OPERATIONAL CONSIDERATIONS AND CONSTRAINTS TO IMPLEMENTING FIRE MANAGEMENT PLANS IN SOUTH WEST TASMANIA

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SUMMARY

Conflicts over the use of fire will inevitably arise between specific fire management objectives such as the protection of life and property and various ecological considerations. Fire management planning is the resolution of these conflicting demands and the formation of operational programs to achieve these goals. South-West Tasmania is inaccessible and contains large areas of wilderness. It is generally wet with fire exclusion communities often abutting more pyrogenic and often fire promoting communities.

The recognition of constraints is vital in allowing operational programs to be implemented. Such constraints in South West Tasmania include the limited access by any means other than helicopter and walking, detection of fires, limited resource knowledge, erodible peats and soils, fire exclusion communities abutting pyrogenic vegetation, unreliable weather forecasting, lack of studies on fire behaviour and the accumulation rates of fuels, the presence of *Phytophthora cinnamomi* , inadequate communication facilities and social pressures brought to bear by conservation interests and industry.

INTRODUCTION

Fire has been a part of the ecology of South-Western Tasmania for many thousands of years. There is evidence to suggest that fire has played a key role in the development of the present pattern of vegetation (Jackson 1968, Brown and Podger 1982). This pattern is remarkable due to the juxtaposition of pyrogenic vegetation (*Gymnoschoenus sphaerocephalus*) and fire sensitive communities which have remained unburnt for many thousands of years. Such communities include ancient King Billy pine (*Athrotaxis selaginoides*) forests and alpine heathlands.

The task of managing fire in an area such as the Western Tasmania World Heritage Area (WHA) National Parks is not an easy one and must embrace compromise from the desired goals to allow for the many and varying practical and operational constraints which occur.

Fire can be a potentially positive biological agent as well as a destructive one. The orange bellied parrot (*Neophema chrysogaster*) is a prime example of a

species with a fire induced habitat (Brown and Wilson 1984). Without the younger vegetation to form a suitable food base, the species could not survive.

The destructive force of fire is well documented and is the main concern of fire management planning. In the last 20 years, 16 per cent of Tasmanian alpine vegetation and 8 per cent of Tasmanian rainforest, both of which are fire sensitive communities, have been burnt in wildfires (Brown *et al* 1983, Kirkpatrick and Dickinson 1984). Prevention of the destruction of climax communities containing rare species and habitats is the prime concern of fire management planning in south west Tasmania.

Background Resource Information

The Western Tasmanian WHA National Parks fall within the forty-one to forty-four degree latitudinal band which is characterised by moist rain bearing westerly winds for most of the year. Orographic lifting on the mountain ranges within the parks leads to rainfalls in excess of 3 000 mm in many areas (Bureau of Meteorology 1987).

Geologically, the southern and central parts of the WHA are dominated by white quartzitic peaks that rise above valleys cut into softer rocks such as schist and dolomite. Angular dolerite peaks dominate the northern region. The parks boast large areas of karst which host many caves and underground drainage systems. Characteristic of the area is the peat that covers many of the valley floors and slopes. This peat has an average depth of 30 cm but can be as deep as three metres.

A wide range of vegetation communities representing different seral stages exist within the WHA. The positioning of these seral stages leads to the principle point of conjecture among researchers and managers: whether site factors give rise to a vegetation type with a stable fire frequency (The Mount School; Mount 1979), or whether chance shifts in fire frequency will change vegetation and site factors, one fire acting as a contagion point in a Poisson type distribution (The Jackson School; Jackson 1968). The implications for fire management are profound; either fire frequencies are constant and a function of sites (resulting in stable vegetation boundaries), or fire frequencies are capable of change and hence altering vegetation patterns.

One of the reasons for the nomination of the region as a World Heritage Area is its large wilderness component (Australian Heritage Commission 1981). The parks contain few roads and only a sparse network of walking tracks. Whilst this may make fire management more difficult, one aim of fire management must be to retain the area as wilderness with minimal permanent disturbance.

Past Fire Management

Past fire management within the WHA can be divided into three broad periods : pre 1960, 1960 to 1970 and since 1970. This division can be attributed to society's changing attitude toward the use of fire and the acceptance of the area as an asset in its own right. Different departments have managed the area with different goals in fire management and variable resources at their disposal to carry out fire management objectives.

Before the 1960s there was no conscious policy as the area was not considered an asset (apart from being a source of huon pine and possibly minerals), and there was little peripheral development being undertaken. This period saw many thousands of hectares of alpine herbfields, native conifer forest and rainforest destroyed due to deliberate lighting of fire and the lack of understanding of the effects of these fires.

The period from 1960 to 1970 saw the beginning of the broad acre burning period. Forestry and mining activities were beginning to take place within and around the area that required protection from wildfire. Broad acre burning was assumed to be the answer and was carried out whenever funds and weather permitted. Little active suppression was undertaken.

The formation of the National Parks and Wildlife Service in 1971 and subsequent extensions of the area under its care saw a "minimum area burnt" policy being introduced. The natural values of the area were being understood and appreciated more, but there was still no real understanding of the dynamic processes involved. A general policy of minimal area burnt was undertaken until a better understanding of the dynamic processes of fire ecology and fuel dynamics could be gained.

Current Fire Management Planning and Policy

The statement of objectives of park management should form the basis of fire management and planning. Specific park objectives for state reserves in the WHA include:

(a) maintaining a long term fire regime where native plant communities presently represented are able to regenerate;

(b) maintaining plant communities in some areas at seral stages which optimise the available habitat for rare animals with known habitat preferences; and

(c) maintaining an element of chance so that the natural processes of seral progression and ecological drift can, in the long term, express themselves in terms of community composition and fire regime (Rando 1985).

Conflicts inevitably arise between specific goals, particularly the protection of life and property and conservation goals. Fire management planning is the resolution of these conflicting objectives on the basis of the best available information at the time of decision. Policy must be made on the basis of those actions which it is believed will best achieve the stated objectives. Critical to this process is the use of the best available biological and social data, and the constant monitoring of actions to ensure that they are directed towards the attainment of the desired objectives. Several research programs are underway at present to complement existing information and to widen the existing data base on which information can be drawn to make specific decisions.

There are four main choices in strategies for fire management: suppress all fires; allow prescribed burns in certain areas; allow natural fires to burn in specified areas; or allow all fires to burn (Fischer 1984).

The fourth alternative is unacceptable because of its adverse biological, social and economic implications. Combinations of the first three have been used by the National Parks and Wildlife Service at different times and locations. The answer as to what is the most appropriate for South West Tasmania is derived from the management objectives, the known fire history and the implications of different fire regimes to the perceived values to be protected.

The Department of Lands, Parks and Wildlife (successor to the National Parks and Wildlife Service) fire management policy is currently under review. This document describes how fire can be used and gives long term protection of the ecosystem priority over any management activities, including the use of earth-moving machinery, which may cause long term environmental degradation.

Fire management planning is close to completion for the three WHA National Parks and peripheral areas to the west. The process of fire management planning is by no means perfect, but attempts to address the constraints placed upon managers through a system of zoning the land, according to the known assets, into parcels. These parcels are composed of similar ecosystems, have common special features or have similar use considerations or similar fire situations. Common fire management objectives, and therefore prescriptions, can be applied to these zones (Fischer 1984).

These fire management zones reflect the four basic responses to fire: fire suppression, observation, scheduled prescribed fire, and conditional fire management.

Operational Considerations and Constraints to Fire Management Planning

For a fire management plan to be acceptable, the implementation or prescription section must be operational. The plan must be able to come to grips with real constraints, yet try and achieve the desired aim. Identification of these constraints is vital, allowing solutions to be designed and management actions implemented to take account of the constraints. Constraints and considerations that apply to South-West Tasmania can be broken down into several categories, each of which is discussed below.

Physical Constraints

The three National Parks that make up the WHA occupy close to 770 000 ha. The size and the remoteness of the area mean that fire management planning has to recognise that response time will be at best several hours. Access to the area is limited, helicopters being the only reliable method of transport except for walking. There are several small airstrips within the parks and several more on the periphery allowing some fixed-wing aerial access. The Lyell Highway transects the parks and is the only major road access. Several other small tracks give access to the perimeter and a small percentage of land within the parks.

Any suppression action that is undertaken has to allow for a time lag in operations, the expense of the operation, and the availability of a limited number of helicopters in Tasmania. (Two helicopters were brought in from Victoria for the Mulcahy Bay fire in December 1986 due to the shortage of local helicopters. The time delay in getting these helicopters to Tasmania may have meant the difference between being able to suppress the fire and failing to stop it.)

The Western Tasmania National Parks were inscribed on the World Heritage List in 1983 for their wilderness values amongst other reasons (Australian Heritage Commission 1981). These internationally recognised values must be considered when any management action is being undertaken. No track or trail construction will take place and fire line construction must be kept to a minimum and only used when necessary for the protection of life and property. The long term environmental degradation associated with any track construction may be decidedly worse than the effects of the fire due to highly erodible soils, peat, and the high rainfall. This in turn means that natural boundaries are used where possible, direct attack will be used where safe, and that some fires may not be extinguished until the fire nears a suitable natural boundary or until it rains.

Vegetation

The vegetation pattern in South-West Tasmania presents its own unique set of problems to the fire manager. Peaks rise to altitudes of 1 000 m and contain unique alpine vegetation and rainforests unburnt for many hundreds of years. The surrounding valleys and ridges contain pyrogenic vegetation. Fire sensitive communities often abut fire promoting communities. Due to the risk of fires running into fire sensitive communities and at the least causing edge attrition, fuel reduction burning is considered too likely to cause damage. It will not be carried out on a broad acre basis until fire behaviour and fuel dynamics are better understood, and the risk of damage to fire sensitive communities is significantly reduced.

Weather

The weather in South-West Tasmania is predominantly under the influence of moist rain bearing westerly winds. There are two main scenarios which can produce days of high fire danger:

(a) a blocking high which directs a warm and dry northerly air flow of mainland origin over the state; and

(b) a south-westerly airstream that is not particuarly warm but has a very low relative humidity. This second possibility is particularly hard to forecast reliably as there are no meteorological stations west of Tasmania. In many parts of mainland Australia, a cold front can be tracked as it passes through towns and accurate predictions of its speeds calculated. A much closer watch has to be kept on the visible weather patterns when dealing with fires in South- West Tasmania.

Resource Information

To date, no detailed resource surveys have been undertaken for the whole WHA. Specific resource data are available for selected sites and for selected communities. Aerial photography is only available at 1:42 000 black and white and there is no detailed vegetation or community mapping for the whole of the area. Aerial photography is planned to be carried out at 1:25 000 in colour during the 1987-88 summer.

The lack of resource information and reliable vegetation/community mapping hampers efforts to detail species and communities which require protection from fire. The lack of information not only compromises the planning of species protection but can obstruct suppression efforts. In most cases the rate of spread and predicted fire path is only known in vague terms due to the lack of specific vegetation mapping which would allow such fire path prediction.

Fire Behaviour

Few studies have been carried out in Tasmania on fire behaviour, especially in buttongrass moorlands. Before accurate predictions on fire behaviour can be made, studies of fuel accumulation rates, effects of slope and wind on the rate of spread, species composition and the amount of available fuel under different moisture regimes need to be undertaken.

The lack of reliable fire behaviour guidelines is one reason the Department considers fuel reduction burning a risk to existing vegetation assets. Fire may also become uncontrolled due to lack of suitable boundaries. Where fuel reduction burning is undertaken for specific site protection, studies are simultaneously undertaken to improve information on fire behaviour and fuel dynamics.

Disease

South-West Tasmania is fortunate with regard to the spread of *Phytophthora cinnamomi* in that access is poor and consequently the spread of fungal spores in infected soil is minimised. *P. cinnamomi* has been recorded in areas where there has been previous soil disturbance. Fire is thought to accelerate the spread of the fungus by increasing solar insolation to the soil through the removal of vegetation. Any use of hazard reduction burning must be carried out in full consideration of the need to restrict the spread of the fungus.

Current fire fighting practices involve handtools and hose lays with transportation of personnel and equipment by helicopter and boat. The risk of spreading *P. cinnamomi* whilst using these techniques is low. All tools are washed down with a suitable fungicide after use.

Communications

Base to mobile and mobile to base two-way radio communications within much of the planning area are poor. A limited remote base station network exists mainly on the perimeters of the parks. The lack of effective communications can hamper suppression efforts or the implementation of management actions. The siting of manual relay stations on nearby mountain ranges to give effective ground-to-ground and ground-to-air communications may be necessary.

Single side band HF radios are used when fighting remote fires in conjunction with the Hobart Radio "Radphone" service. This allows fire to Head Office communications when necessary. This form of communication is not reliable as the distance between sites is often not suitable for the use of HF band radio.

The department is currently planning to upgrade the radio network but is restricted by the requirement not to develop mountain tops for remote radio base stations.

Detection

Detection of fires in South-West Tasmania can be a somewhat opportunistic business. Residents at Melaleuca (a remote mining settlement on the south coast), mining exploration camps, tourist charter flights, fishing boats and yachts, bushwalkers and the general public in the case of the Lyell Highway have all been responsible for passing on information to the Department about fires. The Department also runs a fire spotter flight over much of the area on days of high fire danger.

Due to the large and remote nature of the parks, fires will usually be past the initial spot fire stage before the Department can act on a fire report. The fire may be too large to attempt direct suppression.

Human Error

Human error will always be present whether we like it or not; however, there have been far too many escaped "controlled burns" in Tasmania. A portion of the native King Billy pine (*Athrotaxis selaginoides*) stand at Lake Rhona, a high altitude tarn in the Denison Ranges, was destroyed as a result of such an escape. Strict guidelines on how fire is going to be used and prescriptions for each individual operation must be prepared to minimise the risk of human error.

Social Pressure

South-West Tasmania is an area unique in Australia for its cool temperate rainforests, its large wilderness area and the rare species and habitats it contains. As such, there are many people who are concerned with how the area is managed. Pressures are brought to bear from industry with economic viewpoints and from conservation groups concerned with the protection of the environment.

Community pressure can be considered a benefit as it ensures management activities are carried out with proper planning. However, problems do arise as different people have different expectations on the use of fire. All view points must be taken into consideration when planning the use of fire and the rationale explained in each case.

Resources

One of the main constraints on the implementation of the current fire management plans is that the Department has limited resources, both human and financial to carry out fire suppression operations. Attempts will nearly always be made to suppress peat fires due to their ability to burn for long periods, igniting vegetation when conditions are suitable. Such attempts can cost $10 000 per day to extinguish with only twenty people. These fires characteristically take several weeks to extinguish. The entire fire suppression budget for one year can be consumed in one fire. Casual staff are often employed in fire suppression activities but the time delay in getting a crew of casual staff together is in the

order of twenty-four hours. The recently established Government Trust Fund for wildfire suppression has helped alleviate the monetary problem.

Future Directions in Fire Management

The recognition of constraints in achieving a desired goal is vital in allowing operations to be carried out efficiently. Many of the constraints that have been identified and discussed within this document can be alleviated by the appropriate allocation of resources.

The need for reliable fire behaviour guidelines, resource information and data on fuel accumulation rates is mentioned throughout this report; these are vital information requirements for effective fire management. In May 1987, a seminar was held between all fire managers and researchers to determine the current research priorities of departments interested in fire management and to co-ordinate future directions in fire research. The priorities that were established for fire research for better fire management are listed in Eberhard (1987). These findings form the basis of the Department's research program for the next decade.

The findings were categorised into several sections and the top priorities in each section are:

Ecological Research

- effect of fire on sedgeland animals
- fire refuges in sedgelands
- historical and archaeological evidence of past fire events and past fire regimes.

Fire Studies

- fuel accumulation rates in sedgelands
- guidelines to fuel characteristics in Western Tasmania.

Inventory and Mapping

- mapping rare species and special habitats in the WHA
- mapping principal vegetation types in the WHA from colour aerial photography.

Management Studies

- management requirements of rare vascular plants in the WHA
- management requirements of the ground parrot, *Pezoporus wallicus* in the WHA.

Effective radio communications are a vital component of any fire suppression action. Sites for remote base stations in the VHF band have been selected to complement existing sites. These stations will be developed subject to funding and Departmental policy on development of remote sites. Improvements in technology and the gradual increase in coverage of the area mean that communications will become more efficient. A communications plan is being prepared to oversee the development of the radio network.

P. cinnamomi is a fungus that has already destroyed many thousands of hectares of native vegetation Australia-wide. A program of mapping the existence of the fungus and research into the effects of fire spreading the fungus may eventually improve to management practices which hinder the spread of the disease.

Of all the requirements needed to improve fire management, funding is the common thread. Research into better equipment, radio communications, resource data bases, disease, soil erosion, fire behaviour and fuel accumulation rates all require considerable sums of money. The rate of improvement in practices and equipment is directly related to the funding of the various departments involved with fire in Tasmania and in other States.

CONCLUSION

Fire management planning is an important process for not only understanding the natural role of fire in different ecosystems, but in detailing operational programs designed to implement Departmental policy with regard to fire management and fire suppression. Inherent in putting most plans into action, are operational considerations and constraints which must be taken into account. The identification of these constraints is an important step in making plans become reality as efficiently as possible. Once identified, these constraints can be rectified and allowed for where possible. The rate of development of new equipment and information is highly dependent on the level of funding.

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