PROCEEDINGS

OF THE

PLANTATION PROTECTION CONFERENCE

Held at North Head

21-23 July 1987.

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TABLE OF CONTENTS

PLANTATION PROTECTION CONFERENCE 21-23rd JULY 1987.

LIST OF TABLES AND FIGURES

1. INTRODUCTION:

The conference was held in order to concentrate the attention, talents and experience of those working with Pinus radiata plantations on the problem of fire protection.

These proceedings present the topics, the discussion where appropriate and the "findings" or recommendations of the attendees.

In the interest of brevity most of the presentations are covered in point form. Where discussion or the speaker made significant contribution which later generated a recommendation this is detailed. Experience of fire in plantations since 1982 provided valuable background and initiated many of the findings. These events are therefore covered in greater depth.

2. OPENING SESSION:

The first session began with brief comments from the Chief F.O.D. and the F.C.O.. Co-operation within the Commission and with other organisations will have emphasis in future. The Commission expects to be asked to do the same job with less, a reduction of funds in real terms.

Part of this process will be the adoption of new ideas and technology which may increase effectiveness, reduce cost or both. There has been a reticence to use new concepts in some cases in the past. Part of this is the N.I.H. (Not Invented Here) syndrome. Given the ability of field personnel to solve problems, the solutions need to be promulgated and implemented where appropriate. This type of co-operative information transfer will need to become entrenched and practiced throughout the Commission, with other agencies where possible and appropriate.

3. HISTORICAL LOSSES:

Table 1 of Losses due to fire by Regions follows. There are no records for fires prior to 1951. There were few losses till 1982. In the period 1982-85 10,275 ha of Plantation have been burnt in wildfire. The long experience of small losses was not necessarily an indication that suppression organisation, equipment and management was being effective. That fortune was smiling is probably significant.

Worth noting is the fact that fortune's grin lasted about 30 years. Maintaining vigilance, manning levels, equipment standards and training for such a long period will require a good comprehension of this history and some memory of the results of Lady Fortune's frowns.

TRAINING AND SAFETY:

Foreman are the key unit in the Commission's firefighting force. Their training should be specifically addressed. Junior foresters also need training. Training for these two levels of personnel should emphasise fire behaviour training as against general firefighting training.

Extended flexitime provisions for clerical staff are necessary to facilitate their involvement in firefighting organisation and administration.

Use of standard recording forms for firefighting times and activity of hired equipment is recommended.

COMMUNICATIONS:

It is essential to keep up with new technology.

Backup facility for radio bases and alternate usable bases for each district should be available to prevent breakdown.

Portable radios should be available to foresters to overcome loss of radio access due to the introduction of official vehicles.

The command frequency concept should be kept in mind.

FIRE ADMINISTRATION:

This is great strength in using the existing Commission hierarehy as the fire command structure. This must be maintained.

EQUIPMENT:

Use of tanks on tractors and logging machinery should be noted and pursued.

Selection criteria of watering points for tankers and especially helicopters is needed.

Use, storage and location within the tanker/slip-on/command vehicle fleet of Heliflat hose should be investigated.

Firefighting foam will be trialled at Tumut District during the 1987/88 season.

Technical notes and information for firefighting to be prepared and disseminated in the form of a "manual" that can be regularly updated.

Some difficulties were noted in dealings with the Mechanical Engineering Section of Forest Operations Division. Compared to the historical relationship, current interactions have been greatly improved. It was noted that better communication and a freer exchange of information was necessary. This will relieve the frustration felt in some country areas where explanation and the rationale behind actions taken is not obvious. Enhanced interaction in the decision process about plant requirements, disposal and selection is important.

OUTSIDE INVOLVEMENT OF INDUSTRY AND COMMUNITY:

An examination of the Commission's insurances indicates that all plant hired by the Commission for firefighting has a blanket coverage. Information about insurances held on the particular items hired is required to avoid "double insuring".

HARDWOOD RETENTION AREAS:

Management appears to be quite well organised in drier forest types where burning is more often possible. Fuels should be managed in the wetter types also.

The hazard posed by specific retained areas should be identified. Particular areas then have to be managed to reduce or remove hazard.

Given the problems fuel management may represent for the original intentions of retaining areas a review of their purpose is appropriate.

Retained areas should be fully investigated since they are a proven problem.

LOW PRUNING:

There are advantages to low pruning in keeping the workforce occupied and located in the plantation. Every step possible should be made to obtain 100% pruning for access and visibility into the stands.

The pruning policy is being re-vamped currently and account should be taken of the points raised by this conference.

FUEL REDUCED ZONES:

The crownfire-free zones in Batlow are to be evaluated including an assessment of methods for their creation and their cost of establishment.

The zones should be set up during establishment. Where this has not been done areas where crown fire free zones are desirable, once identified, can be created by taking advantage of any forest management or silvicultural operations carried out in the designated zones.

GRAZING:

Grazing should be promoted due to the fuel management and financial benefits it creates.

PREPARATION, DETECTION AND DESPATCH:

Sufficient training of competent aerial observers is essential. This should be ensured.

Another Cessna 337 or equivalent is necessary to ensure availability for the state.

Priority for fire suppression must be given to the aircraft above all other duties.

If this situation once established is to be maintained then adequate precautions must be taken. The precautions include accurate documentation of rates of hire, times of hire and insurance. Eden region has instituted a standard timecard for recording hours, breaks and maintenance times. Industry will not carry insurance on machinery that is used for firefighting. Equipment so nominated attracts a very high insurance premium. This leaves insurance of machines to the Forestry Commission. The forum suggested a blanket policy that any item hired by the Commission for firefighting is automatically covered in the same manner as our own equipment.

10. TRAINING AND SAFETY:

As a general rule the F.C. has good, dedicated employees with common sense. Specific training and especially safety aspects in relation to firefighting is desirable, increases effectiveness, improves relations, adds to understanding, raises morale and is required by law under the Occupational Health and Safety Act. At present training is ad hoc and relies on foresters in the District. One cause for concern was the lack of A.T.A.C. courses in recent years.

Employees need to have a responsibility for safety. Experienced and untrained people should be mixed within and between crews for the safety of the individual and the gang. Safety at fires depends upon knowledge of fire behaviour. This requirement needs to be specifically addressed. Many personnel learn by experience but a lot of attention must be paid to foreman. A good chain of command is essential to safe practices and awareness of possible trouble on the fireline. Foreman are a key unit in this process and training at their level is needed. In the same context junior foresters require training.

11. SUMMARY AND RECOMMENDATIONS:

The final session of the conference was used to summarise the main points with a view to formulating recommendations. These are set out below in the order the topics were covered.

COMPARTMENT SIZE, ROADING AND ACCESS:

The roading guidelines for plantations should be re-written to account for internal tracks. The tracks should be mapped but not part of the roading submission.

Within this re-write there should be a review of standards for boundary roading.

Ideally all points in a plantation should be within 100m of an all-weather road. A roading intensity of 30km/1000ha is recommended.

ADJACENT LANDS:

Significant effort must be expended improving access to adjacent lands for suppression and hazard reduction.

It may be necessary to improve access as far as 20km from plantation and pay for the improvements.

Aircraft have been described and discussed elsewhere. Their use for surveillance and guidance is invaluable. A transport role has been utilised occasionally. There is great potential to relieve long travel times and provide safer transport for tired crews. Helicopters in particular are useful in this role. Fixed wing transport from other regions has arrived only in time for mop-up in some cases. This rests with slow requests from beleagured areas.

Water bombing is subject to considerable controversy. The expense of this technique combined with filibustering by vested interests and sensationalist media reports has tended to polarise opinion. On grassland fires aircraft may be useful since pilot visibility of the flame front is not obscured. In forest where the canopy intervenes effectiveness is reduced by visibility and dispersion by the trees. It must be stressed that all such aircraft use should be directed from the ground by the fireboss and controlled. The process is costly and the increased effectiveness of adding retardant to drop-loads is essential if results are to be useful.

Communication on the fire uses Shinwa hand-held radios, backpack radios and radios in mobiles. Ground to air communication is vital from the fire line. Headsets are needed for observers to facilitate good contact by reducing background noise from the aircraft. HF radios are set up in some regions. Bathurst have not had good results so far.

The Fire Management Section has advocated the use of various firefighting chemicals for many years. Wetting agent, retardent plus Butyne and now foams are available. The supplier of wetting agent, Shell, is no longer in the market. The source was ICI chemicals. Their product Teric G9A6 was sold to Shell who made up a 30% solution and marketed the result as Nonidet 90WK. Teric G9A6 is being tested currently at W.T. & F.R.D.. Once the results of the standard "sinking test" are known suppliers and recommended doses of the additive will be circulated.

Retardent has not enjoyed significant favour because it has not been used. There are drawings and one example of a retardent inductor which removes the problem of lifting bags onto tankers. The retardent must be used with Butyne added to prevent corrosion. It is important this chemical be tried. There is widespread use of retardent overseas and any benefits in costs and effectiveness of suppression need to be investigated.

A new player in the chemical game is foam. A particular product "Silvex" has been demonstrated to officers of fire management section. Although the presentation was not particularly illuminating the product has potential. A foam generating branch and some Silvex will be tested this season. Foams may useful also for reducing dust on helipads and around staging areas for crew changeovers etc.

9. OUTSIDE INVOLVEMENT INDUSTRY AND COMMUNITY:

In any forestry district it is essential to know what resources are available, from where, how soon they can be mobilised and what their capacities are. For this knowledge to be useful there must be sufficient contact, between personnel of the organisations, to ensure mutual respect and trust is established.

This integrity is assisted by a short line of command:

Regional Forester	: Co-ordinator
District Forester	: Fire Controller
Forester/F.A.	: Field Boss
Forester/F.A./Foreman	: Section Leaders

Additionally the Commission has support staff for event logging, monitor of radio traffic, logistics and resources.

Conflict and confusion doesn't develop until the F.C. interacts with other firefighting organisations. Personal contacts enable confidence to be developed in other people, organisations and their structures. There is a need to separate and identify those people who can be relied on for sound information and good judgement, from those who can not be trusted for any intelligence or decisions. Follow up communication and supervision is essential to this process.

Personnel must be evaluated and allocated meaningful tasks with which they are comfortable. It may be politic to separate paid and volunteer firefighters on the fire line. Section leaders need to be allocated accounting for; geography, capability and the importance of the section to fire control.

The Commission structure is flexible and able to adjust to the size, complexity, number of organisations and structure or organisations on fires. Other firefighting authorities will often liase, or try to, at different levels. This tendency needs to be monitored and identified.

8.4. EQUIPMENT AND CHEMICALS:

Large tankers, small slip-on units and S.O.F.T.s are a basic part of suppression and mop-up. Ancillary water carrying tankers can be useful in reducing fill-up turnaround time and increasing efficiency. The Bedford tankers appear to suffer an inordinate proportion of breakdowns, often on the way to fires or at them. Investigation of this needs to be made, particularly since Brigade volunteers don't appear to have the problem. Training may be a reason.

Dozers, small and large are essential to most fire control efforts. Small machines on gravel trucks have become a key unit in plantation first attack. A towed ramp to enable quick unloading has been developed. Transport of larger machinery has often been delayed by shortage of suitable floats. Graders, scrapers and other machinery may have application.

Hand tools have been standard for many years. Technological advances do not provide much improvement in this area. Knapsacks are undergoing some development. The steel item is a big improvement on the formerly used plastic. A 9 litre pressurised container was suggested. With wetting agent these easy to carry, robust, non-leaking, hand held pieces of vehicle based equipment represent an effective water application method if used properly.

Heliflat hose presents problems in storage and is often damaged in use. Keeping sufficient available on tankers is important and a supplementary box in a command vehicle may be appropriate.

Communication currently is by telephone, radio, facsimile machine and mail. Future possibilities include electronic data transfer between computers, optical fibres etc. Most advances will either make communication simpler, faster or alter its form. One of our major difficulties is the heavy reliance placed on systems that are vulnerable to lightning, mishap, poor or inappropriately trained or unco-operative technicians and so on. All steps possible must be taken to reduce the chance of communication breakdown and ensure rapid repair to networks if they fail (portable base stations etc).

Some challenges in communication are: training of staff to understand the capacity and limitations of the systems; avoiding overloading of the networks; reducing vulnerability of the system and ensuring technical advances don't complicate operation and reduce understanding.

It is felt that spare "emergency" channels should be pursued as a matter of urgency, despite having 2 channels the Albury pine districts are still vulnerable to overcrowding. Interacting with the contractor networks is also important. It is desirable to close the communication gap with other authorities. Even if F.C. radio is available some organisations will not listen or talk to the Commission. The F.C. should have their radios for monitoring. Command vehicles should have all radios so they can monitor and contact all relevant bodies. Care must be exercised since it is not possible to listen properly to 3-4 radios simultaneously. Clerical staff can assist in this.

Phones in towers and electronic data transfer were mooted. The hourly tower reports are listened to by everyone as an indicator. Since the introduction of departmental vehicles, foresters not on duty don't have knowledge of situation and are not mentally gearing up for whatever occurs. This unofficial standby has been lost, and should be considered in conjunction with the loss of hourly weather should phones be placed in towers.

The example of a command frequency operated by the B.F.C. Regional officer at Goulburn was given. The system provides a level of interchange at the control level which is unencumbered by normal traffic and only available to the headquarters of the organisations involved. This leaves the fireline-to-control-centre contact for each organisation clear of "overhead" chatter. It would not alleviate inter-organisation communication problems on the fireline.

The underpinning of the technology is personal communication. This can only be achieved by meeting those people, with whom we will want to communicate effectively when a fire emergency develops, and developing the contacts.

8.3. FIRE ADMINISTRATION:

The Forestry Commission has clearly developed lines of authority and discipline amongst its personnel. This needs focus to ensure that authority and discipline is maintained under stress. Our staff accept direction only from within the existing command structure which guarantees integrity.

8. DETECTION AND SUPPRESSION:

8.1. PREPAREDNESS, DETECTION AND DISPATCH:

The quicker forces get to a fire the better. The higher the FDR the smaller the fire must be for successful first attack. Preparedness levels are based on environmental parameters. In order to be optimally prepared equipment must always be obtained with fire protection in mind, manpower should be trained and liason should be established to define who does what and what is expected. This ensures response time is minimised through equipment and manpower being "ready" to respond to fires.

Detection is vital to first attack arriving whilst fires are small. Primary and secondary towers should be located to minimise blind spots. Aircraft supplement towers and provide valuable detection capability. Ground patrol can be used especially where visibility is poor. All reports and messages must be reported to a central location to facilitate co-ordination and dispatch.

Dispatch should be planned and automatic. Troops should move to the fire as they establish its location. Far more satisfactory to call them off than have lag time due to waiting for orders. Back-up of first attack should be immediate to permit comprehensive suppression. Further back-up is then on-call in case required.

Attack crews need to be well guided and accurately advised, maps and directions are vital. Aircraft are invaluable in this role if available. There are cases of crews being guided to spot fires of which they were unaware, or could not locate, by aircraft.

The collective view was that an experienced firefighting forester to act as overhead fire boss for strategy and tactics, is invaluable. This puts such people in the aircraft or helicopter, the latter is preferable. Helicopters have the ability to pick up fire and line bosses show them the fire and put them back. Such machines also make marginal fixed-wing flyers into good flyers.

Placing aircraft on standby is often done in extreme weather conditions. A proportion of really damaging fires start on days that are moderate to high FDR. If possible err on the side of being conservative. Preparedness also relates to aircraft, pilots observers and their availability.

Forestry Commission personnel are preferred in aircraft so that the information received is reliable.

8.2. COMMUNICATION:

The loss of radio bases at some fires has increased the problem of suppression and the complexity of the operation, always to its detriment. Good communication is vital to suppression.

7. FUEL MANAGEMENT WITHIN PLANTATIONS:

7.1. FUEL REDUCED ZONES:

The Crown Fire Free Zones provide long-term breaks to fight fires and safer escape routes. Road performance has been improved by letting in light and wind, keeping the road dry. The workforce feels more confident knowing these zones are available to retreat to or fight from. The CFFZ doesn't disturb airflow and create turbulence as a break would.

A CFFZ trial was established in Batlow District. The Crown Fire Free Zones were established to a third thinning stocking at T1, then high pruned. Slash was removed while logging or heaped and burnt, the latter caused scorch. Areas were tracked on the back, cross-tracked by extraction. They were 40m wide on the west side of the road and 60m on the east. The areas started out with a clean floor that is now bracken, blackberry and pine regeneration. Reservations were expressed. Pine regeneration is up to 1m high, some prefer T1 slash to that. Cost was very high to remove hardwood, logging debris and keep down weeds. It may be possible to burn them but each soil disturbance will promote pine regeneration. If they were created at establishment some problems could be avoided.

The Fuel Reduced Zones must be identified. They will usually be designated along existing roads on a compartment basis. Their establishment is based in modifications of the normal operations. All activities are still carried out, the intensity and degree of the operations is altered. The development of fuel reduced zones begins at establishment . Effort must be maintained to minimise fuels by physical treatment, removal, grazing or burning. Due to the difficulty involved, plantation established on broadcast cleared areas should not be treated until the second rotation.

7.2. GRAZING:

Reasons for grazing include income, grass control, fuel reduction and establishment. Herefords or hereford crosses are quieter and easier to manage. Use of steers only, simplifies the husbandry. The animals need to get used to the pine. Polling sensitises cattle and keeps them off the trees for 3-4 months.

The operation at Walcha was floated with $30 000. There is still $20 000 in cash, $23 000 in stock plus the value of fencing and the benefits of fuel management.

Goats are the best if they can be held. Fences have to be netted. To control blackberries 5 goats/ha are needed, they won't eat blackberries till they're hardened off in January or February. Again wethers are easier to husband, although goats take more time and energy than cattle.

Simpler options are leasing and agistment. These provide the fuel management benefits and a return for less effort on the part of Commission personnel. Oberon runs grazing at 15-20 cents/head/week over most of the plantation. Grazing hard prior to grass-spraying maximises effectiveness. Sheep are introduced into plantation 3-4 years old.

Once burnt reserves present few problems for subsequent hazard reduction. If grazing is also used the reserves may be burnt every 4-5 years. A strategy is to burn them as often as they will carry a fire. This may be at odds with the objectives of leaving the filter strips and wildlife corridors. Research has demonstrated the value of these areas for wildlife, particularly as links and corridors.

Under the demands of commercial accounts the retention areas are "expensive" to manage by comparison with pine. If hazard reduction and tracking reduces the wildlife value of the strips then it may be "cheaper" to bowl them over and plant the area, in terms of management dollars.

Tracking around the strips has impacts on hydrology, possibly more so than burning. The tracks are necessary however to assist in control of low intensity fires in retention areas.

If is apparent that for a period the emphasis on retention strips was probably too strong. These areas need to be strongly considered in terms of suppression and planning due to the potential impact on the spread of fires into plantation estates.

6.6. LOW PRUNING:

Pruning improves access which is benefical for protection, particularly visibility through the pine. Protection per se is not as clear cut. Immediately after pruning with a deep, well aerated fuel present, potential for fires may be higher and suppression is difficult (Glenwood fire). Within a pruned stand there is increased air movement which may increase fire behaviour. Cases were cited of fires reducing in flame length and intensity as they went from pruned to unpruned stands. In one case at Orange the fire went out. The presence or absence of pruning doesn't appear to affect the way trees burn, pruned or unpruned they torch.

Unpruned trees provide fuel from ground to crown with no interruption. Fire will burn into such trees, crowning at lower levels of fire activity and fire weather. The effects of pruning on fire will only be significant until first thinning, the opened stand being less likely to carry a crown fire, and more suitable for suppression.

The benefits of pruning on wood quality have not been economically justified. Certainly edge pruning has little benefit, providing neither access nor visibility. Selective pruning may be an option worth consideration. The aim is to end up with a fully pruned stand upon completion of first thinning. Supervision is important.

Unpruned stands present some problems for marketing and marking of stands for first thinnings.

Some benefits of pruning rest with personnel. The work keeps people busy and located in the plantation, with tankers, slip-on units and tools available for rapid dispatch.

A draft F.C. policy on pruning and protection has been prepared and is being reviewed.

These internal access tracks do not constitute control lines for suppression. Having turning points is essential and dead ends are therefore not a problem. If located properly they can be used for forwarder extraction. The tracks should be formalised and guidelines re-written to account for them.

6.3. BOUNDARY ROADS:

In topography where slopes generally exceed 15°, boundary roads can not be established to a maximum of 10° at Class III standard. If the condition is strictly met significant areas are left unplanted between boundary roads and boundaries.

An alternative is to plant this area as a crown fire free zone. If a fire approaches, control is initiated from the boundary road. The pine between this and the forest boundary may be sacrificed. This is appropriate only where forest boundaries are predominantly cleared land. Normal stocking, grazing and a service track could also be used although not recommended. Dead end roads are to be avoided. Low standard service tracks may be used to provide links to other roads.

Most plantation fire problems have been related to innaccessible areas. All the "wins" have been where rapid dependable access was maintained.

6.4. ADJACENT LANDS:

Land adjoining plantation can have a vital role in protection. There are some physical factors influencing the type and degree of problem/assistance neighbouring property represents. Fuel levels and the type of fuel; micro-climate of the adjoining land (particularly if different); access to the property either from plantation side, via public roads or by co-operative arrangement; prospects for hazard reduction, likely characteristics of a fire in that property and the chance of controlling a fire of that type; all influence decisions and help boundary lands management aims.

Some other factors are topography of the adjacent lands; date of last fire; width of the plantation boundary and access to it; and relation of the land to the direction of bad fire weather.

6.5. RETAINED HARDWOOD:

These strips and corridors have caused many problems in relation to plantation protection. Management should be initiated at establishment and be tracked to facilitate fuel management. Burning has been carried out using F.C. helicopter. Small reserves are done with the helicopter first and then follow up from the ground very quickly. The operation is done in this order to reduce the hazard from flying in smoke. Some reserves have been burnt at night due to high fuel loads a technique that ensures quieter fire behaviour in most cases.

The use of clerical staff to support and add their abilities to control room management and suppression organisation is invaluable. Involvement of them in this role yielded signficant advantages in all cases. Training of clerical staff for this job is necessary.

The dedication, loyalty and efficiency of the section 10 staff has been an important link in F.C. suppression action.

Relations with brigades were not always the best. Local volunteers constitute a valuable, knowledgeable resource which needs to be utilised. Good relations are essential.

In undertaking suppression in plantations unthinned stands do not constitute a good bet. The heavy fuel built up by line construction makes holding a backburn difficult and making the break is slow. Successful suppression can be carried out within older, thinned stands.

6. PHYSICAL FACTORS AFFECTING PROTECTION:

6.1. COMPARTMENT SIZE:

Economic constraints play a major role in compartment size. Cost per plantable hectare can determine the roading intensity adopted. Current costs range $300 to $450ha depending on roading difficulty. Compartment size has increased significantly for Batlow district from 15ha net to 91 ha net since 1956, roading intensity has declined from 63km/1000ha to 18km/1000ha. This trend is occurring within the requirement for no part of the plantation to be more than 400m from a class III or better road.

Considerable discussion was generated by these points. Levels of 30-40km/1000ha and 200m from class III roads are considered preferable. There is no formal requirement to restrict costs to $300 per planted hectare.

Other factors determining shape and size are; topography, future harvesting and environmental considerations. Once considered the above factors usually determine compartment size and shape.

If compartment boundaries are used as control lines then modern plantations stand to lose six times as much area using this strategy. Reducing fire risks must then look at internal compartment access and hazard reduction in retention areas.

6.2. INTERNAL ACCESS:

As compartment size increases, internal 4WD tracks are being put in at the time of establishment. The aims are to provide access for first attack and plantation maintenance. The tracks are left unplanted and a break of 4-5m is maintained. Ridgetops are preferred. Tracks around retention strips facilitate hazard reduction operations. Track intensity is recommended to ensure no point is more than 80-100m from a track. On agricultural land often no earthworks are necessary.

5.2.2.8. DETECTION:

The established system was fully tested during this season. During periods of low visibility, secondary lookouts and vantage points were used. Three aircraft were used full time over the three days 14-18.1.85.. Despite the necessity of such reconnaissance the Commission aircraft DRI was recalled to Sydney for a ferrying job.

Visibility was very poor at times. Infra-red systems for detection at night or under low levels of visibility would be useful.

Fire towers were manned after daylight in some cases and from dawn if storms had been active overnight.

5.2.2.9. STRATEGY:

There was success in sorting priorities. The Ash country was left to its own devices for two days while fires were put out elsewhere.

Batlow had 5 tractors on floats in strategic locations around the district. They would respond when required then return to the central point to be ready for the next call.

A Section 17 was declared by a shire without recourse to the planning done by members of the Eastern Riverina Bushfire Prevention Scheme. A declaration was necessary but the agreed nominee should have been controller. The Shire F.C.O.'s are responsible for the co-ordination and control of the volunteers. Many are not interested in being nominated for Section 17 appointment, some are not capable of that role. Holbrook Shire has a motion in council never to appoint the F.C.O. as co-ordinator.

5.3. ELEMENTS IN COMMON:

Many of the fires and near misses experienced similar difficulties.

Communication was a constant problem. The loss of radio base stations, or power for them, lack of ability for cross-communicating between organisations and overburdened radio channels were the main elements.

Aircraft were used to great effect for detection, assistance with strategy and guidance for ground crews. In some cases water and retardant drops were effective with rapid ground support, but in most situations they were of little use.

Creek reserves and retention strips are a major headache. They act as sources of spot fires, carry fire into plantation and assist rapid spread through the pine. Fires under the same conditions have proved manageable in plantation but uncontrollable in hardwood.

5.2.2.6. COMMUNICATIONS:

The then single F.C. channel proved inadequate. The radio traffic at key points; control room, towers, offices and spotter aircraft made it difficult to decipher messages directed to them.

Shire radio to F.C. communication was also a problem. There should be radios available to each to permit contact if it is desirable. Around Tumut many brigades want F.C. contact so detection information is available to them. The appropriate level for such contact should be assessed. Group Captain and F.C.O.'s were suggested as suitable for such interchange.

The network was a significant factor in the serious situation not becoming disastrous.

5.2.2.7 EQUIPMENT AND PERSONNEL:

Staff brought in from within the Region and outside played a large role in reducing pressure at overworked centres. The increased use of administrative people was a major reason the Commission's suppression effort was maintained in very difficult times. More use and training of these staff should be made so that their considerable skills are available in future seasons. Aerial reconnaissance and control room work created a heavy drain on foresters.

Employees not involved in suppression maintained a heavy commitment to patrol, preparedness, supply etc.

Equipment was often tied up through the need to assist at fires of lower direct risk because of community, political or legislative requirements. Some shires with fires early in the period tied up resources quickly and contributed to disorganisation.

Resources were committed also in the rest of the state and Victoria. Helicopters for example: N.P.W.S. had 4, the Victorians more than that, F.C. none.

Logging was not shut down per se. It was benefical to have crews in the bush. Most worked in the morning, operations closed in afternoon and many crews did patrol of the forest. All industry crews are on a radio network and had suppression units. The industry also has foresters employed who are a valuable source of personnel.

Concern was expressed over the signing up of casuals. In this situation extra personnel are a highly desirable commodity. The need was not disputed. The way of taking on people, and recording that, is vital. Asking a person to carry out some instruction may be a legal contract ie: an agreement to employ. In such cases the F.C. is responsible for workers compensation and insurance. Junior officers are often involved in this situation and emphasis must be placed on writing down who was taken on, where, why and when. The control centre needs to be informed.

In most cases where fires exceeded 5ha the major reason was decisions to allocate personnel and equipment to higher priority fires. Decisions were based on assessment of location, values at risk or misleading advice that control and mop up by brigades had been achieved. Fires in Bago hardwood were abandoned till control could be re-initiated on 18.1.85.

5.2.2.1. KINROSS FIRE:

Initial control on 15.1.85 was left to Tumut brigades. Extreme conditions put fire out of control on 16.1.85., threatening Green Hills plantation, so a full campaign was launched.

Aircraft used for situation reports and some determination of tactics. Agricultural planes using water and sulphate of ammonia proved effective if quickly followed up by ground support.

Fire was controlled in the afternoon of 18.1.85 at 2500ha.

5.2.2.2. DORA DORA - WOOMARGAMA FIRE:

This 56,500ha fire burnt in two states and was controlled with limited resources in spite of severe organisational and communications difficulties. Backburns were established from existing trails, being completed on 21.1.85.

5.2.2.3. SPRING FLAT - EVERARDS FIRE:

Fire began on 14.1.85 terrain and adverse weather conditions hampered control. A backburn was made from the Spring Flat Creek fire trail and the Cabramurra Road. This burn escaped on the 18.1.85 and was eventually contained within Everards Flat fire trail, Waterfall trail and constructed lines to Swampy Plain Creek and Cabramurra Road. Initial attendance by volunteer and S.M.H.E.A. personnel, final control by N.P.W.S..

Total area 2700ha.

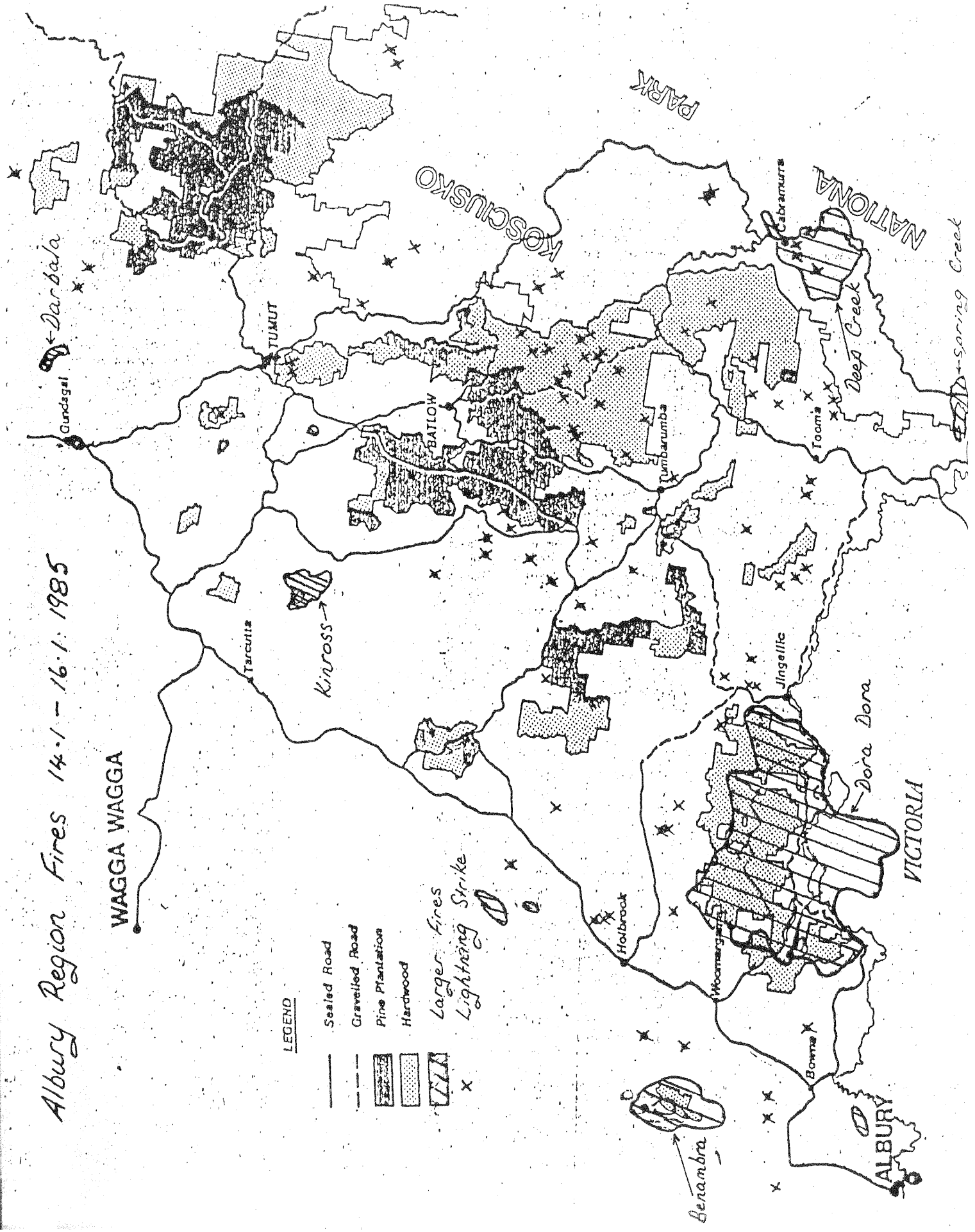
5.2.2.4. DEEP CREEK FIRE:

Fire started 14.1.85, worked on by S.M.H.E.A. and F.C. crews, virtually extinguished by heavy rain late on 15.1.85. N.P.W.S. responsible for patrol. Fire reported "active" again on 23.1.85, work commenced to contain it within trails. Inaccessible country hampered progress and backburns delayed till evening of 27.1.85.. Extreme day on 28.1.85.. Backburned failed, major campaign mounted until control ceased on 31.1.85 following rain. Final area 10,000ha.

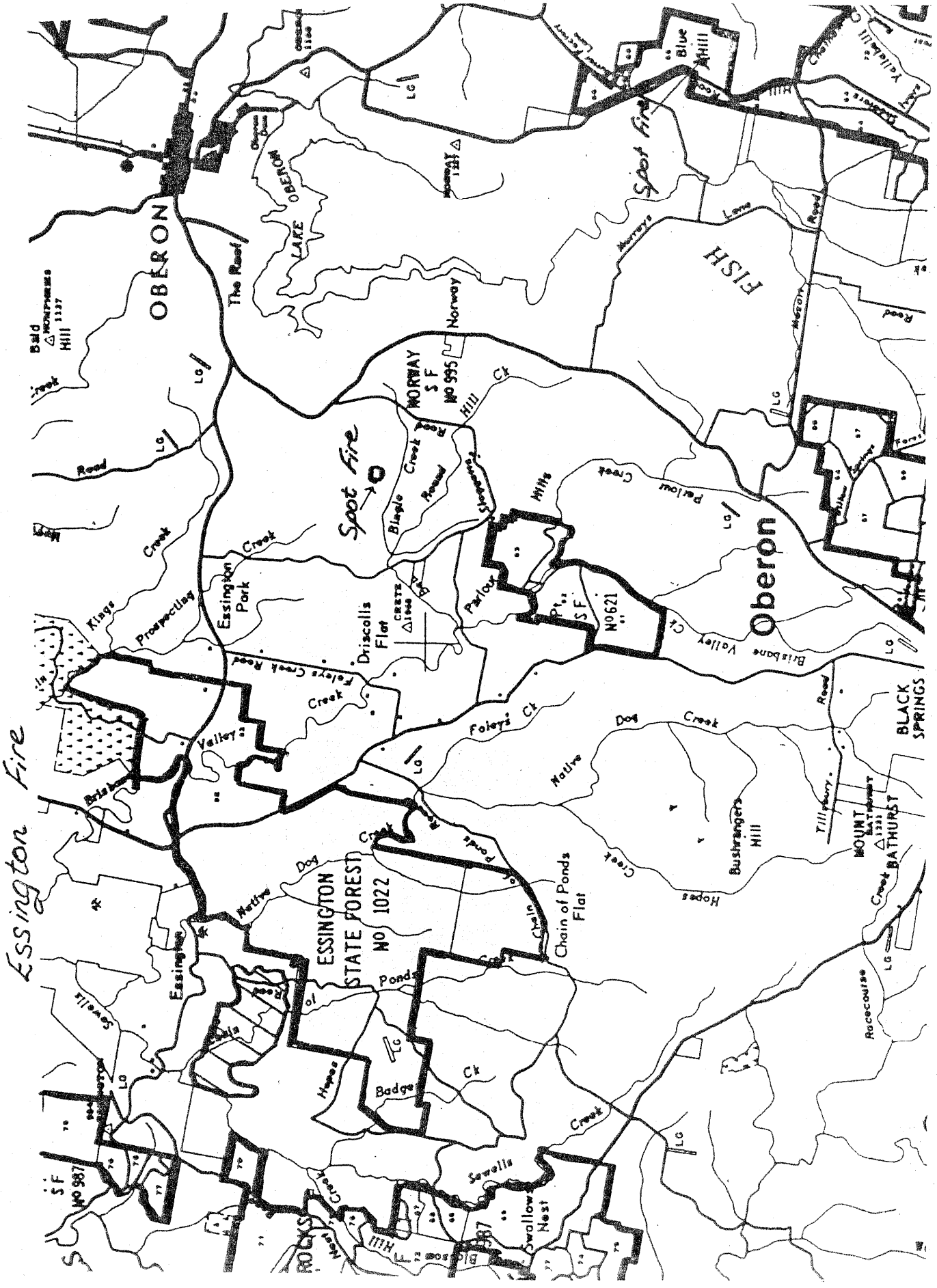
5.2.2.5. POINTS NOTED AND DISCUSSION:

There were significant shortages of most things; personnel, equipment, clear radio time, communications and so on. January 1985 was an extreme situation that tested all facilities and showed up any flaws.

Map 10: Albury Region Fires January 1985



Map 9: Essington Fire



Three tractors, a grader and 6 tankers were on hand very quickly. Volunteer units also assisted. All flanks were secured by 19:00. The effort of all personnel was excellent.

5.2.1.4. ESSINGTON FIRE 2.2.87:

Fire began in private property and spread rapidly through grass into scrub. The fire crowned. An area south of this had been prescribed burnt in the winter which reduced fire behaviour in this area. A small area of private plantation was burnt by a jumpover. The hazard reduction probably saved the F.C. plantations. This fire produced two spot fires one of them 11km away.

5.2.1.5. POINTS NOTED AND DISCUSSION:

Communication was a problem during the Jeremy/Isabella Fire, the Oberon radio base off the air. The Canobolas fire took off the same day. Radio traffic was heavy.

There was no radio contact with F.C.O. of Evans Shire, brigade units from Oberon Shire or contractor dozers. This reduces co-ordination on the fireline.

These fires highlighted some "blind" areas for fire towers. Reports from locals conflicted. In view of the purchase of land for plantation consideration of tower location or re-location to maximise coverage, and remove blind spots, is important.

The attitude of some volunteers to pine must be monitored. Many brigades are very quick to backburn, overkeen in fact. The "strategy" in pine is often to backburn all of it since once into plantation a fire is "uncontrollable". Liason and planning can alleviate these problems somewhat. Undertones of "getting back" at F.C. or private plantation owners were suggested.

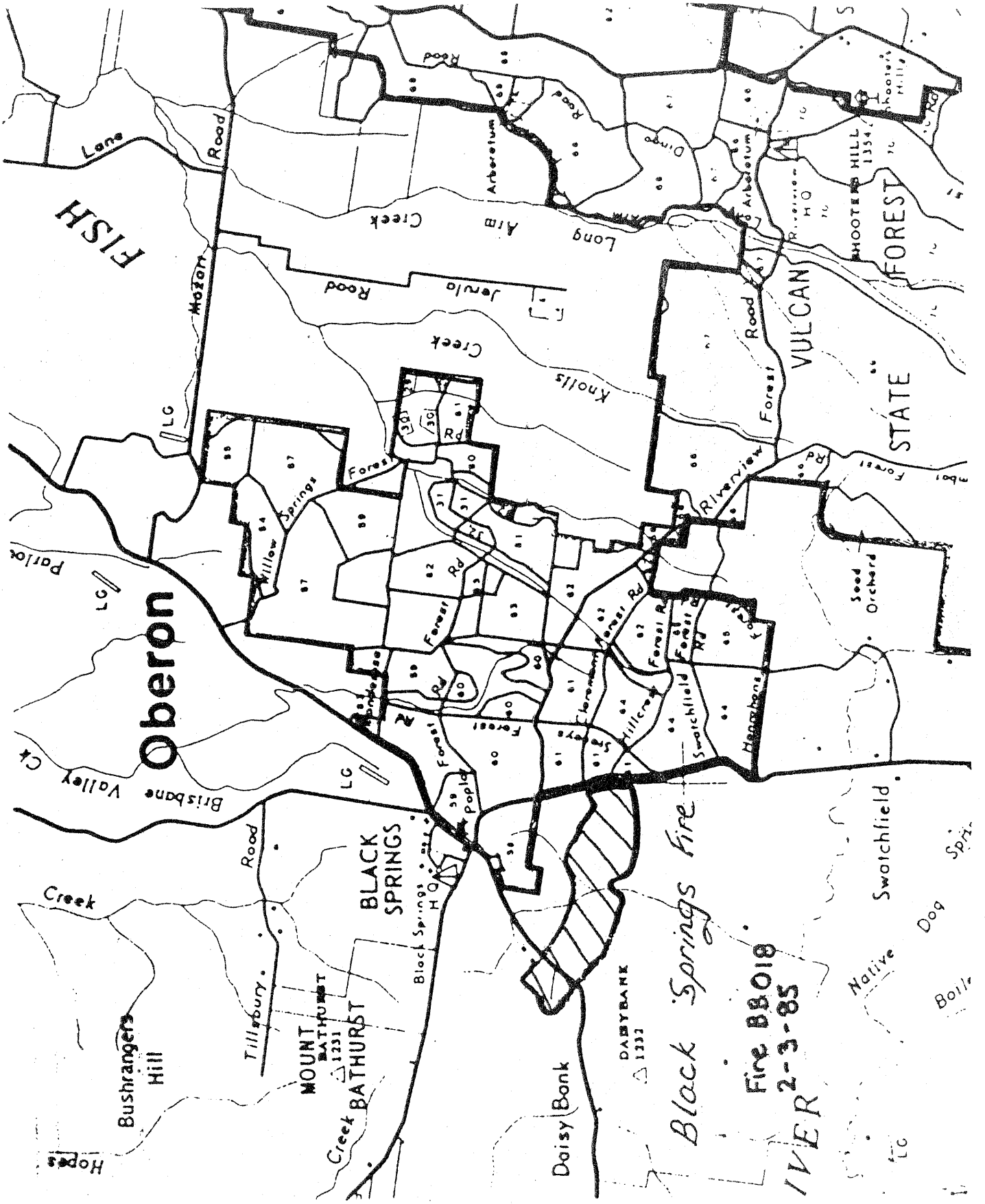
In many cases the loyalty, good morale and ability of F.C. personnel was responsible for converting these fires into near misses. In most cases the first attack strategy was being set up and followed by foreman or forest assistants, without specific direction.

5.2.2. ALBURY 1984/85 SEASON:

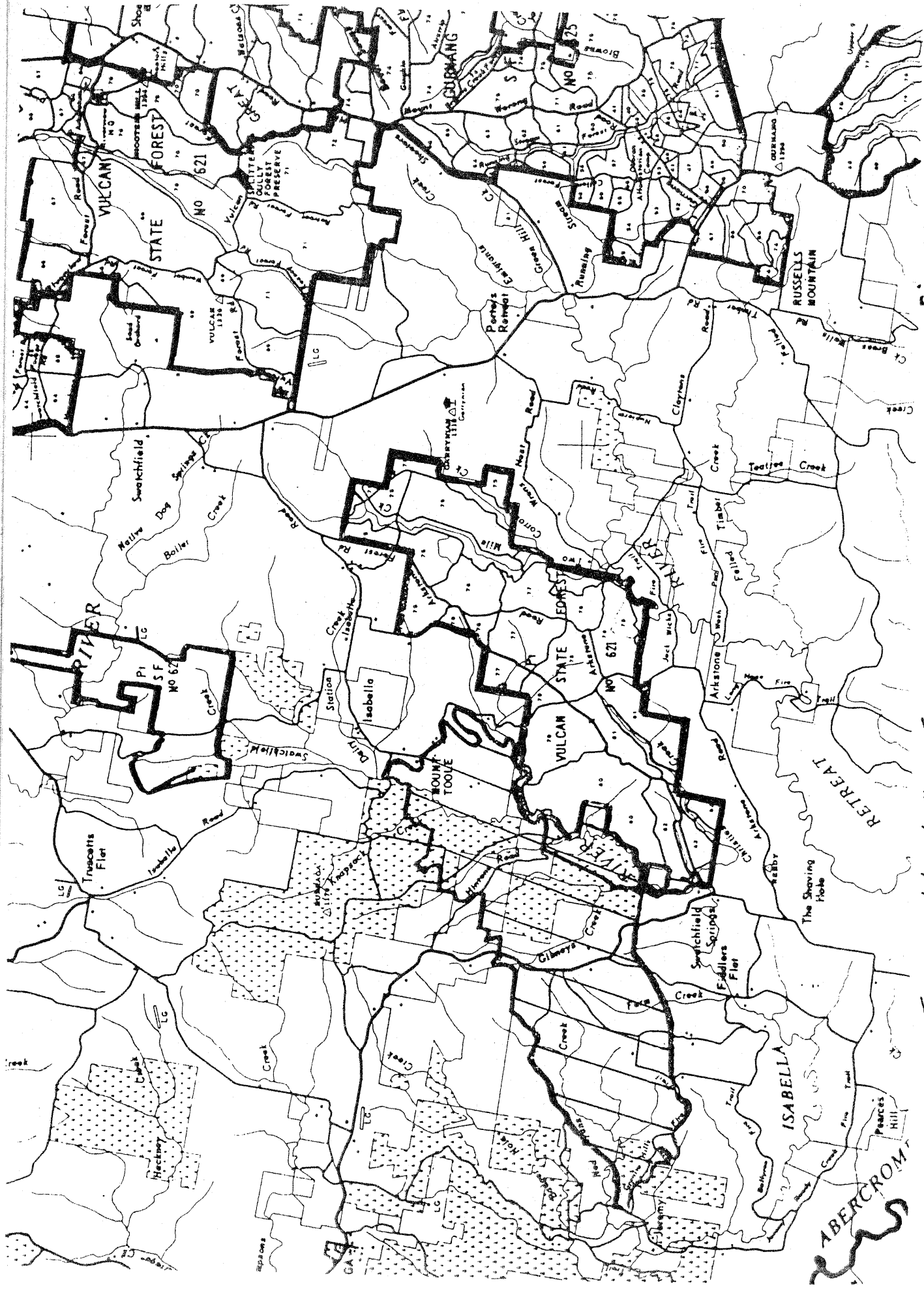
Losses were minimal despite 100 separate strikes in a period of 42 hours. Monday 14.1.85 was a fairly bad day, towers and standby continued after 7:00 p.m.. First strikes were confirmed at 8:00 p.m., dry storms continued till midnight. Next storm occured about 12:00 on 15.1.85 and storm activity continued to 16:00 on 16.1.85. Smoke sightings from dormant lightning strikes continued till the 23.1.85.

The region was involved in major fires from the 15.1.85; Dora Dora, Kinross, Darbalara, Benambra, Spring Creek, Bago/Maragle and smaller fires of significance posed a threat for some days. There were 77 fires in plantation districts, 94 in the region from 14-16.1.85. An unknown but considerable number were not attended, extinguished by light rain or landholders. Fires outside immediate concern severely affected response capabilities of some shires. Wildfires in western and northeastern Victoria added to the problem by blanketing Tumut under heavy smoke, restricting visibility considerably.

Map 8: Black Springs Fire



Map 7: Jeremy/Isabella Fire



A strike in pasture spread to an adjoining scrub and oat paddock. Attack contained the fire to private property except where it burnt 10 metres in S.F. via a retention area, 30ha was burnt, all of it on private property.

5.2.1.2. JEREMY/ISABELLA FIRE 28.1.85:

After an adverse forecast for the day standby was increased to 4 crews. A fire was reported at 13:45 by a Deputy Captain. Brigades were alerted. Shooters Hill tower reported possible smoke at 14:00, confirmed and cross-bearings given 15 minutes later.

Some confusion existed as to the fire's exact location. Crews were dispatched not requiring direction once the fire was sighted.

Crews reached the northern flank. Flame height and wind prevented any direct attack. Volunteer efforts were directed to saving homes and stock. F.C. units were concerned at reaching the southern flank and protecting Vulcan S.F..

Tankers, personnel and machinery were used, the fire being contained after the wind dropped and swung to the east. Backburns were slow since they burnt actively, requiring patrol till they reduced in behaviour.

To the north the fire was contained along a line from Riverview to Isabella. This was secured through private plantation. Considerable conflict developed between shire and F.C. personnel. The shire personnel wished to backburn from a position some distance away from the the fire, in spite of buildings and improvements. This contrasted strongly with attitudes elsewhere where strong objections were raised to the burning of grasslands.

The fire was virtually contained by 19:30 on 28.1.85. Action then consisted of mop up, trail improvement and dealing with spot fires. On 29.1.85 gusty winds forced the open canopy D3 to operate well away from the fire, a closed canopy D6 worked right on the line.

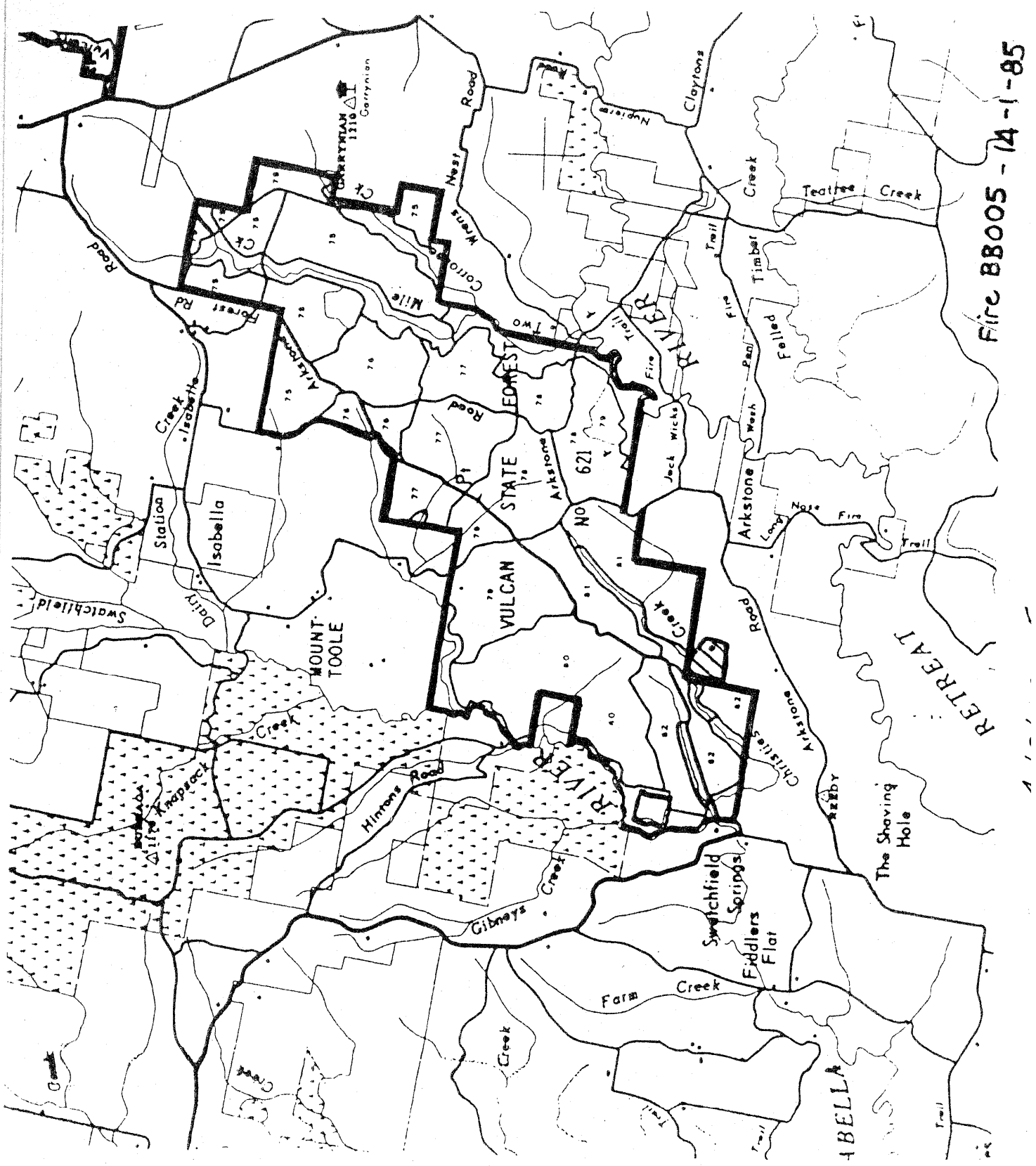
Of the 3900ha burnt, 800ha was private plantation. No F.C. plantation was burnt.

5.2.1.3. BLACK SPRINGS FIRE 2.3.85:

The weather prediction for the day was not severe. An updated early morning forecast indicated "TOBAN" conditions. Standby was upgraded. The F.D.R. was above 32 from 10:00 to 16:00, winds generally in excess of 50km/hr. By 2:00 p.m. 26 personnel were standing by at 6 locations, a D6 on a float at Black Springs.

A fire was reported at 16:00, location confirmed at 16:10. Initial attack was not effective. The fire travelled 2.4km in 33 minutes, reached the Goulburn Road and spotted into the 1961 age class, Vulcan S.F. F.C. units contained the spots which came from a patch of timber 20 metres west of the road. No spotting came from grass fuels. The fire had a very narrow front.

Map 6: The Arkstone Fire



The headfire crowned in the 1966 A.C. soon after entering the forest. It continued to crown along Glengariffe Road ridge until 01:00 on 29.1.85.

The daylight hours of the 29.1.85 were expended in attempting to hold the backburn established the previous night, and hold the fire on Bald Hills Road.

Spot overs were relatively small due to ease of operation for bulldozers and crews in thinned, pruned stands on good topography.

The fire crossed a ridge and began to burn down into the Towac Creek catchment. Its rate of spread slowed. Favourable topography and a previous fire (Glenwood fire) contributed to this. Hand-trails and dozed firebreaks with a large volunteer attendance contained the fire by 20:00 on 30.1.85.

Strong NW-W winds caused part of the fire to burn south despite intensive joint efforts until it reached a previous run of the fire. At 03:00 on 31.1.85 gale force NW winds caused jumpover of part of the southern boundary where the fire had burnt on 28.1.85.. The fire ran quickly SE and by 06:00 had travelled 11.5km. The run stopped when winds abated.

5.1.4.1. POINTS NOTED AND DISCUSSION:

The drop in humidity with the southerly change is a phenomena that should be noted. The change was dry and temperatures increased. Other significant weather factors include the severity of the NW change at 3:00 a.m. and the dryness of the fuel allowing topography to dominate fire behaviour rather than weather.

A helicopter was in use constantly to locate spot fires. Within plantation it is difficult to find small fires more than 100-150m away.

Fixed wing agricultural aircraft were used to drop water on the fire. In forest these efforts were not effective. The pilot is unable to see his target clearly. In open country aircraft may be useful and shouldn't be discounted out of hand.

A major hardwood retention area was significant source of spotting and a sight of entry deep into the plantation.

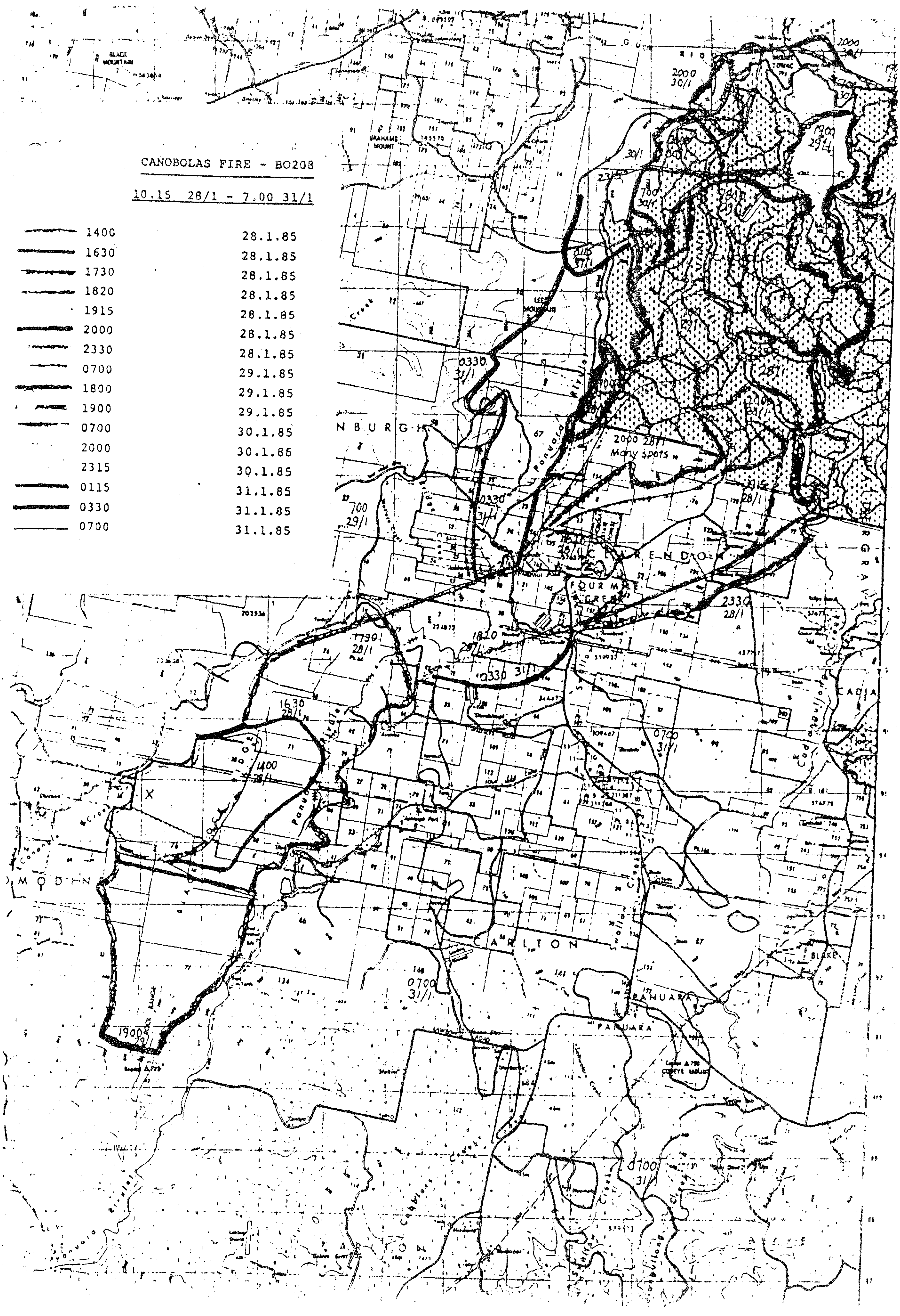
5.2. NEAR MISSES:

5.2.1. OBERON 85/86 SEASON:

5.2.1.1. ARKSTONE FIRE 14.1.85:

Following lightning activity and dry storms Shooters Hill reported, smoke cross bearing from Keogh's Tower. Ground reconnaisance was established in SW of the district. Smoke was detected and Vulcan S.F. crew activated.

Map 5: The Canobolas Fire



5.1.3.5. RETENTION AREAS:

Areas of retained hardwood constituted a major problem. Direct attack was only possible in pine under suitable weather, not in native forest. The creek reserves acted as a medium for fire to enter and travel into the plantation. The were not tracked and not hazard reduced. A lack of crossings and continuity with the plantation caused further difficulties.

Spotting activity often originates from these reserves. Spot fires cause the most concern in these areas.

5.1.3.6 COMMUNICATIONS:

All fires suffered from breakdown or problems in communications. There was a lack of radio contact with the volunteer brigades, hampering co-ordination and strategy. Other difficulties included "shadow" areas where radio contact was poor.

5.1.4. CANOBOLAS FIRE:

The Canobolas fire started on January 28, 1985 burning 9610ha (2439ha of plantation) before it was contained on January 31. A wet year had caused heavy grass growth which was not reduced, stock numbers being low after the 1982 drought. Rainfall for the preceding 3 months was 76% below average. Grass was fully cured. The BKD1 at Canobolas was 372 with a drought factor of 9.

Fire began at 08:30 from an electrical fault near a farm dam 5km south of Charleville section of Canobolas S.F.. The Commission was not aware of the fire till 10:20. NW winds, high fuel levels and steep topography ensured a high rate of spread up Black Rock Ridge. Access to the fire was restricted by terrain and the Panuara Rivulet.

The volunteer brigades concentrated on controlling the western and northern flanks.

At 1400 the fire had burnt 300ha and reached a ridge. All available Orange personnel and equipment were committed. Another fire in Oberon made further F.C. assistance impossible.

A strong wind change to the SW and a drop in RH (32% to 25%) arrived at 15:30. By 16:30 the headfire was uncontrollable. In the 3hrs till 19:15 the fire travelled 9km burning through Charleville section into the 1950 age class. During this run most effort was concentrated on saving homes. Two efforts at containing the headfire were unsuccessful.

Once the older section of Canobolas S.F. was burning it was decided not to attempt control of the headfire. Efforts concentrated on securing the eastern flank against predicted NW winds. This also protected the older sections of Canobolas S.F.. At 21:00 a backburn was commenced along Main Central Road. When the eastern flank was secured the strategy was to cut across the head of the fire. This never eventuated.

At 14:00 a weather change reduced fire behaviour allowing direct attack in the 2 year old plantation. Hardwood retention areas were still out of control. 15:00 weather 18°C, 47% RH, Winds W40km/hr F.D.R. 7. A dozer finally arrived at 15:50. By 18:00 the fire was completely contained. Final area was 294ha. Patrol ended on 9.11.82. A reignition occurred 45 days later from a hardwood stump.

5.1.3.2. NOVEMBER 25, 1982:

The fire was lit in 6 or 7 places in 1952 and 1953 age classes. There had been a TOBAN on that day maximum F.D.R. at Kirkconnell reach 60. Fire was reported at 23:18. Apart from one easily controlled fire the ignitions were burning uphill with a following wind in recent logging slash. Strategy was to contain flanks to compartment roads, prevent fire crossing Sunny Corner Road to the east and save sections of compartments already alight by constructing breaks within the plantation. Dozer arrived 90 minutes after attack began allowing internal compartment breaks to be constructed, a grader had proved inadequate.

Strategy was completely successful the fire controlled by 03:00 on the 26 November. Area burnt was 85ha most of the timber from the 1952 and 1953 age classes was salvaged.

5.1.3.3. JANUARY 8, 1983:

This fire could have been a reignition or deliberately lit. Fire began in slash from a 1982 clearfall operation. Strong westerly winds quickly moved the fire into standing pine.

Standby crew from Jenolan were not able to control initially. Support from volunteers allowed containment along the Jenolan Caves Road. Spotting over the road was a continual danger. Constant surveillance was maintained in this area. Fire was controlled by nightfall and patrolled the next day, a day of Total Fire Ban. Final mop up during the evening of the 9th established a safe fireline.

5.1.3.4. POINTS NOTED AND DISCUSSION:

In these fires there was a problem locating personnel. A poor attitude existed and many refused to be contactable unless paid.

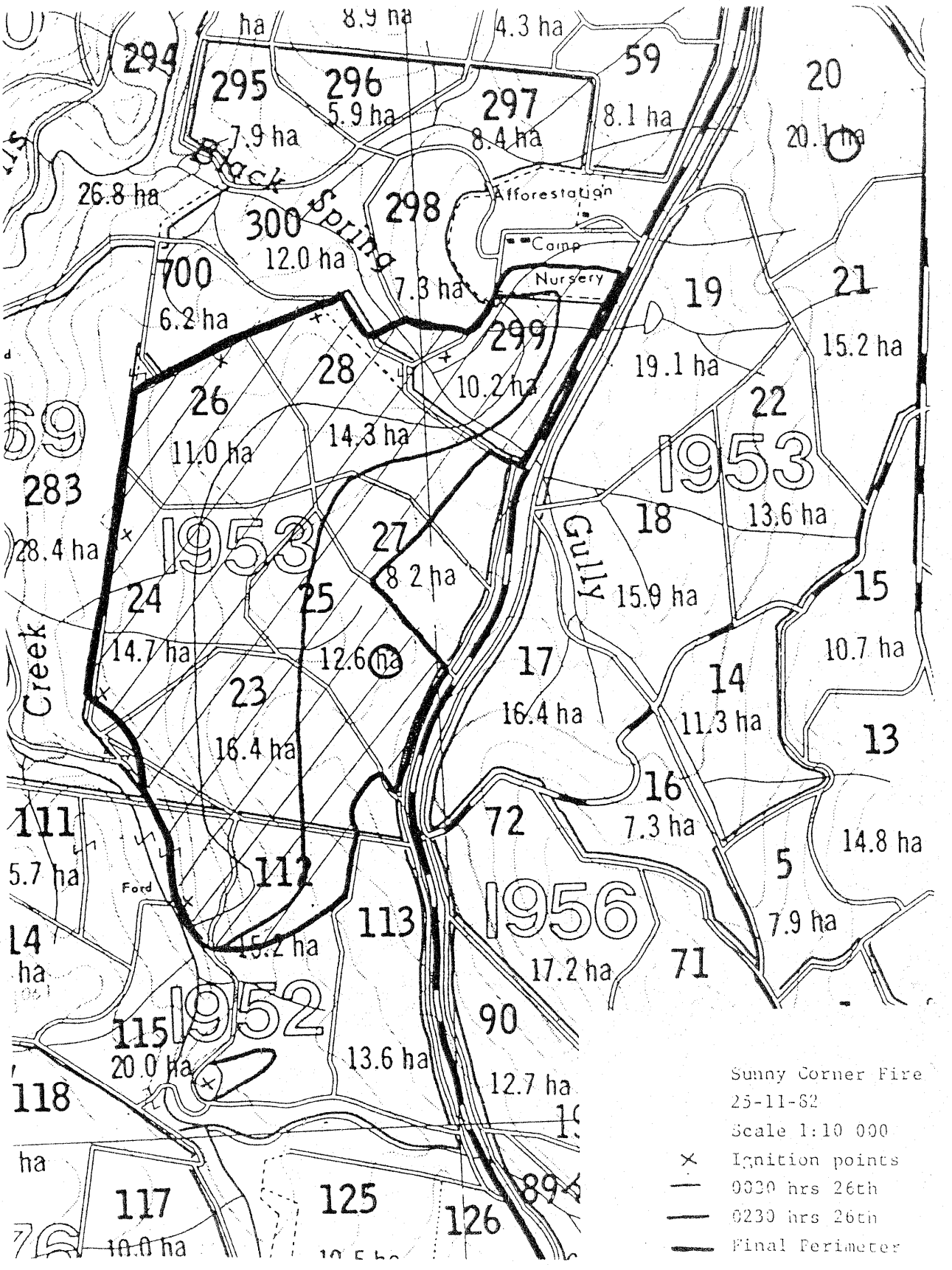
Earthmoving equipment was scarce as was transport for it. In most cases the tractors arrive a long time after being requested.

Roads were one-way in some cases. Once a vehicle enters a road it must continue through due to a lack of places to turn around. There were no crossings through retention strips.

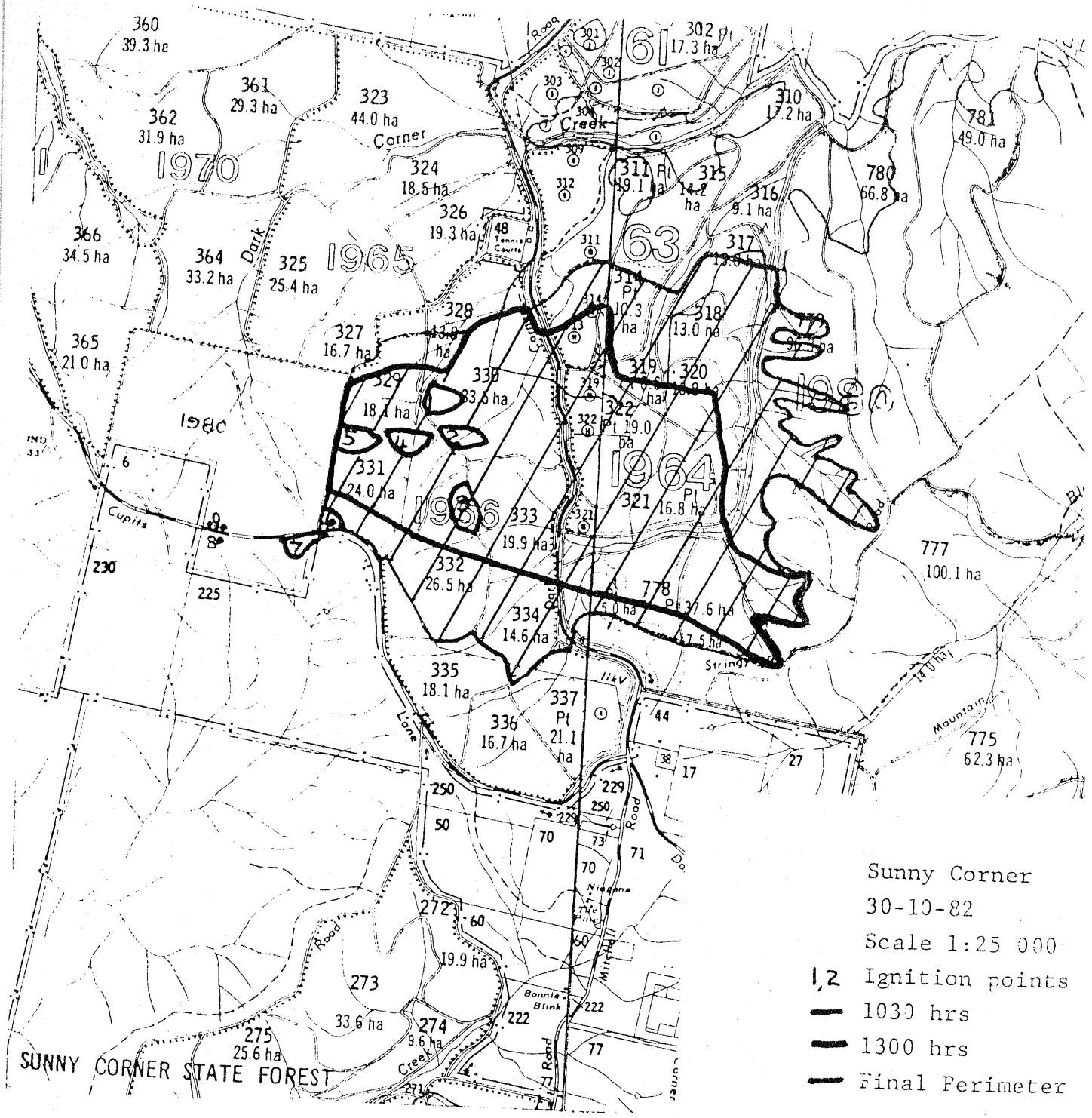
The old pine was clear enough underneath for direct attack to be mounted. Unthinned stands present considerable problems and are only suitable for indirect suppression methods.

Relations with neighbours, and from within the F.C. with employees, is quite poor in some instances. This problem complicates all efforts in relation to fires: detection, suppression, mop up and planning. The incendiarism may be a manifestation of some of this attitude.

Map 4: Sunny Corner Fire 25/11/82



Map 3: Sunny Corner Fire 30/10/82



5.1.2.5. CREEK RESERVES:

The contribution of creek reserves to the fire's spread was important. Some areas of plantation less than five years old had no grass present due to drought. The reserves acted as a vector into these areas.

5.1.2.6 GENERAL:

A lack of spotting activity in the plantation and the very strong convection column, which dominated local winds, meant the forward spread rate slowed in the plantation. Complete absence of grass fuels to carry the fire ensured it did not move northwards through grazing country.

Sub-division roads were in poor condition, hampering control efforts. The ability to maintain these roads is vital to good rapid fire suppression.

Location of spot fires was difficult due to smoke, a poor helicopter pilot and no air-ground communication.

Communication was also a problem between Victorian and Commission forces. The need for good, practiced contact and complementary radios between any two organisations was highlighted.

Within the Forestry Commission the single radio channel proved unable to cope adequately with so much use. A number of emergency channels for each region will resolve this situation.

Volunteer brigades were of two standards. The local personnel were good and effective. Units from Sydney left a lot to be desired.

5.1.3. SUNNY CORNER FIRES:

5.1.3.1. OCTOBER 30, 1982:

There were three fires in the pine that caused damage during the 1982/83 season. All are believed to have been deliberately lit.

The first fire was lit in 9 locations on a total fire ban day, the 30.10.82. Smoke was reported at 09:40. The first crew worked on the first fires it came to. These two fires were put out along with two others before smoke was noticed from the remaining fires.

The final five fires were in logging slash from thinning in 1980. Stronger winds and fire behaviour at the front precluded direct attack. 7 tankers were in attendance by 10:50. Attempts were made to contain the flanks and stop the front on Dark Corner Road. Weather conditions 12:00;26° c 27% R.H., Wind 40km/hr W-N-W, FDR 29 VH. Fire crossed the road, strategy changed to holding the fire at the eastern boundary of the 1963 and 1964 Age class. The volunteer units were deployed on the flanks, 4 F.C. tankers and 2 slip-on units along the new control line.

12:30 crowning and spot fires could not be controlled in the hardwood retention area. Decision taken to fall back to Stringybark Road.

5.1.2.2. BORDER CO-ORDINATION:

Unfortunately the fire could not be controlled while in easier terrain 30km south of the border. Victorian efforts were focused on property protection on the flanks to the south, east and west. Control of the fire was vested in the Victorian authorities. Major decisions were centralised, being ratified from Melbourne. This approach caused some slowing of the decision processes and therefore delays in action being instituted. These considerations made, the Commission should have exercised its rights under the Border Fire Co-operation agreement, and insisted upon providing assistance. There may well have been political ramifications of such action. The losses sustained in plantation alone would have soothed considerable political upset.

Earlier liason, F.C. personnel in the Victorian control room, would have been an advantage in terms of better communication, understanding and persuasion.

It is very important to have control or excellent liason in relation to country that influences the protection of the plantation estate.

5.1.2.3. EVACUATION PROCEDURES:

Routes and strategies for evacuation are not usually written into fire plans. Some guidelines and means of retreat would be valuable. Training and planning of same may be desirable. A single tree across the road for those exiting from the eastern side of the Bondi fire could have been fatal. The timing of retreat should be given emphasis in such planning.

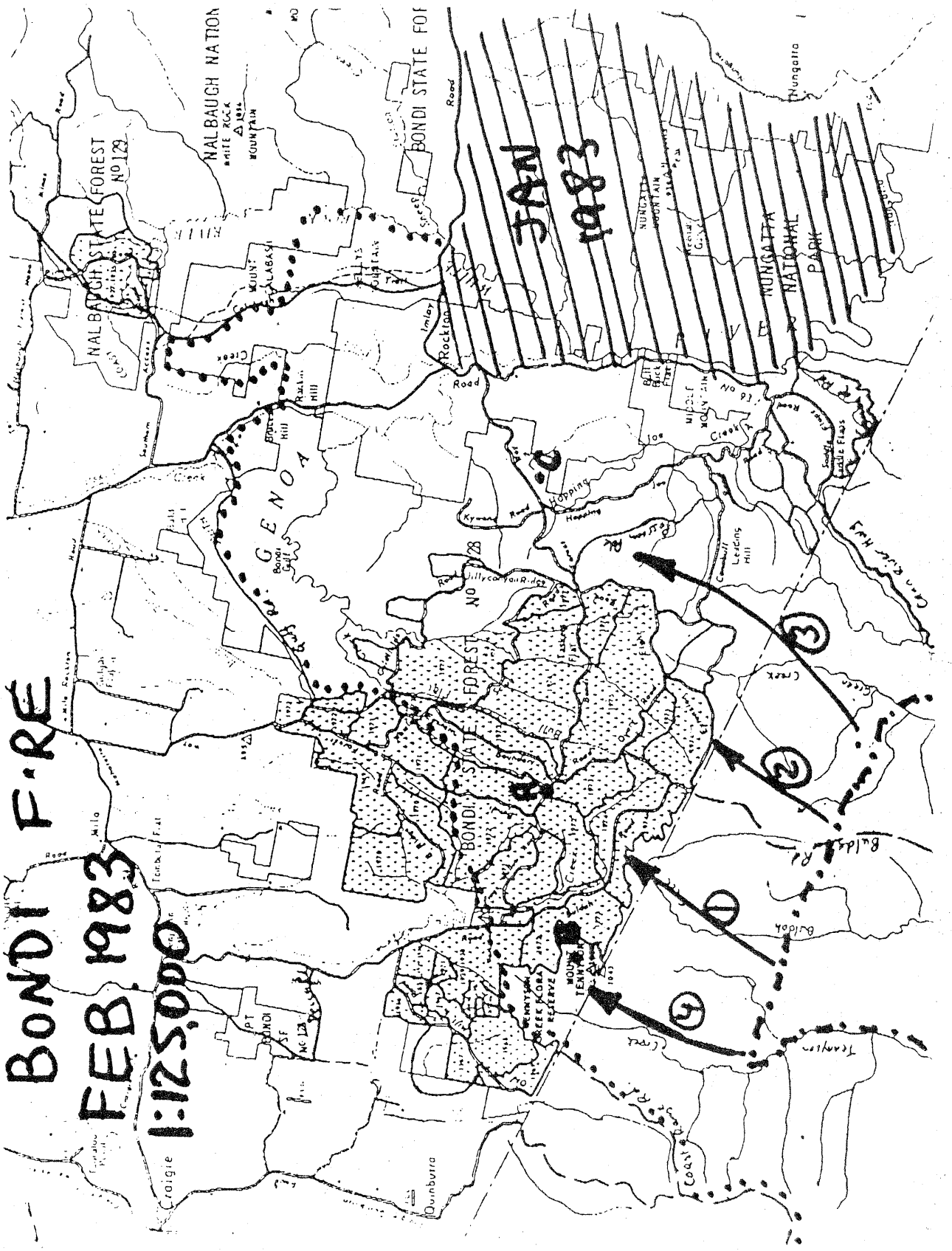
5.1.2.4. STRATEGY:

A potentially more effective suppression strategy could have been to fall back into the plantation and work from a major road. Under the extremely dry conditions and high fuel loads there was no chance of holding the fire at the hardwood/plantation boundary. Terrain, time and conditions were against such a move. The problems inherent in selecting this strategy are based in sacrificing plantation area, and the politics therein.

In a situation where effort must be directed within plantation some choices can be made related to age-classes. Mature pine is salvageable and as the South Australian fires showed doesn't suffer degrade in wood quality due to fire. Recently planted areas can be replanted. The medium age sub-merchantable stands will be the more difficult and costly to re-establish while representing significant losses of added value. These first and second thinning age classes probably represent the best bet for optimising resource saved with suppression cost.

In drought conditions fires can come from unexpected directions. The historical or statistical "norm" may not be valid for developing prevention or suppression strategy. Worth noting is the fact that both of our largest pine fires entered plantations from the south or south west. Predominantly sources of fire are to the west and north of forests. When particularly bad long-term drought prevails, all sides of the plantation are at risk.

Map 2: The Bondi Fire



The fire broke out on the eastern flank. The Victorian effort was split to deal with this, leaving fewer people to slow northward progression. Sydney Bureau of Meterology forecast a minor southerly for early on the 9.2.83. The Melbourne Bureau predicted a strong change 12 hour in advance of the Sydney estimate, winds 100-120km/hr gusts to 160km/hr. The decision was made to withdraw men and equipment to safe locations. The fire front was 18km wide. Time and equipment were insufficient to complete and backburn the break.

The fire would be larger than F.C. personnel and equipment could contain. It would threaten private plantation, national parks and private property. Bega Valley Shire may also be in danger. Planning, order and preparation needed to be made for post blow-up suppression. After consideration of these points a 41F emergency was declared, prior to the change arriving.

Men and equipment working on the Western Section were withdrawn to Bondi Camp. A trench was constructed to protect the heavy equipment. Transport was readied, facing the direction of withdrawal. The fire passed west of the camp as well as east. In order to avoid unnecessary exposure to smoke and heat an evacuation was carried out with reliable personnel in the lead vehicle and the last vehicle. A consideration in ordering the evacuation was the difficulty of maintaining calm, order and rationality amongst all 90 people present, under such conditions.

Equipment was still operating on the eastern side of the plantation. Once it was realised the change was particularly severe men and equipment were withdrawn to a large road junction. At this time fire was everywhere. Vehicles were dispatched to check escape routes and stop further traffic coming into the area. Some clearing was done to provide added protection to the equipment left. As the final group departed the fire overtook the area. Fire-storm conditions in the area destroyed a caravan, moved an old bus 30m, and gutted it completely.

After the change flame heights exceeded 150m and spot fires ignited in Nalbaugh plantation 23km away. The fire front had progressed 18km in 90 minutes much of it by spotting activity. The fire burnt through the plantation at $100,000 per minute. The fire front was now about 55km in N.S.W.. The fire was controlled in four days, mop-up and patrol completed by 9.3.83..

5.1.2.1. POINTS NOTED AND DISCUSSION:

The unrestricted hire of bulldozers to create a break against a fire that may never arrive is not likely to be approved by H.O.. Nor is the deliberate sacrifice of plantation area in the same situation. The plantation area is not bordered to the south by a road that is suitable for forest protection works or for basing suppression actions against wildfire from that direction.

The district is now in a position where the planted area south of Buldah road is not able to be defended without further treatment, construction of breaks and planning. Plantation design is a factor in this case where it seems too much area has been planted for protection aims to be met.

A helicopter would have been invaluable, to pick up line and fire bosses show them the fire, obtain information and put them back again. Use of the helicopter bucket may depend on the state of the forest being burnt. Unthinned stands may not be suitable for helicopter buckets.

5.1.1.4. GENERAL:

The fire was able to be held on plantation roads but only where topography was gentler. The roading pattern was for 50 acre compartments. The Commission now has 50-80ha (125-200ac) compartments. In future the loss of plantation, due to suppression based on compartment roading, will be greater.

Strategy was not organised due to communications problems. Battery back-up for all stations is now installed. A portable link in each major pine region should be ready for deployment in case of failure.

The number, suitability and training of employees needs to be maintained to ensure the districts can mount an adequate suppression effort.

Chainsaws need to be suitable, reliable and well maintained. Stocks of heliflat should be held in districts to replace damaged hose immediately.

All F.C. tractors are now fitted with lights which are tested as part of the daily service.

5.1.2. BONDI FIRE:

This fire started as a lightning strike on 31.1.83 about 28km south of the Victoria-N.S.W. border. The plantation borders the border. The fire burnt to the east under the influence of strong westerly winds. Light to moderate sea breezes pushed the fire north in the late afternoon and evening.

The Victorian efforts were concentrated about settlements and scattered farms on the western, southern and eastern flanks of the fire. By the 6.2.83 these fronts were contained and the attack switched to the northern flank. A series of backburns were tried. Aeroburning from the backburn to the fire front was frustrated by smoke and orders from Melbourne restricting activity to ridge-burning only.

About this time the fire's potential to enter N.S.W. became evident. Following a meeting with Victorian authorities the N.S.W. Forestry Commission began to prepare the border road as a fire break. Winds from the south-west caused spotting of 3.5km and the Victorians abandoned their last proposed control line. Extra tractors were requested to prepare the Border Road firebreak and refused due to lack of funds. Line was built at the rate of 50-100m per hour. There was 10km required. The adjacent high quality Eucalyptus fastigata forest contained a dense understorey, unburnt in living memory.

The suppression was directed at saving hectares. Breaks were put through compartments but the fire was usually across prior to completion. Building line through 14 year old pine is difficult and leaves large amounts of heavy fuel which can make the trail useless as a firebreak.

Extra personnel were flown in arriving in time for mop up. Orientation and briefing was difficult in the dark. Tankers were also borrowed. After 12 hours travel the operators required sleep.

The fire was controlled on December 5 two days after it began, patrol ending on the 12th of December. In all 2500 ha were burnt, 971 ha of S.F. plantation and 320 ha of private plantation were destroyed.

5.1.1.1. POINTS NOTED AND DISCUSSION:

5.1.1.2. BKD1 AND FUEL MOISTURE:

The difference in BKDI at Bathurst and Canobolas highlights two important factors. Local knowledge, such as Canobolas 400 = Bathurst 700, and the consequences of such high figures should be noted in fire plans and used in assessing readiness levels. Secondly the location of weather instruments for data to calculate fire related indices should be such that they accurately reflect actual fuel states.

BKD1 is a reflection of long-term rainfall deficit and indicates the dryness of the soil. Soil dryness influences larger fuels (>75mm diameter) and live foliage moisture. Both fuel types were significant for this fire.

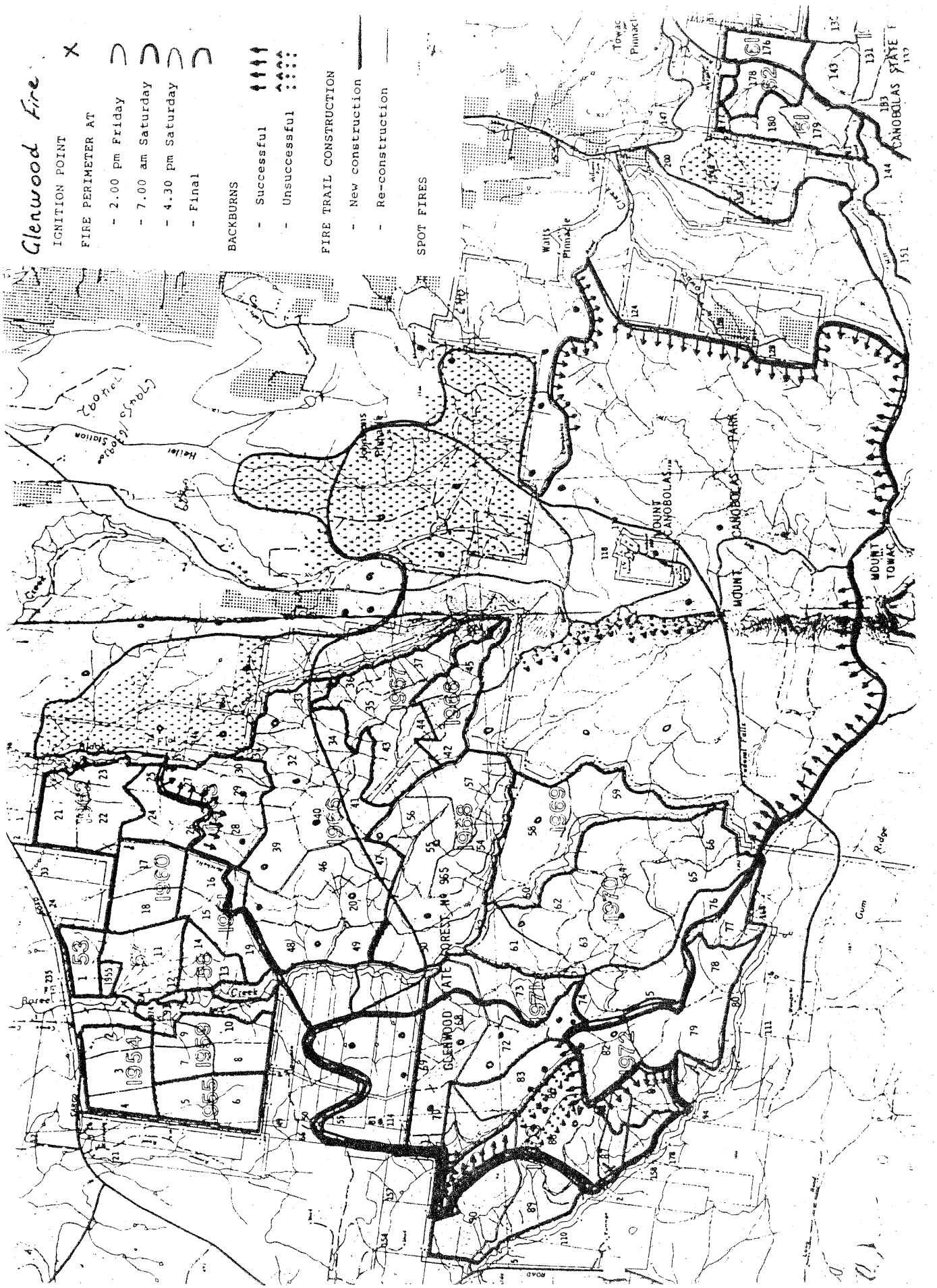
The main spotting activity was from the bracken, blackberries and biddy bush. There was no spotting from the junction zones of backburns and the fire. The fire crowned 3 rows in from the road at 11:00 p.m.. Both facts are indicative of extremely dry fuel.

5.1.1.3. AIRCRAFT:

Agricultural aircraft dropped 138,500 litres of water on the fire. Reports of effectiveness vary. General view is that in open grass country the method could be good since the target can be seen. In forest where fires are obscured by canopy, and tree crowns intercept the drop, aircraft are wasted. (An analogy of cicadas in the trees and certain of their bodily functions was drawn).

For surveillance, planes were important. There was an aircraft up virtually all the time. Some difficulties with radio were experienced in talking to Bathurst. The VHF aircraft air-to-ground radios now in regions should alleviate this.

Map 1: The Glenwood Fire



On 3.12.82 a lightning strike caused a fire in the plantation. The day of the fire was not a "bad" fire day. Fire towers had closed down due to poor visibility and rain. F.D.R. at Spring Hill Airstrip was 9 with 30 km/hr N.W. wind, 52% RH and a maximum temperature of 25°C. At the fire RH was possibly 30% putting the F.D.R. at 20. The D.F. was on flexi-leave and the forester at home having lunch.

A gang located nearby attended the fire. The foreman refused to allow the tanker to push through the pine, afraid of the damage that may have been caused to the tanker. The initial attack failed, insufficient hoselay being available to the gang after damaging heliflat hose in previous suppression action. The chainsaw, a Poulan, was in the workshop its normal place of abode.

The stand had been recently low pruned. Attack by hand was not successful due to fuel loads of pruned material, bracken, biddy bush, and blackberries.

Another lightning strike knocked out the radio base which was not repaired for 1 1/2 hours. Early attack was therefore difficult to organise. The fire burnt through a major land line, that should have been underground and wasn't, resulting in loss of all emergency service radio for a further 5 hours on Saturday. In the initial stages the fire was not contained. A Section 17 declaration meant overall control of the fire was no longer vested in the Commission.

A float took 4 hours to organise. The F.C. tractor had no lights and was therefore not able to be used at night. The fire was held till 1:00 a.m. then lost, held again at 7:00 a.m. and lost completely at 9:30 a.m..

The fire suppression effort kept falling back and losing control at each line of defence as this was done. Since there was poor communications and didn't have administrative control of the fire there was no overall effort to re-group and set strategy.

The volunteers are more familiar with grassfires. Many had not been into a pine forest. This new experience under such conditions made some very frightened, and all needed to be closely supervised. Volunteers were keen to backburn everywhere, especially around orchards, houses and property. This often started new fires and helped the fire spread east. The suppression action was very disjointed.

The steepness of the terrain (50% of it >20° slope) caused significant problems. As a result of the topography roading was narrow, poorly maintained, not conducive to safe travel, nor suitable as firebreaks. The southern boundary was not roaded. Travel times on most roads were slow.

4. PLANTATION VALUES AND PROTECTION COSTS:

Table 2 of Plantation values below sets out the replacement cost of the current plantation estate and its value.

TABLE 2 PLANTATION VALUES (REPLACEMENT COSTS)

Region	Total Value	Value/ha
Albury	$148 100 000	$2036
Bathurst	112 600 000	2063
Eden	29 900 000	2004
Batemans Bay	13 900 000	2689
Glen Innes	23 400 000	2372
State	327 900 000	2085

Costs for protection of the plantation divided into maintenance, detection and suppression are set out in Table 3.

TABLE 3 PROTECTION COSTS BY REGIONS

1985/86 $ per 1985/86 ha

	Maintenance	Detection	Suppression	Total
Albury	6.06	2.36	3.40	11.82
Bathurst	8.66	4.69	3.57	16.92
Eden	4.89	2.75	4.02	11.66
B/Bay	6.00	10.83	3.29	20.12
Glen Innes	7.50	3.95	0.81	12.26
State	6.93	3.58	3.34	13.85

Maintenance costs include low pruning, water supply and road upkeep.

From Tables 2 and 3 it can be seen that the 157 000 hectares of plantation attracts significant costs and has very high replacement value.

5. MAJOR FIRES:

5.1 LOSSES:

5.1.1. GLENWOOD FIRE:

1982 was the worst fire season in Bathurst history. The BKDI was over 600 for 9 months in Bathurst. Local knowledge indicates that Oberon and Orange lag behind Bathurst, that a reading of 400 at Canobolas is similar to one of 700 at Bathurst.

At that time Bathurst Region had only 85 employees, 22 in Orange District. Up to this fire there had been an attitude that Orange did not have fires and none had been reported. As a result, the crews had received little training in fire suppression.

TABLE 1: AREA LOSSES DUE TO FIRE

i) 51/52 - 81/82

		%(85/86 ha)
Albury	632 ha	0.9
Bathurst	1336	2.4
Eden	211	1.4
Batemans Bay	1458	28.2
Glen Innes	88	0.9
	3725	2.4

i.e. 0.08% /annum

ii) 82/83 - 85/86

Albury	neg	-
Bathurst	3818	7.0
Eden	6457	43.2
Batemans Bay	neg	-
Glen Innes	neg	-
	10275	6.5

i.e. 1.62% /annum

iii) Totals 51/52 - 85/86

Albury	632	0.9
Bathurst	5154	9.4
Eden	6668	44.7
Batemans Bay	1458	28.2
Glen Innes	88	0.9
State	14000	8.9

i.e. 0.27% /annum