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Research Station,
DWELLINGUP,

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## Preliminary observations on tree deaths in Bell, Bednall and Nalyerin Blocks, Harvey Division

This report is a supplement to that written by J. Kitt on the 21/11/77.

### Preamble:

During the past few years, many foresters within the Department have been commenting on what they consider to be the general "poor condition" and ill thrift of the jarrah forest. The debate has become more intensive of late following occurrences of tree deaths in certain areas of State Forest and private property. Specific examples with which we are familiar are the widespread deaths along the western slopes of the Darling Scarp and in Bunnings property on the eastern watershed of the Sth. Dandalup catchment. Whilst these deaths are almost indisputedly due to drought there have been many other more spurious causes suggested for the ill thrift exhibited by various species in various areas o f the Forest.

Such an area of ill thrift was reported to occur along the Harvey/Quindanning road (Bell Block) in the vicinity of the S.E.C. power line. This area and another near Lake Nalyerin was inspected by Research Officers Herbert and Kitt on Friday, 23rd December, 1977.

### Quindanning Road/Power line, Match Brook road to Alamo road

This area had been visited earlier (18th November, 1977) by J. Kitt, L. Harman and B. Quicke. They observed and recorded via colour photography trees which were exhibiting signs of stress Viz: (a). dieback of crowns
(b). bleeding from the bole
(c). epicormic growth and death.

This latter symptom indicated that the affected trees had been under stress for a number of years.

The area looked completely different to that observed some 6 weeks previously by J. Kitt. This was due to the lush spring growth which characteristically occurs at this time of the year. However, the unmistakable symptoms of stress mentioned above were still clearly evident together with a pronounced yellowing of basal leaves (10-30% of crowns) and associated leaf fall.

In general, only the overstory species were affected although some shrubs were observed to be dying i.e., yellowing of leaves in *Phyllanthus calycinus* on a steep upland slope. As

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mentioned by J. Kitt most topographic sites exhibited symptoms of decline, however, this survey revealed that the areas with the most mortalities and worst symptoms were associated with shallow soils and rock outcrops. Some trees in the upper slopes were marked with white paint (bands) and aluminium tags, Working Plans?

Survey (1) Eastern hill near power line/Quindanning road

Fresh spring growth - epicormics - looks vastly different than six weeks previous (Kitt). Still evidence of moisture deficiency, saplings dead around gabbro dyke (rock outcrop) lower slopes obviously shallow soils as gabbro commonly outcropping and rock fragments common. Last years epicormic growth dead, new epicormic growth evident. Dead crowns everywhere. Yellowing of older basal leaves in crown. No evidence of dieback caused by Phytophthora cinnamomi.

(2) Western hill (as above)

Similar to (1) above although no evidence of country rock outcropping over the majority of the area except for a dolerite/gabbro dyke which was supporting an almost pure stand of healthy Wandoo. Deaths and severe crown decline, dead epicormic growth etc., was evident in jarrah growing adjacent to this rock outcrop. Elsewhere jarrah, marri showing general symptoms of stress, leaf yellowing, crown decline etc.

In the lowlands separating these two hills, (1) & (2), soils were of a hard-capped silty loam.

(3) Slope near Matchbrook road

This area had large jarrah trees with complete crown death, clearly the worst affected area that we observed in this vicinity. The deaths were adjacent to a large granite "boss" and associated shallow soils and dispersed rock fragments.

(4) Lake Nalyerin

A large area of dead bush had been reported by Forester B. Quicke near the Lake and he requested that we inspect this site. The area encompasses approximately 16 hectares and is situated between the South-eastern boundary of the lake and an adjacent swamp. Lake Nalyerin road passes through the upper northern edge of this area, reference DY 8182. Another area of dead bush has been reported by Mr. L. Harman from aerial observations north west of the Lake, reference DY 7958, it was not inspected.

The former area is confined to a sandy "spit" of land between the Lake and the swamp. The sands are white in colour and somewhat coarser than those observed elsewhere in the forest. The overstory which is composed primarily of jarrah is dead and/or dying. All size classes are affected. Progressive decline over a number of years was evident from dead epicormics. Fresh epicormics were confined to the bole only. Understory species such as Banksia littoralis, Macrozamia reidlii and Xanthorrhoea preissii were relatively healthy. Adjacent vegetation (jarrah) growing on lateritic soils was also relatively healthy. The Lake and swamp were dry.

Conclusions

The general decline in health exhibited by the vegetation observed in the above sites appears to be due to prolonged soil moisture deficiency. Reasons for this conclusion are;

(a). The worst affected areas of vegetation are growing on or adjacent to rock outcrops with associated shallow soils, or in the case of Lake Nalyerin, on porous sands.

(b). The presence of old, dead epicormics suggests that the process has been taking place over <u>at least</u> a 2 - 3 yr. period.

(c). The general area has been mapped by C.S.I.R.O. Geomorphologists (Quindanning road area only) as having rock outcrops and shallow soils associated with rock outcrops in a "Murray" valley type.

(d). Lake Nalyerin and the nearby swamp were dry indicating that the watertable level in this area has been considerably reduced.

Climatic and other hydrological data substantiates the above conclusion. Analysis of rainfall data for Dwellingup since 1966 to date shows that during this 12 year period there have been 7 years of rainfall deficit (the last 3 occurring consecutively), 4 years of rainfall surplus and 1 year of average rainfall. However, it is the rainfall distribution within the year which is important to long term vegetation survival. If a large percentage of the annual rainfall falls during the dry summer period then it is of very little use to deep rooted trees. (See Forest Notes, Vol. 15, 2, pp.52-54). Watertables monitored in the Yarragil catchment have shown a progressive reduction in level over the past 2 years.

If trees are showing signs of moisture stress in these marginal sites (other areas include the Darling Scarp) then it could logically be assumed that the symptoms of ill thrift reported throughout the whole of State Forest could also be due to moisture stress. We do not disregard other likely causes of the reported decline in the general health of the forest, particularly those based on an ecological premise e.g., degrade through overcutting, cool burning, disease. We do, however, stress that from our observations, the vegetation considered in this report is dying and/or showing symptoms of ill thrift due to prolonged soil moisture deficiency.

<u>Recommendations</u>

(1). The Nalyerin Lake area has a large amount of merchantable timber which, if logged now, could be salvagable. It is estimated that the vegetation here will be completely dead by late autumn 1978 and thus beyond recovery.

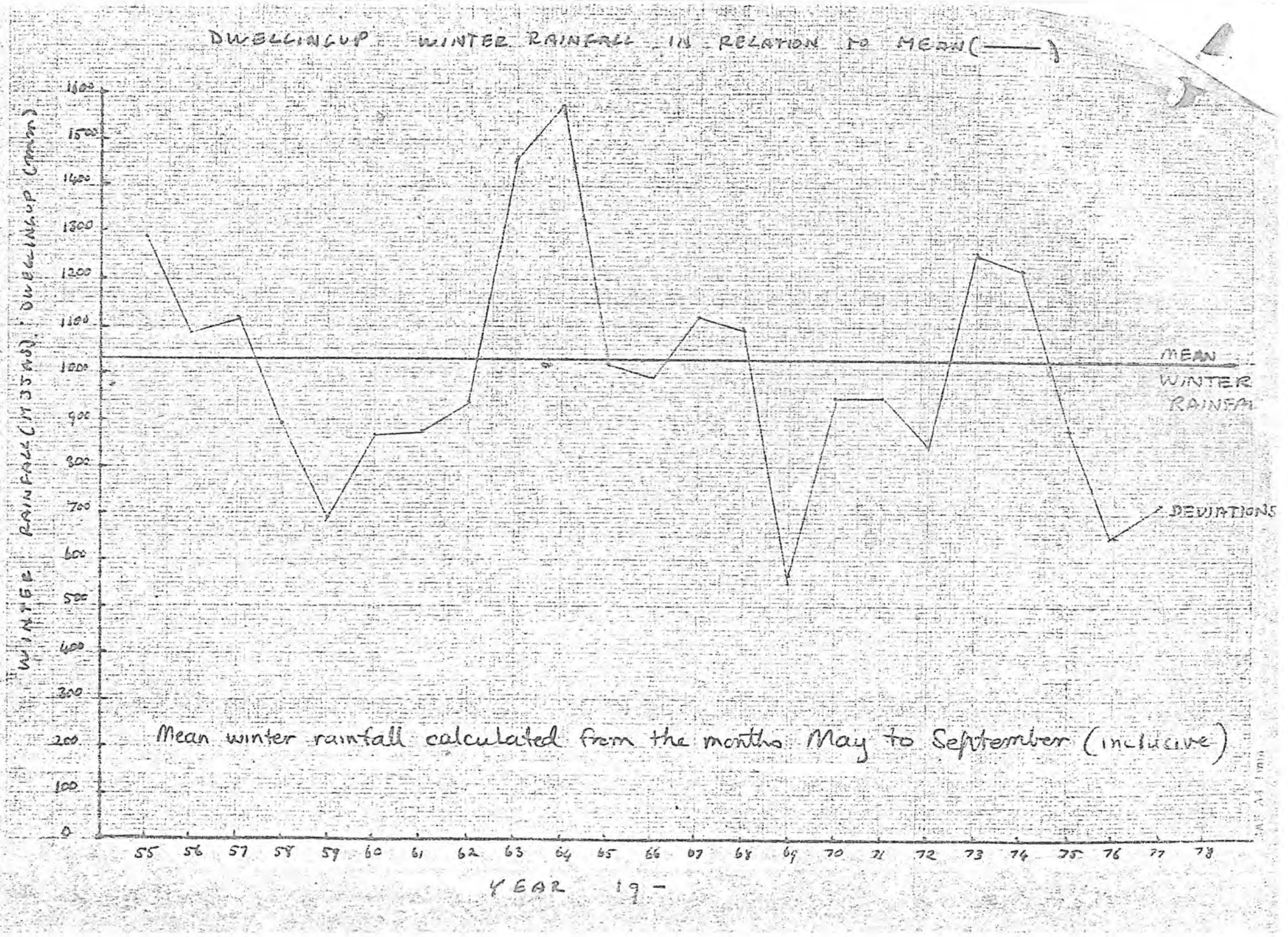
(2). The Quindanning area, which is not as severely affected, could be expected to return to pre-drought conditions if adequate rains are received in future years. If not, then tree deaths will continue to occur adjacent to areas of rock outcrop and on shallow soils. Salvage logging may then become necessary.

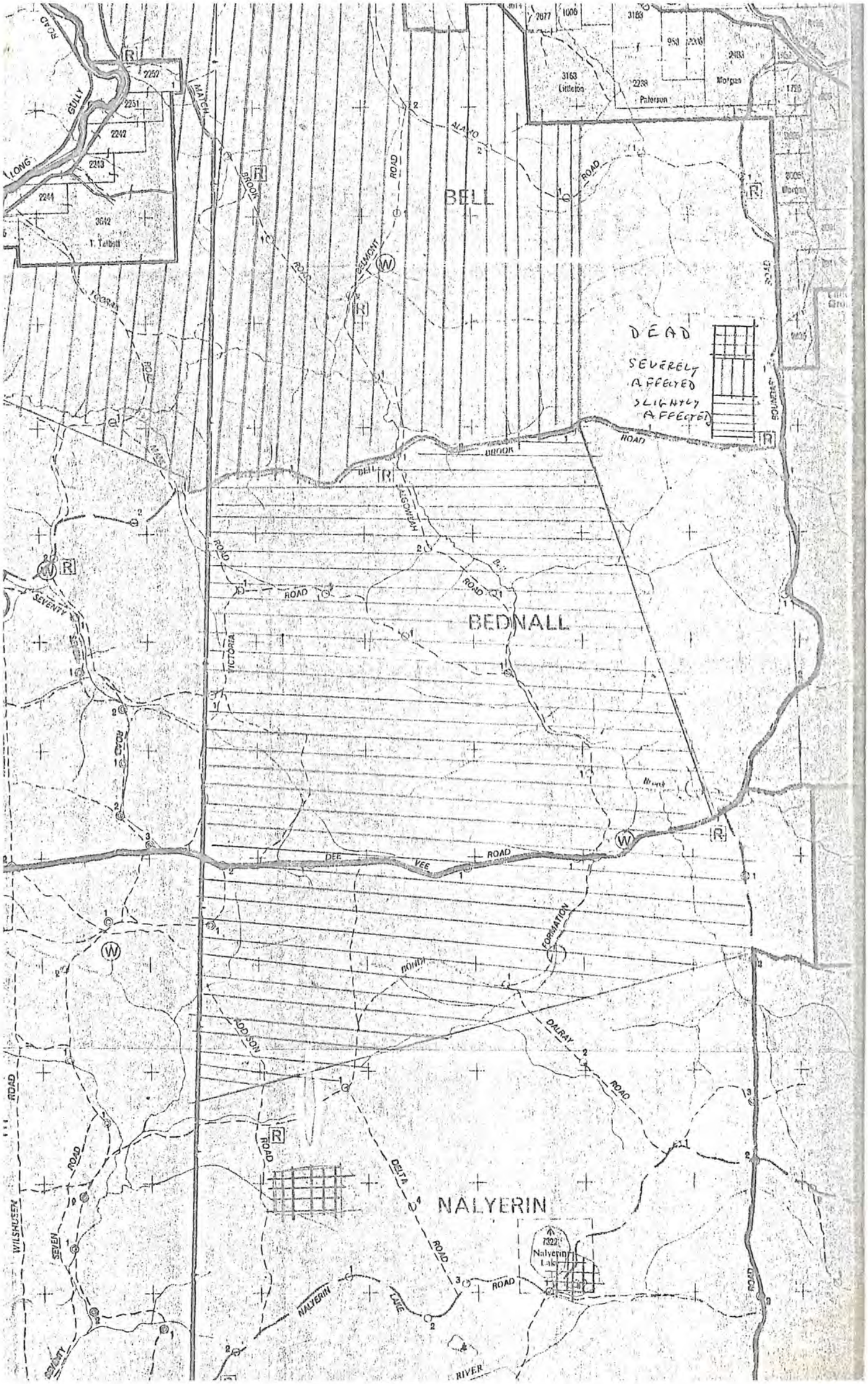
(3). These areas should be inspected again in late autumn to reassess the situation. By that time, however, it will probably be too late to salvage log the Nalyerin Lake area and in any case there would be problems with wet weather and quarantine.

(4). The 2nd area of dead bush reported in the Lake Nalyerin area should be inspected. Colour slides of the vegetation in these areas are available.

E.J. HERBERT E. J. Herbert
R.J. KITT R J Kitt
Research Officers

S.D.F.O. Shea to note
Copy to D.F.O. Scambler, A.D.F.O. Pitson, Forester B, Cuthbe


DWELLINGUP - WINTER RAINFALL IN RELATION TO MEAN(——)
WINTER RAINFALL (MAY TO SEPT) DWELLINGUP (mm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
MEAN WINTER RAINFALL
DEVIATIONS
55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
YEAR 19-
Mean winter rainfall calculated from the months May to September (inclusive)


BELL
BEDNALL
NALYERIN
DEAD
SEVERELY AFFECTED
SLIGHTLY AFFECTED
BOUNDARY
ROAD
BROOK
DEE VEE ROAD
DELTA ROAD
DALRAY ROAD
FORMATION
RIVER
Nalyerin Lake