



Submission No.253

A SUBMISSION TO

HOUSE SELECT COMMITTEE ON THE RECENT AUSTRALIAN BUSHFIRES

INQUIRY INTO THE RECENT AUSTRALIAN BUSHFIRES

Submitted by

**with an attached separate report to the Bushfires Council of NSW on
THE NEED FOR PUBLICITY ON BUSH FIRES AND THEIR EFFECTS
August, 1979**

A SUBMISSION TO

INQUIRY INTO THE RECENT AUSTRALIAN BUSHFIRES

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Summary of the matters dealt with in this submission

This submission is based on the author's experience in bushfire prevention and control, and observing and considering the effects of bushfires in the natural environment, this experience outlined in the *Introduction*.

The first of the major sections of the submission is a review of a report to the NSW Bushfires Council in 1979 following the severe bushfires in the Blue Mountains in December, 1978, and which is still relevant to today's circumstances. That report, entitled *The Need for Publicity on Bushfires and their Effects* was concerned primarily with bushfires in the Outer Sydney region, but provides an outline of how the bushfire prevention and control organisation developed in New South Wales, and deals with many of the problems facing bushfire fighting authorities to this day. The review also provides an outline of the material on attitudes to hazard reduction burning and the need to educate the general public to be more accepting of this practice. The report deals with several matters raised in the Terms of Reference and a copy has been presented with this submission.

The section on *The Effects of Fire on the Elements of the natural Environment* relates to the matters raised in Item (c) of the Terms of Reference in relation to the environmental impact of hazard reduction.

The third section on *Bush Fire Prevention and Control in the Snowy Mountains region* relates to the matters raised in Item (b) of the Terms of Reference including land management practices and policies in national parks, State Forests and other Crown lands; and item (d) in respect of land management policies to mitigate the damage caused by bushfires to the environment. It deals particularly with the Kosciusko National Park, an area in which the writer has had considerable experience. It also proposes that prescribed fire and prescribed grazing be used as management tools in the national park estate rather than the badly flawed concept of total protection.

The fourth section on *The Brompton Fire Rat in Bushfire Control* relates to Item (e) in the Terms of Reference dealing with an implement which has proved to be very effective for bushfire prevention and control in grassland areas, and which should be very effective in handling bushfires breaking out of forested areas into open country. There is a final section listing material which would be appropriate to a bushfire data base.

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Introduction,

The author's experience and involvement with bushfires

The author of this submission is a graduate in agricultural science with training in botany and soil science and a range of other related subjects including forestry. He was employed by the Soil Conservation Service of N.S.W. for 21 years from 1947 to 1968, transferring to the Western Lands Commission in that year and retiring as Western Lands Commissioner in 1984.

From 1963 to 1968 he represented the Soil Conservation Service as a trustee of the Kosciusko State Park and a member of the Hume-Snowy Bushfire Prevention Scheme, a body responsible for bushfire management in the Kosciusko State Park and surrounding areas of the Snowy Mountains region. At that time the practice of hazard reduction burning was being widely researched in forest and woodland areas surrounding the KSP. The experience in that region will be discussed under a later heading entitled *Bushfire Prevention and Control in the Snowy Mountains Region*. The writer also represented the Dept of Conservation on the National Parks and Wildlife Advisory Council when that body was established in 1967 along with the National Parks and Wildlife Service.

In 1969 there were widespread fires in the mallee country in the Mt. Hope region of the Western Division. As Assistant Western Lands Commissioner, and working with the Bushfires Branch of the Chief Secretary's Dept, The writer was instrumental in establishing the Mallee Bush Fire Prevention Scheme co-ordinating measures for prevention and control of bushfires over an extensive area of several million hectares of mallee country covering parts of three shires in the Western Division -- Cobar, Central Darling (based on Wilcannia) and Carrathool (based on Goolgowi in the Central Division, this being accomplished in 1972.

The winter of 1974 gave every indication of a huge bushfire situation developing in the following summer. At that time the West Darling was not (and is still not) incorporated into shires, leaving the seven bushfire brigades in this region (covering a total of over nine million hectares) outside the ambit of the Bushfires Act. Again, working in co-operation with the Bushfires Branch, the author was instrumental in bringing the seven bushfire brigades under the umbrella of the West Darling Bush Fire Prevention Scheme providing an administrative framework to operate under the Bushfires Act. It also provided a co-ordinating framework for bushfire prevention and control over the whole region which was very effective in limiting the extent of fires in that region.

In the 1974-75 season in the Western Division there were 108 ignitions attended by volunteer bushfire brigades, 83 being caused by lightning strikes. These burned over 3.754 million hectares, the great majority being in mallee country, primarily in the central and south-western portions of the region. Recognising the nature of the threat, the relative lack of radio communication and manpower and mapping available to the brigades, the Western Lands Commission provided a framework for the field staff of all government agencies staff involved in land use and management to provide intelligence and communication services to brigades and fire control centres in the field.

1976-77 was another serious fire season with 347 ignitions (326 from lightning) of which 224 ignitions were in the West Darling unincorporated area and the adjoining Central Darling Shire.

The experience of the 1974-75 season and the co-ordination developed under the two Bush Fire Prevention Schemes kept these fires to less than a quarter (905,000 ha) of that burnt in 1974-75 season. The West Darling BFPS had been equipped with a Brompton Fire Rat, a machine fitting to the three-point linkage of a wheel tractor, able to cut a clean ditch-furrow and fitted with drip-torch for backburning operations. This proved very effective in handling several fires and preventing their spread. Its application to other areas is discussed under the later heading *The Brompton Fire Rat in bushfire control and prevention*.

The success in co-ordination of firefighting efforts over such vast areas in these two seasons led to the establishment of the South West Mallee Bush Fire Prevention Scheme in 1978, this embracing the Balranald and Wentworth Shires and part of the Central Darling Shire in the far south-west of the State. This provided an umbrella organisation for the 21 volunteer bushfire brigades in the region, able to arrange funding for strategic regional community firebreaks and their continuing maintenance.

The three community Bush Fire Prevention Schemes mentioned above were all modelled on the Hume-Snowy Bush Fire Prevention Scheme, each having a constitution setting out the responsibilities and roles of the constituents (Shires, bushfire brigades, government agencies, fire control officers, etc.) and, in the case of the incorporated areas, making provision for community fire trails in country in which roads were few and far between.

A feature of the 1974-75 fires, occurring under conditions of high grass fuel volumes under mallee vegetation also with a heavy load of leaf and bark litter were the convection columns which developed on occasions, even at night. The writer is aware of three such events in that series of fires, the columns moving out ahead of the main front, generating a huge noise and very strong winds. This would seem to be the nature of the event which struck the Stromlo Forest and the suburb of Duffy on the 9th. January, this year.

Following his involvement with the 1974-75 fires in the Western Division, the writer became a member of the Bushfire Council of NSW representing the Western Lands Commission. In that capacity he was the co-author of a wide-ranging report on *The Need for Publicity on Bush Fires and their effects* following the 1978-79 fires in the Blue Mountains area. This report elicited much information of value to this Inquiry. It has been reviewed herein, and a copy attached to this submission.

In view of the extreme difficulties in handling fires in the mallee country which occurred over much of the Western Division, the writer was able to interest the CSIRO Rangelands Research Unit based on Deniliquin in undertaking a research program to study the nature of fire on the mallee and its effects. The unit also investigated the role of fire in discouraging and controlling scrub infestation which was severely inhibiting productivity over a large proportion of the Western Division. The excessive rainfall seasons which sparked the widespread bushfires in the Western Division in the 1970s, was also responsible for a further wave of scrub invasion extending westward into central Australia and northward into central Queensland

Following his retirement from the Western Lands Commission in 1984, the writer operated as a Rangeland and Environmental Consultant, being engaged on one occasion, to report of the effects on the environment of the Conargo-Jerilderie Fire of December, 1986. In the latter capacity he has maintained his interest in bushfires and their effects, and the place of fire in shaping and managing the environment.

REPORT TO THE BUSHFIRES COUNCIL OF NSW FOLLOWING THE BLUE MOUNTAINS FIRES OF DECEMBER, 1977

This Report was developed by a sub-committee of the Bushfires Council, the writer serving in a secretarial and research capacity. It is still very relevant, in many parts, to the Outer Sydney and Blue Mountains area following the serious fires there in recent years. For that reason, some relevant aspects are reviewed briefly and a copy has been provided with this submission. The main theme of the Report was the need for educating the public, and the various fire control organisations on the benefits of hazard reduction burning. The writer believes that that need is still very relevant.

The title of the Report was *The need for improved publicity on bushfires and their effects*, and the Terms of Reference were as follows :--

1. The need for an expanded education program to publicise :
 - (a) the benefits and need for hazard reduction;
 - (b) the methods of protecting housing and other property in bushland areas;
 - (c) the responsibilities of local government for hazard reduction fire prevention and fighting fire outbreaks;
2. The role of bushfire fighting personnel and of local government in implementing any extension program which may be recommended.
- (3) Whether there is an expanded program for training bushfire fighting personnel.
- (4) The role of the media in keeping the public informed on developments as they occur in a serious fire situation.
- (5) The resources likely to be needed to implement any recommended program

The *Introduction* to the Report provided a brief review of the Blue Mountains fire of Dec. 1977.

Most important was the influence on the fire as it passed over the area burnt in 1968 compared with the area which had not been burnt since 1957. The intensity of the fire in the lighter fuel loads (1968 burn) was calculated (Hutchings, 1978*) to have been only one quarter of the intensity of the fire in the heavier fuels (1957 burn), notwithstanding the much worse weather conditions on the Sunday that the fire passed through the area of the 1957 burn, rates of spread in the lighter fuels were only half those experienced in the heavier fuels. The Report also includes a table from Hutchings (*op. cit.*) showing the relationship between rates of fuel accumulation and fire intensity in relation to period of exclusion of fire, the fire intensity (as measured by kilowatts of heat energy per metre of fire front) being approximately proportional to the amount of fuel accumulation.

In another section of the Report, Hornsby Shire Council reported that on five occasions in recent years (to 1977) major wild fires had been contained because of hazard reduction work. On another occasion, coinciding with the day of extreme fire danger in the Blue Mountains, when several Hornsby brigades were engaged on those fires, local firefighters were able to ignore a fire in areas hazard-reduced the previous winter. One such fire went out of its own accord, the other had flame heights of only two metres compared with crown fires in the area where they hazard had not been removed.

It was reported at the time that several Outer Sydney Shire Councils employed hazard reduction gangs in appropriate seasons, the best arrangement being where a gang was employed to do all the necessary preparation work during the week, with the local bushfire brigades carrying out the hazard reduction burning on week-ends., this also providing valuable training for the brigades.

The Report also outlines the development of the bushfire brigades organisation, as related by R.H. Luke, a former senior office of the Forestry Commission with a lifetime of service in bushfire prevention and control.

The Bush Fire Prevention Associations in the coastal and tablelands strip began with the Hume-Snowy Bush Fire Prevention Scheme in 1952. Nine other prevention schemes followed in 1958 in the wake of the Leura fires (1957-58) which spurred the authorities to accept the proposal put forward many years previously for the protection of the vast areas of unoccupied crown lands which generated many fires to threaten farming and urban areas along the coastal plain and contiguous mountain ranges. Prior to this there were only half a dozen or so bushfire brigades along the coastal and tablelands strip between the Victorian and Queensland borders. Now (1978). there were hundreds, many being involved in co-operation with the Forestry Commission and bushfire prevention associations in the protection of the coastal strip. Those bushfire prevention associations were instrumental in re-kindling interest in local volunteer bushfire brigades and awakening shire councils to their responsibilities in bushfire control.

A full account of the history of the bushfire fighting organisation is given by Luke and McArthur (1976) in "*Bushfires in Australia*" published by the CSIRO Div. of Forest Research.

It is pertinent to point out that those bushfire prevention associations were concerned with bushfire prevention and control in unoccupied Crown lands. With the conversion, in recent years, of many such areas to national parks and similar areas, they have come under the purview of the National Parks and Wildlife Service. Being no longer Crown lands the bushfire prevention associations have been dismantled and the areas concerned now subject to the management plans developed by the Service. In respect of the environment, this largely becomes non-management.

As part of the Terms of Reference, the Report covered a range of relevant subjects, as listed below :--

- Shire Council attitudes
- Public attitudes
- Problems arising from changing population composition
- co-operation with other bodies in educating the public
- Design of subdivisions
- Design of housing -- and the need for education in such design
- Good house-keeping
- Being present (during a bushfire)
- Publicity
- Powers of local government councils and other bodies
- The role of the Bushfires Council in relation to local government
- The role of the Bushfires Council

A total of 34 recommendations, listed under each of the Terms of Reference were made to the Bushfires Council.

Under the heading of *Public attitudes* there were a number of points which are worth making to this Inquiry -- because it is misconceived public attitudes to hazard reduction burning that are primarily responsible for the present unsatisfactory situation in relation to hazard reduction.

Relevant council staff and most councillors were well aware of the benefits of hazard reduction. There was sometimes a problem of educating councillors. There were problems of a council approving of a hazard reduction program after which councillors were then importuned by conservation-conscious ratepayers who were able to have approved programmes postponed pending further discussion of conservation issues in council. Although council might reaffirm the approval, the opportunity for effective hazard reduction had often passed because of unfavourable weather conditions.

Most councils had problems with protesting "conservationists" with occasional confrontations. This meant that council staff had to make doubly sure that there would be no burning on privately held land.

Often the anti-burning campaign comes from one or two over-zealous landholders who are able to rally support. In some cases they have been suitably impressed with the results and, subsequently have been the first to do a hazard reduction burning on their own properties. This confirms the view that most opposition comes from a minority of ill-informed persons who do not appreciate that there are degree of burn less than holocaust level. It points very strongly to the need for public education so that ill-informed opposition can be recognised for what it is

Two councils in the Central Coast area have solved the problem by taking every opportunity to have the fire control officers talk with service clubs and progress associations. 95% acceptance is usually achieved when a few bushfire brigade members are present and able to lead the discussion along sensible lines. In this way the councils have been able to get community acceptance and support, even in areas where they expected strong opposition.

There needs to be an understanding by the public that the excessive quantities of fuel that build up on the forest floor after 20-30 years of freedom from fire is not part of the natural scene, nor is the holocaust-like fire which consumes that fuel under severe weather conditions.

There also needs to be an understanding by the public that the nature of the fuel in an Australian forest is very different to that in the northern hemisphere where the foliage is soft and rots away as humus in a few months. The leaf of the *Eucalyptus* species is slow to decay because it contains an antibiotic which inhibits decay and may take 15 years to leach out of the dead leaves.

There needs to be an appreciation that prescribed burning for hazard reduction is getting much closer to the natural condition than the resent situation of long-term buildup of fuel followed by catastrophic damage to the forest and the urban environment sometimes mixed up with it.

Finally, there needs to be recognition by those responsible for fire prevention that, for hazard reduction to be acceptable to the discerning environmentalist, they need to develop techniques and systems that will enable some hazard reduction burning to be done in the summer months to ensure the necessary "diversity" of environment. The only case that the environmentalist has against hazard reduction burning is the fact that it is mostly done in the autumn and winter with the result that the burns tend to encourage species responding to burns at this time of the year and eventually cause the disappearance of species dependent on summer burns which would have been the norm in the natural environment prior to European settlement (Bell, 1977)

The Report goes on to consider ways by which public acceptance of hazard reduction burning might be secured.

REFERENCES

- * Bell, F.C. (1977). *Forest Ecosystems – their future in NSW*. A Total Environment Control Publication.
 - HUTCHINGS, P.T. (1978). *Fire frequency in the Blue Mountains and the 1967 and 1977 wildfires in retrospect*. CSIRO Interim Report
 - LUKE, R.,H. AND MCARTHUR, A.G. (1976). "*Bushfires in Australia*". CSIRO Division of Forest Research. Canberra. 1976
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THE EFFECTS OF FIRE ON THE ELEMENTS OF THE NATURAL ENVIRONMENT

This section of the Submission relates particularly to
Item (c) in the Terms of Reference, viz.,
the environmental impact of hazard reduction

As a senior officer of the Soil Conservation Service of N.S.W in the 1960s, the writer represented the Service as a Trustee of the Kosciusko State Park, and as a member of the Hume-Snowy Bush Fire Prevention Scheme, and as co-chairman (with a senior officer of the Snowy Mountains Hydro-Electric Authority) on the quarterly soil conservation conferences, these being instrumental in inspecting and ensuring the stability (in terms of catchment condition) of all the Authority's construction works. All three bodies had bushfire prevention and control as strong interests.

Arising from these interests he was exposed to the research on fuel reduction burning being conducted in the southern tablelands montane forests and sub-alpine woodlands by the Forestry and Timber Bureau at Canberra. He also inspected the results of some of the research burns in the field (McArthur, 1962). and was duly impressed with its potential as a means of reducing the risk of ignitions and the damage to the environment resulting from ignitions in high fuel loads, especially in severe water conditions. Particularly could he see its potential in protecting the Snowy Mountains region which had been devastated by the 1938-39 fires and threatened from the west in the 1956-57 fires. Most impressive was the minimal adverse effect of the control burns on the forest floor vegetation, and the trees, and its potential for maintaining a grassy forest floor which had been the pre-settlement condition of most forest areas in Australia. But the Soil Conservation Service executive of the time was not keen on the idea of burning in the KSP montane and sub-alpine forests and woodlands. However, after observing the horrific damage to the steep slopes of the Tumut Valley above Ravine in the March 1965 fire, the writer undertook a detailed study of *The Effects of Fire in relation to Soil Conservation*, reviewing the then research in Australia and worldwide on the effects of fire on the natural environment. This review covered the following aspects :-

Fire as a feature of the natural environment in Australia and other countries.

The effects of fire on various aspects of the environment

1. Animal life
2. Plant life (trees, shrubs, ground flora and plant litter)
3. Plant nutrients
4. Soil conditions (physical conditions, soil moisture and plant litter)
5. Catchment condition.

The Conclusions from this study are apt today (comments in brackets in a different type-font have been included with the benefit of hindsight).

The review (of research literature worldwide) has shown that occasional burning of forest lands, as would be carried out by prescribed burning under mild conditions of temperature, humidity, wind velocity and fuel moisture, can do little harm to the forest environment. In most respects, the environment is improved by such practice.

The soil of small amounts of soil by erosion must be admitted, although research carried out in relation to prescribed burning in forest areas indicates that there was negligible loss from burnt areas compared with the amount coming from roads and surfaces within the forest which were

naturally bare irrespective of burning. Many researchers and reviewers have pointed to the extreme danger of which results from allowing vegetative material to accumulate in an environment which must be visited by fire (as has happened in the Kosciusko State Park in the year 2003 with fires allowed to burn uncontrolled for several weeks which, in most summers, will normally have several days of high and even extreme fire danger -- see below re the 1957 fires in this area). Fuel reduction burning is a regular and recommended practice in grasslands and forested country in many parts of the world.

The effects of fuel reduction burning on the occurrence of wildfire must also be considered

Greatest cognisance must be given to the premise that occasional firing is a natural feature of the Australian environment. Early explorers report systematic use of fire by the natives to attract game. Recent trends of the frequency of lightning strikes in long protected forest areas suggest that what the Aborigines did not burn would eventually be burnt by wildfires from lightning strikes. (It is well known that the greater the volume of fuel on the forest floor, the easier the ignition by lightning strikes and the less chance of such a strike going out of its own accord.)

It is reasonable to assume that the breaking up of the countryside into blocks by Aboriginal burning would have limited the area susceptible to damage by wild fires.

An assessment of weather conditions in relation to the pattern of fires started by lightning strikes in the Hume-Snowy district in the 1967-68 season indicates that this was a year in which the whole of the Snowy Mountains area would have been burned over by mild and moderate fires had these fires not been put out by bushfire brigades. Fuel conditions were extremely dry but no days of extreme fire danger occurred. In burning extensively over the mountains, these fires would have removed much fuel which now remains and which now makes the country very susceptible to the risk of extreme damage by wild fire in the near future. (It seems that we have had to wait until 2003 for this prediction to come true, with over sixty years of fuel accumulation and undergrowth since the widespread 1939 fires, adding to the severity of the damage.)

Granting that occasional firing is a feature of the Australian forest environment, and granting that all other warm-temperate and sub-tropical regions of the world have had fire as a natural feature of the environment, the place of fire in relation to catchment and catchment protection must be considered in this light. Fuel reduction burning attempts to emulate the natural conditions by burning under carefully controlled conditions with the aim of doing minimum damage to the environment (in the areas so treated).

It is considered that the fire control authorities and other bodies must regard fuel reduction burning as more acceptable than total protection (from fire), realising that total protection is impossible, and that near-total protection will cost much more than the community is prepared to pay. Fuel reduction burning carried out under properly controlled conditions must also be regarded as more acceptable than a policy of leaving natural fires to burn themselves out (with always the risk of the consequences which struck Canberra in Jan. 2003), realising that much of such burning will occur under conditions of higher fuel accumulation and adverse weather conditions than would be permitted under a prescribed burn.

The report on this study was presented to the executive of the Service with appropriate recommendations as to the implementation in the Snowy Mountains region under the management of the Hume-Snowy Bush Fire Prevention Scheme. Its application to that region is discussed in the following section.

BUSHFIRE PREVENTION AND CONTROL IN THE SNOWY MOUNTAINS REGION

This section of the submission relates to the matters raised in Items (b) and (d) of the Terms of Reference

It is necessary to appreciate that small fires, and occasionally large and hot fires, had been a regular feature of the montane forests for aeons, initially as part of the Aboriginal approach to land management. Since European settlement, the stockmen who had run sheep and cattle in the summer-time snow leases followed a practice of burning off the old grass in the late autumn when such fires were likely to go out at night as increasing humidity and sharply decreasing temperatures made it difficult for a fire to maintain itself. In this practice, the stockmen were following much the same practice as the Aborigines had used.

The region was visited by widespread and serious fires in the summer of 1938-39, as was the Victorian forests and alpine areas. There was always concern, following the establishment of the Kosciusko State Park and the Snowy Mountains scheme about stockmens' fires escaping into timbered areas. But it is interesting to note from statistics on fire ignitions in the region that ten years after the cattle and stockmen had been taken out of the region, the number of ignitions each year had been of the same order as previously.

The Hume-Snowy Bush Fire Prevention Scheme was established in 1952 following the establishment of the Snowy Mountains Hydro-Electricity Authority with the concomitant need to protect the works centres scattered through remote areas in the mountains and, most importantly, the catchment areas to the many storages for electricity generation and irrigation needs in the Murray and Murrumbidgee river valleys. The Management Council of the Scheme was chaired by the Commissioner for Forests with the Forestry Commission providing administrative and operational services. Other bodies represented were the SMHEA, the Soil Conservation Service of N.S.W., the Kosciusko State Park Trust, and representatives from shire councils. The emphasis was on the construction of fire trails to provide access to remote areas and lines for backburning in the event of fire.

Many of the Eucalypt forests surrounding the Kosciusko State Park were State Forests and logged for timber supplies based on the mills in Tumut. The Forestry Commission would have been practising control burning in these areas, the techniques being refined by McArthur's (1962, 1966) research on control burning following his earlier work with the Forestry Commission at Tumut. This research was able to determine the rate of fire spread, flame height, etc. in relation to wind speed, ambient temperature, fuel volume and fuel moisture. In the late 1960s the techniques of aerial ignition for control burn were developed, this enabling the coverage of large areas with scores of spot fires which burnt into each other quietly and went out before developing any momentum. Weather conditions were carefully selected in advance to ensure mild burns with only occasional scorching of the foliage in the tree crowns.

As hazard reduction burning became accepted into the Scheme's fire management program, such burning was carried out within the Park area in most years. This continued through to the early 1980s, together with work on the maintenance of fire trails and those former Snowy Mountains Authority construction tracks which had been accepted as fire trails under the Scheme's fire management program. The Hume-Snowy Bush Fire Prevention Scheme had been established

under the Soil Conservation Act, although this legislative backing was apparently repealed, the Scheme continued to operate.

In the mid-1980s period, the Kosciusko National Park had developed a management plan under the National Parks and Wildlife Act, this plan also making provision for fire management. There was conflict between the Hume-Snowy Scheme's fire management plan, and the Park's management plan, the NPWS policy being against hazard reduction burning. As the Park's management plan was backed by legislation, the Hume-Snowy Bush Fire Prevention Scheme disappeared into the mist.

There are three other points worth mentioning in the context of protecting the environment of the Snowy Mountains region. The first is in relation to the effectiveness of hazard reduction burning, the second in relation to the effectiveness of positive fire management plans in protecting the environment in forest and alpine areas :--

(1) The 1965 Yarrangobilly fire had come up the steep scarp on the eastern side of the Tumut River on one day and raced across the snowgrass plain north of Kiandra on the following day, posing what would have appeared to be a serious threat to the town of Adaminaby about 30 kms further east within the following couple of days. But that threat disappeared when the fire petered out in an area of forest off the eastern side of the Park which had been hazard reduced in the preceding years under the Hume-Snowy scheme.

(2) There were a lot of lightning strike fires ignited in the Park area in 1967-68. But these were put out by bushfire brigades which were obviously able to get to them on the network of fire trails and construction roads left by the Snowy Mountains Hydro-Electricity Scheme. These fires would have also been relatively easy to put out many ignitions would have been in areas protected by fuel reduction burning, or moved into areas so protected, enabling much more effective use and deployment of fire-fighting forces resources.

(3) In addition to the fires which lightning strikes in the Kosciusko National Park in December-January of 2002-03, there were, at the same time, lightning strikes and ignitions in the forest country surrounding the Park. Significantly, there was no publicity about these fires - - because they were in areas subject to hazard reduction programs and were put out quickly by fire-fighting teams before they could get away. This is the first principle of fighting bushfires -- get to the fire quickly and get it under control before it gets a head of steam.

These points illustrate the difference between a positive fire management plan for the State Forest areas and having a fire non-management plan for national parks, nature reserves and wilderness areas.

An important consideration arising out of these examples, is whether present NPWS policy is to allow fires in remote areas of the Park to continue on the grounds that it is a natural event and hopefully rain (another natural event) will soon put them out. But wildfires in a 20-year accumulation of leaf and bark litter and scrubby undergrowth are not natural events for most Australian forests.

The other consideration is that it is now difficult to get to fires in remote areas and there aren't enough fire-fighting personnel to do the job anyhow. Has access to these trails been blocked in the interests of keeping the public out of remote areas (a good fire control measure). If so, it

would be preferable to have these trails maintained sufficiently to facilitate access by fire-fighting vehicles when needed, and as a basis for controlling hazard reduction burns.

One of the problems is that the Service's estate is now spread so widely as a result of the current Government's keenness to keep on establishing national parks and nature reserves and wilderness areas, but without the resources to manage them adequately. In the early years following the establishment of the NPWS, there were a sprinkling of ex-foresters on staff, these having training and experience and an ethic in bushfire control. The writer recalls a specialist fire control officer being brought from Tasmania to head the fire-fighting organisation in the NPWS. One suspects that this approach to bushfire control in national parks has been allowed to lapse as the forestry-trained people have moved on with the passage of time.

It is expected that the situation will become worse as some State Forest areas, currently under a fire control regime with adequate fire trails, are added to the huge area of forest without such protection in national parks and wilderness areas.

There is also a perceived environmental problem with fuel reduction burning in that the ecologists see a need for hot burns as well as cool burns in order to maintain biodiversity -- fearing that fuel reduction burning will promote those species that thrive in cool season burns, and disadvantage those species that might thrive with hot season burns. Ideally, to maintain control of a fire situation, fuel reduction burning needs to be done in the later autumn while weather is cooling down rather than spring when an unscheduled day of high fire danger can occur and the weather is warming up with increased risk of escapes.

With the availability of aerial incendiaries, it would be possible to establish a regime of fire control in regions in which the outer perimeters (which would adjoin private lands and perhaps expensive developments) of large areas of natural forest could be subject to a continuing regime of cool-season burns, with large areas within the outer perimeter area subjected to control burns under cool and/or warm conditions and at different times of the year. However, that would require a special hazard reduction burning service with its own operatives and equipment, but able to provide training for training for volunteer bushfire brigades in organisation and operations. Although it might be seen as costly, the cost would surely be less than the experience of the last few summers when difficult-to-control fires on urban fringes have destroyed millions of dollars worth of homes and public buildings. The cost of fighting such fires has also become astronomical

The Service has copped a lot of flack this summer, and in previous summers, from neighbouring landholders and bushfire brigades who have been critical of the Service's firefighting effort. But it is now patently obvious, as it has been for years, that national parks and similar areas need positive management for fire prevention and control rather than *laissez-faire* fire management plans

The Consequences for the Kosciusko National Park of the 2002-03 fire season

Fire in natural areas usually means new life, but the capacity for new life depends on the nature of the fire. With the huge area that has been visited by the fires of December-January, 2002-03, we must hope and pray earnestly that the initial rains following the fires will continue

to be gentle but copious. That will allow grass and herbage and, hopefully not too many shrubs, to restore the areas bared by the fires. Although much of the fire would have occurred in mild weather, the sheer volume of fuel on the forest floor, and in the dense undergrowth in so many areas, would have ensured a very hot fire in most areas. Where the fires were working up steep west-facing slopes, the damage will have been catastrophic.

Large areas of mountain ash, much of it appearing after the 1939 fires, will have succumbed, as it has done in a severe fire on the slopes of the Tumut Pond in the 1970s, giving these slopes a strong grey tinge against the green of the regenerating young ash and associated species. The density of this young stems will form a severe fire hazard for the future. Most of the other Eucalypts in forest areas will recover by epicormic branching

If the fires in the summer of 2002-03 have moved into the higher sub-alpine and alpine grasslands, the enormous volume of live but very dried snowgrass, with only about 5 % or less of green stems, would also have ensured catastrophic conditions, with the biomass reduced to ash and blown off in the winds to expose the bare soil. If heavy rains occur before there is good ground cover, there will be catastrophic erosion on steep and moderate slopes. If there is poor ground cover when the first snows fall, the erosion during the coming spring from frost heave in the freeze-thaw conditions which occur every night, will again be catastrophic.

The consequent erosion will send much silt into the storages of the Snowy Mountains Scheme. The objective in establishing the Hume-Snowy Bush Fire Prevention Scheme was to prevent such from happening by adequate protection against fire. We have taken the stockmen out of the mountains and created wilderness areas largely free of human interference, and intervention, the Hume-Snowy Bush Fire Prevention Scheme also having been dismantled. But these policies have left the consequent unnatural environment, and the very substantial investment in the Snowy Scheme, very vulnerable

This applies also to national parks and nature reserves and wilderness areas which have been established along the coastal and tableland strip of New South Wales. The conditions resulting in multiple lightning strikes in remote country, as happened in the high mountain regions of Victoria and New South Wales in the summer of 2002-03 will occur in other areas. The longer such areas go without a policy of strategic hazard reduction burning, the greater will be the damage to their environments.

Grazing as a Fire Protection Measure -- and as a Tool for enhancing Wildlife Habitat

Although the thought of having domestic livestock in national parks and nature reserves is anathema to the conservation movement, and to most professional conservationists, the damage to the ecology which might be caused by livestock would be miniscule compared with that which Kosciusko National Park and other national parks, nature reserves and wilderness areas will suffer from the catastrophic effects of fires in heavy fuel loads.

The writer was a senior officer of the Soil Conservation Service of N.S.W when the cattle were being removed from the Snowy Mountains snow leases in the early 1960s. Although he favoured the idea at the time, he has since changed his mind, with the wisdom of age and experience and increasing knowledge of what can be done with intelligent grazing and other

forms of management in improving the ecology of what are essentially, not really natural areas -- because of the substantial changes which have occurred, particularly in forest and woodland areas since European settlement. The need is to consider positive management of natural areas as distinct from total protection (= non-management).

The writer spent much time in the alpine and sub-alpine regions of the Snowy Mountains in the 1960s -- in planning and supervising the erosion reclamation works on the Main Range north-east of Mt. Kosciusko, and other areas, and in planning erosion and catchment surveys in the region. In the process he spent much time walking the country above 1800 metres, including the Jagungal area in the upper Gechi catchment, and driving through lower country where there were established tracks. He was also co-chairman of the quarterly Snowy Mountains Soil Conservation Conference which involved field inspections on most the construction tracks into otherwise remote country. This provided the opportunity to become very familiar with the montane and sub-alpine forests and woodlands all over the then Kosciusko State Park.

He has also had the opportunity to visit much of the Park area in the late 1980s. He found several instances in which the ecology of the area had declined as a consequence of total protection :-

- (1) Large areas of former grassland in the upper Gechi catchment (Valentine River) around the Jagungal area are now under dense scrub, making this formerly excellent walking country virtually impossible to walk through, other than on the established fire trails. Bushwalkers were preferring to use the adjoining freehold country, still under cattle grazing, and largely free of inhibiting scrub. The other problem in the Park area is the near-disappearance of the close ground cover, this having been replaced by the highly flammable scrub. Areas without ground cover tend to be prone to soil erosion from overland flow under the scrub.
- (2) In many frost-hollow valley areas, the snowgrass is overgrown, mostly dried out and only a leaf or two in each tussock indicating any sign of life. This is the situation which the Aborigines and, later, the stockmen used to set alight on their way out of the mountains each late autumn, knowing that such burns would normally go out by nightfall. The result was fresh new growth in the following spring, with space for other species to maintain their place in the biodiversity -- and something to encourage wildlife to such areas in the case of the Aborigines, to provide usable forage for the later domestic livestock
- (3) A major problem with the long-dried-out snowgrass is that the natural herbivores of the area can't use the country so affected for forage. Their foraging is confined to small areas around the huts and former stock yards where the fertility resulting from use by the former domestic livestock, and the constant grazing by the native livestock, has kept the snowgrass fresh and green, and continually palatable. It is these places that the native wildlife will be found in the evenings as they feed.
- (4) A continuing problem with all protected areas is that the lesser species in the plant communities, are being pushed out by the dominants in the ground cover communities. This is particularly the case in the sub-alpine grasslands that are now either almost mono-specific stands of snowgrass, or are being taken over by scrub species which compete for light, moisture and nutrients to the ground cover species. Ecological communities need some form of disturbance to allow the lesser (and hence more likely to be endangered) species to maintain

their place in a community. At the higher altitudes, extremes of temperature in the winter provide the necessary disturbance. In the sub-alpine grasslands, woodlands and the montane forests, that disturbance can be provided artificially by prescribed fire, or by prescribed grazing by domestic livestock. Most importantly, these two approaches can also be used to reduce fuel loads -- to minimise the risk of extreme damage to the ecology and soil in severe fire situations.

Cattle were removed from sub-alpine and montane forest regions in the early 1960s; ostensibly because they were perceived as the cause of the erosion problems on the Main Range and some other areas. It would be reasonable to expect that cattle and sheep, depasturing in huge numbers in the mountains during the 1895-1902 drought would have been responsible for some of the erosion on the Main Range. However, it is now pertinent to ask to what extent the January 1939 fires, and the subsequent heavy rains, in excess of 300 mm in each of February and May of that year, may have contributed to the perception of cattle being the cause of this erosion.

There was erosion also in earlier times in the sub-alpine freehold country adjoining Kosciusko National Park on its eastern border. But this erosion has been repairing itself over the last 50 years in spite of its continued use by sheep and cattle. This recovery has taken place for much the same reasons that the widespread erosion which occurred in the tablelands, the western slopes wheat belt, and the semi-arid and arid rangelands further west, has been largely repaired over the latter half of the 20th century. Currently, the biggest erosion problem in the sub-alpine freehold country is due to wombats digging their holes in the very steep slopes above some watercourses, and over-using the surrounds.

Fire and grazing as management tools for "natural" areas.

National parks and wildlife authorities in North America are looking increasingly at using domestic livestock to manage and improve habitat for native fauna, particularly birds and beasts (Severson, 1990). In recent years, also, there have been marked advances in the science and art of grazing management in which stock can be used in varying densities and time periods to produce particular results. The need now is to remove the blinkers on both fire and grazing and consider them as tools for management in supposedly natural areas to create and maintain environments which will be attractive to a range of wildlife, and much safer from the adverse effects of catastrophic wildfires.

Currently, there is a problem in introducing such a regime into areas of forest or grassland with such explosive fuels. -- in selecting areas and times in which forest or grass can be burnt with a minimum of damage to the environment. A problem also applies to the introduction of domestic livestock. In the overgrown snow grass they would find very little sustenance.

There is a problem for the environment in the present situation in unburnt areas in that, in the standing and mostly dead snowgrass, there is virtually no re-cycling of nutrients. On the other hand, there is a substantial store of nutrients waving in the breeze, with little hope of getting back into the soil unless it is burnt. Or, it can be trampled with heavy short-term grazing so that the dead plant material is put back in contact with the soil where the decomposition processes can begin working again. This is what happens with the large numbers of herbivores in the wild, being chased by feline predators in the African grasslands, and which used to happen with the huge herds of bison in North America.

To avoid using fire, it is possible to use large herds of hoofed animals for a short time, if necessary driving them to create the necessary herd effect. It would probably be difficult to entice commercial cattle owners back into the subalpine and forest areas on a permanent basis. But it should not be difficult for the management authorities to lease cattle for this purpose, or even own their own cattle. Portable electric fencing can be used to confine cattle, or to discourage their use of certain areas. Such an approach would also have the effect of providing green feed for the native herbivores presently confined to former stock camps and similar areas.

However, in the current situation in the Kosciusko National Park, with areas in which the mostly-dead grass has been removed, or opened up by fire, there would be an opportunity to introduce livestock into such areas as the grass recovers, within two or three years, to be able to withstand short-term heavy grazing to maintain its vigour, and to promote or maintain the biodiversity of the plant, and subsequent animal communities.

The need is for the National Parks and Wildlife Service to discard its total protection mentality and establish a management service for these purposes.. This would initially be on an experimental and research basis, but primarily to demonstrate to the doubters that there is a sensible way to manage the national park estate using prescribed fire and prescribed grazing for particular objectives.

Much of the Kosciusko National Park will be in a tender conditions for some time following the 2003 fires. It will need TLC and intelligent management to get it back into good condition. The time to start moving in this direction is now, rather than wait for the next conflagration to raise all these issues again.

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THE BROMPTON FIRE RAT IN BUSHFIRE CONTROL

This machine, so named because it looks a bit like a rat, is a smaller version of the fire plough used in outback Queensland to quickly establish firebreaks. The standard fire-plough cleared a break some 2-3 metres wide by scraping the grass off the surface with two heavy blades arranged in a V. The Brompton Fire Rat fits to the three-point linkage of a small or large wheel tractor, using the hydraulic power of the tractor to cut a very clean break about 60--90 cms wide, in a broad V about 5-10 cms deep. It is also fitted with a drip torch which can operate on the grass fuel on either side of the cut line to be able to extend the width of a firebreak by backburning against the wind, or with the wind once the downwind side of a break had been secured by a backburn.

Its big advantage over a grader is the very clean and fuel-free cut, whereas the grader, or the standard fire plough scraping a trail, is likely to occasionally ride over a roll of grass building up in front of the blade and leave a fuel connection across the break. The Rat is light enough for two men to load it on to the back of the standard ute, with two men also being able to unload it and fit it onto a tractor fitted with 3-point linkage. The spoil material is pushed to each side of the cut, serving to widen the break by half-burying the grass and half-smothering any fire which might get into this material.

The Bushfires Council worked with the agricultural engineering section of the NSW Dept of Agriculture at Glenfield in developing and improved model in which the cutting blades were extended by detachable blades, these being used to spread the spoil material, and clearing debris so that the line cut by the BF Rat could also be used for firefighting vehicles with greatly reduced risk of punctures. The triangular point at the front of the blades was also given a downward tilt so that it worked at a set depth in both sandy and clayey soils without the need to be making adjustments to the 3-point linkage for different soil types. In operational mode, the Rat has worked at speeds of 10 kmh.

It is ideal for widening a firebreak alongside existing roads or track, using the Rat widen a break from an initial 10 metres to 50 and a hundred or more metres in three successive passes. It is also ideal for rounding up spot fires before they become too large, establishing a burnt break across the front, then working around the sides and the back to tie it up. It is ideal in treeless grassland country, but can be used in country with scattered timber or scrub, taking care to avoid logs and fallen branches which might lift the blade off the ground if caught underneath.

The Bushfires Branch and the Western Lands Commission arranged a series of demonstrations of the Rat in each of the shires throughout the Western Division in early 1976. These were in a range of fuel types, all very successful, including one at Cobar in dense metre-high Queensland blue grass with flame height to 3-4 m under a mild breeze and a single cut not breached anywhere when the fire reached a downwind side at an angle of 40°. Several of the machines were supplied to Western Division shires after these demonstrations.. These were used on several fires in the 1976-77 fires with excellent results, being preferred to graders when available on a fire front, and sometimes working in parallel with a grader to establish a burnt break about 100 m wide ahead of a fire front.

Once the front is controlled the Rat can then carry out a rapid backburn along the side on which the fire may next be expected to move. On one occasion, when a lightning fire broke out in a discrete range of hills near Ivanhoe, the unit from Balranald, 200 km away, was on site and rigged up in three hours. Being unable to work in the stony and rocky hill country, it encircled the hill country with two cuts about three metres apart, the bushfire brigades then merely having to wait for the fire to come out and ensure that it didn't jump the two cuts – which it didn't. The big advantage of the Rat in grassland and woodland country was its mobility, cleanness of cut, and ability to be fitted to any wheel tractor with a 3-point linkage.

Applicability to the Canberra 2003 fires and elsewhere

The implement is mentioned in this submission because it could have been used very effectively to control those fires as they came out of the forest country into the grassland country surrounding Canberra, and to keep the fires out of the Stromlo Forest. Knowing the conditions that were to be expected on the Saturday, the Rat could have been used in the preceding two or three days to prepare wide burnt breaks around the fringes of the forest country, which would have reduced the incidence of spot fires, and stopped the fire getting into the Stromlo Forest. Another wide break around the perimeter of the suburbs adjoining the grassland country would have stopped the main fire fronts and left the fire brigades to deal with a few spots in the suburbs.

The unit would also be usable in grassland and woodland areas in the tablelands and western slopes regions, especially in areas adjoining forested areas, in any country in which it is safe to use a wheel tractor. Some concern has been expressed about the possibility of causing erosion with the clear cut running across steep slopes and acting as a drain in heavy storms. However, the windrow of spoil mixed with standing grass on the uphill side of such a "drain" would very much reduce the volume of run-off getting into the drain. In the non-fire situation, control measures can be implemented by turning the furrow into the adjoining grass every fifty metres or so in the manner of a mitre drain, this distance depending on the erodibility of the soil, and the quality of the ground cover. Where a cut has been built in a hurry in a fire situation, the best approach would be to, afterwards, use a blade to push the windrow back into the furrow.

Availability

The unit is available from Mr. Ken Doyle, Hughenden Welding Services, P.O. Box 222, Hughenden. Q. 4821. Mr. Doyle has continued to improve the implement, so that the current units, at about \$2,000 each, are much advanced on those used in the Western Division in the mid-1970s. The photographs on the following page show some of its features.

A landholder in the West Darling has developed a much smaller version, called the "Wilangee Mouse" based on two shortened but weighted grader blades in a sharp V which could be pulled by a landrover-type 4-WD vehicle, and which proved very effective in establishing a clean breaks in sandy grass country to be able to round up fires before they got going, or to establish a line across country from which to backburn towards an approaching fire front. This home-made gear and the details of its construction was written up in the Winter 1977 issue of "Sitrep", the bulletin of the then Bushfires Branch within the State Emergency Services.

THE BROMPTON FIRE RAT

A rear view of the modified Brompton Fire Rat showing the main wings and the retractable additional wings, but without the 20-litre drum of fuel and drip-torch which can work on either side

A view of the trail cut by the modified Brompton Fire Rat showing the windrows on each side levelled by the retractable rear wings

A BUSHFIRES DATA BASE

Having been involved with the Hume-Snowy Bush Fire Prevention Scheme and having a background in research in land management aspects, the writer began to develop a collection of research and similar papers on bushfires. He took up this habit again when involved with the Bushfires Council of NSW. Consequently, he has a wide collection of research papers on bushfires, these being listed below in the expectation that an object of the Inquiry will be develop a data base on the subject, and that it might be useful to other organisations which may have established data bases. These papers have been listed in broad subject groupings and alphabetically by author within each such subject grouping, using a standard reference format. Should the Inquiry wish to have copies of any of these papers the writer will be pleased to make copies available.

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