Kelmscott WA7 ELT 7.16.

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THE TEESDALE REGENERATION TRANSECT.

This report deals with a 16.35 chain transect in a "Dieback" area. It was established in 1949 and observed until destroyed in the wildfires of January 1961. Details are recorded on file DSH 2.3.3. held at the Forests Department Research Station Dwellingup.

SUMMARY.

The ten year period 1949-59 - E.calophylla is replacing E. marginata. Banksia grandis is being eliminated and E.marginata regeneration does not survive the dynamic sapling stage. The average rate of height growth of Marri saplings has been only 1.4 feet a year and the rate of increase of the Marri sapling class numbers is slow. It seems unlikely that in these circumstances E.calophylla would be capable of restoring forest conditions to the site except over a very long period.

SUMMARY OF TRENDS.

From 1949 to 1959 the following trends were evident

(1). Banksia grandis is being progressively eliminated.

(2). Eucalyptus marginata numbers are decreasing except in the unaffected "green island."

(3). Eucalyptus marginata is not developing beyond the advance growth stage.

(4). There are considerable mortalities in the seedling stage and replacement ~~by~~ from seed trees.

(5). Plants in the dieback area which produce a dynamic shoot die before making more than a few feet of height growth.

(6). Eucalyptus calophylla numbers are increasing and in the "green island" this species is replacing E.marginata as the dominant among regeneration.

(7). Recruitment of E.calophylla into the sapling class is occuring and the mean height of this class has increased from 12' to 19' in the ten year period.

(8). There is relatively little mortality of E.calophylla.

(9). Establishment of both E.marginata and E.calophylla appears to be restricted to close proximity to parent trees. There is little regeneration elsewhere.

(10). The area of disordered forest did not appear to extend in the ten year period i.e. the patch remained relatively stable.

Since 1959 the position has altered in some respects.

(1). Between August 1959 and January 1961 the patch further extended its boundaries especially on the south side on the slopes rising to Teesdale Hill. The death of Banksia grandis preceeded the death of jarrah.

(2). The southward extension of the disorder was onto slopes in excess of 5° whereas previously this had appeared to be a

natural barrier to the further spread of the disorder.

In January 1961 the area was ~~devasted~~ devastated by wildfire and in the Winter of 1961 the whole of the "barren" area was cleared and planted to pine. The "green island" was left intact. Since then

(1). There have been deaths of Eucalyptus marginata trees during the Summer of 1963-'64 in the green island.

(2). The southern limit has extended further up the slopes of Teesdale Hill.

(3). The deaths of Macrozamia reidlii within the Pine area and upslope during 1963-'64 are a further indication of the persistence of the pathogenic influence in these sites.

Location. Three miles west of Dwellingup. see file DSH 2.3.3. for details.

Method.

The line was established in November 1949 by A.B. Hatch and reassessed until 1954 by Forests Department staff. In August 1959 the line was reassessed by F.D. Podger.

The line is 16.35 chains long and all E.marginata, E.calophylla and Banksia grandis occuring within a strip 10 links wide were recorded and their positions plotted on graph paper. E.marginata and E.calophylla were assigned to height classes at 6" intervals to 2' and one foot intervals thereafter.

Assessments were made in Nov. 1949, May 1951, Jan. 1953, Jan. 1954 and August 1959.

TREATMENT OF ASSESSMENT DATA.

For the purpose of this report the transect data has been segregated into four zones. These are

Zone 1. 0 - 5 chains a "green island." This area has a stocking of large jarrah and marri and there have been no "dieback" deaths, at least in recent times, among the tree strata. Banksia grandis is absent but otherwise the ground flora is typical of much unaffected jarrah forest.

Zone 2. 5 - 11 chains a "barren" area. This area carried large dead jarrah stags and several groups of marri saplings. Much of the area carries no trees. The ground flora is largely composed of dense mats of Loxocarya, Lepidosperma and bare patches are frequent.

Zone 3. 11 - 13 chains - This area carried mainly living jarrah trees and a few trees killed by "dieback." Much of the Banksia tree understorey was dead. The ground flora was as for adjacent unaffected forest, but more sparse.

Zone 4. 13 - 16.35 chains. This area carried a moderate stocking of jarrah and marri saplings and poles and was unaffected in 1959.

Since 1959 there has been an extension of dieback into the lower part of this area.

The zones may be summarised as follows

Zone 1. Unaffected. Apparently resistant remnant.
Zone 2. Old dieback.
Zone 3. Current dieback.
Zone 4. Unaffected.

HISTORY OF STAND.

Each of these areas formerly carried a 50% - 90% cover of jarrah which was severely reduced by trade cutting on three occasions prior to 1923. The area was treated for regeneration in 1932.

The area had suffered from dieback from as early as 1928 at least (Wallace personal communication.)

RESULTS.

REGENERATION TALLIES BY ZONES AT EACH ASSESSMENT.

JARRAH TABLE 1. EXPRESSED ON PER ACRE BASIS

	1949 Nov.		1950 May		1951 May		1953 Jan.		1954 Jan.		1959 Aug.	
ZONE	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
1	104	0	86	18	348	70	192	156	192	0	122	130
2	5	0	0	5	0	0	2	0	3	0	2	2
3	345	0	75	265	730	580	105	725	200	0	60	140
4	173	0	72	101	444	328	116	328	110	6	54	57
ALL	627	0	233	389	1522	978	415	1209	505	6	238	329

MARRI TABLE 2.

	1949 Nov.		1950 May		1951 May		1953 Jan.		1954 Jan.		1959 Aug.	
ZONE	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
1	288	0	274	14	268	6	244	0	366	0	380	0
2	23	0	23	0	27	0	20	7	25	0	32	0
3	20	0	20	0	5	15	5	0	20	0	40	0
4	9	0	9	0	6	3	3	3	6	0	3	0
	340	0	326	14	306	24	272	10	417	0	455	0

BANKSIA GRANDIS TABLE 3.

ZONE	1949 Nov.		1950 May		1951 May		1953 Jan.		1954 Jan.		1959 Aug.	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	5	0	-	5	-	-	-	-	-	-	-	-
4	224	0	143	80	143	27	164	-	216	0	66	191
Total	229	-	143	85	143	27	164	-	216	-	66	191

DISTRIBUTION CHANGES 1949 - '59.

For the 1949 and 1959 assessments location diagrams of all regeneration on the strip are available. Each ten links on the strip was regarded as a quadrat and each quadrat containing one or more plants of a given species was rated stocked for that species.

TABLE 4. % OF ALL QUADRATS STOCKED BY SPECIES. WITHIN ZONES.

	0.5 Acre Zone 1.	0.6 Acre Zone 2.	0.2 Acre Zone 3.	0.33 Acre Zone 4.
Jarrah 1949	54%	3.3%	60%	79.4%
1959	54%	1.6%	35%	29.4%
Marri 1949	64%	16.6%	15%	8.8
1959	72%	23.2%	25%	2.9
Banksia 1949	0	0	5%	67.6
1959	0	0	0%	35.3

Marri is increasing its distribution within the area on both dieback and non dieback stands. The exception in Zone 4 is not considered to be significant in view of the low figures.

Jarrah is maintaining its absolute position in the "green island" but is losing its position relative to marri regeneration. The ratio of marri stocked quadrats to jarrah has increased from 1.185 to 1.333 and of marri seedlings to jarrah seedlings from 2.77 to 3.11. Elsewhere jarrah is being severely reduced and has been all but entirely eliminated from Zone 2.

Banksia grandis was either not present on Zones 1 & 2 originally or more likely has been eliminated from them for a number of years. During the observation period Banksia has been eliminated from Zone 3 and its distribution halved in Zone 4.

Figures 1a, 1b and 1c illustrate the relative positions for 1949 and 1959.

DEVELOPMENT OF REGENERATION BEYOND THE ADVANCE GROWTH STAGE.

Jarrah and Marri regeneration are known to be capable of long persistence in a more or less dormantt"advance growth" stage. At some point they may become "dynamic" and develop into a sapling and ultimately a tree. Further there is present in many dieback areas a scattering of both marri and jarrah advance growth. Marri is capable of dynamic development on dieback sites, but once jarrah becomes dynamic it does not seem to be able to survive long on dieback areas. This phenomenon is illustrated in the following table where the lack of recruitment to larger size classes with time can be seen for jarrah.

TABLE 5. FREQUENCY OF PLANTS IN ~~SIZE~~ HEIGHT CLASSES AT EACH ASSESSMENT. which site?

	JARRAH					MARRI				
	1949	1951	1953	1954	1959	1949	1951	1953	1954	1959
0" - 6"	149	433	99	136	47	69	57	10	83	62
6" - 12"	19	24	37	28	31	42	49	66	63	77
12" - 18"	7	9	9	5	13	20	9	16	19	30
18" - 24"	2	2	3	3	3	10	11	8	9	8
2' - 3'	1	-	4	-	-	7	12	13	13	4
3' - 4'	-	-	1	-	-	3	2	5	5	8
4' - 5'	-	-	1	-	-	-	3	14	2	2
5' - 6'	1	-	-	-	-	3	1	1	2	1
6'-	3	3	3	3	4	11	13	13	13	23
Totals	182	471	157	175	94	165	157	146	209	215

Marri is capable of growing through and becoming a tree on these sites but the growth rate is relatively slow. The eleven saplings shown as taller than 6' in 1949 then had a mean height of 129'. The tallest eleven saplings in 1959 had a mean height of 26.8 giving a mean height increment of 13.9 feet or a ten year mean annual increment of only 1.39 feet.

Conclusions.

The data shown here lends support to the contention that Eucalyptus calophylla will recolonise certain dieback sites. However the rate of spread is slow and height growth rates are poor. In the light of this and in the absence of regeneration at all but the immediate vicinity of old crop trees the re-establishment of forest conditions by E.calophylla will be at best a long term process. The development of severe twig cankers on veteran marri and on some regrowth saplings is a further retarding complication.

The inability of jarrah to re-establish itself on disordered

areas is apparent and it seems that jarrah for some time at least is destined to play a declining role in these stands. This is supported by the failure of artificial establishment trials with jarrah and the moderate success achieved with similar marri planting trials. Whatever the cause of the disorder it seems to be long persistent and capable of renewed activity. The development in the last two years of the disorder in the "green island" indicates that there are not likely to be significant areas of resistant jarrah or of favourable refuges on laterite soils in the main dieback zone.

The existence of temporarily resistant areas of sharp boundaries and large fluctuations in regeneration stocking levels is not consistent with the theory that a gradual site deterioration has triggered the disorder. There is no doubt however that subsequent to the disorder these sites have deteriorated as an environment for the growth of the indigenous eucalypts.

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ELAINE DAVISON
COMO RESEARCH

RE: RESEARCH FILE BFH 2-3-3.

We can't locate this old file and the majority of our files do not go back that far. We can only conclude that the very old files such as these have gone to Archives in Como. Dwellingup Research definately does not have it. Sorry couldn't be more help

Heather Warren.

Checked D-S-H-2.3.3. - but not held at Dwellingup - try archives, Como - not there