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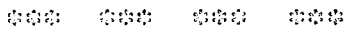
FOREST NOTES

FORESTS DEPARTMENT
PERTH
WESTERN AUSTRALIA

VOLUME 2 NUMBER 2

CONTENTS



- EDITORS' NOTE -

General comments received suggest that most readers approve of the change in format for the last issue. Since we have sufficient covers printed for the next two years, we are stuck with it anyhow.

An Author's Index for all previous issues has been included in this number in an effort to shame some of the inactive readers, but we don't want any more measurements of big trees unless they are really outstanding. Over 24% of all articles in the five numbers produced have been on this subject and we will only consider for publication, a tree which has a total height of over 286 feet and a girth in excess of 40 feet.

However, there are a great number of other topics which could be used; a list of likely topics has been issued to all Editorial Whips and there is one of these Whips in your Division.

We wish to place on record our appreciation of the valuable assistance rendered in the preparation of previous issues of Forest Notes by Miss Margaret Redman and Miss Anne Fleming (now Mrs. Eric Jenkins) of the Library staff. We wish them well in their new spheres of activity.

P. N. Hewett C. J. Edwards

JOINT EDITORS

PRODUCTIVITY ! ! !

P. N. Hewett and C. J. Edwards

We are including below, a modified Author Index to show the officers who have supported "Forest Notes" up to and including Volume 2, Number 1, in March, 1964.

If your name does not appear on this list then you have not been pulling your weight with this publication. The numerals in parenthesis indicate the number of contributions over this same period and can be considered as a Productivity Index.

Barrett, P. H.	(1)	Perry, D. H.	(3)
Brockway, G. E.	(2)	Phillips-Jones, D.V.	(1)
Clover, H. G.	(1)	Podger, F. D.	(3)
Harris, A. C.	(2)	Quicke, F. G.	(2)
Hart, A. J.	(1)	Quain, S. J.	(2)
Hatch, A. B.	(2)	Rice, A. E.	(2)
Hewett, P. N.	(8)	Sanders, F. W.	(1)
Hopkins, E. R.	(3)	Stewart, D. W. R.	(2)
James, N. K.	(2)	Selkirk, A. B.	(1)
Kesners, A.	(2)	Spriggins, D. L.	(2)
Lejeune, D. R.	(3)	Underwood, R. J.	(1)
Macdonald, A. A.	(1)	van Didden, G. A.	(1)
McKinnell, F. H.	(2)	van Noort, A. C.	(1)
McNamara, P. J.	(1)	Wallace, Murray	(1)
Meachem, J. C.	(2)	Wallace, W. R.	(4)
Morison, I. G.	(1)	Watson, D.	(1)
Moore, D. R.	(1)	Welch, T. J.	(1)
Nunn, G. W. M.	(1)	Williamson, A. J.	(5)
Peet, G. B.	(2)	Wheeler, G. A.	(1)

TIMBER INSPECTION AND GRADING

By A. R. Kelly

Timber grading can be defined as the art of sorting or classifying timber into grades which have definite relative values for the various uses to which timber may be put.

Grades are framed to safeguard the consumer, but they must equally serve the miller and the forest, to be effective and economic.

Clear hardwood timber forms only a small proportion of mill production, as none of our timber can be milled without producing a fairly large proportion containing defects or blemishes of some type.

Sound grading practice lies not in the selection of perfect timber, but, on the contrary, it aims at the inclusion in each grade of as many defects as possible without detracting from the value of the timber for the purpose for which it is required.

The early methods of establishing standards were more or less a matter of trial and error. Each inspector or grader had his own idiosyncrasies and uniformity was completely absent.

Without rules and standards, a great deal depended on the individuals and, as their ideas differed, there was considerable variation in the quality of timber supplied.

Not unnaturally, buyers tended to protect themselves from such inconsistencies by specifying in their order that the timber supplied be near perfect and early specifications supplied by the buyer generally read "timber shall be of the best Western Australian Jarrah, free from all defects, sawn on all four sides, rectangular in cross section, straight without winding, etc., etc."

These early specifications resulted in a great deal of waste, since timber that was quite good was rejected.

It was in an endeavour to stop this needless waste that from 1930 a major project of the utilization section of the Forests Department involved the development of grading rules for Jarrah and Karri.

The first extensive study was carried out in 1932 in co-operation with the C.S.I.R.O. and in the course of these studies draft specifications were prepared and tested and the results were published in 1933 and used as a bases for discussion.

Investigations continued and resulted in the publishing in 1935 of Bulletin 49, a series of specifications endorsed by the Standards Association of Australia as Australian Standard Grading Rules for Jarrah and Karri, and covering the major items of sawn and hewn production.

These rules were a tentative attempt to standardise grades of Karri and Jarrah and they served a very useful purpose in regulating the qualities of the various grades and maintaining the good name of our timber.

Changes in market conditions, additional research and observations from the long range tests on the behaviour of the various defects encountered in our timbers, resulted in the revision of the rules and the publishing in 1938 of Bulletin 51 and in 1948 of Bulletin 56 which is still current.

In these revisions both consuming and supplying interests were consulted, as draft specifications were prepared and submitted by a committee representing sawmillers, timber merchants, builders, architects, railway engineers, housing and forest authorities.

In the preparation of these specifications it is appreciated that the only really sound specification is one which reflects a proper balance between the material available and the use requirement of the final product.

It involves the recognition of the characteristics affecting the quality of the different timbers and the limitation of the size, type and location of the defects in the timber according to grade.

A grading specification defines the lowest limit of quality considered admissible for a certain use.

Bulletin 56, the current Standard Grading Rules for Jarrah, Karri and Wandoo, covers sleepers, crossings, structural timbers, crossarms, mine guides, flooring, lining, weather boards, piles and poles.

These rules comprise -

(a) General provisions

(b) Grade descriptions

The general provisions deal with scope, terms and definitions, timbers, limits of accuracy, equivalent defects, dimensions and, when applicable, moisture content and seasoning allowance.

The grade descriptions state what defects are to be excluded and then sets out the limits of size and/or location of permissible defects in the worst piece.

In sleepers and crossings durability, strength and spike holding capacity are the major factors.

In structural timbers, it is strength and stiffness.

In crossarms and mine guides the major factor is strength.

In the finish grades, such as select flooring, lining and joinery, appearance is the ruling factor.

In piles and poles, durability and strength.

In the development of grades for structural purposes, it has been necessary to consider technical data on mechanical properties of the timber and the influence of defects differing in type, size and locations, on the strength or stiffness of the section.

To understand the technical basis for structural grades it is necessary to appreciate that the inherent strength of timber is determined by mechanical testing.

It is international practice to conduct strength tests under standard conditions, on small clear specimens, which enables timber tested in Australia to be compared directly with any other timber tested by the standard method elsewhere in the world.

Before the test data can be applied, allowance has to be made for the fact that our commercial timbers are not available in this "clear" state, as defects found in log supplies are generally present in timber sawn for structural purposes.

Tests have established the influence on strength and stiffness of defects varying in type, size and their location in structural sections.

This has shown that some defects influence mechanical properties more than others and limits are defined for sloping grain, knots, holes, gum pockets, gum veins, wane and shakes.

Structural timber has been limited to two grades.

"Select" in which the worst piece is to have not less than 75% the strength of "clear" timber of the same species.

"Standard" in which the worst piece is to have not less than 60% the strength of "clear" timber of the same species.

Our Australian timbers have been classified into strength groups A, B, C, D, and the Handbook of Structural Design shows the safe loads for graded timber in each strength group with allowances for different conditions of exposure and load. (Some of these figures are shown in Appendix A of Bulletin 56.)

From the data in this handbook, designing engineers can compute the section of graded timber, in any strength group, that will be necessary to support known loads.

In the "finish" grades, as the name implies, appearance is the ruling factor and imperfections are considered in the light of their appearance on the exposed face of the piece.

Select grade limits should be consistent with the requirements of material to be used uncovered or finished with a transparent coating.

Standard grade shall be suitable for use generally beneath a covering material or finished with paint or other opaque coating.

Buyers, of course, should not demand grades and qualities in excess of the needs of the particular end use, that is, they should not order high strength grade for low strength requirements or high durability grade when not exposed to factors affecting durability nor high appearance grade when the finish is not visible.

Whatever is wasted at the sawmill must be charged back to the consumer in the price of the timber sold to him, thus the buyer by making his demands too severe merely ends up by paying more than is necessary for his timber.

It is practically impossible to draw up a series of grading rules so precisely worded that a buyer can tell exactly what he will get and it would be even more impossible to get an inspector or grader to accurately apply them economically in this State.

The question of interpretation of grading rules has always presented difficulties, not only here but in many other countries.

The main aim in inspecting or grading to any specification should be uniformity, or consistency, so that both buyer and producer know what to expect.

Uniformity is the first step in the orderly marketing of timber and the attack on competitive materials and is an essential feature in the timber producing industry and distributing trades.

Without uniformity, substitutes of a non timber nature will begin to take the lead, not because timber is unsuitable for the work, but because it may not be consistently supplied in the right form by the producers.

Under the present market conditions many buyers reserve the right of rejection at destination of any sub-specification material, with consequent monetary loss to the producer, so, particularly for export, the importance of a well applied specification can not be over-emphasised.

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ESTABLISHMENT TRIALS ON DIEBACK SITES : GLENEAGLE

By S. J. Quain

The following results were obtained from trials conducted at Gleneagle in 1963/64 to determine survival of seedlings on 'dieback' sites.

Site

Dieback areas adjacent to the Gleneagle settlement, with typical lateritic gravel profile on slopes running into greyish-yellow sandy profile in the flats.

Preparation

Complete clearing with ploughing and cultivation.

Fertilizer

Two ounces of blood-and-bone and two ounces of Potato-E manure, well mixed with soil in each planting hole.

Planted

Hand planting in the first week of July, 1963.

Weather Conditions

An extremely wet winter resulting in waterlogged conditions in the lower part of the trial area and then followed by a very dry summer.

Species Layout

Species ran across the contour so that each species sampled both the gravel slopes and the waterlogged flats.

Survival Results to 7th April, 1964 (over 1 inch rain previous week)

Species	Alive	Dead	Remarks
E. bosistoana	81	6	Growth and survival good
E. laevopinea	59	25	Growth variable, deaths mainly in waterlogged section
E. delegatensis	61	23	Growth and survival poor
E. sieberiana	65	21	Death confined to waterlogged section

Species	Alive	Dead	Remarks
E. pilularis	53	34	Deaths mainly in waterlogged section
E. fastigata	63	26	do.
E. globulus	80	8	Growth and survival excellent
E. botryoides	87	2	Growth and survival excellent
E. baxteri	57	27	Deaths confined to waterlogged section
E. Gardneri	66	7	Survival good, growth moderate
E. redunca var. elata	69	33	Deaths mainly in waterlogged section
E. gigantea	59	25	Deaths mainly in waterlogged section
E. cladocalyx	83	3	Growth and survival excellent
E. microcorys	69	17	Survival good but growth poor on drier sites
E. obliqua	75	12	Deaths mainly on wetter sites but growth good
E. scabra	62	24	Deaths confined to wet areas, survival good on drier sites
E. muelleriana	49	37	Growth and survival poor
E. Robertsoni	55	33	Growth poor, deaths mainly in waterlogged section
E. sideroxylon	74	15	Growth and survival good.
E. macrorrhyncha	61	21	Growth and survival fair on drier sites but very poor in water-logged section

(For Botanists only) . . . There are two names for the one species in this trial, but, rather than fathom out the botanical differences, I planted them as received from the nursery - e.g. E. delegatensis and E. gigantea are one and the same tree ! !

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THE ROLE OF PRICKLY MOSES IN THE KARRI FOREST

By C. A. Miller

Introduction : Prickly Moses (Acacia Pulchella)

An introduction to this remarkable misconception of nature seems hardly necessary; a point upon which most bushworkers would sharply agree. It appears to have been designed to keep us all alert and on our toes, as well as continually reminding one of the vast variety of great Australian adjectives.

Effects :

Supposedly one of its meanest achievements is to considerably shorten lunch breaks in the bush. This it does, often within a few minutes of knocking off, and it's soon evident that every possible place is polluted by this persistent pest.

The second significant feature of Prickly Moses to note, is its drastic action in wearing our clothes. Actual personal experience while working as a survey hand has demonstrated that a worker can have his trousers worn through in three days by the plucking and scratching encountered while negotiating thick Prickly Moses country. Then look where you'd be! You'd have a strong case for a "free pair for non-fair wear".

Why Eucalyptus species planting trials are ever established in Prickly Moses areas, one will never understand. It is a fact that the bush affords good cover and camouflage to the small seedlings - so good that future observers and measurers have a difficult task to find them at all and as a result of this, the plot is usually abandoned. What's more, no Technical Assistant likes degrading a future "King of the Forest" by planting it alongside a 'B bush'.

The tenacity of the prickles is such that their eradication is a long term project. Ridding one's system of them usually takes several days, during which time any form of repose has to be carefully planned to avoid aggravating any of the softer "spots".

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A MAXIMUM BASAL AREA FOR THE NORTHERN JARRAH FOREST

By P. C. Kimber

Possibly one of the most difficult tasks associated with thinning a forest crop is that of measurement and expression of the thinning intensity to describe the degree and type of thinning achieved or desired. A review of methods evolved has been made by Vezina (1963) and among those he describes that based on Assmann's relative basal area appears attractive for application to our Jarrah forests. In this method the intensity of thinning is described by the basal area remaining after thinning expressed as a percentage of the maximum basal area which can be achieved by the stand in the particular locality. It has been applied, with slight modification, to experimental conifer thinning both in the U.K. (Wood 1962) and to some extent in the Eastern States.

With a view to applying the method to research thinnings in Dwellingup Division, an attempt has been made to determine a general maximum basal area for the region. The determination was made from stocking, in terms of basal area, recorded on a total of 112 plots of between 0.4 and 1.0 acres in extent and originating as follows -

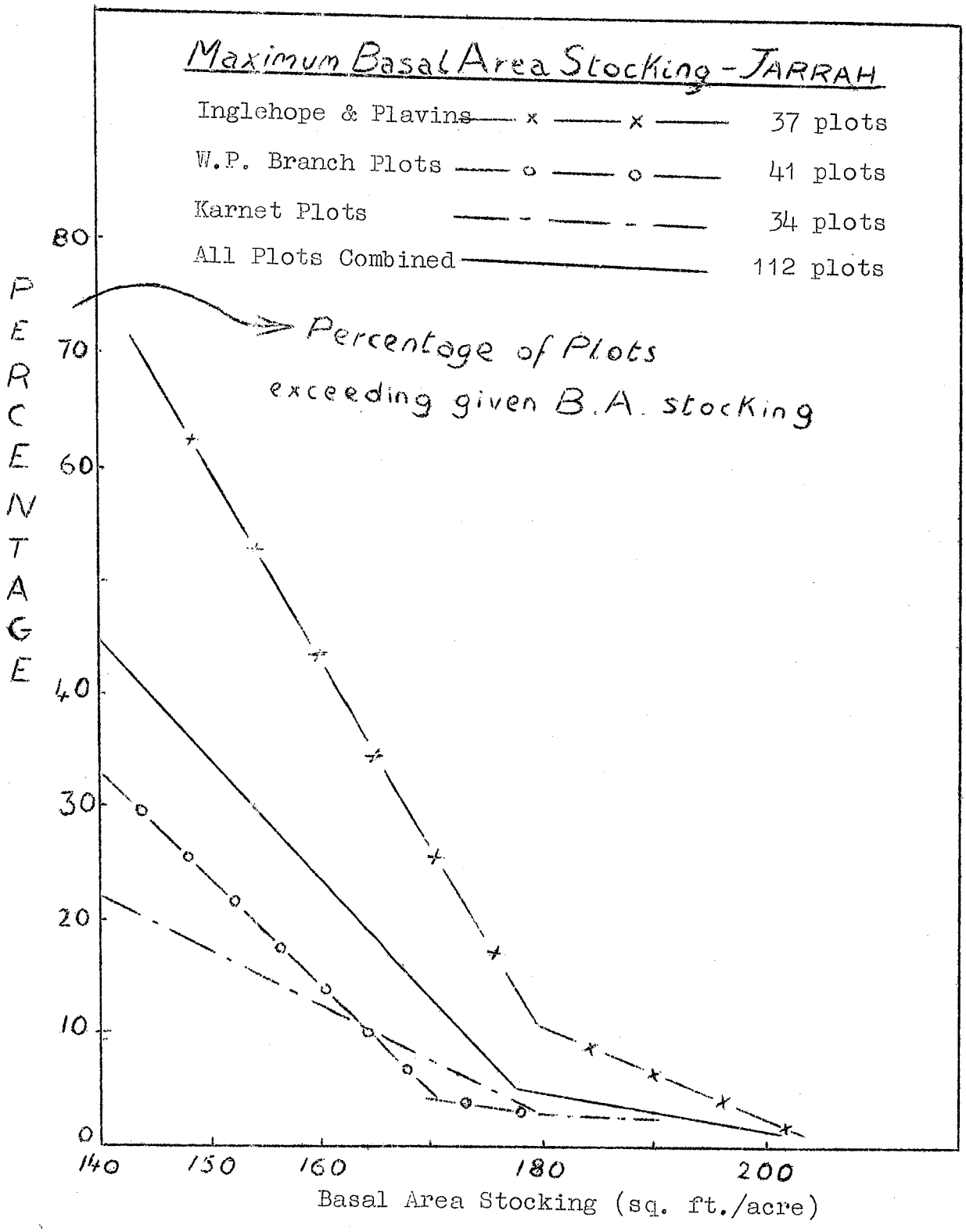
(a) Working Plans Branch sample plots covering the northern Jarrah forest area. 41 plots

(b) Plots enumerated in connection with the preparation of a working plan for Karnet, Dwellingup Division. 34 plots

(c) Thinning research plots, Inglehope and Plavins blocks, Dwellingup Division. 37 plots

Plot data were graphed as shown below. The points for each series of plots formed a curve of fairly steep descent and rapid flattening at the higher basal area values. To emphasise the points of maximum basal areas chosen, the plotted curves are presented as two straight lines, their junction point coinciding with that of abrupt change in the original curve. It will be noted that all these points fall within the range of stocking of 170 and 180 square feet basal area per acre, with the Dwellingup Division data nearer the latter figure which has been chosen as the maximum basal area for research purposes. It is interesting that the combined plot figures, covering the whole of the northern Jarrah forest, fall very close to the Dwellingup maxima.

It must be pointed out that this "maximum" basal area figure should not be taken to infer that areas of Jarrah forest will not be found exceeding this stocking; in the plots used in the calculation stocking up to 211 square feet/acre was found. The figure does infer, however, that in a given area this density of stocking will only be exceeded by very small portions of forest.


Maximum Basal Area Stocking - JARRAH
Inglehope & Plavins — x — x — 37 plots
W.P. Branch Plots — o — o — 41 plots
Karnet Plots — - — - — 34 plots
All Plots Combined ——— 112 plots
Percentage of Plots exceeding given B.A. stocking
PERCENTAGE
80
70
60
40
30
20
10
0
140
150
160
180
200
Basal Area Stocking (sq. ft./acre)

The problem of the "maximum" figure concept is mainly one of nomenclature and was overcome by Assmann by calling it the "average maximum basal area". A more subtle title for a similar maximum measurement was used by Stoate and Bednall (1940) in dealing with height studies in Jarrah. Their average maximum height was described as "final height" and this type of expression could well be applied to the measurement of basal area, calling it "final basal area".

References: Stoate, T.N. & Bednall, B.H. - Australian Forestry V. 1, 1940.

Vezina, P.E. - Forestry Chronicle XXXIX, 3, 1963.

Wood, G.B. - Australian Forestry XXVI, 2, 1962.

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REPORT FOR JUNE, 1902

During the month I have travelled over a good portion of the Northern and Western portions of my district. As winter has set in at last, travelling has been the reverse of pleasant. Fodder for horses in many places is scarce, necessitating the carrying of chaff etc. for considerable distances. Bush fires were very prevalent last summer which will make the feed better when it comes, but until then, in grass country stock are hard put to find a living. The fruit growers have forwarded all their produce to the city and goldfields and the quantity sent forward shows that many young orchards are coming into bearing. I notice that many fruit growers are using the red gum fruit cases cut by Mr. Girts a few miles from Bridgetown. This mill turned out some 9,000 cases last season and next year will put out something like double that number. Thirty thousand cases have been sent out from the mill since it commenced operations and they are growing in favour with the orchardists. By careful selection of trees free from gum there is a very small percentage of waste certainly not more than 30%. I also noticed some excellent boards for other purposes turned out by the same firm. These red gum fruit cases are light and durable when seasoned and I have heard no complaints so far of any deterioration to the fruit from the red gum. I see no reason why a large business in these cases should not be successfully carried out there, regard being given to the selection of the timber used.

Much interest is shown in the district in the boring operations for petroleum and several parties of prospectors are scouring the country.

Forest Ranger Willmott

(The staff of the Woods and Forests Department of Western Australia in 1902 consisted of the Secretary, Clerk, Clerk and Messenger and seven Forest Rangers. F. E. S. Willmott was stationed at Warren River.)

RAW RESEARCH SECTION

By the Editors

A regular section of Forest Notes under this title will be used for as long as Divisions will supply the material. At a recent meeting of Northern D.F.O's., it was agreed that brief progress reports on Divisional investigations, leader trials and 'ad hoc' research could be useful to other Divisions if circularised within the Department. The title "Raw Research" has been adopted to cover the broad field of these progress reports and by way of introduction, two such reports from the Mundaring Division are included in this issue.

R.R.1 Mundaring - Coppice Emergence

Two series of observations have been progressing since August, 1963, to record the elapsed time and general nature of coppice initiation following trade cutting.

(a) Wandoo and Jarrah in the Wandoo Zone

Observations to April, 1964, indicate that coppice emerges from six to eight weeks after falling in both species, irrespective of the month falling was done. Elapsed time does appear to be increasing from January onwards.

(b) Jarrah Pole Stands following Stand Improvement Work

A similar set of observations are being conducted in areas which were totally ringbarked in 1905 and which are now being thinned for firewood. This was initially J B + bush, but has been a total sapling and pole stand since 1905. Elapsed time in this series has so far been much the same as for (a), but less orderly.

R.R.2 Mundaring - Wandoo Bark Shedding

The bark of Eucalyptus redunca var. elata, is described as regularly decorticating. Very little has been recorded about the periodicity of this bark shedding and to help provide more information, four Wandoo plots were given full girth paint marks at breast height in February, 1963, and regular observations are made of the amount of paint mark which has been shed.

Each observation is recorded as bark lost in inches of girth and expressed as a percentage of girth overbark. Indications to April, 1964, are that bark shed is only slightly affected by tree size and vigour and that each tree may have its own particular decorticating cycle with a two or three year period required for total bark shed.

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CULL FELLING

By P. N. Shedley

The term cull felling is used to cover the silvicultural removal of useless and potentially marketable trees which are competing with valuable growing stock. The term also covers the preparation of saleable mill logs from these trees.

In the Karri forest areas, a system of cull felling has been introduced to all the major Karri sawmilling permits. Briefly the system is to classify the tree to be removed into one of three groups by placing one, two or three toe-marks on it.

One mark trees are the major group about which there is little or no doubt regarding quality. The cost of the small proportion of condemned logs which result from this source is carried by the industry.

Two mark trees must be felled and tested by the industry, but are trees of doubtful quality. The Department pays compensation for the cost of falling and testing where no mill log is obtained.

Three mark trees are useless to the industry and the Department again compensates for the cost of falling. Falling is compulsory, but testing is not required.

Record books which show measurements of all two and three mark trees are kept by the fallers who are paid by the Department.

The method is proving a very useful silvicultural operation at a very moderate cost.

Could Barney White give us some per acre figures with an estimate of the cost of a comparable job carried out without the assistance of the sawmiller?

Some concern is felt within the industry at the increase in the proportion of average quality logs at the expense of the much sought after "mineguide" logs. This is likely to effect marginal and fire damaged permits in particular because the proportion of two and three mark trees is higher in these areas.

The system although being a useful one, is unwieldy in its operation, having a complicated marking procedure and an involvement of three parties in the continual struggle for acceptable utilisation standards.

I suggest that if the Department payed compensation to the permit holder, not the faller, for all trees which do not produce acceptable mill logs, the cost would be no more in the high quality undamaged stands, it would provide an equitable share of the cost of silviculturally treating poorer quality forest, would leave the forester once again to deal with the permit holder only in matters of log treatment and acceptability and simplify the tree marking and

administration of the cull felling operation.

Naturally in the poorer stands there will be some increase in cost, but only represented by the number of one mark trees which turn out to be unacceptable. Payments made to the permit holder will then provide some compensation for an overall drop in quality and the use of equipment while the question of paying the faller for increased work remains the responsibility of the permit holder.

Cull felling in the Jarrah is most desirable silviculturally and in many areas the thinning of regrowth stands is hampered by the presence of the culls. Economically it is sound to remove culls at the time of the trade operations when log extraction equipment is at hand, but when we come to consider cull felling in the Jarrah forest, the very thought of recording the vast number of unacceptable logs which would be produced in the average permit today, makes us shun even the simplest system of compensating a permit holder or faller to perform all that is required. On the other hand the industry is at present accepting a far greater rejection rate in Jarrah than was the case in Karri before cull felling so that we have more to lose if we accept the responsibility of compensation for unacceptable logs.

The alternatives appear to be an entirely separate operation following trade cutting or for the Department to carry out all falling operations.

In the first instance there is the difficult problem, particularly in the south, of recovering logs resulting from the operation.

Alternatively, should the Department undertake to carry out the whole operation, the situation might be as follows.

Consider the theoretical case of a permit of 9,600 loads obtained from 2,400 acres per annum.

It is considered that two fallers could -

(a) Fall the 40 loads per day required by the mill;

(b) Carry out the cull felling required;

(c) Carry out all top disposal cleaning;

and this is estimated to cost for a year -

Wages 2 @ £1,300	£2,600
Overheads	£520
Operating costs for 2 chain saws @ £500	£1,000
Transport and sundries	£500
	£4,620

We could expect a direct return from the permit holder of 5/- plus 1/- overheads per load.

Per Annum	£2,880
leaving the cost of cull felling and top disposal at	£1,740
Cost per acre for 2,400 acres	14/6d.

We are already spending 5/- per acre on top disposal cleaning.

I can't suggest a better value than cull felling in the Jarrah for 9/6d. per acre.

Perhaps we can't persuade existing sawmillers to come to the party, but what about new permit areas and why not at Dwellingup?

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THE USE OF THE TUART WEDGE

By T. J. Ashcroft

It is considered that crowning off by chain saws could be made much easier for the operator and machine if a small Tuart wedge was used, say 6" in length, 3" wide and tapering down from a 1" top.

These can be carried in the hip pocket without any discomfort to the operator. It is considered that the main advantage is in the "crowning off" of logs. As soon as the saw is out of sight, it is no effort to take the Tuart wedge from the hip pocket and enter it into the cut, thus avoiding the trouble of removing a pinched saw and having to bore in from the side to widen the cut and enable the saw to run freely. It is not only hard on the saw-bar-and-chain, but can be hazardous and hard on the operator. All this trouble could be avoided by the use of a Tuart wedge.

PLANTING MACHINES : FACTS AND FIGURES

By P. D. Staley

Mechanical pine planting was first carried out in this State at Gnangara in 1950. Since then there have been continual modifications and improvements to the machines, which have resulted in a very high standard of planting at greatly reduced cost per acre.

The original Lowther Tree - Planting Machines, as imported from the U.S.A. were unsuitable for planting in this State, due mainly to the failure of the rear wheels to revolve properly in the deep loose sand. Modifications were made to the frames of the machines, enabling larger rear wheels to be fitted almost vertically, with only a slight lean outwards at the top. This enabled the wheels to revolve much more freely and planting was greatly improved. Later the performance was further improved by substituting 15" x 5.90" tyres for the 15" x 4.00" tyres.

Other early modifications to the original machine included -

1. Addition of a fixed depth control.

2. Improved arrangement of seating and foot plates.

3. Addition of a large capacity plant box.

Originally the machines were built with all axles rigidly fitted to frames, without a turntable at the front. This meant that considerable difficulty was experienced when turning, either around stumps or logs, or at the end of the lead as the machines had to be literally dragged around. This was overcome by removing the front wheels and fitting a large universal joint to the front of the machine and attached directly on to the tractor drawbar. It was found that by using this method it was possible to extend the drawbar of the tractor and attach two machines at the required spacing and that two machines could be handled comfortably by a large rubber tyred tractor. It is the practice in the Wanneroo Division to use planting machines in pairs in banksia country and a single machine attached to a smaller tractor where stumps are more numerous.

Using machines in pairs, a five man gang, which includes the tractor driver, can plant an average of 26 to 28 acres a day. Up to 32 acres in one day have been planted under good conditions.

Using a small tractor, with a single machine and a three man gang, results are equally favourable. In fact there are less stoppages with the single machine and an average of 14 to 16 acres per day is obtained.

Costs for planting are kept to a minimum by using planting machines and over the last three planting seasons for Gnangara Block over 1,000 acres have been planted at a spacing of 8' x 8' and 9' x 9' for an average cost of just under £1.10. 0. per acre. This above cost includes all wages and machine costs, plus the cost of all modifications to planting machines for the 1963 season.

For the Pinjar Block where Tuart and Jarrah stumps are fairly numerous, during the three seasons to 1962, 830 acres were planted at the slightly higher cost of £1.12.0. per acre, this cost also including all machine costs.

The rate at which it is possible to plant with these machines greatly reduces labour problems during the planting season. No recruitment of casual labour is required even for large planting programmes. Small teams of experienced men on machines do the work of large gangs of hand planters. Machine planting is reliable and the amount of supervision required is consequently greatly reduced.

The use of planting machines in the Wanneroo Division has considerably shortened the time taken to complete the planting programmes and this is important, enabling planting to be carried out under the most favourable conditions. In the Wanneroo Division where annual rainfall for the last few seasons up to 1963 has averaged only about 31", the wet season is short and little rain falls between the end of August and April or May the following year. Planting commences as soon as the ground is thoroughly wet, early in June and is usually completed early in July.

Results speak for themselves and the value of planting machines is demonstrated by the fact that planting deaths in Pinus pinaster at Gnangara in the last three years have not exceeded six per cent.

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UTILISATION OF KARRI FOREST RESOURCES

By A. L. Clifton

The Karri forests belt* has a vast potential for sustained wood production and there is an enormous reserve waiting to be used.

But there is disastrous cellulose wastage in the present utilisation of the resource.

The economy of the area is relatively depressed. What it needs is overall planning to transcend the nibbling approach of the present milling system and pre-occupation with agriculture.

This regional planning should incorporate integrated sawmilling, hardboard, paper pulp and the generation of electric power.

The need for at least one such integrated unit is urgent, now.

But there are two arguments against the establishment of a pulp industry in this region. Firstly the population of Western Australia is not great enough to sell all the end products. Secondly there is not enough pine on the spot to provide the necessary proportion of softwood fibre for blending with indigenous pulps.

Both these objections can be surmounted.

The first should not be difficult if we look beyond our own coast-line to see the potential markets in South-East Asia where rising living standards will demand increasing quantities of paper, hardboard and other wood products. This market is right on our doorstep.

The second is partly answered by the rapidly developing Blackwood Valley plantations. However, they are not enough - not enough in area and not as economic as on-the-spot plantations could be, because Pemberton or at least the Warren Valley is the natural place for such an industry, with its indigenous timbers and ample water supply.

Pilot soil surveys indicate that there is more Pinus radiata soil in the Warren Valley under Forests Department control than all areas north of the Karri belt combined. And nearby, on the coastal belt there are many thousands of acres of sands showing promise for Pinus pinaster growing.

Here then is a blue print for the first stage of much needed development of the Karri forest belt -

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* I refer particularly to the area bounded by lines drawn east from the Darling Fault to Manjimup then to Walpole, back to Northcliffe and west again to the Darling Scarp.

1. Immediately establish several thousand acres of Pinus radiata down to an estimated SQ V, close to a suitable industrial site in the Warren Valley. These plantings could occupy fire damaged Karri sites, repurchased farmland etc. These plantations would be managed for pulp production to tide over the period until coastal plantations can come into full production.

2. Conduct extensive trials on and intensive studies into Pinus pinaster establishment on coastal sands. To be followed up by large-scale planting of these areas.

3. Keep figures on pulpwood resources from Karri thinnings, mill offal, Marri logs etc. constantly before the potential users of our raw material.

4. Expand our capacity to carry out the field work required, which is beyond present resources. Such trial programmes as proposed should be administered separately from divisional work with its many distractions.

Research facilities and personnel are required. Site preparation equipment must be ear-marked for the planting trials. Economic studies must be carried out on a large scale and, if necessary, a pilot plant established to prove the feasibility of using local materials on a working scale.

Many of these things have been said before and some carried out, but let us keep up the pressure for fuller utilisation of our resources.

EXAMINATION TECHNIQUE

By P. N. Hewett

In August each year, many field staff officers may attempt their promotional examinations. The following points suggest an orderly method of study which may increase your chances of success.

A written examination and the race against a time limit may be a poor way to assess the examinee's ability, but there are no really satisfactory alternatives and, of course, an officer's ability in the field is also assessed before any promotion is assured.

With a bit of effort and a usable technique, we can all get maximum returns from the time and energy invested in the study.

Preparation

A prolonged, continuous study is usually prohibited by work, family and social commitments. Fortunately the August exams have been staged to avoid all of the normal controlled burning and firefighting. All candidates then should be able to invest four or five nights a week from June 1st to the examination, in concentrated study.

(a) Essay Writing

Many officers have trouble expressing themselves when questions require an essay type answer. While few people are potential Neville Shute's, anyone can improve by practice. Two methods I would recommend are first, to practice writing answers to old examination questions or secondly, to read a few pages of any novel or book and then rewrite it in your own words. A little practice of this kind, especially if combined with an attempt to improve your own hand-writing, will reflect in all aspects of your work and exams whenever a report is required.

(b) Revision Programme

Your main sources of information will be the Forests Act and Regulations, Bush Fires Act and Regulations, Forester's Manual, Departmental Circulars, "Forestry in Western Australia" and previous examination papers etc. Not many D.F.O's. hold copies of old exam papers, but all D.F.O's. should be able to borrow a set from their Regional Inspector or Superintendent for a few weeks.

The first step then is to assemble your sources of information and allocate the time available for study among the main sections of your course. At the rate of three hours per night, from June to early August you should have 180 or more hours available for study. Allow yourself a fixed amount of time for each section to be read through at least twice, making notes of the whole section the first time and a new set of notes covering main points only in the second

attempt. You may be able to put your summaries onto a small set of cards or into a notebook which you can carry with you at work, to check the more difficult sections. In addition, you should keep a separate list of points which you don't understand. Take these queries to your O.I.C. who, almost invariably, will be able to assist you.

Unless you have a photographic memory, there is no substitute for notes. Merely gazing at the pages does little more than put you to sleep.

The Examination

Don't study on the night before the exam, since this will surely confuse you. A good night of rest will do far more good and you'll arrive at the exam physically and mentally refreshed.

If several in your district are taking the exam, keep out of their way until you are called into the examination room. Pre-exam discussions are guaranteed to alarm all but the veterans.

Re-assure yourself that your preparation has been adequate (if it HAS been adequate) since this boosts your morale. Read the instructions on top of the paper, check that you have the right paper and ask the supervisor to explain any instruction which you cannot understand.

When told you can commence, read the whole paper carefully. Check for misprints and for equipment which may be necessary.

Only answer as many questions as you are required to answer and allocate 5 minutes for reading the questions again and twenty minutes for checking all your answers at the finish. The rest of the time should be allocated between the questions (equally if all questions are of equal value). Stick rigidly to this schedule, since you cannot earn more than the maximum by spending a lot of extra time on one question which you find to be easy.

Select the question you can answer best and do it first. The completion of this should give you confidence to tackle the other questions.

Don't panic if another examinee uses much more answer paper or books than you do: he may write a larger hand than you or he may have ruined a few pages.

Do diagrams and sketches wherever you can to help support your answers. Allow yourself time to check you answers before you hand them in and put your name on every page if booklets are not being used (and on each book if they are used).

The methods outlined above are tried and proven methods. If used properly, they will enhance everyone's prospects of passing a promotional examination.

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WANDOO SEEDLING SURVIVAL

By C. J. Edwards

Officers who have worked in the Wandoo forest have, no doubt, noticed the strong tendency for Wandoo regeneration to occur almost solely over ash beds. Even without actually observing seedling regeneration, the typical habit of Wandoo saplings and poles to occur in groups of perhaps a dozen, would lead observers to assume that this ash bed germination pattern was normal.

Over the last couple of years, officers of the Mundaring Division have been conducting controlled observations in an attempt to learn more about Wandoo germination and survival and the factors that control it. No striking conclusions can be made at this stage, nor can any be expected, since the main purpose of the observations is to confirm (or refute) suspected trends and give a better basis for conclusions that have already been tentatively made.

Perhaps a few notes on one aspect of this work, the study of seedling survival, would be of interest.

Three plots, consisting of burnt crowns with two year old seedling regeneration, were selected, one in the Julimar State Forest and two in the Wandoo forest east of Mundaring.

In each plot two sample areas of four square feet were pegged out. These areas were subjectively selected in an attempt to get a fair average sample for the entire plot.

Observations to Date -

1. Regeneration was extremely heavy and in some cases completely outlined the burnt crown.

2. Height and vigour of the seedlings varied. The largest and most vigorous normally occupied the bole area where the ash residue was thickest and tapered off gradually towards the edge of the crown.

3. The number of seedlings per unit area followed a reverse pattern and were fewer in the bole area than in the crown.

4. Height increment of the largest seedlings was approximately seven inches and this represented a thirty per cent. increase in height for the year.

5. Mortality rate (2nd to 3rd year) was found to be variable over the sample areas examined; extremes being 60% mortality in one case and 0% mortality in two cases. The overall average mortality was approximately ten per cent. for the year ending March, 1964.

As a final comment with regard to this work, it should be mentioned that attempts are already underway to provide rough quantitative data on seedling mortality during the first few years following germination (not covered in the plots discussed), and to adopt a system whereby the records of all plots etc. are continually brought under notice and not allowed to gather dust in the archives.

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DISORDER IN LIERIA STRAIN

Over the past couple of autumnal periods, a disorder has affected the leading shoot of Pinus pinaster, Lieria Strain in the Lake Pinjar area of Wanneroo Division.

At a recent plantation conference there were some doubts expressed about the permanence and/or significance of this disorder which has a 'modus operandi' much the same as the fungus Diplodia. The following adaption from "Rubaiyat of Omar Khayyam" explains part of the problem.

The Ruinat of Pinar Pinjaram

The waving pine tree wilts,
  And having wilt, grows on.
Nor all thy research skill, nor supered grit,
  Can bring the leader back at all,
Nor all thy prayers produce a useful stem of it.

And that mal-nourished stick we call a bole,
  Whereunder Ips and other beetles crawl,
Lifts not its leaves or branches to the sky,
  To please the research boys, nor you, nor I.

For lo! the Pinjar plus trees awesome blight
  Has brung Diplodia to give a fright
To those for whom the future's mainly fraught
  With dreams of planting costs all gone for nought.

But come without a damn, and leave the plot
  Of fungal spores and hypae polygot
And blame it all upon the autumn flush
  Diplodia, the wog, disorder, rot.

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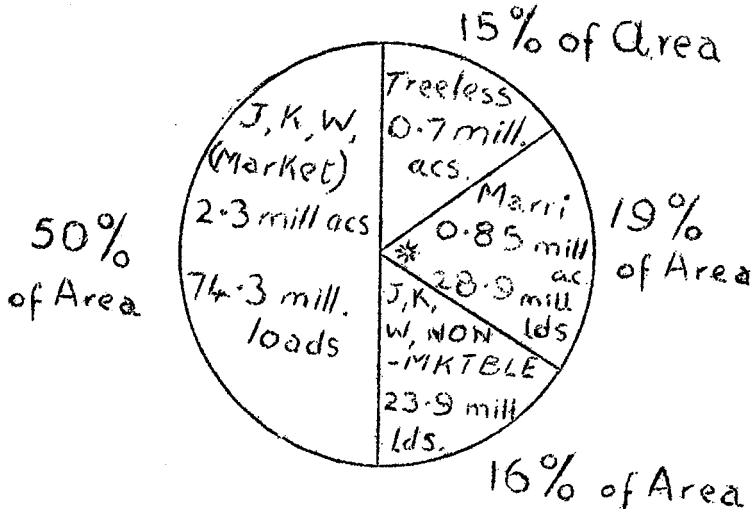
THE 1960 INVENTORY OF FOREST RESOURCES

By A. J. Williamson

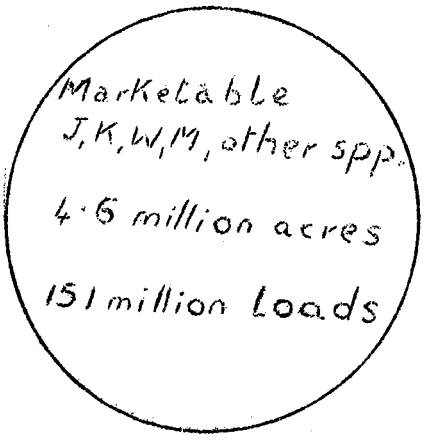
In 1960 Western Australia became the first State in Australia to produce a forest inventory to National standards. The figures presented in this inventory explain the current departmental activity in the silvicultural fields of Karri cull falling and Jarrah thinning, as well as investigations into Jarrah and Marri cull falling. The importance of this work is shown diagrammatically in the following two "wheels".



STATE FORESTS AND TIMBER RESERVES

4.6 Million acres - 1960

* Assuming the area occupied is proportional to the volume present.



Comments on the "wheel" for 1960

Marketable J, K, W :

Thinning the marketable stems will increase the yield. A pulp industry will provide a market for some of the small sizes.

Non-marketable J, K, W :

Some is available for firewood; some is available for a chip-board industry; the rest should be removed in cull falling operations.

Marri :

Some Marri is marketable (small sizes are suitable for pulpwood); some Marri can be used to produce wood distillation products; the rest should be removed in cull falling operations.

Treeless Areas :

To be afforested by such species as Pinus pinaster, Pinus radiata and Eastern States Eucalypts. (Stone Pine (pinus pinea) on the granite outcrops, no doubt! Eds.)

It is this Working Plan Officer's hope that by the year 2060 (or about 3 cutting cycles away) State Forests and Timber Reserves in Western Australia will consist entirely of marketable timber. The doubling of the annual yield (from 0.74 to 1.5 million loads in the round) will be the reward of 100 years of cull falling, thinning and research into afforestation of the existing non-timbered areas. If the Forests Department's programme to obtain an increased yield from the forest is accompanied by an increased efficiency in the milling industry and the introduction of new forest product industries such as pulp, hardboard, chipboard, wood distillation and charcoal iron industries, Western Australia may continue to be a self supporting State with respect to timber, even with a greatly increased population.