REPORT NO. 63-32

3420
3430
JUNE, JULY, 1963

AERIAL DETECTION AND EVALUATION SURVEY FOR SOUTHERN PINE BEETLE IN SOUTH CAROLINA

By

H. L. Lambert, John E. Graham & W. D. Buchanan*

Introduction

In the period June 17, 1963 to July 5, 1963, an aerial survey was made to determine the number and distribution of pine trees with red tops and fading foliage as a result of bark beetle attack in South Carolina. This survey was a cooperative activity between the South Carolina State Commission of Forestry and the U. S. Forest Service.

The aerial survey was conducted by H. L. Lambert and R. L. Flora, U. S. Forest Service, Zone 1 Forest Insect and Disease Control Branch, Asheville, North Carolina; in cooperation with John E. Graham, John W. Little, Dan Riddick and William Lawrence, South Carolina State Commission of Forestry.

The aerial survey was made in 20 counties in South Carolina (Figure 1) with a reconnaissance flight of the counties located on the boundary of the infested areas.

History

In 1955, an epidemic of southern pine beetle and pine engraver beetles occurred over a 4000 square mile area in South Carolina with Union County as the center of that outbreak. This outbreak subsided in 1956, but built up again in 1961-62. In June, 1962, the beetle population was epidemic in 14 counties and by September, 1962, the epidemic area had increased to 19 counties. On the present survey a total of 1022 infested spots containing approximately 3312 red top and/or fading pines were detected in twenty counties.

---

* Lambert and Buchanan are from Zone 1, U. S. Forest Insect and Disease Control Branch. John Graham - South Carolina State Commission of Forestry.

Aerial Survey Method

County road maps of one-inch-to-the-mile were used for the survey. Flight lines were in an east-west direction and spaced at five-mile intervals. All red and fading pine trees, both single-tree and multiple-tree spots were located on the map by the sketch-mapping method. A Cessna "172" was used on the survey. The plane flew at 1000 feet above terrain and at a speed of 90-100 mph. Two tracker-observers viewed a one-half mile strip on each side of the flight line. A third crewman was given training in aerial survey techniques.

Results

Although flying conditions were generally good, a great deal of haze was encountered, making it difficult to spot red tops and/or faders and undoubtedly some were missed because of haze. It is estimated that 60% of the spots were detected along each flight line.

There were 414 multiple-tree spots and 608 single-trees located from the air in the 20 counties surveyed. (See Table 1).

The largest number of spots and single trees were found in Berkely County. The amjority of these were concentrated on the Francis Marion National Forest. (See Table 2).

Ground Survey Method

Ground inspection to find the insect potential was made in spots selected at random from those marked on maps in the aerial survey and, in addition, spots detected while enroute from one area to another were also checked. (See Table 3).

Evaluation

The southern pine beetle, Dendroctonus frontalis, and Ips spp. had emerged from trees with red foliage and were often gone from the upper portions of trees with advanced fading. Well developed D. frontalis larvae were found in the mid and upper portions of the stems on some trees with green foliage, but in most trees with green foliage the insects were in the process of constructing their galleries. In a few other green trees the beetles had been "pitched out." The bulk of attack was in shortleaf pine, Pinus echinata, and loblolly pine, P. taeda, possible because they were more abundant than other species of pine in the areas involved. Shortleaf pine

Shortleaf pine affected with littleleaf disease did not seem to be preferred over trees in good vigor. The attack in littleleaf infected trees was gnerally lighter than in nondiseased trees.

Very few predators were found and there was no evidence of disease among the larvae. Woodpeckers had fed extensively on D. frontalis larvae that were in bhe bark in the winter of 1962-63. Exit holes made in the spring of 1963 indicated that the woodpeckers missed large numbers of larvae. No evidence of woodpecker feeding was found in any trees with current bark beetle brood.

The ground observations were made by W. D. Buchanan and W. M. Ciesla of Zone 1, Forest Insect and Disease Control Branch, also by R. T. Franklin of the Atlanta office of Insect and Disease Control. There were a number of South Carolina State Commission of Forestry men under John Graham who made inspection both in conjunction with National Forest personnel as well as by themselves. Among them was John Little, Jack Gould, Paul Traylor and others.

Discussion

All of the fourteen counties surveyed in June, 1962, show a drop in multiple tree spots and number of red tops and/or fading pines. (See Table 4).

Recommendations

It is recommended that:

1. A reconnaisance survey should be made about the first of August and September, 1963.

2. If the southern pine beetle population increased, an aerial detection survey should be made in September, 1963.

References

1. Forest Insect Survey Report No. 4, Sept., 1955, Southern Pine Beetle and Pine Engraver Beetle Conditions in north-central South Carolina. Detection and Appraisal Survey by Edward P. Merkel and Herbert M. Kulman.

2. Southeastern Forest Insect & Disease Newsletter No. 2, Sept., 1956.

3. Aerial Detection Survey for Southern Pine Beetle in South Carolina, by H. L. Lambert and W. D. Buchanan, Report No. 62-104.

TABLE I: The number of bark beetle infested trees detected in aerial and ground checks on state and private lands with an estimate of the number in the areas indicated.

	Infested spots found on aerial survey-				Estimated No. spots and trees				
County	Single trees Redtop & Faders	Multiple (Spots)	Total No. Redtop Faders	Mean trees per spot in multiple tree spots	No. Spots	Redtops Faders	Green Trees	Grand Total	Ratio Red:Green
Abbeville	31	39	306	7	583	2,533	405	2,938	1: .16
Anderson	31	30	178	5	508	1,508	528	2,036	1: .35
Berkely	102	54	1,156	18	1,300	8,950	11,277	20,227	1:1.26
Cherokee	19	10	59	4	241	490	157	647	1: .32
Chester	51	27	165	4	650	1,325	278	1,603	1: .21
Edgefield	8	1	11	3	75	91			*
Fairfield	30	17	90	4	392	818	155	973	1: .19
Greenville	15	6	37	4	175	325	23	348	1: .07
Greenwood	14	8	43	4	183	381			
Kershaw	12	8	59	6	167	502	206	708	1: .41
Lancaster	36	32	163	4	567	1,368	1,190	2,558	1: .87
Laurens	40	42	267	5	683	2,083	1,791	3,874	1: .86
McCormick	9	3	19	3	100	150			
Newberry	23	3	33	3	217	267	112	379	1: .42
Oconee	20	3	27	2	192	125			
Pickens	9	8	29	3	142	276	121	397	1: .44
Saluda	9	3	16	2	100	125			
Spartanburg	18	20	117	5	317	985	709	694	1: .72
Union	87	64	401	5	1,257	3,385	3.351	6,736	1: .99
York	44	36	136	3	667	1,267	836	2,103	1: .66
Total	608	414	3,312		8,516	26,954	21,139	46,221	

* Inadequate ground data available for Red:Green tree ratio

TABLE II - The number of bark beetle infested trees detected in aerial and ground checks on federal lands with an estimate of the number in the areas indicated.

Ranger Districts	Infested spots found on aerial survey: Single trees Redtop& Faders	Multiple (Spots)	Tot. No. Redtop Faders	Mean trees per spot in multiple tree spots	Estimated No. Spots and trees: No. Spots	Redtops Faders	Green Trees	Grand Total	Ratio Red:Green
Enoree	17	2	24	4	159	210	1/	210	
Tyger 2/	20	25	150	5	375	1,207		1,207	
Gen. Pickens	6	3	17	4	75	150		150	
Long Cane	19	17	121	6	300	1,012		1,012	
Santee	21	8	98	10	242	845	1,065	1,910	1:1.26
Witherbee 3/	34	35	941	26	575	7,875	9,923	17,798	1:1.26
Wambaw	14	6	121	18	134	423	533	956	1:1.26
Total	131	96	1,472		1,860	11,722	11,521	23,243	

1/ Red to Green Tree Ration on Ranger District Inadequate.
2/ Calhoun E. F. is included with Tyger R. D.
3/ Santee E. F. is included with Witherbee R. D.

TABLE III:— Results of inspection of trees attacked by bark beetles in the counties indicated.

County	No. Spots	No.* Trees	Tree Species					Foliage				Insects Found			Diseases		Remarks
			SL	Lob	Va	LL	Other	Red	Fader	Green	None	SPB	BTB	Ij	#LL	Other	
Abbeville	31	106	90	16				64	20	14	8	90	14		3	3	
Anderson	8	95	43	52				60	9	24	2	83	27				
Berkeley	13	21		14		4	**3	13	4	4		12	14				**Pond pi
Charleston	2	3		1		2			1	2		2	1				
Cherokee	12	76	75		1			32	25	19		65					
Chester	7	65	42	23				44	9	11	1	58	2				
Edgefield	2	3	3					3					3				
Fairfield	8	31	19	12				20	7	4		19	7				
Greenville	6	33	33					25	3	2	3	28	1				
Greenwood	2	11	1	10				2	2	7		8	3				
Kershaw	7	36	33			***2	##*1	17	8	9	2	28	1				# #Slash p ***Singed not inf
Lancaster	10	45	16	1	28			12	11	20	2	14			2		
Laurens	12	190	183		7			•*101	24	63	2	176	97				•*8 dead, tained SPB eme
McCormick	2	6	4	2				3	1	2		3	3				
Newberry	7	31	15	16				16	8	6	1	23	7				
Oconee	2	58	32		26			3			55	55	2				
Pickens	4	13	12		1			3	6	4		9	2				
Saluda	2	6	4	2				4		2			2				
Spartanburg	10	166	118	47	1			62	35	67	2	157	3				
Union	15	79	36	41	2			15	26	38		69	2				
York	12	55	43	1	11			14	9	32		50					
Totals	154	1,129	802	238	77	8	4	513	208	330	78	949	181	2	5	3	

*Number of trees actually examined.
#Littleleaf disease

TABLE IV. - Number spots and trees found on aerial surveys, June, 1962 and June, 1963

County	No. Singles 1962	No. Singles 1963	No. Multiples 1962	No. Multiples 1963	Total No. redtops & faders 1962	Total No. redtops & faders 1963
Abbeville	39	31	103	39	1,038	306
Cherokee	32	19	39	10	707	59
Chester	34	51	129	27	1,045	165
Fairfield	15	30	30	17	686	90
Greenville	39	15	69	6	555	37
Greenwood	38	14	31	8	269	43
Kershaw	41	12	49	8	707	59
Lancaster	4	36	34	32	372	163
Laurens	42	40	148	42	2,395	267
McCormick	47	9	33	3	280	19
Newberry	10	23	17	3	79	33
Spartanburg	130	18	350	20	3,436	117
Union 1/	314	87	713	64	6,939	401
York	72	44	211	36	3,339	136
Total	857	429	1,956	315	21,847	1,895

1/ Union County flown at 1 mile in 1962. In 1963 - 5 mile intervals.