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FOREST FIRE PROTECTION IN WESTERN AUSTRALIA

By A. J. Milesi, Fire Control Superintendent

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SYNOPSIS

Adequate protection against fire is a prerequisite for successful forest practice.

Organised fire control in Western Australia dates from shortly after the appointment of the first Conservator in 1916.

First lookout towers were built in the Mundaring District in 1919.

Communication then was by heliograph; now it is by 1800 miles of Departmental telephone lines, 16 fixed two-way radio stations and 75 mobile sets in vehicles.

Early suppression methods in mainly virgin stands were by beating and some raking with back burning at night.

Water, applied by hand pump, was first used in the early 1930's and the first power pump was used in 1938.

Present suppression force consists of some 70 heavy duty fire fighting tankers and an equal number of fast attack gang trucks.

The virgin forest had little undergrowth and bush fires were mild doing little damage to mature trees.

Logging slash left by the fallers provided a heavy fuel bed leading to devastating wild fires.

The present sequence of fire control operations is advance burn before logging; top disposal burn to remove slash; complete protection of regrowth while necessary and then light burning at frequent intervals, subject to the silvicultural requirements of the crop.

Successful fire suppression depends on early detection, accurate location and speedy attack of the fire.

Thirty five lookout towers, ranging from short towers on high points to cabins built in the tops of tall Karri trees, manned continually throughout the Summer watch over the forest from the Metropolitan area to the South Coast.

Towers are connected to each other and District Headquarters by Departmental telephones.

Intersection of cross bearings on a smoke from two or more towers pin points the position of the fire.

The weather has a big influence on fire behaviour and to keep abreast of weather trends the Department maintains its own fine weather forecasting service in collaboration with the Bureau of Meterology.

The daily forecast is given over the Departmental radio network at 7.45 o'clock in the morning and a preliminary forecast for next day is given over the same network at 4.15 o'clock in the afternoon.

This weather knowledge enables gangs to be held in various stages of readiness depending on the hazard.

On receipt of an alarm the fire gang, consisting of well trained regular employees proceed at all speed to the fire.

The fire must be "knocked down" before it attains large proportions.

Knock down is followed by consolidation and "mop up" that is, complete extinguishment of the fire.

Diligent patrol is continued until the fire is completely safe.

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The forest region of Western Australia comprises a fairly compact strip of forest, some 200 miles long, and thirty miles wide in the extreme South West of the State from the Swan River in the North to the South Coast, and bounded roughly by the 25 inch isohyet.

This forest area enjoys a Mediterranean climate with cool wet winters and hot dry summers, and may conveniently be divided into the Northern or Jarrah region, the drier of the two with a very xerophytic undergrowth and the Southern, or Karri region which is regarded as a temperate rain forest with a mesophytic undergrowth, a summer rainfall in excess of 12 inches and generally milder conditions.

In the Jarrah region, although the annual rainfall is up to 50 inches, approximately 60% of this falls in June, July and August, and only 5% in the months December to March, when temperatures are frequently over the century and bare soil temperatures in excess of 150°F. have been measured.

In the Karri region the influence of the Southern ocean modifies the climate somewhat and Summer rainfall is higher than in the Jarrah and temperatures generally lower.

A feature of the whole forest belt is the extremely slow rate of decomposition of leaf litter and in the Jarrah, where considerable work on this subject has been carried out, equilibrium had not been reached after 23 years when the litter accumulation was in the vicinity of 6 tons oven dry weight per acre.

These conditions are conducive to severe bush fires during the Summer and although fires in the virgin stands of early settlement days, burning in leaf litter and grass with little undergrowth to feed them were not of the severity of the present day with a dense fuel bed of scrub throughout the forest, the first settlers took early legislative action to protect themselves.

The first ordinance passed in Western Australia in connection with fire control was

gazetted in September 1847 and the first bush fires Act was passed in 1885.

These old Acts did little more than make provision for a prohibited period when the setting of fires was prohibited; the general idea being more to protect the growing crops than to prevent bush fires.

They were important in that they established the principle of a prohibited period during the hottest part of the year when no fires may be lit and this has done as much as anything to prevent catastrophic fires in this State.

The first Conservator of Forests, Mr. Lane Poole, well realised the importance of fire legislation and wrote into the Forests Act 1919 certain provisions designed to assist in dealing with fires.

It is an offence to light a fire within a State Forest or within twenty yards of the boundary of one.

Any person lighting a fire close to a State Forest or Timber Reserve must notify the Forester, and a forest officer may call upon any person residing or working within five miles of any fire burning in the State forest to assist in extinguishing the fire.

However, the prohibited period ended when the harvest was over and hot developmental clearing fires were the order of the day.

True it was necessary for the settler to notify the forester of his intention to burn, but there was nothing to stop a hot clearing fire being put through at the height of summer in close proximity to highly vulnerable new regrowth or heavy logging slash.

To overcome this difficulty the Bush Fires Act was amended in 1925 to provide for the declaration of fire protected areas within the boundaries of which it was necessary to obtain a permit from a forest officer before any fire could be lit between 1st October and the next following 31st May. Two such areas were declared and still exist, one round Collie and one at Mundaring Weir.

As yet there was no organised fire control in the State other than within the forest service, nor was there any legal provision for any such organisation.

However, in 1937 the old Acts were repealed and new legislation drafted making provision for the formation of rural fire brigades, and generally setting up a sound fire prevention and suppression organisation with a body called the Rural Fires Prevention Advisory Committee, appointed to advise the Minister on fire control matters.

In 1954 this Act was repealed and a Bush Fires Board appointed with statutory powers to administer the Act.

The Board consists of representatives of local Government, the Insurance Companies, the Departments of Forests, Agriculture and Railways with the Under Secretary for Lands as its Chairman.

The rural fire control organisation is based on the Shires, and is entirely voluntary without any outside subsidies, although the local authority may spend money in assisting its registered brigades.

Practically all equipment is privately owned with some heavy equipment supplied by the Shire Council and generally a strong efficient organisation is being built up with good liaison with the Department which really began organised fire control in Western Australia.

The first look-out towers were build in the Mundaring District in 1919, and their communication with the gangs in the field and the forester riding his horse through the forest was by means of the heliograph.

The helio was early replaced by telephone lines, particularly between towers and to headquarters, and by 1924, five years after the passing of the Forest Act, there were 51 miles of Departmental telephone lines in the forest. At the present time the Department is served by 1800 miles of its own telephone circuit augmented by 16 fixed two-way radio stations, 75 mobile sets in vehicles and 20 portables.

It is of interest to note that as early as 1923 it was proposed to experiment with two way radio communication between towers and gangs in the field, and some three years later tests were actually carried out but the sets then available were inadequate for the job, and it was not until 1946 that the first successful field trials were carried out.

In the early days the forest was largely a virgin stand with little or no undergrowth and practically the only fuel was leaf litter and light scrub, resulting in a comparatively mild fire.

Most bush fires were looked upon as more or less inevitable and suppression methods were by direct beating with bushes with some raking and back burning at night.

The 1927 edition of the Foresters' Manual states "All fire fighters must have on hand the following equipment:-

Plan mounted in sections
Rake Head
Full water bag
Rations for self and horse".

It also pointed out that Marri boughs are best for beating and should always be used where available.

By the early 1930's water was being used for fire fighting, being applied per medium of an under arm spray pump, pumping from a kerosene tin carried by a water joey.

It proved quite effective until the water joey fled the fire face.

In 1934 the first mobilisation of fire fighting equipment was attempted by placing knapsack spray units and a 33- gallon tank of water with low-down force pump in a light utility.

In 1937 it was suggested that a small centrifugal or rotary pump driven by a separate power unit could replace the low down pump, but it was not until the next year, 1938, that the first power pump, a Wajax high speed rotary was available.

This type of pumper had certain drawbacks, but the outbreak of war precluded any further purchases of fire fighting equipment of this nature, and it was not until 1944, when some A.R.P. pumpers became available that the programme of mechanisation of the fire fighting force was speeded up.

The Department now has a fleet of some 70 heavy duty units consisting of a truck carrying a tank of at least 600 gallons capacity on which is mounted a fire fighting pump capable of delivering up to 200 gallons per minute and developing pressures up to 200

pounds per square inch.

Approximately an equal number of gang trucks carry smaller tanks and light weight pumpers or hand pumps.

The virgin stand as seen by the foresters of 1919 was a mature stand and suffered little if at all from the fires that did occur from time to time from various causes, but when a fire started in the debris left behind by the timber faller and in bad weather conditions the resulting conflagration was completely beyond the powers of the primitive organisation then in existence; did considerable damage to the remaining trees and brought up a dense crop of highly inflammable undergrowth to provide an augmented fuel supply for the next fire.

The havoc caused by these fires in logging slash brought home very forcibly the necessity for some form of top disposal following trade operations, and to further reduce the intensity of this top disposal fire an advanced burn was put through the area to be logged some months before logging started to remove the existing surface fuel.

The sequence of fire control operations then was advance burn, top disposal, regeneration burn where necessary and protection of the resulting regeneration until such time as it could suffer a light fire without damage.

The remainder of the forest was to be burned over by a light fire as frequently as possible.

The ideal of the forester is, of course, no uncontrolled fire in the forest and, to this end, very extensive fire prevention measures are carried out by the Department every year.

Over 96% of all fires are man caused and therefore largely preventable and, by lectures, radio talks, newspaper articles, visits to schools etc., an attempt is made to ensure that no fires start but, in preparation for those that do start, a fire suppression organisation must be built up.

Successful fire suppression depends on early detection, accurate location and speedy attack by well equipped highly trained personnel.

Nowadays, to provide for early detection,

some thirty odd lookout stations have been established through the forest, ranging from Sawyers Valley in the North to Mt. Frankland, South-east of Pemberton, with an isolated tower overlooking the Mallet plantations in the Narrogin district.

These lookouts range from low towers on high points to cabins built in the tops of tall karri trees in the main karri belt, where the rolling terrain and high forest preclude the use of shorter towers.

The tallest of these tree lookouts is Gloucester Tree, named after the Duke of Gloucester, who witnessed some part of the early work in preparing the tree for the cabin; it is 200 feet high and is situated some three miles from Pemberton.

The lookouts are so placed that the whole of the forest area is under the observation of at least one, usually two and sometimes three towers which are manned continuously throughout the summer.

As soon as the spring controlled burning season commences, the towers begin to be manned, and when the fire season proper starts all towers are manned from early morning till after dark.

The towerman's first report is given to the District office at 6 a.m. or 7 a.m., and the last regular report at 7 p.m.

If conditions are bad or fires are running he may be required to give reports earlier in the morning or later at night as conditions warrant.

It is frequently possible to pick up the glow of a fire at night through the smoke haze which would hide the smoke column during daylight hours.

The lookouts in each district are linked to each other and to district headquarters by Departmental telephone lines which also extend into neighbouring districts and cover the whole of the forest area with a network of 1800 miles of lines.

Each tower is equipped with a plan of the area correctly oriented with the country, and on which is mounted the direction finder also correctly oriented.

A protractor circle is printed on the plan centred on the position of the tower and from this is read the bearing of the fire sighted through the direction finder.

To assist the towerman in placing fires a series of panoramas showing the topograph of the country are mounted in special cases hinged to the side of the tower cabin.

The towerman is also equipped with sunglasses to cut down the glare, which can be considerable, and to act as a light filter to give better definition to light smokes against the bright sky. High powered binoculars are also provided to assist in detecting very faint or distant smokes.

As soon as a towerman sights the faintest whisp of smoke, he takes a bearing on it, enters it in his log book and advises his district office.

Cross bearings are obtained from other towers and plotted on the co-ordinating plan at the control centre.

The intersection of these cross bearings fixes the position of the fire, and if it is within protected forest or threatening protected forest, the nearest gang is contacted by telephone or radio and despatched to the fire.

Another aspect of the bush fire problem has been given attention - the forecasting of fire weather,

In the early days of fire control it not infrequently happend that numerous outbreaks of fires on days of unexpected high temperature and low humidity caused disorganisation with resultant heavy losses. Sometimes too, controlled burning was undertaken on days which unexpectedly turned out to be of high fire hazard.

To overcome these disabilities, to find a method of measuring the day-to-day hazard and to provide a forecast of fire weather, a Fire Weather Research Station was established at Dwellingup in 1934.

After some years of trial it was found that the loss or gain in weight of half inch cylinders of locally grown pine gave a reasonably accurate measure of the inflammability of the fuel on the forest floor and, therefore, of the probable intensity of a fire in any specific fuel concentration.

To give more complete coverage over the forest area the collection of weather data was extended to Ludlow and Margaret River on the South-West coast,

Pemberton in the far south karri forests, and Dryandra on the Great Southern in the Narrogin district.

These stations transmit their reading to the Meteorological Bureau in Perth, and to the research station at Dwellingup, and this latter station, working in conjunction with the Divisional Meteorologist, sends out daily a fire weather forecast which is relayed by telephone to all divisions, districts, towers and out-stations and broadcast over the Departmental radio from Dwellingup at 7.45 a.m. each morning.

A preliminary forecast for the next day is also sent out at 4.15 p.m. every afternoon.

The forecast is given in terms of an arbitrary scale of seven terms, from nil when a fire would not be expected to burn, through low summer, moderate, average summer, high summer, and severe summer to dangerous, which indicates the worst summer conditions likely to be experienced.

This forecast provides a valuable guide to foresters in controlled burning operations and in the organization of men and materials in period of high hazard.

The farming community and the man in the street generally are becoming more and more interested, and now the forecast is prepared by the Meteorological Bureau to cover all sections of the State during the summer months.

On days of low hazard the gangs will be called up on the radio only at long intervals, say, every two hours, but as the hazard increases the interval between calls is reduced until on dangerous days the gangs may be brought in to a centre with telephone communication, or a messenger boy stationed at the radio set which is left on "Receive", so that there is no delay in getting a message to the gang.

Immediately on receipt of a message locating a fire in their area the gang makes all speed to get to it without delay, as a fire caught in its very early stages gives little trouble.

The first fire gang despatched to the fire usually consists of three or more permanent employees under the direction of an overseer.

They are regular forest workmen, trained in

fire fighting and in the use of modern equipment.

Their usual gang transport and equipment consists of a utility or light truck carrying a water tank of up to 200 gallons, several packsprays, a low down force pump or small power pump, fire rakes or shovels, felling gear, such as axes, crosscut saws (now being replaced by chain saws), wedges, hammers and fitted with portable wireless.

Their job is to extinguish the fire before it assumes large proportions, and if this is not possible, to hold it in check until help arrives.

On arrival at the fire the overseer makes a quick reconnaissance and directs the gang to where they are to start and how they are to attack the outbreak. He then radios a fairly detailed report back to Headquarters, establishing the fact that the gang has arrived, and giving such detail as exact location of the fire, its size, the type of fuel bed and terrain, and an estimate as to whether the gang can or cannot cope with the outbreak without assistance.

The fire is usually attacked with packsprays and rakes or shovels, although if the truck can get close enough the low down pump or light power pump replaces the pack sprays. Usually the gang can bring the fire under control before it has burnt more than a fraction of an acre.

If conditions are very severe, or if the fire is located in a known heavy fuel bed, the controlling officer may order a heavy duty outfit to stand by or proceed to the fire even if the first overseer considered that his gang could handle the situation.

If the fire has gained such proportions when the first gang reached it and they were unable to suppress it, or if it eventually got out of hand, a radio call is immediately put through to Headquarters when one or more heavy units and, if necessary, other gangs are sent as reinforcements.

No risks are taken in letting a fire gain large proportions. It is found that if a fire is kept small it is comparatively easy to handle, but when it becomes very large, the effort and time taken in suppression are out of all proportion to the increase in the area of the fire.

The use of water from packsprays on a fire began a new era in fire fighting, and every effort was made to extend its use.

Fire suppression entails three operations, "knock down", of the running fire, mopping up and patrol. The first attack on the fire aims at stopping the running fire as quickly as possible by whatever means are available, but the fire is only stopped and is by no means out.

After the fire is knocked down, the arduous job of putting it out and "mopping up" commences, and a cleared break is constructed round the whole of the perimeter.

This break is either a hand raked strip 18" to 2' wide and down to mineral soil, or if a dozer has been brought into the fire, the break will be a rough track 6 to 8 ft. wide and capable of allowing the passage of a heavy duty truck.

These light bulldozers capable of being transported on five ton trucks, have been used for some time now on fires that threaten to attain large proportions and do a splendid job in constructing a trail round the fire, particularly in the extremely dense scrub of the karri forest which is frequently impenetrable to men on foot with hand tools.

Every tree or spar that is alight close to the edge of the burn and might throw sparks into the unburnt country is either put out or felled. Every log and stump burning close to the raked break must be extinguished with water, completely covered with earth or cut off and rolled in on to the burnt country.

When the fire is considered safe, a patrol is left on the area, and the gangs and equipment return to headquarters for overhaul, refuelling and generally refitting ready for the next call.

The patrol, equipped with a light unit and radio, remain until the fire is completely safe, even up to several days, and a flying patrol is usually made sometime after the fire, particularly if dangerous conditions develop.

It is felt that it is better to spend several man days on patrol than very many man days on re-extinguishing an escape.

The above is a brief outline of fire control in Western Australia. The organisation and methods are not static and are subject to variation as new equipment and greater knowledge of the fire problem become available. The magnitude of the problem in this State is great but results so far have been encouraging and it is felt that future success will fully justify a continued expansion of this organisation.