Visit of Senator Robert Hill and Senator Winston Crane to south-west forest areas

Thursday, 18 April
to Friday, 19 April 1996

THURSDAY, 18 APRIL 1996

1425 - 1630 Depart Perth

Senator Hill, Senator Crane, Trent Zimmerman and Dr Syd Shea (CALM) to travel in a Channel 7 helicopter ex-Langley Park (Heliport between Riverside Drive and Swan River)

Remainder of the party
(6 Commonwealth representatives, 3 State representatives) travel in a Conquest fixed wing aircraft ex-Perth airport (Central Air Charter)

Helicopter schedule

1425	Depart Perth from Heliport on Riverside Drive
1440	Arrive Rottnest - meet Hon Peter Foss, Minister for the Environment
1520	Depart Rottnest
1535	Arrive Heliport Perth (Passengers change to Helicopters Australia helicopter. Mrs Hill replaces Trent Zimmerman.)
1540	Depart Heliport Perth
1600	Arrive Dwellingup
1605	Inspect regrowth jarrah forest
1615	Inspect Forest Heritage Centre This unique forest education, interpretation and woodcraft training centre was recently opened to the Public. It is an outstanding example of forest ecotourism.
1635	Depart Dwellingup
1710	Overfly salinity degradation sites on cleared agricultural land east of Collie
1800	Land at Perup

Conquest schedule

1630	Depart Perth airport
1720	Arrive at Manjimup. Travel by bus to Perup.
1820	Arrive at Perup

1730 - 1820 Travel to Perup Nature Reserve, east of Manjimup

1900 Barbeque dinner

2000 Spotlight survey of forest fauna including several rare and endangered mammal species. Briefing on CALM's fauna research and management programs including 'Operation Foxglove' and 'Western Shield'. (Dr Per Christensen)

2200 Return to Perup homestead
Overnight accommodation in dormitory style units used for environmental education and interpretation programs.

NOTE: These are very basic facilities.

FRIDAY, 19 APRIL 1996

0700 Breakfast

0730 Overview briefing of forest management in Western Australia (CALM)

- Forest reserves (national parks, nature reserves, conservation parks)
- Informal reserves (road, river and stream reserves)
- Ecologically sustainable forest management, silviculture and management of forest structure
- Management of timber harvesting
  - coupe planning
  - sustained yield
  - codes of practice
- Protection of rare and threatened species
- Other forest uses and resources

0830 Summary of the Deferred Forest Assessment process in Western Australia and status of the Regional Forest Agreement

0900 Depart on forest tour (CALM)

- Jarrah forest logging and silvicultural treatments
- Forest reserves
- Karri forest logging and regeneration
- Fire management
- Tourism and recreation

1045 Arrive at Pemberton
Meet timber industry and FPS representatives. Inspect Bunnings karri sawmill. (FIFWA)

1130 Big Brook Dam
Karri regrowth forest, recreation site and water supply reservoir (CALM)

Lunch at Big Brook Dam
Meet representatives of State Government, local authority, unions, small business and community groups. (FPS)

1215 Depart Big Brook Dam

1230 Arrive at Manjimup - Bunnings production centre
Timber processing and value adding - drying kilns, machining and finishing processes and jarrah furniture manufacturing. (FIFWA)

1300 Meet representatives of the voluntary conservation movement at Manjimup

1400 Return flight for West Australian representatives (Shea, Walker, Armstrong, Marmion)

1730 Commonwealth representatives arrive at Karri Valley
Two hire cars to be waiting at Karri Valley

DETAILS OF TOUR PARTICIPANTS

Commonwealth Government

Senator Robert Hill, Mrs Diana Hill and three advisers (Trent Zimmerman, Matt Brown and Peter Komidar)
Senator Ian Campbell's adviser (Alan Oatham)
Senator Winston Crane
Mr Mark Tucker, Forests Division, DEST

Western Australian Government

Dr Syd Shea, Executive Director, Department of Conservation and Land Management (CALM)
Dr Jim Armstrong, Director, Science and Information Division, CALM
Mr Alan Walker, Manager Regional Forest Agreement, CALM

Other CALM staff will meet the tour at appropriate stops

Mr Bill Marmion, Ministry of the Premier and Cabinet

Timber Industry

Mr Cam Kneen, Executive Director, Forest Industries Federation (WA) Inc
Mrs Margaret Pearce, Acting State Director, Forest Protection Society
Mr Keith Kessell, Corporate Affairs Manager, Wesfarmers/Bunnings
Mr Ian Telfer, Forest Resources Manager, Bunnings
Graham Gibellini, Manager Pemberton Mill, Bunnings
Ed Valom, Manager Southern Forest Operations, Bunnings
Richard Breidahl, Treefarms, Bunnings

Community Representatives

Mrs Jeanette Sturis, Forest Protection Society
Mr Nick Oaks, Forest Products Union
Mr Ted Thompson, Manjimup Shire President
Mr John Peos, Manjimup Chamber of Commerce and Industry

Mr Paul Omodei MLA, Member for Warren

TOUR NOTES

18 - 19 APRIL 1996

DEPARTMENT OF CALM
WESTERN AUSTRALIA

THURSDAY, 18 APRIL 1996

BAUXITE MINING

Two companies, Alcoa and Worsley Alumina, have leases for bauxite mining in south west forests. The five operating mines employ 5535 people.

Bauxite mining commenced at Jarrahdale in 1959 for supply to the Alcoa alumina refinery at Kwinana. A new refinery at Pinjarra was constructed by Alcoa in 1970 and mining began at Del Park (1971) and Huntly (1976) in the Dwellingup District. Two new refineries built at Wagerup (Alcoa) and Collie (Worsley) in the Central Forest Region saw mining begin at Willowdale (1979) and Mt Saddleback (1980).

Bauxite occurs within 6-7 metres of the surface. It forms lenticular ore bodies of up to 100 hectares in size, usually in mid slope situations.

Reserves of 3000 million tonnes of bauxite are known and sufficient bauxite deposits exist to allow mining to continue at the current annual rate of 500 hectares for at least 100 years. Viable ore bodies occur on 30 per cent of the publicly owned jarrah forest. Twenty-five percent of this area lies within nature conservation reserves which will not be mined.

The area mined annually is related in part to world demand for alumina. However, the mining companies smooth the market fluctuations to a certain extent in respect to area mined each year. Indications are that Australia's share of the world market for alumina will remain steady or increase slightly.

CALM supervises all mining operations in State Forest to ensure orderly removal of forest produce, appropriate hygiene, compliance with environmental conditions and rehabilitation requirements.

Current rehabilitation requires the optimum re-establishment of previous vegetation. Direct topsoil return has resulted in approximately 70 per cent of previous plant species being represented in the rehabilitated sites.

DWELLINGUP - THINNING IN JARRAH FOREST

In the northern jarrah forest between Mundaring and Collie there are several hundred thousand hectares of regrowth jarrah forests. Many of these forests were regenerated from intensive timber harvesting, similar to clearfelling, which occurred in the early part of this century before there was any formal forest management. Elsewhere, several wildfires such as the 1961 Dwellingup fire have created even-aged regrowth stands.

Most of the high quality regrowth stands are found on the lateritic uplands of the Darling Plateau. Whilst there are already vast areas of this forest type in the reserve system, there are some Commonwealth agencies seeking a minimum 15 per cent representation of each 'forest community' in reserves. Increasing the reservation of the Dwellingup high rainfall vegetation type to 15 per cent would

require another 30 000 hectares of mostly high quality regrowth forests to be set aside. Such action would not only affect the supply of logs to the timber industry, but also it would 'sterilise' bauxite ore worth $100 billion.

At this stop near Dwellingup a thinning silvicultural prescription has been applied. In this case the best potential crop trees are retained and protected, with remaining trees available for harvest. Thinning is an important strategy for improving timber production and sawlog yield in high quality regrowth forests. There are also potential benefits to water yield into harnessed catchments following thinning operations.

At this site an operation to remove fencing materials has followed the integrated logging operations. This demonstrates the ideal situation for utilisation of small sized jarrah stems. Unfortunately, markets are insufficient for this material and cull treatment (to waste) is usually required following commercial thinning. Jarrah is unsuitable for woodchips for paper pulp. There is a vast amount of wood fibre available as thinnings from regrowth forests.

The improved growth and potential yield of sawlogs in the thinned stand is clearly contrasted with the unthinned stand on the opposite side of the road.

CALM has carried out research and development of a process to utilise more wood from small diameter and short stems. The finished product is known as VALWOOD.

DWELLINGUP - FOREST HERITAGE CENTRE (SEE ATTACHED BROCHURE)

LANE POOLE RESERVE

The northern part of the Lane Poole Reserve is zoned for recreation priority. The reserve straddles the Murray River and several major campsites and day use recreation sites are managed by CALM. Up to 10 000 people may visit Lane Poole on a single long weekend, and many visitor management problems must be faced. Recreation activities include camping, picnicking, canoeing, bushwalking and swimming.

With so many people in the forest, fire protection is a major management issue. Regular prescribed burning must be carried out to reduce the fire hazard.

Several private bush camps have been established on freehold land in the valley including the very popular Nanga Bush Camp.

A management plan for Lane Poole Reserve was completed in 1990.

The southern part of the Lane Poole Reserve is zoned for conservation and is proposed to become National Park in the 1994 Management Plan.

These are some of the best examples of virgin and old growth forests in the northern jarrah forest.

Several rare and restricted plant species are known to occur in the reserve amongst the 500 known species of plants. 21 native mammals, 39 reptiles, 11 frogs and 100 species of birds are known to exist in the reserve.

This reserve is one of many in the northern jarrah forest which provide representative forest ecotypes. Other major reserves include:

Monadnocks	15 000 ha
Wandoo Conservation Park	37 900 ha
Julimar Conservation Park	28 800 ha
Avon Valley National Park	18 800 ha
Dale Conservation Park	6 800 ha

The Deferred Forest Assessment found that 19.4 per cent of the original (pre-1750) jarrah forest is protected in reserves (15.4 per cent in dedicated reserves and 4.0 per cent in informal reserves).

WANDOO FOREST

The rainfall on the Darling plateau diminishes quickly from west to east. Rainfall drops from approximately 1200 mm per annum at Jarrahdale to 600 mm per annum at the eastern edge of State Forest.

Wandoo is found in the eastern part of the forest belt where annual rainfall falls below about 900 mm, Wandoo occurs mainly in poorly drained gully systems but can also occur on mid slopes and ridges at the eastern extent of State Forest.

Wandoo Forest is well represented in reserves with the most important being the Wandoo Conservation Park (37 900 hectares) Julimar Conservation Park (30 000 hectares) and the Lupton, Duncan and Gyngoorda Conservation Parks (8800 hectares, 8000 hectares and 3400 hectares).

The Deferred Forest Assessment did not examine the reservation level of wandoo forest, because very little wandoo is harvested for timber. Because so much wandoo forest has been cleared for agriculture, rigid application of the 15 per cent rule would result in tens of thousands of wandoo forest in State forest and private property being required to add to the reserve system. This action would cause a severe impact on the bauxite ore reserves of mining company Worsley Alumina. This company is currently investigating the potential for expansion of its mining operations at Boddington and the refinery at Collie.

SALINITY AND REFORESTATION PROGRAMS

Agricultural clearing in Western Australia has helped to feed the nation and generate billions of dollars in export income. Unfortunately the clearing of native vegetation has been at a cost - the degradation of soil and water.

Over millions of years large quantities of salt have accumulated deep in the soil. The replacement of deep rooted native vegetation with shallow rooted crops and pastures allows the water table to rise, mobilising salt into the streams.

Salination bares the soil and damages its structure making the fertile valley soils prone to erosion.

The end result of this inexorable process is the formation of large salt 'scalds' bare soil, compaction, waterlogging and erosion. The latest figures show that 1.8 million hectares of previously fertile farmland is salt damaged and half of the total water resource of the south-west region has been degraded. And the process is continuing.

The only way to reverse the process of rising watertables is to establish deep rooted perennial crops. The most viable long term solution lies in the establishment of trees which combine high water consumption capacity, tolerance of adverse soil conditions and high commercial productivity.

The Western Australian Water Authority has undertaken a major reforestation program in the Wellington Catchment involving the planting of 5000 hectares of re-purchased farmland. This program has cost 10 million dollars. The tree species being planted in the Wellington Catchment have primarily been selected for their high water consumption and salt tolerance. Most have little potential for wood production. It will be possible, and in some situations necessary, to establish non-commercial trees. But the cost incurred by the community to compensate for income forgone by farmers makes the large-scale establishment of non-commercial trees impractical.

The major eucalyptus species which have been planted for wood fibre around the world are *Eucalyptus grandis, Eucalyptus saligna* and *Eucalyptus globulus* (Tasmanian Bluegum). In Western Australia over a number of decades, trial plots of tree species have been established on different site types. Of the paper producing species, bluegum is the superior performer.

Bluegum has wood quality characteristics which are ideal for high quality paper production. It also has the capacity to grow on a wide variety of soils although its growth rate varies accordingly to soil type and rainfall. The average growth rate in the target area for planting is estimated to be 20 cubic metres per hectare per annum.

Bluegum can be grown on a rotation between 7 and 13 years depending on soil type and rainfall. Two further rotations could be obtained after the initial planting at minimal costs because bluegum, like other eucalypt species, resprouts from the cut stumps.

The economics of bluegum plantations are such that farmers entering into an annuity scheme could receive annual net payments between $50 and $250 per hectare depending on site quality. These payments compare favourably with that obtained from traditional agricultural crops.

The projected rates of return from an investor in the scheme between 10 per cent and 18 per cent (nominal) are highly competitive. The investment is further enhanced because it would qualify as a legitimate primary industry tax deduction.

CALM has established several major sharefarming initiatives. There is currently sufficient investment to establish plantations in the high rainfall zone. The next major challenge is to tackle tree establishment in the low rainfall zone where the most promising species are maritime pine *(Pinus pinaster)* and mallee eucalypts which can be grown for essential oils.

PERUP NATURE RESERVE

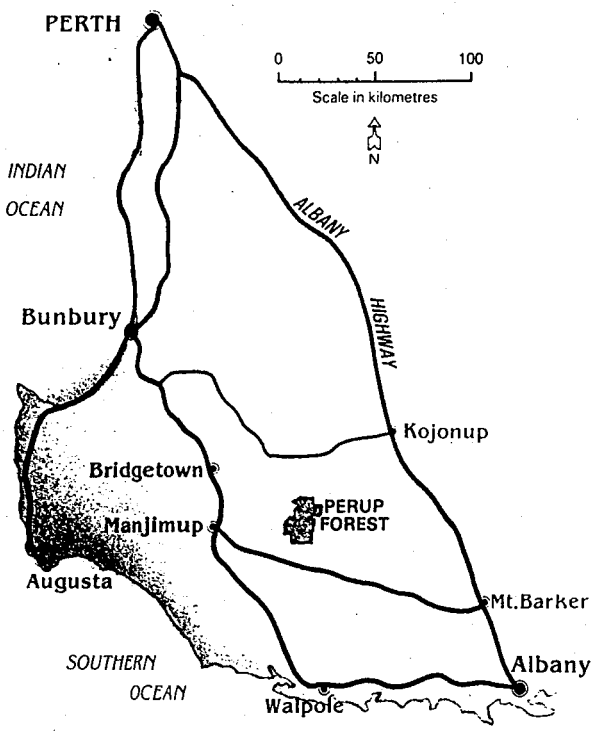
This nature reserve of 40 000 hectares was first established as a 'Fauna Priority Area' in State forest in the 1970s. This area of jarrah and wandoo forest has been a focus for fauna research and conservation when it was discovered that many forest dwelling animals, including six threatened species, were found to be surviving there.

In the 1994 Forest Management Plan another 13 000 hectares of mostly virgin wandoo and jarrah forest were added to the nature reserve. This provided additional suitable areas for reservation of important forest fauna habitat.

In recent years a repurchased farm within the reserve has been used as a centre for education and interpretation of wildlife conservation and for training of CALM staff and other people in fauna management techniques.

More notes on Perup are contained in the following extract from 'Landscope'.

An exciting new development is happening at Perup. The forest ecology centre will be expanded with the construction of a 'Wilderness Lodge' designed to accommodate environmental education and forest interpretation programs. The project has been funded from a range of sources including the Commonwealth Forest Eco-tourism program. CALM has spent $50 000 on the latest stage of this development.



THE Perup Forest lies 50 kilometres from Manjimup between the headwaters of the Perup and Tone Rivers, tributaries of the Warren River. It is situated in undulating country, with broad, flat valleys and low ridges. The rainfall is low and streams and swamps in the area are seasonal.

Like most of the South West jarrah forests, the Perup forest has been harvested for commercial timber. The area was first harvested during the early 1940s; logging and regeneration continued up until 1976. At that time 40 000 hectares of jarrah forest and wandoo woodland were set aside to study and manage forest animals.

Part of the area was once a cleared farm surrounded by State forest, a fact put to good use when the farm was abandoned in 1972. At that time the Forests Department was starting work on fauna, so the area was acquired for research into the effect of fire on forest animals. Much of the early research on the numbat was done here, and it was as a result of other research at Perup that the fox was first implicated in the disappearance of a number of mammals from many areas of the South West.

The area also has many rich fauna populations, including six threatened animal species: the numbat, woylie, tammar wallaby, western ringtail possum, southern brown bandicoot, and the chuditch, or native cat. These populations are regularly monitored to ensure they are maintained at a satisfactory level. Many species have been recorded in the area: birds (more than 120), some mammals (21) and frogs (6). Reptiles, notably the deadly tiger snake, are also visibly abundant.

As CALM staff began spending more and more time in the area, they decided to establish a research centre at Perup. The old farmhouse was ideal for this purpose, and the researchers began renovating the building to make it suitable for a study centre. Over time, additions were made and it is now an excellent facility capable of accommodating sizable groups.

The centre even has its own resident fauna - bandicoots live under the house and a brushtail possum lives in the old wood stove. If the lid of the stove isn't properly secured, scientists using the house can find that the animal has had an overnight party with their food.

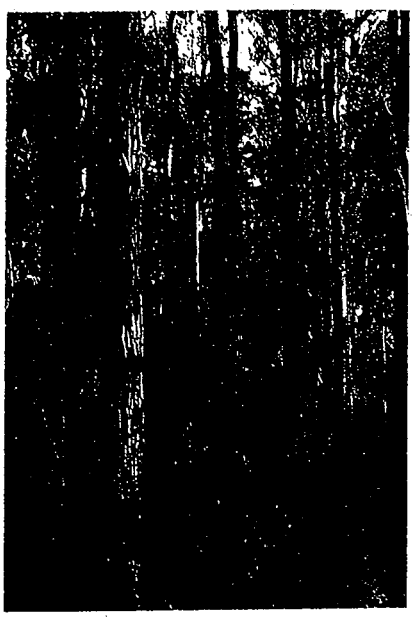
A male splendid fairy-wren in full breeding plumage.
Photo - Jiri Lochman ▲

The jarrah forest is one of the last strongholds of the chuditch.
Photo - Michael Morcombe ◄

FACE TO FACE WITH WILDLIFE

Researchers Per Christensen and Graeme Liddelow had long been running a course for staff of CALM, and earlier for the Forests Department, to illustrate the Department's research methods. They were asked to include the course on the University of Western Australia's Extension Program. Per and Graeme readily agreed and now, four times a year, a varied group of people make the long journey from Perth to Perup.

The course, called 'A Wild Weekend with CALM', aims to bring people face to face with wildlife they wouldn't otherwise see, and teach them about research into the forest and its inhabitants. Proceeds from the course help to maintain the Perup Forest Ecology Centre, as it is now called.



Students on the Perup course go spotlighting for animals such as this ringtail possum and her youngster.
Photo - Michael Morcombe ◄

CALM researcher Graeme Liddelow with one of the birds caught in a mist-net.
Photo - Carolyn Thomson ▲▲

The jarrah forest of Perup is a haven for six threatened mammal species.
Photo - Jiri Lochman ▲

Each night, course participants are taken 'spotlighting' for nocturnal animals. Possums, including the threatened ringtail, are abundant; so are kangaroos, bandicoots and nocturnal birds like the tawny frogmouth. At some times of the year many possums have young and, as the vehicle moves off, the youngsters can often be seen clambering onto their mother's back. Spotlighting is the main source of data for animals like the ringtail possum, which is difficult to trap. It is also a good way to learn how to recognise the various species and their habits.

The woylie, or brush-tailed bettong, occurs throughout most of the forest area. Its population is still substantial at Perup, despite predation by the fox. Because the woylie is nocturnal, a trapline has to be set up by Graeme Liddelow the night before. While he and Per take each animal from the trap the following morning, they show how to collect data about the woylies and how to tag them.

Another highlight of the weekend course is a visit to the melaleuca thickets, home of tammar wallabies. The tammar needs dense low scrub for daytime shelter and open grassy areas for feeding. It does not leave the scrub until after dark.

Students are also shown research techniques used to document the birds that frequent Perup. Birds are caught in mist-nets. Researchers then record the species of each bird, take their measurements and band them. These techniques yield valuable information about bird movements after forest disturbances such as fire or, in other areas, logging.

On the morning of the final day Per Christensen gives a presentation about fire ecology and research being done on the effects of fire. As well as being able to predict the effects of prescribed fire on plants and animals, the information gleaned from the research has allowed CALM scientists to formulate fire management plans which benefit the species of the area. They have found, for instance, that hot autumn burns are needed to regenerate the melaleuca or heartleaf thickets needed by the tammar for cover, knowledge that has changed the fire management of the area.

The Perup course and the researchers who run it are doing something positive about conservation. The data collected by participants contributes to the long-term study of animals and plant populations of the area.

This spring a new course specialising in the flora of WA's southern forests was added to the University Extension program. It was an instant success and is destined to become an annual event. A course specialising in birds is planned for the autumn program. CALM is also looking at other ways of extending the program. ⊡

Carolyn Thomson is a communications officer with CALM's Public Affairs Branch. She can be contacted on (09) 389 8644.

FRIDAY, 19 APRIL 1996

RESEARCH ON THE IMPACT OF TIMBER HARVESTING ON FOREST WILDLIFE

A major study is currently underway at Kingston Forest Block, near Perup Nature Reserve, on the impact of timber harvesting on forest wildlife. The five year study is investigating the impacts of timber harvesting and prescribed burning and prescribed burning on composition and structure of the vegetation, medium-sized mammals, small vertebrates, terrestrial invertebrates, birds, and hollow-bearing trees.

The study follows several decades of research on various aspects of the environmental impacts of timber harvesting. However, this will be the first long-term study of its kind to be done in south-west forests by a large team of scientists from across a range of disciplines (see 'Forest Focus' in Landscope, Summer 1994-95). The adaptive management approach used by CALM has ensured that the results of previous environmental research, and the present study, have and will continue to be been incorporated into current forest management.

Early results show that fox control is the predominant factor influencing abundance of medium-sized mammals (see attached figure). Trap success rate has increased from 10 per cent to 70 per cent after three years of fox control. Abundance of animals in logged areas has remained high and is similar to abundance in unlogged areas.

LAKE MUIR NATURE RESERVE

Lake Muir is one of the largest freshwater lakes in Western Australia. The reserve of 11 600 hectares includes several other lakes and swamplands forming an important system of wetlands for migratory waterbirds. Although the reserve is surrounded by cleared private land, it still has great conservation value.

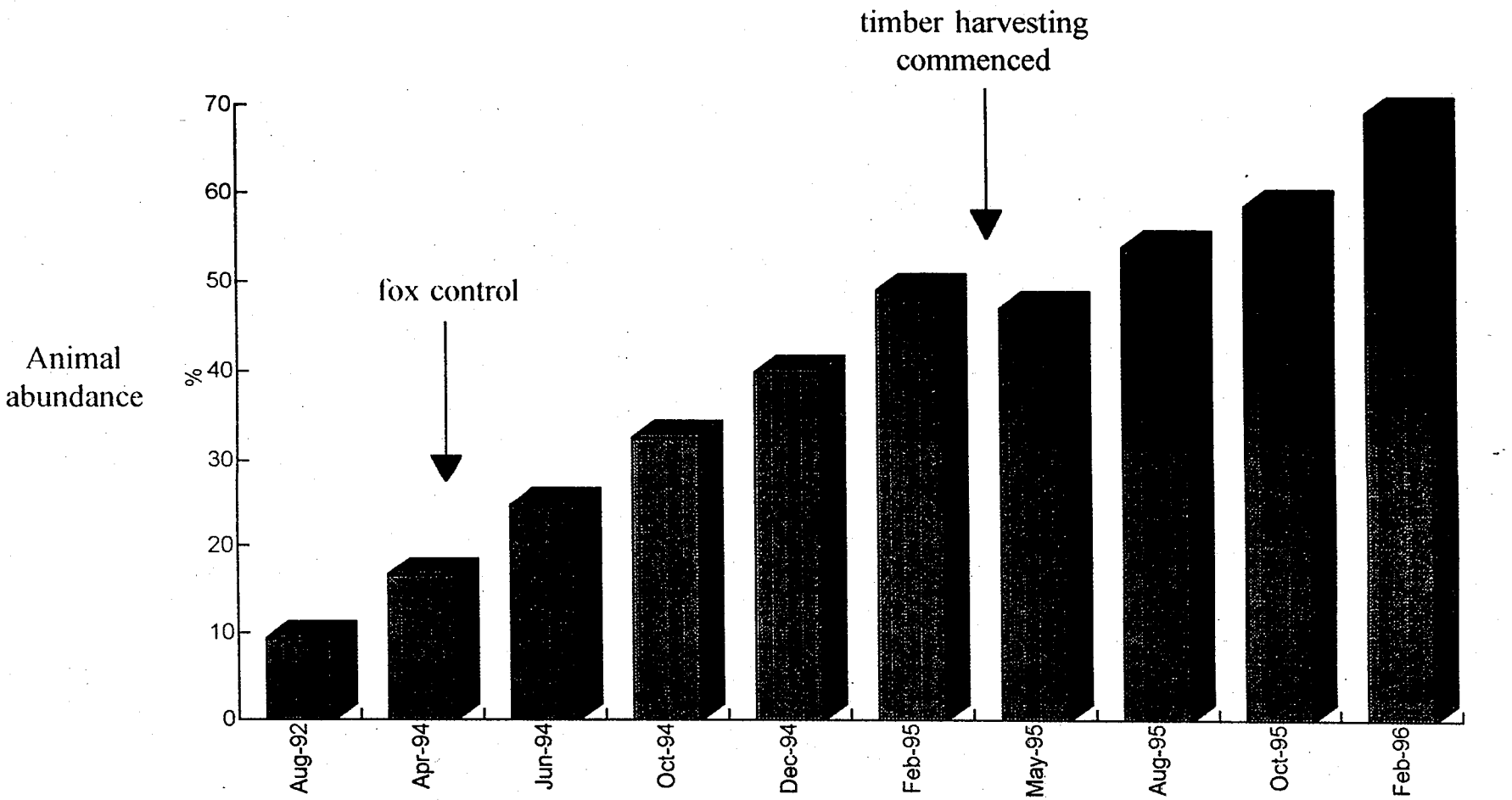
To the north of this reserve is the huge Perup Nature Reserve (40 300 hectares) which is the home of six rare and endangered mammal species. This area is a focus for CALM's nature conservation research and management programs.

SHANNON TOWNSITE, SHANNON NATIONAL PARK

The Shannon National Park (52 600 hectares) was gazetted in the mid-1980s following an intense debate between conservationists and the former Forest Department about reservation in the karri forest. The Department argued for a network of smaller reserves including parts of the Shannon because other parts were badly affected by past wildfires. The Conservation movement wanted the entire catchment reserved. Soon after the Burke Government was elected in 1983 it was announced that the Shannon Basin would be reserved. A Management Plan for the Shannon National Park was approved in 1987.

KINGSTON TIMBER HARVESTING STUDY

TRAP SUCCESS RATES FOR ALL MEDIUM SIZED MAMMALS ALONG ROAD TRANSECTS



A sawmill operated at the Shannon townsite on the South-West Highway for several decades. Approximately 10,000 hectares within the Park was logged during this time. Some of these regrowth areas can be seen north of the townsite.

The townsite has now been converted into a major recreational site. It is immensely popular with campers and day users alike. CALM has constructed recreation facilities mostly with resources provided during unemployment relief schemes in the 1980s.

This year CALM has established a new tourism initiative in the Shannon National Park. The Great Forest Trees Drive is a 50km circuit which traverses some of the finest karri forest in the Park. A comprehensive guidebook will be supplemented by eight stops where a car radio frequency will provide audio explanation of key features.

MT BURNSIDE

From the viewing point on Mt Burnside the extent of the largest southern forest reserves can be seen. As well as the Shannon and adjoining D'Entrecasteaux National Parks there are two other large parks.

MT FRANKLAND NATIONAL PARK

The Mt Frankland National Park (30 500 hectares) is one of the jewels of the reserve system in the karri forest. It contains some of the best examples of virgin karri forest, in particular the Wattle Forest Block adjoining South-West Highway. At Mt Frankland there are recreation facilities and walk trails provided.

Several species of rare flora are known to occur in swampy vegetation north of Mt Frankland. To the east of Mt Frankland tingle forests, including the rare Rate's Tingle, can be seen flanking the slopes of the Soho hills. Occurrences of Red Flowering Gum are also found in this area.

MT ROE (SECTION 5G/PROPOSED NATIONAL PARK)

This reserve of 74 000 hectares was proposed for inclusion in the Reserve System in the 1994 Forest Management Plan. It contains vast areas of undisturbed forest and woodland including some areas with wilderness qualities. This area has also been listed on the Register of the National Estate primarily because of the lack of previous disturbance. This reserve links the Mt Frankland National Park to the west, the Mt Lindesay National Park (25 500 hectares) to the east and the Lake Muir Nature Reserve to the north. This forms a huge interconnected reserve system within the Southern Forest Region.

KARRI LOGGING OPERATION - SUTTON 9 COUPE, SUTTON STATE FOREST

Details of this site will be provided at the field stop.

SILVICULTURE IN THE KARRI FOREST

Clearfelling was the preferred silvicultural prescription for karri used in the 20s and 30s. Around 1940 foresters moved to the "Group Selection" silvicultural system due to several reasons relevant to that time:

- There was intense pressure for clearfelled forests to be converted to agriculture (because the heavy work of removing the larger timber had already been done). Selection cut forests, on the other hand, still looked like a forest and were less likely to be alienated.

- Cutting under a Group Selection prescription required almost twice the area to be cutover each year. This required more access into the forest (roads, rail) and foresters of the day needed that access for fire control.

- It was considered that log utilisation could be improved under a selection system.

Group Selection was tried for about 30 years in the karri forest. By the mid-1960s it was evident to foresters of the day that the Group Selection system had failed in the karri forest. Problems encountered included poor growth of sapling stands in the renerated groups; extreme difficulty in managing intense regeneration fires within Group Selection areas and problems with damage to regrowth caused by the felling of adjoining mature trees when the second cycle of felling was required. Clearfelling was reintroduced in 1965 and is still the preferred silvicultural practice.

There are numerous examples of successful regrowth following clearfelling in the karri forests around Pemberton and Manjimup.

KARRI REGROWTH - NAIRN STATE FOREST

The Nairn Block was largely logged in the period 1975 to 1990 and regrowth stands are approaching 20 years of age. Some stands will soon be ready for first thinning.

BIG BROOK STATE FOREST

Big Brook Forest and the neighbouring Treen Brook Forest are the best examples of even-aged karri regrowth following clearfelling. Big Brook was clearfelled between 1925 and 1930. Several thousand hectares were being prepared ready for regeneration burning when a wildfire swept through the forest in the summer of 1930. Fortunately, it was an excellent seed year and prolific regeneration followed. Today, the regrowth which is older than 60 years, provides the best possible evidence that clearfelling is an appropriate silvicultural system in the karri forest.

One of the reasons why the regrowth is so successful in these blocks is the treatment which followed the regeneration burning. Cull trees, unwanted by the mills of the day, were ringbarked by teams of forest workers. This cull treatment removed competition to developing regrowth allowing growth to be optimised.

There are some subtle differences between the silvicultural method employed in 1930 and the method employed today. The scattered large trees seen in Big Brook were probably pole-sized trees at the time of regeneration. These older trees have developed broad spreading crowns and hollows which provide a valuable age class diversity. Today, the network of stream reserves and other patches of mature forest retained through clearfelled areas provides this necessary diversity

Commercial thinning was introduced to the karri forest in 1980. Nearly all of the regrowth in Big Brook Forest has been commercially thinned. Not only does this thinning allow crop trees to develop into sawlogs sooner, but a valuable intermediate yield of small sawlogs and pulpwood is obtained.

Non-wood values are also important in Big Brook Forest. This forest forms part of the catchment of the Lefroy Brook which is Pemberton's water supply. Forest recreation is another major land use in this area. Picnicking, camping, scenic driving, bushwalking, horse-riding and canoeing are very popular in the Big Brook area. The newly constructed Big Brook Dam provides an excellent focus for recreational use.

TOURISM AND RECREATION IN SOUTH-WEST FORESTS

The forests of the south-west are a major resource for tourism and recreation for the people of Western Australia, with over four million visits per year. CALM's objective is to facilitate public enjoyment of the forest in a manner that is consistent with nature conservation and other objectives.

CALM's strategy is to:

- develop and upgrade tourism and recreation sites on all of land tenures
- develop projects which enable visitors to have a high quality experience which also provides interpretation and understanding of the forest
- provide value added experience through innovative programs
- enter partnerships with the private sector to generate funds to provide quality facilities and services
- develop quality information packages for individual tourists and tour operators
- pilot innovative access programs to demonstrate the potential for new projects

CALM's annual expenditure on tourism and recreation in south-west forests is of the order of $4.5 million.

Major projects that have been developed in recent years, involving capital expenditure of over $6 million, include:

- the Hills Forest near Mundaring;
- revitalisation of the Bibbulmun Track from Perth to Albany;
- the Forest Heritage Centre at Dwellingup;
- three climbing trees in the karri forest at Gloucester, Diamond and Bi-Centennial Tree;
- the great forest trees drive in the Shannon National Park;
- a demonstration forest near Bunbury;
- the Tingle Forest Canopy walk in the Walpole-Nornalup National Park;
- upgrading of Beedelup Falls near Karri Valley resort at Pemberton;
- Perup Wilderness Lodge in the Perup Ecology Centre.