TOUR OF S.W. FORESTS AND GOLDFIELDS WOODLANDS

DAY 1 - PERTH TO MANJIMUP -

A.M. - PERTH TO WEST MANJIMUP - Map Distance 310 km

Perth founded in 1829 on arrival of the 'Parmelia' in the Swan River. Leaving metropolitan area going south, repeated occurrences of Eucalypts:

Eucalyptus calophylla (marri), E. wandoo on heavier soils and E. rudis along streams.

37 Leaving Byford on the left, patch of dead jarrah (E. marginata) from 'dieback' root rot, Phytophthora cinnamomi (Information Sheets, 4, 35, 37).

39 Naval ammunition stores; then E. wandoo along creek on left.

41 Brickworks - Cardup

43 Jarrah dying on right.

44 Sandplain jarrah and bull banksia (Banksia grandis) with marri, then sheoak (Casuarina fraserana) after passing a brook.

At Medula Brook: Paper bark (Melaleuca rhaphiophylla), E. rudis and E. calophylla.

52 Banksia dieback.

54 Serpentine River (Information Sheet 10) and scarp upstream is part of National Park (636 ha).

55 E. lane-poolei on right at roadside and again in paddock before road junction.

56 Pinus pinea (stone pine) umbrella shade tree on left.

58 Creek just before detour to left.

(detour) 2km 59 Kingsbury Drive lookout. Detour 2 km up scarp (Res. Papers 16, 17) Marri then jarrah (Forest Policy - Forest Focus 17) and E.laeliae north side; Xanthorrhoea preissii topside of road, of estimated age 200 years growing about 1cm/yr in height.

1. STOP 60 Green Gables, Johnston Memorial Church, Retirement Village and Kindergarten for unwanted children.

*Enter driveway on right, stop at gate on left. (Turn around).

Dirk Brook, six eucalypts of the Swan Coastal Plain: E. marginata (jarrah, stringybark); E. calophylla (marri, bloodwood, friable flaky-bark); E. rudis (flooded gum, fibrous scaly-bark); E. wandoo (white gum); E. laeliae (pure white gum) and across the road, E. lane-poolei (pinkish-white gum bark).

66 Heytesbury Stud. E. lane-poolei further south on west side.

68 In west paddock Nuytsia floribunda (orange blossom Christmas Tree) is a root parasite.

70 Old windthrows in paddock west side. Occasional tornadoes sweep through these coastal and forest areas.

80 South Dandalup River, most southerly dam for metropolitan Perth.

84 Carcoola settlement of Alcoa of Australia to west and refinery to east, mining aluminium from bauxite of the jarrah forest on the Darling Plateau.

87 Murray River has salinity problems and is the second largest river of the south west. Araucaria sp. in park.

93 Olea europaea along east side of road, then occasional large girth relic marri and jarrah.

107 The grass tree (Kingia australis) and blackboy (Xanthorrhoea preisii) uncleared flats on the west side of the road and cleared on the east side.

112 Waroona, northern part of irrigated districts.

(detour) 1 km 115 Hamel Pinus pinaster 44 years. Drive through Forest Settlement now Education Department field study centre.

Pause 116 Hamel Forest Nursery. Turn bus around. (FD Price list of seeds; Dept Agriculture Bull. 3618). (Information Sheets 36, 30).

125 Yarloop. Mature jarrah trees on townsite, and large sawmill, cutting jarrah.

126 Pure sheoak grove on east side and E. rudis along stream.

134 Dieback jarrah (Information Sheets 4, 35, 37).

140 Harvey River, E. rudis, Agonis flexuosa (Peppermint) and Melaleuca rhaphiophylla.

Harvey headquarters liaison for Artificial Breeding of cattle.

145 Peppermint trees east of Wokalup, Agricultural Research Station for A.I. liaison.

170 Waterloo (Bunbury 13 km west). Dardanup turn-off eastwards, old brick kilns; Agonis flexuosa and E. rudis.

193 Boyanup; railway carries 2 or 3 trainloads of woodchips daily from Manjimup to Bunbury.

208 Donnybrook, centre of apple growing district and potential for cider, only if economy improves. 60 000 ha pine forest project conversion south of here. (Forest Focus 16).

225 Bracken fern problem on the hillside.

227 Entering Mullalyup. Old building on right Cobb & Coach Inn.

231 E. patens (yarri) has drooping leaf habit on right, E. rudis on left in gully.

235 Balingup, spot sawmill cutting jarrah. E. patens on left leaving Balingup.

244 Greenbushes, the realignment of the road avoids the current workings of the old tin mines. As a rehabilitation measure in the road cuttings, the topsoil, which carried the seed of native plants is spread back over the batter or side-slopes; these lateritic soils are very gravelly.

252 Hester Brook, E. patens on right. Private plantation of Pinus radiata has been recently established (Information Sheet 17). High quality jarrah forest soils converted to Agriculture and now Tree Farming.

260 Bridgetown.

262 Comparison of E. patens (yarri) on the right and E. rudis on left, and then marri and jarrah. House on hillside to south of road is protected from the wind by Boobyalla (Myoporum insularis).

268 Acid and basic soils not yet covered in cutting on north side of road.

271. Yornup Primary School on south side.

273 Source of Donnelly River,(E. rudis and Melaleuca preissiana swamp) **flows south through the karri forest.**

281 Jarrah, marri and yarri.

287 Palgarup sawmill and settlement.

Slow 295 Manjimup turn right at Ampol Service Station, cross railway line, follow it turning left. Wildlife **(RP 11, IS 12)** sanctuary on right has a variety of Australian marsupials, birds, reptiles. Manjimup timber museum is on the right. Manjimup is the geographic centre of sawmill and chipwood operations and one of the largest towns in the south west.

296 Manjimup Senior High School on the left, landscape planting and windbreak.

297 Take left fork: orchards, vegetable gardens and pastures, in common with the rest of the farming industry the orchards at the moment are undergoing a recession and are not quite the good investment they were ten years ago. Jarrah-marri forest of only average quality. Several exotic plantings are scattered throughout the properties, mainly pines, and some exotic eucalypts.

300 The road on the left goes to Deanmill which has the largest automated mill in Western Australia, milling karri and jarrah. This new mill replaced the original old mill which was built in 1913.

Detour ($1\frac{1}{2}$ km) 302 Take dirt road on the right to the West Manjimup nursery. Again passing through very poor quality jarrah-marri forest.

On the left hand side regenerated stand of young jarrah-marri coppice and advance growth from lignotubers.

303 On the left is a field with a great number of dead stags. These are known locally as Mitchell's Monuments and were ringbarked when the area was opened up for grazing and settlement. There are many examples of this particular type of field through the southwest.

$303\frac{1}{2}$ West Manjimup Forests Department nursery is raising 1.3 million open rooted karri seedlings for use in the Department's regeneration programme in the karri forest in the south west**(Res Paper 12)**.

The nursery also raises a great number of mixed peat pot

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plants, including exotic eucalypts, some conifers and other Western Australian species such as marri, yarri and tuart (E. gomphocephala). These other species are used both for ornamental plantings and for rehabilitation of dieback sites, gravel pits and log landings.

Of interest is the windbreak of exotics, planted around the edges of the nursery to protect the young karri seedlings. Nursery practice here is basically the same as other hardwood nurseries in Australia. The seedlings are watered, fertilised, root ripped to a depth of 8" and then before planting are topped to give a manageable size. Trials will be commenced this year to test the effect of cutting them back to root-shoot cuttings for age of planting and to reduce the planting shock on them.

The dormitories on the site are part of the Forests Department's cadet training scheme. Trainees have six months in the field at Manjimup learning basic forest practices under experienced divisional staff, six months in the jarrah forest at Dwellingup and one year at a Technical Training College in Perth.

The old kilns on the site are relics of another industry that has failed. Tobacco growing was a big industry in the Manjimup district about thirty years ago, but has since proved unviable because the nitrogen fertilisation of the soil produces a strong leaf which is not acceptable to the industry.

LUNCH 12.30 pm

TOUR 7/DAY 1 - KARRI FOREST REGION:

1 P.M. FROM WEST MANJIMUP NURSERY

Approx. (hr/mn)	(km)	
0/0	0	Turn south
	2	Graphite Road, turn west, travels through jarrah-marri forest, where one can see the tiered nature of the regeneration coming up beneath the existing stand.
		Occasional dead banksia on the left due to dieback infection as before by the root rot, Phytophthora cinnamomi. Marri and karri are not affected, marri because of its resistance and karri because of the sites it grows on.
	7	The first karri trees (Eucalyptus diversicolor) on the left are of very poor form due to being unmarketable and left to grow in the open.
	9	Glenoran, an old forest settlement, 1 km to the south - as a fire control requirement, these settlements were scattered through the bush where only one officer and a gang of six men were housed, always handy to an outbreak of fire. However, with modern transport and tankers and efficient equipment and communications, the main outposts now have been shifted back to divisional headquarters.
	12	The road now begins to descend into the valley of the Donnelly River, one of the largest rivers in the area. This area has a great potential for tourism and is, in fact, very well patronised by tourists, both from interstate and from Perth. The area is very popular for trail-bike riding, hiking and other bush nature pursuits.
		As we descend further into the valley karri is the dominant species. In the northern part of its range, this is a characteristic feature: karri-marri and pure karri stands occupy the gullies, in moister, more shaded situations on the soils weathered from the country rock, while jarrah-marri and marri-jarrah forests occupy the more exposed, less hospitable lateritic ridge tops. In the southern part of its range this situation is reversed: karri is found

higher in the landscape on soils weathered from the country rock and jarrah and marri are found at a lower level on residual lateritic soils

Slow

14 Virgin karri forest reserved on the north side, not of particularly high quality but typical of the spacing and understorey of hazel bush (Trymalium spathulatum and Chorilaena quercifolia) which is evident in a mature, unburnt, uncut karri stand.

(Pause)

The Donnelly River picnic area and One Tree Bridge (a museum piece), which was used for crossing the river to mine graphite in the early days, has been replaced by two road bridges, the present one and the adjacent obsolete one.

You will notice the sign on the right pointing to the Bibbulmun Track. This is a joint venture between the Forests Department and other government instrumentalities to outline a walking trail south from the Darling Scarp of the Avon Valley east of Perth to Northcliffe or further. At the moment the track has various shapes and forms and reaches from Kalamunda to the Boorara fire tower tree, uses very few of its own tracks but follows Department roads, public highways and in fact is over 400 km long (Forest Focus 13).

Next on the right we are passing through an area of selection cut karri forest with parent trees towering over the regeneration.

1. STOP

15 The Four Aces which are another tourist attraction. By a freak of nature, natural regeneration some 300 years ago just happened to produce these four beautiful stems in an exact straight line and very close together, a situation which is very uncommon in the natural spacing of trees in karri stands (Information Sheet 1).

As the road passes along the gully you can see again the influence of karri in the gully and fading out as it moves up the ridge top. Another species is coming in on the right hand side, bullich (Eucalyptus megacarpa) which is very similar to karri but does not grow nearly as big and is not nearly as wide spread. It is interesting to note the amount of jarrah and marri advance growth is most evident along the road edges where the increased light and water runoff has made conditions more favourable for its establishment and growth.

(hr/mn) (km)

0/40 . 17 Turn left into Pine Creek Road. This road passes through a jarrah-marri selection forest logging process. Under this system the area is first burnt to remove scrub, then the jarrah is felled and the usable sawlogs are taken out, in this case to Deanmill. When this process is finished, the chipwood fellers move in and the utilisable marri is felled and taken to the Manjimup chipmill (Diamond Block). The area is then 'top disposal burnt' and the jarrah-marri regeneration is allowed to fill up the gaps. This system works with jarrah and marri because of the species' tolerance to shading and extremes of environment. In testing the karri system of selection logging it was found that 24 per cent of crown cover was sufficient for regeneration to fail, and for best development the karri regeneration required full sunlight **(For Foc 12; Regeneration in Karri Forest Community).**

18 Again we can see the phenomenen of the karri growing in the valleys and as soon as you start to move up to the ridge tops it disappears very quickly and the jarrah-marri stand takes over.

20 On the right you will notice many broken stems particularly of the marri, left before the advent of the logging process for milling chipwood. A protection burn also has been carried out by the Department to remove excess scrub and litter and hence to reduce the chances of a wildfire destroying the forest. Protection burns are theoretically on a cycle of seven years but due to the limitations in areas which can be done each year, burning prescriptions and available times for suitable weather conditions, this seven year cycle is rarely adhered to.

21 The road now begins to **enter** better quality karri forest: again selection cutting is evident with the young stems coming up under the old canopy. This is not the safest form of karri regeneration as we shall see later. The understorey here is typical of young karri stands and is just about due for its first protection burning. Karri should not have a protection burn before about fifteen years of age because the bark thickness is inadequate to allow it to withstand the severe heat. After that period, the thickness of the bark will allow it to withstand the prescribed burn without ill effects and the scrub can be burnt away. As you can see, this selection system also has some very deleterious effects on the

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(hr/mn) (km)

remaining karri trees. They start to die back from the top as competition develops from the scrub and younger stems around them.

22 Along here the road passes through more selection cutting and again you can see the dieback in the open mature karri that was left after the cutting, epicormic growth which was , possibly due to some influence of the top disposal burn & opening of stand.

23 On the left there is an area of 4 year old regeneration that was originally selection cut and then at the time of seedling establishment in 1972 was cut to the seed tree system to allow for proper karri regeneration. On looking at the form of the young karri stems in the selection cut stand, one can see that they are not suited to this treatment.

2. STOP

24 (Before junction). The area in front of you with the remaining seed trees is a form of a stream reserve. Under present logging management practices that stream reserve will be completely uncut forest one hundred metres wide on each side of the stream. However, when the area was first cut in 1972, no such safeguards existed, and the seed trees that you can see are remaining as a very minor form of stream reserve. The amount of logs left on the ground after chipwood operation is also quite unusual in that this area has been cut in three stages instead of the usual two and not all the logs that could have been taken were taken.

This area that is in front of you is an area that was burnt for karri regeneration in March 1976. As you can see green cover of regeneration has already extended over the area.

On top of the hill you can see an area of jarrah-marri forest that was protection-burned and edge-burned in readiness before the regeneration burn. This area suffered a very severe fire during the protection burn and you can see the way the tips of the trees are reshooting from epicormic shoots. Those trees were defoliated by the burn in March 1976.

When a karri-marri stand such as the one across the creek from you is logged, the general process is as follows: first the scrub is rolled flat by tractors which are working in the area so that the tree marker can get in and select the best karri trees which are

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left as a seed tree. These karri seed trees are of average form, excepting an occasional elite tree. After treemarking by the forester, the fallers move in and take the marketable karri sawlogs. Following this, the chipwood fallers move in, remove all the utisable marri and cull out the karri which has been rejected for sawlogs, but which will go to the chip-mill. All the other trees, except for the seed trees, are felled and culled for anything that is utilisable then the area is burnt, preferably during the year which coincides with the trees bearing seeds. After the fire and as soon as possible after the seed has been shed, the fallers move back into the area. The seed trees are removed for saw logs and a comparatively shade-free environment is left for the young karri seedlings to develop in. If the area was burnt where the trees did not have seed, then they must be all clear fallen and the area either hand planted or hand sown as soon as possible or in the first winter after the burn.

As I said before, the logs in the gully will not be allowed to be felled under present day logging management practices, because of causing pollution and, having a deleterious effect on the fish population of the stream.

On our left here we have a trial planting of exotic eucalypts from other states as well as some from other parts of Western Australia.

The wide road up the hill in front of us is known as Palings Road and is a chip road, a private road used by Bunnings Logging Company for their logging vehicles and has the dual effect of keeping them off the public carriageways, thus making it safer and also, a much quicker way of transporting timber to the saw-mills and to the chipmill. Forests Department personnel only are allowed on this road and then we have to receive permission from our superiors.
Turn the headlights on when travelling on chip road. This is the valley of the Donnelly you are looking down into. At fairly steep and dangerous parts of the chip road you have to get right over on the left hand side. If you do see a chipwood hauling truck you will note they are carrying what seems to be a very large volume of logs. This is a private road, not restricted by State Government and police traffic laws: hence this is a more efficient way of transport-ing timber.

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(hr/mn)(km)

Back on the right is an area of karri regeneration approximately 8 years old, again resulting from the seed tree system. The excellent form of the stems and the way in which they have overtopped the scrub is now becoming evident. Karri begins to overtop the scrub at about five years of age.

40 In the regeneration on the right we have a karri thinning trial designed by the Working Plans Branch to test the effect of stand density on the growth of young karri. At the moment the trial is too young to see any worthwhile results. The only thing that seems to be showing is that young karri when spaced to very wide spacing is very susceptible to bending and windthrow, because it does not have strength in the stems as yet, nor stability in the root systems.

41 Again an example of a virgin karri forest with an understorey predominantly in this case of hazel, which is another wet sclerophyll understorey species.

42 On the right we are now moving into an area that has been prepared for regeneration burning in Autumn 1977. As you can see the seed trees have been left prior to burning. Under the chipwood felling agreement the average coupe size will be about 200 hectares.

46 An example again of jarrah and marri advance growth and regeneration coming up from seed.

47 An experimental planting of Pinus radiata, one of the many experimental plantings situated around the Manjimup division.

48 Palings Bridge, an old railway formation bridge over the Donnelly River built when logs were hauled by bush railway trains. The bridge has been replaced for use by the heavy chip trucks of today.

52 On your left you have just passed the road to the Deanmill Mill.

53 On the right hand side of the road you can see an area that has been protection burnt, probably in 1975. The undergrowth is just starting to recover. This was a very severe protection burn in that all the trees seemed to be scorched. Most of these protection burns are done by air with the aim of burning 60 per cent of the area on which the chemical incendiaries are dropped.

(For Foc 13).

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(hr/mn)(km)

Restricted areas and difficult places such as steep slopes are still lit manually with a kerosene torch.

Pause 56 Seven-Day Road. All traffic on the chip road must stop and give way to traffic on public roads where they cross. The chip road today has passed through a wide range of forest types from very poor quality jarrah-marri into some virgin karri of not particularly high quality.

Slow (1/55) 62 To go right into Channybearup Road, turn left off chiproad, back bus and about face, travel south-westerly.

64 Karri begins to become dominant again in the moister shaded gullies. Again you are crossing the Bibbulmun Track which you last saw at One Tree Bridge.

65 Very, very dense karri pole regeneration and again the odd dead banksia is the result of Phytophthora cinnamomi infection.

68 Turn left on to Tramway Trail. Just after the start of Tramway Trail on your right you can see the area that was protection burnt from aircraft, in cool weather of the spring 1976. This did not achieve 60% burn over the area.

70 High quality karri pole regeneration.

72 On your right a dense stand of Warren River cedar (Agonis juniperina) grows well along these streams of the Warren and Donnelly Rivers.

74 On your left another protection burn. This is of better average quality that you could expect in the karri forest. You will note that there is very minimal damage to the tree stems, while the scrub has been almost completely knocked back. It is the ideal burn under the forest cover in cool conditions in spring where flame height and heat is not too high.

75 Again a very dense stand of Warren River cedar on your right.

Now coming to the Big Brook arboretum and take the left hand fork into Rainbow Trail. (Acacia melanoxylon at the corner).

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(hr/mn) (km)

Slow 76 Early 1930 arboretum, testing this climate with small plots, mainly of coniferous exotic species from many countries of Europe, North America (e.g. Sequoia sempervirens) and the Eastern States (Species are labelled at one corner).

A very dense karri pole stand, unthinned at 47 years of age. Among the very dense stand you can see the natural selection and thinning out of the very small stunted and thin stems that are evident. Thinning plots at 25 years of age showed twice the increment in the crop trees - 6.8 per cent increment for the ten years after thinning the overstorey to 100 stems per hectare (6.5 sq. m basal area inside bark). One of significant understorey species of the karri forest here is Casuarina decussata (the karri sheoak).

77 Stirling Road Junction, turn left towards Pemberton. On the right you pass one of the original land settlement houses belonging to one of the pioneers under the group settlement scheme about 1920.

78 On the left is an excellent stand of karri regeneration that has been thinned.

79 Continue straight ahead along dirt road. Do not turn right.

Pause 81 Junction with Rainbow Trail. (leaflet) The trout ponds are off to the left. Inspection times for the trout ponds are 9 a.m. to 12.00 noon and 1 p.m. to 4.30 p.m. daily. The bus is capable of turning in the parking bay at the trout ponds.

2/25 Back on the Rainbow Trail and now heading towards Pemberton.

82 Straight ahead is the Pemberton mill which is the biggest hardwood mill in Western Australia and probably in Australia.

Slow 2/30 If detour towards the swimming pool weir and amenities, turn left. The swimming pool has one hillside of virgin karri forest. The pool was built entirely by local labour of Pemberton townspeople, turn around in the parking bay.

Junction of highway, turn left uphill into town, Junior High School and hospital on left. At Post Office, on brow of hill, turn right - can look back over panoramic view of the valley of the mill and town; continue to

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(hr/mn)(km) road junction, then left on the road that runs behind the Pemberton Divisional Forest Office.

(Detour) 84 Turn right along Burma Road then right again at 200 m towards the pine mill and seed extraction kiln. This mill is owned by the Department but operates in fluctuation with demand for timber.

3. Stop The seed extraction kiln for karri seed was opened here in winter 1976; capsules are harvested in the coupes by various means from selected crowns. The harvest is brought in and stripped from branchlets as necessary and placed in 6 wire-mesh cylinders, which rotate in the dry air stream from a Master Heater (240 volts, 2 amps) for up to 48 hours. The seed is then taken out, swept up, sieved and sent to Como for storage in the cool store.

2/50 Back on Burma Road towards the Gloucester Tree.

4.Stop 86 The Gloucester Tree fire lookout. The Department has had six of these large karri trees with fire towers built in the top of them in its network of 38 towers, but most of these have been superseded by aerial observation. However, on days of high fire danger they are still being used as fire spotting towers. The fire spotter towers have proved very efficient in detecting outbreaks of fire but are more expensive to operate than the aerial observation.

Slow 3/20 88 Proceed through the Pemberton Divisional headquarters, bypass the smaller lookout tree, turn right at the office then take the middle dirt track down the hill, towards the old camp quarters and panoramic view of the arboretum.

Pemberton arboretum has some poplars and conifers, with mainly a selection of eucalypts from the south west, the Goldfields and the Eastern States. The eucalypts were planted about 1962 and 1969/70 and trials with fertilisers have been used. All trees are labelled with the sign usually on the corner facing the major road bordering that block.

89 At hilltop - Eucalyptus muelleriana, (yellow stringybark) an eastern states eucalypt, principally from Victoria. Turn left at the top around the E. muelleriana and left again over small gutter and down the boundary track. Turn left away from the fence where it deviates to the right. Make the complete circuit and turn right back along the track out of arboretum past the young stand of poplars in the gully.

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(hr/mn)(km) Continue in front of the Pemberton Office, along the bitumen through the north side of the town.

91 Very steep hill down to the Pemberton township will require very low gear for the bus. Turn right at the Vasse Highway junction and Mobil Service Station in Pemberton.

3/30 Vasse Highway from Pemberton to Manjimup passes through rich grazing and agricultural country, alternating with occasional jarrah-marri and karri-marri stands.

97 Well maintained apple orchards: in addition, also to dairying and canning of stone fruits, other main primary industries of the area are beef cattle, potatoes, root and green vegetables.

101 On your right you will notice a blackboy sweep under jarrah and marri forest on a granite quartzite outcrop.

103 Diamond State Forest is a fine example of young and mature karri forest with some overmature trees starting to die back at the tips.

Slow 104 Turn right down the old narrow highway through the virgin karri-marri stand. The road is in very reasonable condition. Several very large karri trees are evident in this stand.

105 Return to the Vasse Highway and turn right. You are just about to pass over another of the chipwood roads. This one running south towards Northcliffe, from the Diamond chip mill. You will note the important separation between the chip road and the public road is to separate the traffic, avoid delays and possible accidents.

106 On the paddock on your left you see a very dense small stand of peppermint, Agonis flexuosa.

107 Turn left onto the Southwest Highway towards Manjimup. At this stage the jarrah trees in this vicinity are suffering a very heavy attack of jarrah leaf miner, (Perthida glyphopa, Inf. Sheet 8).

Along the Southwest Highway the forest is mainly jarrh-marri and karri-marri stands with dense regeneration following cutting and burning and also, open farmlands and grazing land on the right hand side - the eastern side. Again, infestation of the understorey by Phytophthora cinnomomi is quite evident on the left hand side of the road.

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(hr/mn)(km)

(Pause) 113 Another of the Department's fire spotting towers on the left. This one is the Diamond Tree tower of height of 55m. The bus can be turned around at the tree should you desire to enter here.
(Next Junction, Detour to Chipmill for 8.15 a.m. Tues. to be approved & to be arranged).

Slow 121 Bunnings Timber Yard, kilns, end-matching and planing shops. Note: Historical train and whim on right and opposite on left, Ace Motel accommodation, see later

122 Manjimup Forest Division and Research H.Q. and Arboretum are accessible from the Motel, see later.

Stop 123 Timber Museum, time to be arranged locally and confirm.
* 5 PM
Wildlife Sanctuary (also see notes pp4).

Turn back through town to Ace Motel.

Stop 125 Ace Motel.

TOUR 7/DAY 2 - MANJIMUP TO ALBANY - Map Distance 272 km

A.M. - MANJIMUP TO WALPOLE TINGLE TREE - 130 KM

8.15 a.m. at Woodchip Mill to be Arranged

(Approx.) Time	km	
	0	Leave motel, turn south down South West Highway
	3	Jardee and Barmell sawmills on right
Detour	8	Turn right into Eastbourne Rd. towards chipmill
(2 km)	9	Turn right into chipmill parking area. Leave at 8.45 a.m.
1. STOP		The Diamond Chip Mill utilises mainly marri logs and culled karri logs that are not suitable for sawmilling. However, at the chip sit, multiple use is made of good marri logs, which are taken to the Barmell mill for cutting sawtimber, also any good quality karri logs of small size are taken to Monier's Tile-batten Mill in Busselton and the larger ones are removed from the chip mill landing and taken to (Jard .) karri sawmills.
0900 am	10	Turn right into South West Highway, passing Diamond Tree
	15	Forked road, keep left on S.W. Highway
	19	Track right to turn around in Hayles loc. 9784
2. STOP	20	Karri Provenance Arboretum
0945 am	21	Turn right into S.W. Highway
	24	Warren River, largest stream in this region.
	27	Dieback rehabilitation planting trials with Eastern States Eucalypts in Sir James Mitchell National Park, 200 m roadside reserve (1093 ha)
	39	Softwood and hardwood species-site plot trials.
Slow	44	Westcliff granite outcrop is surrounded by jarrah-marri, then karri is lower down: the situation for relative positions of species around granite rock along the coast is reversed (pp) karri surrounds the rocks, jarrah is lower down and heath replaces the trees on the sandplains.
1015 am	55	Shannon River.
	63,70	Weld River
	80	Mixed species trials for resistance to Phytophthora cinnamomi in adjacent forest (Inf. Sheet 37)
		Low quality jarrah stand with Casuarina fraseriana on deep sands).
(Pause)	82,87	Wye Plain Plots, softwood and hardwood species site-treatment plot trials in treeless wet sites. Rotational burning in low jarrah and flat types on 7-year rotation.

	92,98	Burnett plots.
10.55	am 110	Deep River
3. STOP	116	John Rate lookout to the Southern Oceans looking through E. guilfoylei (yellow tingle), E. calophylla (marri) and E. diversicolo r (karri), part of the Walpole-Nornalup National Park (13 357 ha). The two inlets for the river estuaries have good fishing in whiting, black and silver bream, herring, skipjack, cobbler, flathead, small sharks and bay schnapper (see Tourist Board).
	119	Walpole River
	121	Walpole Forest Office
Slow	124	Knoll Drive detour to Coalmine Beach - thin seams of low grade coal to the east and loose samples in the sand. Karri grows down to waterline in soils weathered from the country rock into the Walpole Inlet (northside) and the Nornalup Inlet (south side) - wherein also flows the Deep River (west side) and the Frankland River (east side).
	130	Cross over the South Coast Highway to Hilltop Road detour.
Pause		At hilltop, stop at trail:
4. Lunch		Walk trail to very large burnt out tingle tree,
Noon		E. jacksonii has restricted natural distribution between the Deep and Frankland Rivers. Develops persistent epicormic branches after fire. Timber needs reconditioning after drying to remove collapse and currently is unmarkable.
		Leave by 12.40 p.m

WALPOLE TINGLE TREE TO ALBANY.

	140	Frankland River and Nornalup townsite.
	145	Ficifolia Road detour of Ficifolia Flora Reserve.
	150	(Optional) detour to Conspicuous Cliffs 2 km SW, salmon fishing along coast.
5. Stop	155	E. ficifolia, red flowering gum flora reserve (92 ha).
	160	Back to Valley of the Giants Road detour.
2.40	pm 177	South Coast Highway at Bow River Bridge.
Pause	220	Denmark and river embankment (pause to the south side of
3.15	pm	road before crossing bridge).
	237	Turn south via Torbay, Agonis juniperiana, Psoralia pinnata, Oxylobium lanceolatum.
4.00	pm 274	Turn east to Albany, see plan details, [illegible].
6. Stop	280	Middleton Road Albany Old Farm.
7. Stop	285	Mt. Clarence, Memorial and panoramic view.
8. Stop	290	Albany Highway, Travel Inn.
5.30	pm	

TOUR 7 / DAY 3 - ALBANY TO ESPERANCE (Distance 486/520 km)

Refer to field portable herbarium

	(Approx) km	
	0	Albany, turnoff to King River.
(slow)	7	Albany blackbutt (Eucalyptus staerii) along left hand side of road, **note size of capsules.**
	9	King River.
	34	E. occidentalis, flat-topped yate.
	40	Porongorup Range, Karri Forest Outlier to the west.
	46	E. incrassata, E. oleosa var oleosa.
	50	E. tetragona.
	52	E. wandoo, E. occidentalis, E. rudis and mallee, E. anceps.
	57	E. decipiens, E. calophylla, E. marginata, Stirling Range, **National Park 115 689 ha.**
1. STOP	87	Wandoo, yate and mallees, decipiens and tetragona. (Bluff Knoll of 1073m to the east.). Wheat and barley crops common, insufficient grain of rust-resistant varieties is available to avoid severe losses in cool weather as occurred in 1976, with snow in November for first time (10cm 11th).
	95	An example of salt-affected land near the road.
	97	Sheoak, Casuarina glauca. York gum, E. loxophleba and jam, Acacia acuminata becoming more common.
(slow)	105	York gum, E. loxophleba, E. anceps, E. flocktoniae, E. celastroides.
	117	E. platypus with other mallees as before.
	150	Ongerup. Salmon gum, E. salmonophloia and swamp mallee. E. spathulata (also see var. grandiflora Ravensthorpe).
	213	Left hand side shelter belt about 3 rows. The area around Borden and Ongerup could mark the southern limit of the established portion of the Great Southern wheatbelt. As we move further east we have the new wheatbelt. The development of wheat and sheep farming on the light land is mainly on mallee country over fairly shallow soils subject to wind erosion. Because of the inflated cost structure and depressed farming market in recent years, a number of the farmers in these light land areas are

	(approx) km	
		going through serious financial troubles. During the 1960's these light lands were cleared for farming at a rate of about 400 000 ha/year.
	296	Road south to the original Cocanarup Homestead of 1868.
	297	Phillips River.
Detour (1 km) **Pause**	302	Road south to Cocanarup Reserve (8988 ha), remnant salmon gum (E. salmonphloia) and jam (Acacia acuminata) woodlands, sandalwood (Information Sheet 26) and general woodland species, mallees and heath types.
slow	316	Ravensthorpe. Salmon gum, flat-topped yate (E. occidentalis), blue mallet (E. gardneri), E. eremophila, E. gracilis.
2. LUNCH	322	Cordering Brook, Ravensthorpe eucalypts (as above). Good stopping point for lunch at end of private property right hand side. Park on left, backing along roadside, or continue to gravel pit on the right.
		E. megacornata on N.E. ridge in area proposed for reserve. Quandong (Santalum acuminata), mallee, E. flocktoniae, E. pileata, E. spathulata var grandiflora, the fine leafed species. The Ravensthorpe Hills system is a natural arboreta of some 40 Eucalypts spp. at from 10-30 km from Ravensthorpe. Leave at 1.45 p.m.
	331	E. platypus, E. oleosa and E. annulata.
	342	E. tetraptera.
	375	E. Lehmannii and E. gomphocephala in farm.
	405	E. preissiana.
	406	E. lehmanni and Tasmanian bluegum (E. globulus) shelter belt. Lambertia inermis (chittick).
	408	E. gomphocephala (tuart) shelter belt.
	421	Young River station, Pinus radiata.

	(approx) km	
	424	The road reserve narrows down to about 40 metres from about 100 metres. The spoilation of the native vegetation is very evident. One other point is the arable land, the farming land has increased considerably from this point going eastwards.
slow	445	Windrow of Pinus pinaster on south side of road and then on the north side of road Eucalyptus cladocalyx (South Australian Sugargum). Following on is a row of E. cladocalyx on the north side of the road without any pine shelter belt on the south side. Points to difference in tree form or wind effect.
	454	On north side of road some private planting by the farmer of Pinus pinaster; three separate age groups can be noted.
3. STOP (4 pm)	500	Rotary lookout. E. platypus and Callitris roei.
4.30		Tommy Windich's grave; aboriginal companion and servant of explorer Sir John Forrest.
5 pm.		Twilight Cove fixing Sand Dunes West of Esperance, 9 km turn around and return.
5.30		Travellers' Inn.

TOUR 7 / DAY 4 - ESPERANCE TO KALGOORLIE - MAP DISTANCE 430 KM

To check timing, kilometres and species (See details)

		Approx. km	
		0	Esperance, Holroyd Road, north to Norseman Highway.
		12	Junction of Ravensthorpe Road.
	SLOW at	22	Caitup, Forest Arboretum (see notes), Pinus pinaster; Eucalyptus falcata, E. gardneri, E. astringens.
	SLOW at	32	Gibson Soak, Cobb & Coach Hotel.
		37	Esperance Plains Agriculture Research Station.
1.	STOP (Before bend)	78	E. forrestiana, ssp. dolichoryncha, E. goniantha, E. incrassata, E. merrickae, E. rigidula, E. spathulata var. grandiflora, E. eremophila, E. conglobata.
		120	(Salt lakes and woodlands) (See notes).
		202	Brockway Reserve, south boundary (3 770 ha)
2.	STOP (Shell board)	211	E. brockwayi and E. dundasi
	SLOW	223	Norseman - Eyre Highway Junction to Eastern States.
		235	E. brockwayi
3.	LUNCH		Along roadside, pending E. salubris/E. salmonophloia/ or E.flocktoniae - E. dundasi - E. lesoueffii - E. torquata - E. griffithsii - E. stricklandii.
		338	**Kambalda turn-off east**
	SLOW	355	Detour Kambalda west on flat and Kambalda east on hill. **Naturally occurring trees used in landscape housing of 5 000 people; has 2 road junctions and no other crossroads.**
4.	STOP	364/5	Red Hill/Lookout, Nickel load goes under Lake Lefroy.
		369	E. websteriana
		372	Junction with Highway
		419	Boulder, Burt Street.
5.	STOP (4 p.m.)	420	Hainault Tourist Mine
		423	Kalgoorlie, Hannan Street
		426	Highway Auto Motel

A BRIEF HISTORY OF ESPERANCE

Esperance was named in 1792 by the French explorer Rear Admiral D'Entrecasteaux after one of the ships of his fleet, the "Esperance". From then on it was largely unused, although in the 19th century Middle Island, about 80 miles east of Esperance, was a base for sealers operating in southern waters. All the other islands are reserved for flora and fauna as the Recherche Archipeligo Wildlife Sanctuary.

The town and port of Esperance came into being in 1893 as a port for the Coolgardie goldfields following the discovery of gold in the Murchison, Coolgardie and Dundas areas between 1891 and 1893.

Agricultural development of the area was slow. The railway to Norseman was completed in 1927.

Between 1916 and 1948 enthusiasts had continually pointed out the potential of the area and experimented with Pinus pinaster crops at Caitup, and with pasture establishment, fertiliser and species in 1928, 29, 30 and 1931 also near Gibson.

Mr. A.D. Helms, the manager of Esperance Pine Forests Limited, had shown that with careful land preparation and an annual application of super at 168 lb. per acre, excellent subterranean clover and other legume pastures could be grown. The trace elements copper and zinc were not known at this stage.

Since 1949 experimental work has largely been carried out at the Esperance Plains Agricultural Research Station at Gibson.

New Land Trials in the 1960s on the property of Mr. R. Teasdale at Gibson demonstrated development procedure for success, included 1 year of fallow (1963), as well as

Scrub logging	1961	(spring)
Burnt (patchy)	1962	(autumn)
Disc ploughing	1962	(August)
Disc ploughing	1964	(April)
Disc ploughing	1964	(May)
Root raking, then Sown to trials.	1964	(May)

Esperance Land and Development Companies assisted by personal financial investment from the U.S.A. have demonstrated remarkable expansion of stock and food production.

NOTES TOUR 7/DAY 4 ITINERARY (pp)

ESPERANCE TO KALGOORLIE - Also refer to field portable herbarium

km.

0 Esperance(History pp).

Slow 22 Caitup, Forest Arboretum and flora and fauna heath reserve of about 3 720 ha. is surrounded by farms.

The adjacent plantings include original 1928 Pinus pinaster and a row of the 3 mallets - Eucalyptus falcata, E.gardneri and E. astringens and recently (1973-4) a filling-in with 3 W.A. and 3 Eastern States eucalypts. The original pine venture failed through lack of treatments and the 1930 financial depression years.

Current establishment techniques have proved to be completely successful. Success follows from thorough preparation (See History), a handful of Cu Zn superphosphate at time of planting, plus a handful of strong nitrogen fertiliser 1 year later and weed cultivation in the second year. (The current trials are not accessible by bus, refer list of species with Mr Richmond and see other arboreta later. Also inaccessible are the 1960 superphosphate treatments of 30 year old pines, which recently were reduced to the final crop stems. Prescriptions 1970 require early pruning and cleaning to 750 stems per hectare at an early age of 6 years, as these are the productive stems which have captured the site).

The marked response to the prescribed treatments has demonstrated the suitability of Pinus pinaster for local log and fence post requirements.

27 Aerodrome for light aircraft.

(slow) 32 Gibson Soak, Motel/Hotel of the Cobb and Coach era when horses and drivers rested at recognised stops during earlier times following the gold rush.

37 Gibson: Esperance Plains Agricultural Research Station is an excellent example of research in advance of spectacular development and settlement. The annual rainfall is about 600mm at Esperance and 450mm here and 300mm at Kalgoorlie.

Australian soils have been described as a museum of mineral deficiencies. These soils generally have a sandy and gravelly surface over clay subsoil, in shallow and deep phases; and also, deep sands. In the Esperance System, the height of the dominant scrub above ground reflects the relative depth of the surface sands and the suitability of management of the deeper soils for deep-rooting crops, pine, lucerne and grain and of the shallower soils for clover rye pastures.

km.

These are tertiary sediments and residual lateritic soils of a gently sloping plateau from sea level to about 180m here, on which the natural vegetation has developed.

Proteaceae are dominant in the scrub heath: Banksia speciosa on deep sands, Lambertia inermis on medium and Bryandra sp. on shallow sands. The fresh water swampy depressions are conolised usually with Melaleuca preissiana and are associated often with Christmas Tree, Nuytsia floribunda.

72 Forrestiana Reserve 412 ha., one of 4 blocks vested in Native Welfare and proposed for a flora reserve. Three different vegetation systems converge in this location - the Lort, Esperance and Ridley systems of Beard (1973). The association and diversity of mallees are important features for preservation. A recommended larger area requires to be defined and ratified in order to contain the present genetic diversity and any future changes at the boundaries of these systems.

1. STOP 78 Mallee heath becomes dominant where soils are shallow over winter-water-logged impermeable 'gilgae', solonized domed clay. Eucalyptus eremophila-E.forrestiana is the main association on these soils, with casual associates (see pp) some local E. goniantha on sands and E. occidentalis in clay depressions.

120 Salt lakes and woodlands

Although there are no signs of any organised system of drainage of the arid region, drainage lines are frequently detectable from the particular vegetation growing along them. This feature has been clearly observed already, along the active rivers of the coastal regions. Similarly, a detectable indent drainage system of the inland lakes was formed apparently from rivers, millions of years ago (Beard 1973). The climatic conditions were different then and an inland sea covered the present Western Australian deserts. A wet climate then prevailed also and the continent appears to have been some 15 degrees latitude further south. During millions of years, and as the continent imperceptibly moved northwards, laterite was formed and subsequently, disintegrated with a change to arid climatic conditions. The present drainage systems of the salt lakes of the interior regions have emerged since the Kosciuskan and desert uplift and fault of the Darling Range and there are no permanent streams.

Beard, J.S. (1973) - Elucidation of Palaeodrainage Patterns in Western Australia
———————— - Vegetation of Esperance and Malcolm Areas, W.A.
University of W.A. Nedlands.

km.

The vegetation pattern of the bottom-woodland and bluebush (Maireana spp.) plains of universally deep alluvium, commencing from the top of gentle slopes usually in the woodlands, thins out downslope into bluebush, then into pure saltbush (Atriplex spp.) and then into samphire (Arthrocnemum spp.) in the lake beds. The salt content of the soils also increases towards the lakes and texture contrast soils are common with light surface loams over a saline subsoil.

124 E. salmonophloia (very shiny, small leaf and tiny fruit).

127 E. flocktoniae, E. oleosa, E. diptera, E. grossa, E.eremophila, E. conglobata ssp. fraserii.

(140 Mt Charles to the west)
E. gracilis (fine leaf)

150 E. longicornis) favours basic soils derived from greenstones
E. dundasii)

152 E. dundasii)
E. flocktoniae) favours acid soils from granites
E. salubris (gimlet fluted stem; see also E. diptera above).

(170 salt lake)

176 Acacia acuminata (Jam has shiny leaf)

181 E. oleosa, E. flocktoniae;
Eremophila species (broom bush);
Melaleuca spp. (ti-trees).

188 E. calycogona;
E. lesouef ii, E. flocktoniae.

195 E. transcontinentalis (white gum bark and dull leaf species, known formerly as E. oleosa var glauca) and E. flocktoniae (with the dark shiny leaf, as we see is one of the main species around Norseman).

202 Brockway Reserve of 3 770 ha., has a scenic, hilly landscape and provides a refuge for fine woodlands of virgin and regenerated eucalyptus species, especially E. brockwayi and also E. dundasii, E. flocktoniae and E. salubris. Other species include E. torquata, E. sheathiana and E. lesouef..ii.

209 Track to 3 abandoned tin mines. Continue 0.5km.

2. STOP AT Fireline on westside, before Shell sign on east side, see 3, E. brockwayi.

223 Norseman has produced over 85 million grammes of gold.

km.

235 E. brockwayi, E. salubris, E. flocktoniae, E. salmonophloia, E. dundasii and E. lesouef.ii.

The recurring pattern of the main woodland communities include E. lesouef.ii on gently rising, sandy earths with E. griffithsii and E. oleosa on the slopes of lighter soils and the E. salmonophloia-E. salubris woodlands on the lower brown earths and loamy clay flats. Two main associates which appear in open transitions between these types are E. transcontinentalis and E. flocktoniae. These types with E. transcontinentalis as the associated species have been reserved in 16 700 ha at Randells, 80 km east of Kalgoorlie (and N.E. of here).

263 Lake Cowan

269 E. griffithsii, E. salubris and E. salubris var. glauca.

(slow) 279 Salmon gum then E. torquata on knoll.

281 E. stricklandii on second knoll.

3. LUNCH STOP. (283 and 315 railway crossings.
(316 Widgiemooltha by-pass to salt beds, Lake Lefroy.

323 Brachychiton gregorii.

334 Nickel Mine.

338 Kambalda turnoff; then some salmon gum coppice.

345 Kambalda Reserve 6 700 ha.

The topography is gently undulating with several creeks draining into Lake Lefroy. Diverse vegetative associations show sharp contrasts between the woodland-shrub, savannah woodland, Brachychiton-shrubland and saline flats communities. The open, virgin woodland contains Eucalyptus lesouefii and E. griffithsii on the slopes with E. torquata and E.websteriana on the rockier ridges. The savannah woodland is dominated by E. salmonophloia with which are associated E. lesouefii, E. oleosa obtusa, E. celastroides, E. transcontinentalis and Melaleuca pauperiflora. On the heavier textured soils E. stricklandi and Brachychiton gregorii occur. E. salubris glauca is to be found on the heavy clays along the drainage channels.

364 Red Hill produced 850 thousand grammes of gold.

4. STOP 365 Kambalda East. Viewpoint over Lake Lefroy and Western Mining Co. site of first nickel boom in Australia, 1965-70.

Nickel occurs mainly as nickel iron sulphide at 20-50 ppm Ni in the soils and in minable deposits of 1-4% and to 10%. The ore is ground to a fine powder, agitated with water and additives. Nisulphide particles are floated off in froth and the concentrate is dried for smelting and/or export.

368 Nickel Concentrator and dust killed trees.

369 Eucalyptus websteriana, one tree at roadside on right; junction with Highway at 372 km.

407 WMC Ni Smelter burns 25 tonnes of concentrate per hour (200 000 t/year) and separates slag from the metal, 70% Ni.

419 Boulder-Kalgoorlie are twin towns of 25 000 people. The first gold found in 1893 at Mt Charlotte (Kalgoorlie) started the rush and mining of gold continued until the Charlotte Mine was the last mine to be producing gold in 1976.

5. STOP 4 pm

420 Hainault Mine, guided tour of mining equipment and methods at the surface and underground is worth the experience ($2 each).

Arrangements to be confirmed.

TOUR 7/DAY 5 KALGOORLIE TO PERTH - Map Distance 592 km.

	(Approx) km	To check timing, kilometres, species and stops:
Slow	5	Arboretum tour, 10m spacing of 60 plants per species, 1973, 74 and 75. Holes dug with backhoe to 1/3m deep and bottom broken up before planting, irrigated once per month for first year, cultivated 2nd year and mowed 3rd year.
1. Stop		Refer 'Selected Flowering Eucalypts in W.A.' in the arboretum, Forest Focus 15 and Seed List (Oct 1975).
Slow		Sandalwood, Santalum spicatum, at road junction leaving town (Information Sheet 26).
2. Stop (at truck bay) if early 8.30 a.m. otherwise if late	29	E. salmonophloia in one of the best woodlands here, plus E. transcontinentalis, E. salubris var glauca, E. campaspe and E. clelandii. These species are reserved in the Kangaroo Hills Reserve of 6 940 ha just south of Coolgardie (Information Sheet 20). A fine stand of virgin salmon gum. Saltbush is reserved in the Majestic Reserve of 2 550 ha some 48 km east of Kalgoorlie.
(At culvert)	31	E. torquata, E. campaspe, E. salubris var glauca, E. celastroides.
	45	Coolgardie Ghost Town Museum, railway station and coaches. New arboretum.
3. Stop (Pause) 9.30 am	52	Mulga, Acacia aneura, southern outlier (Information Sheet 16) Mac's Reserve of 59 500 ha was burnt in the 1975 fires at Goongarrie.
	76	Bullabulling, inland sandplain and scattered woodland of E. salmonophloia, E. salubris, E. transcontinentalis has rough bark form, E. flocktoniae, E. oleosa, E. griffithsii, E. clelandii here and further north.
	98	Finalyson, microwave transmission tower and N-S continental divide, broadly separating drainage to the west and to the east.
	111	Woolgangie, as above and E. eremophila, E. calycogona and E. loxophleba; scrub heath, Callitris preissii sp verrucosa and broom bush thicket on yellow sands (Kwongan).
	137	Boorabbin, microwave transmission tower.
Slow	167	Koorawalyee, as before and E. wandoo.

Tour 7/Day 5 Kalgoorlie to Perth - Map Distance 592 km (continued)

	168	Vermin fence at culvert grid across road.
	180	Karallee, as before, also E. burracoppinensis and Casuarina campestris (Wodjil).
	196	E. sheatheana close to salt lake; E. gracilis, E. oleosa, E. salmonophloia, E. salubris.
	199	Yellowdine yellow sand plain heath and thicket (Kwongan).
4. Lunch Noon	233	Southern Cross, Caravan Park, E. camaldulensis provenance trial (1970). Arboretum planted July, 1953. Fringe of wheatbelt. Koolyanobbing iron ore 50 km north, source for Wundowie industry.
(Pause)	234	E. longicornis with rough bark and E. corrugata with smooth bark here replace other inland ridge species, E. gracilis (cf. Syn. var. yilgarnensis, E. salubris grow better on bottom-land heavy soils
(Pause)	295	Overhead railway bridge, then E. erythronema (also near here are 2 remnant species to 50 km north, E. caesia and E. crucis which grow in fissures of granite tors).
	342	Merredin.
	345	Country water supply pumping station.
	353	Salt flats with samphire (extensive at 362).
	375	Hines Hill, E. sargentii.
Detour (Pause)	414	Kellerberrin Arboretum detour includes E. crucis in heavy soils and in adjacent street, E. caesia next to high school detour and continue.
	391	Railway crossing, E. loxophleba (York gum, rough bark form in the west becomes a smooth bark form and glaucousin in the east and inland).
	398	Contour bank, poor erosion control in northern paddock.

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Tour 7/Day 5 Kalgoorlie to Perth - Map Distance 592 km (continued)

5. Stop (40 mins 3 p.m.)	450	Cunderdin Museum depicting Meckering Earthquake, History of Farming Relics, Goldfields Water Scheme Pumping Station (Inf. Sheet 16) Air Force Tiger Moth Pilot Training and Original School House.
	509	Northam, the largest wheatbelt town, population of 12 000 (about half that of Kalgoorlie).
Slow (	510	Bridge over weir, waterfowl, white swans and ducks (suspension bridge is downstream from Western Bridge). Roadside trees (topped) E. gomphocephela on south-side and E. rudis, northside.
	512	E. cladocalyx from South Australia.
	514	E. loxophleba and Jam (Acacia acuminata).
	516	E. calophylla, E. wandoo, E. loxophleba.
	518	Radio broadcast transmitter (6AM, abt 1100 khz).
	523	White Gum (E. wandoo) or Powder Bark Wandoo (E. accedens).
	526	Clackline Bridge
	529	Refractory Road.
	532	Bakers Hill.
	534	E. marginata, E. calophylla, E. wandoo, Casuarina tessellata.
	540	Junction to Wundowie Charcoal & Iron Industry and a small self-contained town, started 1948, now producing 30·000 tonnes/year of specified high grade pig iron for spheroidal graphite iron process. Used about 130 000 cu. m of firewood; ancillary sawmill output of 8 000 cu m and refinery was recovering acetic acid (soot) methanol (250 t) and wood tar (1 200 t) Integration with vanadium industry now is proposed **when economy should be more favourable and also, doubling the output of SG iron using a new char-process.**
	546	El Caballo Blanco Hotel and Andalusian stud, breeding the famous dancing horses of Spain.
	547	Jarrah forest species as before and Casuarina fraseriana, extend southwards in a continuous formation from the northern limits in Julimar Forest Reserve of 28 000 ha, some 50-80 km north of here.
	566	Sawyers Valley

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Tour 7/Day 5 Kalgoorlie to Perth - Map Distance 592 km (continued)

	570	Divided Road, Mundaring, E. citriodora from Eastern States.
	575	Orchards in valleys.
	579	John Forrest National Park (1 579 ha) just south of the Avon Valley National Park (4 352 ha) and Walyunga N.P. (1 748 ha).
	581	Darling Scarp overlooking the City and plains of Perth, E. calophylla;
	584	E. rudis and E. wandoo.
	585	Midland Junction of Metropolitan Region.
6. Stop	600	Perth.