lookout tower, the construction of a series of truck-trail fire-breaks that would give hour control for the entire woodland area. The 7S type in itself is of medium fire risk, the greatest amount of risk occurring where the number of snags and dying trees are present in comparatively large quantities. We had but one forest fire in these woods so far this season which burned an area of about five acres. Considering that on one occasion the previous year, three fires broke out in one day considerable strides have been made in forest fire protection.

The litter in the woods is composed mainly of pine needles and small twigs from the pine trees, the soil is sandy and it has a layer of about six inches of black sand between the litter and the sub-soil. The ground cover in itself consists of approximately twenty species. In Table six, the distribution by percent of the various species is shown, besides those mentioned there is a cactus, (*Opuntia vulgaris*).

The second most important type from a timber standpoint is the pine pole type, (Photograph #10), 7C on type map, there are 69 acres of this type, (Table one), The distinguishing characteristic between this type and the one previously discussed is that the average diameter of those trees that are greater than 7 inches is less than 9.6 inches, or less than saw-log size. The characteristics of this type in regards to ground cover, fire hazard, presence of bark beetles, amount of underbrush, recreational possibilities, and species present is almost identical to the pine saw-log type. In tables seven through eleven the species present, the average height, the average diameter, the number of seedlings and the ground cover are shown.

TABLE 7 - DISTRIBUTION OF SPECIES IN LOBLOLLY POLE TYPE 7C

Common Name	Scientific Name	No. per Acre	No. on Type
Loblolly Pine	Pinus taeda	322	22,218
Live Oak	Quercus virginiana	32	2,208
Persimmon	Diosporus virginiana	26	1,794
Blue Beech	Carpinus caroliniana	14	966
Bay	Persea species	12	828
Holly	Ilex opaca	10	690
Dogwood	Cornus florida	8	552
Total -		424	29,256

TABLE 8 - DISTRIBUTION OF SEEDLINGS IN 7C TYPE

Common Name	Scientific Name	No. per Acre	No. on Type
Loblolly Pine	Pinus taeda	22,254	1,604,526
Bay	Persea species	42	2,898
Holly	Ilex opaca	4	276
Live Oak	Quercus virginiana	4	276
Dogwood	Cornus florida	4	276
Yaupon (bushes)	Ilex vomitoria	80	5,520
Total -		23,338	1,613,772

TABLE 9 - STAND TABLE BY DIAMETER CLASSES OF 7C TYPE

Diameter in inches	No. per Acre	Diameter in inches	No. per Acre
.5	76	9	44
1.	8	10	66
2.	2 (average dia.	11	2
3.	12 6". average	12	22
4.	20 dia. trees	13	0
5.	14 greater than	14	2
6.	58 7" in dia.	15	0
7.	44 8.4).	16	2
8.	52	Total -424	

TABLE 10 - STAND TABLE BY HEIGHT CLASSES OF 7C TYPE

Height in feet	No. per Acre	Height in feet	No. per Acre
5	84	45	146
15	4 (average	55	42
25	46 height 33')	65	6
35	96	Total - 424	

TABLE 11 - GROUND COVER IN PERCENT OF 7C TYPE

Common Name	Scientific Name	%	Common Name	%	Scientific Name
Loblolly Pine	Pinus taeda	20	Unknown	4	
Yaupon	Ilex vomitoria	17	Bay	3.5	Persea species
Amer. Beauty Bush	Callicarpa americ				
	ana	17	Smilax	3	Smilax species
Litter		16	Holly	3	Ilex opaca
Grass		7	Persimmon	3	Diosporus
					virginiana
Grape Vine	Vitus species	5.5	Wax Myrtle	2.5	Myrica cerifera
Live Oak	Quercus virgin				
	iana	5	Dogwood	1.5	Cornus florida
		Total ----	100%		

From an acreage standpoint this type is of very little importance since there are only 69 acres of the type. Since most of the type is found on a ridge near the town of Buxton, I believe that many of the larger trees have been removed at one time or another by the local residents for firewood. There is an average of 7000 B.F. of pine per acre in this type with a total of 483,000 B.F. on the type. As in the case of the 7S type this is not based on a commercial estimate but rather a total of the growing timber.

The snags average thirty-eight per acre while the disease trees average 12 per acre, as in the case of the 7S type the death of the trees and the presence of the disease trees can be traced to the effects of the storm and the following attack of the bark beetles. As far as the underbrush in this type is concerned it is very light and it is very easy to penetrate the area. From a recreational standpoint the type is too close to the town of Buxton to be utilized for anything but a natural woods area for the townspeople. As in the case of the 7S type the fire hazard is low except for the dead and diseased trees that are present. Since the area in itself is right near the Buxton-Hatteras Road, the question of accessibility in case of fire is no problem.

The next pine type to be discussed is the pine sapling type, 7B on type map, this area consists of 64 acres and it is one of the smallest types in the area. The main difference between this type and the other pine types is the size of the average tree. In this type the trees are from five to ten years old, with an average height of 8.95 feet and an average diameter of 2.18 inches. In tables 12 through 16 an accurate picture of the species present, the stand by heights and diameters, the number of seedlings and the ground cover is given.

TABLE 12 - DISTRIBUTION OF SPECIES IN PINE SAPLING TYPE 7B

Common Name	Scientific Name	No. per Acre	No. on Type
Loblolly Pine	Pinus taeda	674	43,136
Live Oak	Quercus virginiana	29	1,856
Persimmon	Diosporus virginiana	25	1,600
Yaupon	Ilex vomitoria	19	1,216
Willow	Salix nigra	16	1,024
Holly	Ilex opaca	7	448
Bay	Persea species	3	192
Blue Beech	Carpinus caroliniana	1	64
Total -		774	49,536

TABLE 13 - DISTRIBUTION OF SEEDLINGS IN LOBLOLLY PINE SAPLING TYPE 7B

Common Name	Scientific Name	No. per Acre	No. on Type
Yaupon(smaller than 10')	Ilex vomitoria	55	3,392
Persimmon	Diosporus virginiana	15	960
Live Oak	Quercus virginiana	4	256
Loblolly Pine (One year old)	Pinus taeda	1	64
Loblolly Pine (Two year old)	Pinus taeda	1	64
Total -		74	4,736

TABLE 14 - STAND TABLE BY DIAMETER CLASSES IN LOBLOLLY PINE SAPLING TYPE

Diameter in inches	No. per Acre	Diameter in inches	No. per Acre
.5	84	8	2.66
1.	215.9	9	5.32
2.	200.8	10	1.33
3.	91.77	11	1.33
4.	49.21	12	2.66
5.	18.6	13	---
6.	19.95	14	6.65
7.	5.32		

TABLE 15 - STAND TABLE BY HEIGHT CLASSES IN LOBLOLLY PINE SAPLING TYPE

Height in feet	Number per Acre
5	559.93
15	151.62
25	37.24
35 (Average Height 8.95')	21.28
45	3.99
Total -	774.06

TABLE 16 - GROUND COVER IN PERCENT OF LOBLOLLY PINE SAPLING TYPE

Common Name	Scientific Name	%	Common Name	Scientific Name	%
Loblolly Pine	<i>Pinus taeda</i>	26.67	Smilax vine	<i>Smilax species</i>	2.67
Yaupon	<i>Ilex vomitoria</i>	21.34			
Grass		20.33	Persimmon	<i>Diosporus virginiana</i>	1.00
Wax Myrtle	<i>Myrica cerifera</i>	13.33	Grape vine	<i>Vitis species</i>	.67
Litter		5.33	Holly	<i>Ilex opaca</i>	.67
Live Oak	<i>Quercus virginiana</i>	4.33	Blackberry	<i>Rubus Allegheniensis</i>	.33
Amer. Beauty Bush	<i>Callicarpa americana</i>	2.67	Smooth Bay	<i>Persea pelustris</i>	.33
			Black Bay	<i>Salix nigra</i>	.33

This type (7B) is found scattered throughout the entire area in small patches, perhaps the most interesting portion of this type is a patch of about ten acres, along the southern border of the tract. Plot #24 was taken within this tract. This particular section is almost pure pine and it is growing out in the open in face of the severe ocean winds, thus showing that pine will grow in the open sands. The trees are comparatively thrifty with neither any snags or diseased trees present. It seems as if pine seeds from the adjacent mixed hardwood ridge were disseminated and due to the heavy grass cover on this location were able to germinate and live past the seedling stage. Since most of the beech has not as thick a mat of grass as this location it is probable that this fact is the reason for the survival of the pine trees in this area. From a recreational standpoint, outside of the aesthetic values of this type, there is no possible use since the mosquitoes and other insects are present in great quantities. From a forest fire angle this type rates low in the list of fire risk as there are comparatively few dead or diseased trees in the type. The trees are rather fast growing, they averaged seven years in their last inch of diameter growth. As a general rule, due to the density of the stocking it is almost impossible to penetrate the area. Since these few areas are not infected by bark beetle infestations it is of the utmost importance that proper steps be taken so that surrounding areas are cleared of all possible insect carrying trees.

In regards to determining the cause of the presence of these isolated patches of young pine saplings, I inquired of natives the possibilities of these areas being logged at a later time than the rest of the woodland tract, however, this could not be found out. It is possible that at one time these areas, (except on the southern ridge), were homesteads and for one reason or another were given up and the land was allowed to go back to it's natural state. Since the average age of these trees is nine years, it shows how fast the pine comes up once a start is made.

The next type to be discussed is the pine reproduction or 7A type, within this type the average pine tree is less than ten feet tall and not greater than one-half inch in diameter. These areas are found where logging has taken place within the past five years and the pine seedlings have come back to take over the area rather than the live oak, yaupon, and persimmon. Most of these isolated spots are in the center of the woodland area, rather than near the shore or the sand. In some cases rank weed growth is competing with the young pine rather than any of the tree or shrub species. In

picture #11 taken at Plot #7 the recently cut pine stumps are clearly visible, while it is hard to discern the young pine scattered throughout the weeds. The only standing tree other than some sapling pines is a six inch dogwood. In cutting this area it was clear-cut without any seed trees left standing. This seems to be the general logging practise in this section of the country. In tables 17 through 21 the species found, number of seedlings, the average heights and diameters and the ground cover are shown.

TABLE 17 - DISTRIBUTION OF SPECIES IN LOBLOLLY PINE REPRODUCTION

TYPE - 7A

<u>Common Name</u>	<u>Scientific Name</u>	<u>No. per Acre</u>	<u>No. on Type</u>
Loblolly Pine	Pinus taeda	368	7360
Persimmon	Diosporus virginiana	226	4520
Yaupon	Ilex vomitoria	62	1240
Live Oak	Quercus virginiana	10	200
Dogwood	Cornus florida	4	80
Sumach	Rhus coppalina	2	40
Total -		<u>676</u>	<u>13,520</u>

TABLE 18 - DISTRIBUTION OF SEEDLINGS IN LOBLOLLY PINE REPRODUCTION

TYPE - 7A

<u>Common Name</u>	<u>Scientific Name</u>	<u>No. per Acre</u>	<u>No. on Type</u>
Two year old Loblolly Pine	Pinus taeda	210	4,200
Persimmon	Diosporus virginiana	20	400
Grape Myrtle	Lagerstromia indica	12	240
One year old Loblolly Pine	Pinus taeda	8	160
Three year old Loblolly Pine	Pinus taeda	6	120
Live Oak	Quercus virginiana	4	80
Total -		<u>260</u>	<u>5,200</u>

TABLE 19 - STAND TABLE BY DIAMETER CLASSES IN LOBLOLLY PINE REPRODUCTION TYPE (7A)

<u>Diameter in inches</u>	<u>No. per Acre</u>	<u>Diameter in inches</u>	<u>No. per Acre</u>
.5	446	6	0
1.	168	7	0
2.	58	8	2
3.	0	9	2
4.	0	10	0
5.	0	(average diameter .79).	-
Total -			676

TABLE 20 - STAND TABLE BY HEIGHT CLASSES LOBLOLLY PINE REPRODUCTION TYPE (7A)

<u>Height in Feet</u>	<u>Number per Acre</u>
5	604
15	70
25	2
Total -	<u>676</u>
Average Height 3.5	

TABLE 21 - GROUND COVER IN PERCENT IN LOBLOLLY PINE
REPRODUCTION TYPE (7A)

Common Name	Scientific Name	%	Common Name	Scientific Name	%
Persimmon	Diosporus virginiana	26.0	Wax Myrtle	Myrica cerifera	3.5
Yaupon	Ilex vomitoria	23.0	Grass		3.0
Loblolly Pine	Pinus taeda	16.5	Amer.		
			Beauty Bush	Call. americana	2.5
Grape Vine	Vitis Species	7.0	Elder	Iva frutescens	.5
Annual		6.0	Fern		.5
Crape Myrtle	Lagerstroemia indica	6.0	Smilax	Smilax species	.5
Bare		4.5	Live Oak	Quercus virginiana	.5
Total - 100%					

This type presents the best possibilities from a vegetation standpoint for the construction of some type of recreational development since there is no mature timber that would be destroyed in the process of construction. Since the swamp known as Jennett Sedge has some of the best duck hunting in that part of the country, (provided the Park Service allows duck hunting), the 7A area in the vicinity of this sedge would make an ideal location for the construction of some hunting cabins. There is a road, the Doctor's Road, that is passable practically the entire distance by automobile to this location. However, the same fact enters here as in the remainder of the woodland that as long as there are mosquitoes in the woods it would not be practicable to construct any habitation.

From a fire protection standpoint this type is so small that any plans that are drawn up to protect the remainder of the stand will be sufficient to cover this type. Since the area is practically devoid of any large growth it is very easy to penetrate this type. Almost 5 percent of the ground is bare and three percent is covered with grass. As yet the entire area has not been taken over by the loblolly pine but in a matter of a few years there should be a thick stand of young pine. The crape myrtle that is present makes a very attractive shrub and although it is not native to this country I believe it should be investigated to determine whether or not it could be used as a plant for beach planting.

The last pine type to be discussed is the pine swamp type 7S y on the type map. This type is usually found running along the highland pine ridges in narrow strips between the marsh meadows and the highlands. The strips vary in width from about 15 feet wide to almost a quarter of a mile wide. In some cases they are very heavily stocked with timber but as a general rule a good number of these trees died out as a result of the two previously mentioned storms. In pictures 12 and 13 taken in plots 20 and 27 respectively, the density of the pine and the underbrush is clearly shown. In most places the stand is practically impenetrable due to the thickness of the vegetation and the presence of water. However, for sheer beauty this type is one of the most attractive within the woodland area especially in the early spring when the flowers on the many vines are in bloom. In tables 22 through 26 the distribution of species, the distribution of seedlings, the stand table by heights and diameters and the ground cover of the pine saw-log swamp type are given.

TABLE 22 - DISTRIBUTION OF SPECIES IN LOBLOLLY PINE

SAW-LOG SWAMP TYPE

Common Name	Scientific Name	No. per Acre	No. on Type
Loblolly Pine	Pinus taeda	162	44,226
Bay	Persea species	19	5,187
Persimmon	Diosporus virginiana	8	2,184
Smooth Sumach	Rhus coppallina	7	1,911
Water Oak	Quercus (?)	5	1,365
Black Willow	Salix nigra	3	819
Yaupon	Ilex vomitoria	3	819
Mulberry	Morus rubra	1	273
Total -		210	57,330

TABLE 23 - DISTRIBUTION OF SEEDLINGS IN LOBLOLLY PINE

SAW-LOG SWAMP TYPE

Common Name	Scientific Name	No. per Acre	No. on Type
Yaupon(less than 10-feet)	Ilex vomitoria	97	26,481
Wax Myrtle	Myrica cerifera	96	26,202
Bay	Persea species	24	6,552
1yr Loblolly Pine	Pinus taeda	40	10,920
2 yr. Loblolly Pine	Pinus taeda	29	7,917
Sumach	Rhus coppallina	3	819
Total -		289	78,897

TABLE 24 - STAND TABLE BY DIAMETERS - LOBLOLLY PINE

SAW-LOG SWAMPS

Diameter in inches	No. per Acre	Diameter in inches	No. per Acre
.5	5.32	12	23.9
1.	19.95	14	26.6
2.	6.65	16	11.97
3.	7.98	18	10.64
4.	9.31	20	7.98
5.	3.99	22	3.99
6.	7.98	24	7.98
7.	1.33	26	2.66
8.	22.61	28	2.66
9.	10.64	30	1.33
10.	14.63	Total - 210.14	

Average diameter 10.7 Average diameter trees greater than 7" - 15.5

TABLE 25 - STAND TABLE BY HEIGHT CLASSES - LOBLOLLY PINE

SAW-LOG TYPE

Height in feet	No. per Acre	Height in feet	No. per Acre
5	29.26	45	42.56
15	7.98	55	38.52
25	10.64	65	38.53
35	29.26	75	13.3
Total - 210.14		Average Height 43.2'	

TABLE 26 - DISTRIBUTION OF GROUND COVER IN FLASANT - LOBLOLLY
PINE SWAMP TYPE

Common Name	Scientific Name	%	Common Name	Scientific Name	%
Water		45	Bay	Persea species	3
Wax Myrtle	Myrica cerifera	13.5	Yaupon	Ilex vomitoria	2.5
Elder	Iva frutescens	12	Willow	Salix nigra	2.5
Unknown vines		11	Loblolly		
			Pine	Pinus taeda	1
Smilax vines	Smilax species	9	Reed		.5
Total - 100%					

There is an average of twenty-five snags per acre in this type and an average of 13 disease trees. This number is the greatest of the pine types due to the fact that the storm waters came through and covered over the butts of these trees for a height of about eight feet and the roots were totally submerged. There is water present the entire year in these swamps and as a result the species that make up the ground cover are different than the remaining pine types. From a fire protection standpoint this type is of negligible importance since the large amount of water that is present serves as the protection. In the late fall after the storm season is over, I believe, that a close examination should be made of these swamps in order to determine the presence of bark beetles and all the infected trees should be removed in accordance with the instructions of Mr. Wilford that were mentioned in the earlier part of the report.

From a recreational standpoint this type will be only of value as a natural area since the water will prevent the construction of any type of shelter. The difference in vegetation between this type and the remainder of the pine types will serve as a break in the general appearance of the area. The water oak mentioned in Table 22 is a species of black oak that has hybridized with live oak. I was unable to determine it's specific name. There is an average of 24,680 board feet of pine per acre with a total of 6,737,640 board feet on the type. This is the largest per acre average of timber on the entire area, this fact is due to the presence of an occasional large veteran that survived the loggers axe of thirty years ago.

The next type to be discussed is the mixed hardwood sapling type MB on type map, that is found only on the last ridge near the ocean. I believe that the cause of the difference in the vegetation between this ridge and the other ridges is that due to the closeness to the ocean the salt spray and sharp winds have killed the pine trees leaving the dogwoods, holly, and other hardwoods to take over the sight. In the following five tables the distribution of species, seedlings, stand table by height and diameter and ground cover distribution are given.

TABLE 27 - DISTRIBUTION OF SPECIES IN MIXED HARDWOOD
SAPLING TYPE - MB

Common Name	Scientific Name	No. per Acre	No. on Type
Yaupon(over ten feet)	Ilex vomitoria	153	52,206
Loblolly Pine	Pinus taeda	100	33,900
Persimmon	Diosporus virginiana	40	13,560
Bay	Persea species	32	10,848
Dogwood	Cornus florida	29	9,831
Holly	Ilex opaca	27	9,153
Blue Beech	Carpinus caroliniana	27	9,153
Live Oak	Quercus virginiana	20	6,780
Total -		427	144,253

TABLE 28 - DISTRIBUTION OF SEEDLINGS IN MIXED HARDWOOD
SAPLING TYPE - MB

Seedlings	Specific Name	No. per Acre	No. on Type
Yaupon(less than 10')	Ilex vomitoria	126	42,713
Loblolly Pine (1-yr.)	Pinus taeda	61	20,679
Loblolly Pine (2-yr.)	Pinus taeda	13	5,507
Persimmon	Diosporus virginiana	11	3,606
Total -		211	71,529

TABLE 29 - STAND TABLE BY DIAMETER IN MIXED HARDWOOD
SAPLING TYPE-MB

Diameter in inches	No. per Acre	Diameter in inches	No. per Acre
.5	81.13	8	19.95
1.	69.16	9	18.62
2.	101.08	10	9.31
3.	39.90	12	1.33
4.	14.63	14	1.33
5.	9.31	16	----
6.	31.92	22	1.33
7.	26.60	24	1.33
Total - 426.93 Average diameter 3.34			

TABLE 30 - STAND TABLE BY HEIGHT CLASSES IN MIXED HARDWOOD
SAPLING TYPE - (MB)

Height in Feet	No. per Acre	Height in Feet	No. per Acre
5	199.50	35	26.6
15	151.62	45	---
25	46.56	55	---
Average Height 13.15'		65	2.76
Total 426.94			

TABLE 31 - GROUND COVER IN PERCENT OF MIXED HARDWOOD
SAPLING TYPE

Common Name	Scientific Name	%	Common Name	Scientific Name	%
Wax Myrtle	Myrica cerifera	12.67	Live Oak	Quercus virginiana	6.67
Yaupon	Ilex vomitoria	12.66	Annual		3.67
Smilax vines	Smilax Species	12.00	Vines		3.00
Loblolly Pine	Pinus taeda	11.67	Holly	Ilex opaca	2.33
Grass		8.33	Dogwood	Cornus florida	2.33
Bay	Persea species	8.00	Grape	Vitis Species	1.67
Amer.Beauty Bush	Callicarpa A.	7.00	Blue Beech	Carpinus caroliniana	1.00
Persimmon	Diosporus virginiana	6.67	Cactus	Opuntia vulugaris	.33
Total - 100%					

Part of this ridge is in the area owned by the National Park Service at NC-SP-6, Cape Hatteras State Park. It is on the south side of this ridge that the cabins that are being put up by the CCC enrollees of Camp Diamond Shoals are located. The type in general is almost park-like and it is very easy for a city bred individual to find his way through these woods. As long as the cabins are located some distance from the swamps, and close enough to the ocean for the benefit of the cool ocean breeze the potential occupants will not be disturbed by the mosquitoes.

There are approximately 43 snags to the acre and seventy diseased trees to the acre. Since there are only 427 trees per acre in this type about one-sixth, (16.4%) of the total are diseased. The majority of the diseased trees are found on the border of the dune and their weakened condition is due primarily to the work of the shifting sands and the strong ocean winds. I do not believe it would be a wise policy to remove any of the diseased trees from this ridge as they serve the all important factor of holding back the onrush of the sands. In the center of the ridge one finds the most luxuriant undergrowth that is found in the entire woods. There are many young pines coming through as well as hardwood and herbaceous seedlings. In picture No. 15 I attempted to show the mixture of hardwoods and pines with the understory of *Callicarpa*, as a photograph it was not successful.

From a fire hazard standpoint this ridge is the one that at the present time is the least protected and is perhaps the most important ridge. On the south side of the ridge is a vast sandy waste that is from one quarter to three quarters of a mile wide. In this waste there is a growth of young grass that is coming through. If fire should get in this young growth the prevailing winds would sweep it into the woods. At the present time it is possible to drive along the beach at low tide, but at high tide the present "Inside Road" is not passable in many places. I believe that if the Doctor's road was built up so as to reach the beach it would provide a more rapid and safer means of entering the woods if fire should break out midway between Buxton and Frisco along this mixed hardwood ridge.

The last timber type to be taken up in detail is the Yaupon, live oak, persimmon type shown on the type map as IV, QV, DV. This type is found along the borders of the dune that runs on the north side of the woods near Pamlico Sound, also along the eastern and western boundaries of the area. In photograph No. 16, taken at Plot 16, (rather poor picture), an attempt was made to show how the persimmon comes in on the open sand against a background of Yaupon and stunted live oak. Some pine are also found in this type but they are usually stunted and are a minor factor in the stand. This is the first time that I found this particular growth in areas large enough to classify it as a separate type. In the four previous reported areas there were some small isolated patches of this type but never as large as two and a half acres. In tables 32 through 35 the distribution of species, the distribution of seedlings, stand tables by diameter and height and the ground cover in percent are given. In regards to Yaupon, since this is practically a shrub and reproduces by runners it is very difficult to determine seedling growth. As in the previous types all Yaupon bushes that are less than ten feet in height are classed in the seedling group, while those that are higher than ten feet are classed in the tree group.

TABLE 32 - DISTRIBUTION OF SPECIES IN THE YAUPON, LIVE
OAK, PERSIMMON TYPE - IV-QV-DV.

Common Name	Scientific Name	No. per Acre	No. on Type
Persimmon	Diosporus virginiana	446	156,546
Live Oak	Quercus virginiana	122	42,822
Cedar	Juniperus virginiana	60	21,060
Loblolly Pine	Pinus taeda	32	11,232
Dogwood	Cornus florida	24	8,424
Yaupon	Ilex vomitoria	10	3,510
Prickly Ash	Xanthoxylum claviherculis	6	2,106
Total		700	245,700

TABLE 33 - DISTRIBUTION OF SEEDLINGS IN YAUPON, LIVE
OAK, PERSIMMON TYPE

Common Name	Scientific Name	No. per Acre	No. on Type
Yaupon	Ilex vomitoria	358	125,658
Persimmon	Diosporus virginiana	70	24,570
Live Oak	Quercus virginiana	42	14,742
Loblolly Pine-lyr	Pinus taeda	2	351
Total		472	165,672

TABLE 34 - STAND TABLE BY DIAMETER CLASSES - YAUPON,
LIVE OAK, PERSIMMON

Diameter in Inches	No. per Acre	Diameter in Inches	No. per Acre
.5	498	8	22
1.	86	9	2
2.	10	10	10
3.	10	12	0
4.	12	14	4
5.	16	16	2
6.	12	18	2
7.	14	20	0
Total - 350		Average Diameter 1.56"	

TABLE 35 - STAND TABLE BY HEIGHT CLASSES - YAUPON, LIVE
OAK, PERSIMMON

Height in Feet	No. per Acre	Height in Feet	No. per Acre
5	596	25	56
15	34	35	14
Average Height 7.68'		Total - 350	

TABLE 36 - GROUND COVER BY PERCENT IN YAUPON, LIVE OAK,
PERSIMMON

Common Name	Scientific Name	%	Common Name	Scientific Name	%
Yaupon	Ilex vomitoria	38.5	Litter		2
Persimmon	Diosporus virgin.	34.5	Red Cedar	Juniperus virginiana	1.
Annual		7.5	Dogwood	Cornus florida	1.
Live Oak	Quercus virginiana	6.	Holly	Ilex opaca	1.
Smilax Vines	Smilax species	4.	Grape Vine	Vitis species	.5
Prickly Ash	X.claviherculis	4.	TOTAL - 100%		

According to the sample plot data there is an average of twenty-four snags and no disease trees per acre. As in the case of the mixed hardwood type most of this type is surrounded by sandy areas that have a light growth of grass, in case a fire should get started in the grass this type would be severely endangered. Since most of the IV, QV, DV type is on or near a passable road it would be an easy matter to control a fire once it got started. However, it is necessary to keep a sharp lookout during extremely dry seasons as the grass will catch on fire very easily. Last spring we had grass fires caused by such widely divergent reasons as lightening, back-fire from an automobile and careless smokers.

This type from a sand fixation standpoint is perhaps the most important vegetative development on the banks as it usually is found as the last barrier between the sand and the main timber growth. The Yaupon and live oak are especially tenacious in their fight against the moving sand. In some cases you can dig around the base of the larger live oaks to a depth of six to eight feet and still find that the diameter of the tree is the same or larger than at the present ground line of the tree. The Yaupon has runners extending from the main stem in many directions and in that fashion is able to keep it's hold on life. Persimmon seeds in very well and although some of the trees may die out one year, it's ability to germinate and survive will keep the total number the same from one year to another.

At the present time there is a nursery at the CCC camp of the Cape Hatteras State Park in charge of Mr. Jack Clark in which he has had great success with the growth of native trees and shrubs from locally collected seeds. The seeds were planted in the fall of 1936 and there will be a considerable number of seedlings ready for fall transplanting. Some of the species that are being grown in this nursery are loblolly pine, persimmon, wax myrtle and red cedar. I do believe that it would be possible for this project to carry out a nursery on the same or larger scale for our beach planting.

Another type that I came across in the survey was a mixed hardwood swamp of nine acres near the town of Buxton. I did not take any sample plot data of this type as it was small in area and of minor importance. In this type the predominating species were black willow and wax myrtle, it is symbolized on the type map as MB VV. The type in itself is very similar to the shrub swamps mentioned in the early part of the report, the main difference being the comparative absence of the water bush, (*Iva frutescens*), and the silverling, (*Baccharis holmifolia*), in the mixed hardwood swamps.

Conclusion:

The Hatteras Woods consist of an area of 5364 acres of swamps and woods. There are six distinct timber types within the area and four variations based on diameters of the loblolly pine highland type. The most important timber type is the loblolly pine saw-log type, 7S, both from an acreage and stumpage value.

There are very few recreational possibilities in the woodland area in itself that is in regards to the construction of picnic shelters or cabins due to the large number of insect pests that are found in these woods in the summer. On the dunes near the beach there are ideal locations for cabins which can be utilized by tourists who wish to take advantage of the swimming, fishing and hunting that is to be found in this country.

Fire protection for this area can be taken care of by the use of the old Lighthouse as a lookout station or the use of the new tower to be used in connection with the new Coast Guard Station that is being erected near Buxton. It may be necessary to open up the old Tram Road that used to run from Buxton to Frisco and to build up the Doctor's Road so as to provide one hour control for the entire woodland area.

The dying of the loblolly pines in the woodland can be traced to the work of the Ips engraver beetle and I believe it will be necessary to control their activities by removal of all trees that are harboring these beetles at the present time.

The removal of the cattle from the woods has led to increased vegetative growth as proven by seedling counts taken in areas that had the cattle removed and those that still have cattle present.

The pine in this area is fast growing and if given the proper protection from fire and insect attack the woods will be supporting a beautiful stand of timber in thirty years time.

Planting of trees and shrubs on exposed sites should not take place unless grass is planted or fences erected previous to the planting of the shrubs.

Respectfully submitted.

Sylvan Settel,
Sr. Foreman, (Forester)



Illustration 1 - View taken from beach toward mixed hardwood ~~tree~~ ridge, showing dead pine in background, and the advance of the sand as it covers the growth on the south side of the ridge, taken near the point where the Doctor's Road comes out on the beach.



Illustration 2 - View of fencing at the southwest corner of the woodland area, showing the first line of fabricated brush fence as set up in a continuous line and in the background a fence of scrap wood panels that are set up in half moon circles in groups of three and four panels and face the prevailing winds. This type of fence may be the solution to the holding of the sand in large open areas so as to allow vegetation to get started



Illustration 3 -View of young pine, 0-10 years old, coming in under stand of pine 21-40 years old. This thick young pine growth is typical of a considerable part of the area.



Illustration 4 -View of loblolly pine saw-log stand, 7S, showing variation of diameter classes in an even aged group also park-like appearance of stand due to the presence of cattle up until the present year.



Illustration 5 - View of loblolly pine saw-log stand taken along an old road showing the light underbrush of yaupon that is very common in the area.

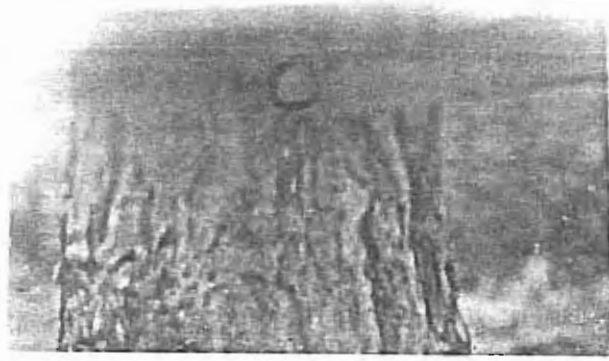


Illustration 6 - Large pine about 16 inches DBH attacked by turpentine bark beetle, *Dendroctonus terebrans*, circle surrounds pitch tube. This insect does not fatally injure a tree but causes a decrease in it's timber value.



Illustration 7 - Tree in foreground is the large tree that has been attacked by the turpentine bark beetle and there is a considerable browning of the needles. Kneeling in front of tree is a native who became quite interested in the work and he is locating insects in the bark that has been stripped from the tree.



Illustration 10 - An attempt to show how the pine are dying out in small patches, in center foreground is a group of dead pine trees while on all sides are living trees. This is a common sight in the woods especially along the ridge where the Buxton-Hatteras road cuts through.



Illustration 11 - Picture of 7A type showing pine stumps of recently logged timber, young pine are mixed in with the weeds, some young pine saplings and a six inch dogwood on the right hand side of the picture



Illustration 12 - Picture of loblolly pine swamp type showing heavy growth of wax myrtle and other swamp growing shrubs in the undergrowth.



Illustration 10 - An attempt to show how the pine are dying out in small patches, in center foreground is a group of dead pine trees while on all sides are living trees. This is a common sight in the woods especially along the ridge where the Buxton-Hatteras road cuts through.



Illustration 11 - Picture of 7A type showing pine stumps of recently logged timber, young pine are mixed in with the weeds, some young pine saplings and a six inch dogwood on the right hand side of the picture



Illustration 12 - Picture of loblolly pine swamp type showing heavy growth of wax myrtle and other swamp growing shrubs in the undergrowth.



Illustration 13 - Pine swamp showing density of undergrowth especially the vines that make the area practically impenetrable



Illustration 14 - Poor picture of the mixed hardwood spring type, showing park-like appearance of ground and the absence of any heavy vines.



Illustration 15 - Technique of getting increment borings, note the worker is wearing a raincoat on a sunny day as a protection against mosquito bites.



Illustration 16 - Showing the yaupon, live oak, persimmon type, in the immediate foreground are a large group of young persimmon, in the background are stunted live oaks and pine and yaupon scattered throughout the picture.