FIRE MANAGEMENT PLANNING FOR TWO PEOPLES BAY NATURE RESERVE, SOUTHWESTERN AUSTRALIA

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Two Peoples Bay Nature Reserve is located approximately 30 km ENE of Albany on the south coast. The reserve was created in April 1966 following the rediscovery of the Noisy Scrub Bird there in 1961.

The reserve has a varied physiography. In the east is Mt Gardner, a pre-Cambrian granitic feature of a little over 300 m in elevation. There are other extensive exposures of granitic rocks in the general peninsula area and numerous deeply incised and heavily vegetated gullies running down to the sea. To the west are two major, permanent water bodies: Lake Gardner (joined to the sea by Gardner Creek) and Moates Lagoon. This general isthmus - lakes area is low-lying and comprised mainly of calcareous sands (Cretaceous). To the north of Moates Lagoon there is a type of jarrah/Casuarina woodland on laterite, while to the south there is a large and conspicuous mobile dune that probably originated in the past 150 years.

Annual rainfall is about 800 mm per annum most of which falls in winter (a sub-mediterranean climate).

The vegetation is predominantly coastal limestone heath, shrub dominated vegetation up to 1 m in height with quite a deal of parrot bush (Dryandra sessilis). Of course there is the jarrah/Casuarina woodland that I mentioned previously and a variety of other woodland types in the western portion

of the reserve (Banksia, peppermint). In the deep gullies where the main populations of Noisy Scrub-birds occur there are low forests (mainly eucalypt dominated) and thickets of tall shrubs with a good deal of the sword sedge (Lepidosperma scabrum, L. gladiatum) on the ground.

The Noisy Scrub-bird, the animal for which the reserve was initially created, is a small (35-50 gm), inconspicuous brown bird that lives close to the ground and feeds mainly on litter invertebrates. It is a weak flier but a fast and agile runner. Males have a loud, penetrating and melodious call.

The total world population is estimated to be 300 birds. However the population has increased very noticeably over the past 15 or so years - initially when studies began at the reserve it was estimated that there were only 40-45 singing males or probably 100-120 birds in all (i.e. there has been a build up in numbers which is at least partly attributable to the fire exclusion policy).

Noisy Scrub-birds were widely distributed when the first European settlers came to Western Australia. There are early records of the bird from Albany west along the south coast to Augusta and inland to Mt Barker and 1 record from Waroona. It seems probable that changes in burning patterns since settlement contributed to the birds' demise - more frequent and widespread fires reduced the availability of dense habitat and, perhaps more importantly, reduced levels of litter and thus litter invertebrates available as a food resource.

We speculate that the principal reason for the survival of the Noisy Scrub-bird around Mt Gardner is the natural fire protection afforded to those deep gullies where they occur. The extensive exposures of granite together with the isthmus/peninsula form, the presence of the two large waterbodies and, more lately, the mobile sand dune, reduced

the likelihood of fires in those deep gullies around Mt Gardner.

There are two other rare birds on the reserve - the Western Whip-bird and the Western Bristle-bird. These two tend to occupy drier and more open habitats including areas of limestone heath and swamps in the isthmus. Again they appear to be fire sensitive. But I don't propose to discuss them here.

Quite clearly then, fire is a most important consideration in the development of management plans for the Two Peoples Bay Reserve. The first fire management plan was designed in (and implemented from) 1976. A new and comprehensive management plan is currently being prepared.

The management objectives for the Reserve are (in general, but not strict, order of priority):

1. to conserve the Noisy Scrub-bird;
2. to conserve other rare fauna (Western Bristle-bird, Western Whip-bird, Red-eared Firetail, Ringtail Possum, Carpet Python, Peregrine Falcon);
3. to conserve rare flora (Adenanthos cunninghamii, Banksia verticillata, Stylidium plantagineum);
4. to conserve restricted assemblages of fauna and flora;
5. to conserve the (representative) sample of south coast biota found in the reserve;
6. to provide for the proper use and management of the scientific and educational resources of the reserve;
7. to provide for appropriate and legitimate public use of the reserve;
8. to minimise any undue detrimental effects of the reserve on neighbouring lands;
9. to conserve the landscape features of the reserve;
10. to conserve the archaeological and historical values of the reserve; and
11. to maintain those values of the reserve that contribute to the regional reserve system (network).

These general management objectives should be read in conjunction with the relevant policy objectives. For example, the Departmental Fire Policy Objectives are:

1. to protect community and environmental values on lands managed by the Department from damage or destruction from wildfire; and

2. to use fire as a management tool to achieve land management objectives, in accordance with designated land-use priorities.

This combined set of objectives more or less embraces those set down for the reserve in 1976. The process of developing the fire management plan is given in Table 1. In developing that plan, some of the key considerations were:

i) known prime Noisy Scrub Bird habitat and areas of existing populations were confined to the Mt Gardner area;

ii) major possible sources of fire included adjacent farming areas ('Tandara' NW of Lake Gardner, 'Black Cat Creek' west of the reserve), areas around Moates Lagoon used by Marron fishermen, and the picnic grounds where there were brick barbeques fuelled with wood. (Fires were prohibited elsewhere in the reserve);

iii) the fire history of the reserve indicated that all major fires in the preceding decade had come in from the west and north-west (ie. the farming areas); and

iv) we did not want to set up a broad-acre burning program mainly because that could prejudice other conservation values of the reserve (and the Department didn't have resources to implement such a program).

Important components of the fire management plan developed in 1976 are:

1) protection of boundaries of the reserve with well maintained firebreaks and, in some cases, burnt buffers about these edges and beside the roads.

2) a system of internal firebreaks which included slashed or mown strips in areas susceptible to erosion, some wide bulldozed breaks between granite exposures and, again, some firebreaks parallel to the road with the intervening strip of vegetation burnt when necessary.

3) continued restriction of use of fire in the reserve (still only in the fireplaces provided).

4) restriction of public access to prime Noisy Scrub-bird areas to reduce the likelihood of accidental fires in those areas.

5) gradual replacement of the wood burning barbeques with gas ones; and

6) development of a strategic fuel reduced zone through the isthmus, isolating the major habitat areas (Mt Gardner) from the major sources of fire (the farms and marroning areas).

This Strategic Fuel Reduced Zone is a key element of the plan but, it must be emphasised, it is only one of the parts of a total plan. Apart from protecting the Noisy Scrub-bird, it obviated the need for more general, broad-scale fuel reduction. AND it demonstrated the Department's commitment to proper management and so gained support of the local, rural population.

The plan was implemented in 1976. The Strategic Fuel Reduced Zone (SFRZ) was divided into 12 blocks using existing roads and tracks and, where necessary, slashed fire breaks. These slashed firebreaks were cut at least 12 months ahead of any burning to allow time for the cut vegetation to break down. The slashed firebreaks have

proved to be very effective - being sufficient for fire control yet without the disadvantages of graded breaks (permanent disturbance, erosion, aesthetic considerations).

Each of the 12 blocks is 40-60 ha. Two blocks were scheduled for burning in spring of each year and this program has been adhered to with only minor variation.

Each block takes about ½ day to burn off with a team of 5-7 people including volunteers from the local brigade.

Behaviour of each fire has been monitored closely to contribute data to future fire behaviour studies. In addition, the effects on vegetation and bird habitat and the subsequent regeneration have been measured in detail. For example, looking just at the above-ground biomass of the vegetation which roughly approximates to fire fuels there is quite a rapid return to pre-fire levels of about 16 tonnes per hectare (Figure 2). That is, within 4-6 years this equilibrium level is achieved.

The regeneration story is not completely straight forward. A major impact on the regeneration has been the kangaroos - they have thrived on the succulent seedlings and resprouts after the fire. Because the blocks are quite small they have been heavily grazed - this has reduced the rate of accumulation of above-ground biomass by around 50%. That should be advantageous from the point of view of fire management but, unfortunately, the heavy grazing alters the floristic composition of the vegetation and promotes invasion of weeds.

The ultimate, long-term management strategy has yet to be devised. However experience from the 1976 plan has been invaluable and will form the basis of future management planning. Features that we will want to keep or develop further include:

1) Proper identification of the special areas and the likely sources of fire/ignition.

2) Elimination of sources of fire where possible (e.g. replace wood barbeques with gas ones).

3) The Strategic Fuel Reduced Zone obviates (to a large extent) the need for widespread fuel reduction burning.

4) Proper monitoring and assessment of the program has placed us in a strong position where we can develop a greatly improved plan the second time around.

Table 1. A systematic procedure in planning for fire management on nature conservation lands in Western Australia.

1.	Define aims/objectives for area.
2.	Identify sources, risks.
3.	Collate fire history data in conjunction with climatic data.
4.	Examine ways to manage sources/risk without impact on biota.
5.	Survey area for vegetation, fuels, natural low-fuel areas, important biota requiring special attention.
6.	Redefine objectives if necessary.
7.	Assess management capability for both planned and unplanned fire.
8.	Examine simple methods for isolating sources from risk areas (strategic).
9.	Plan other essential fire control measures.
10.	Plan ecological burning requirements.
11.	Undertake modelling where possible.
12.	Plan and implement monitoring programmes.
13.	Reassess plan regularly.

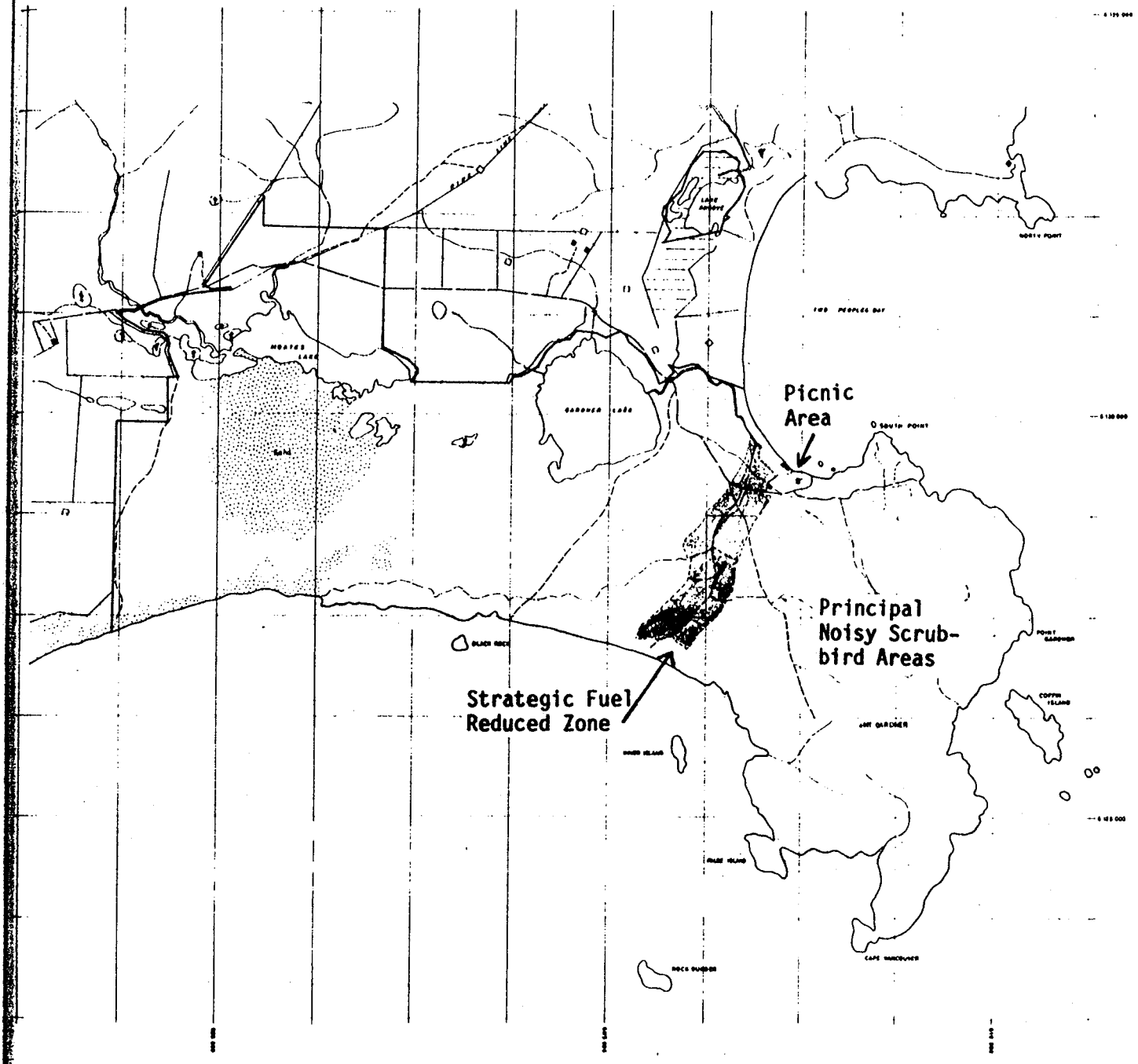
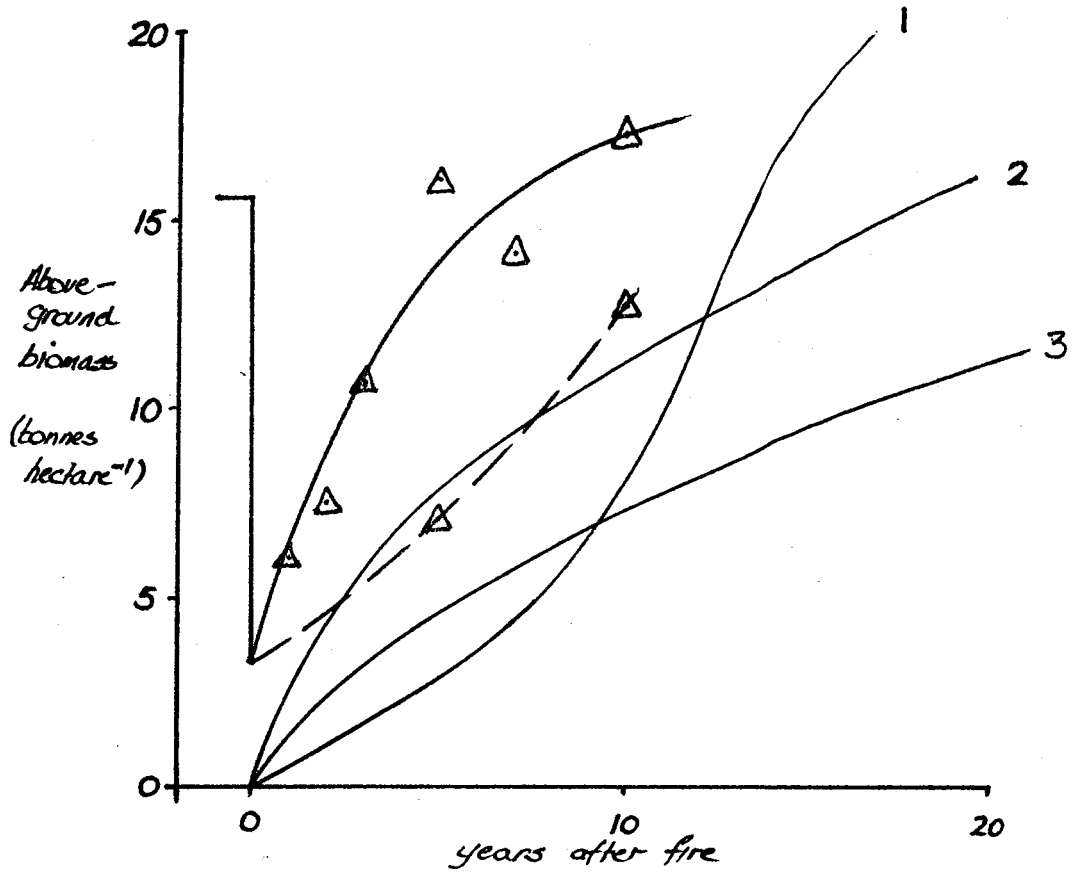


Figure 2. Map of Two Peoples Bay Nature Reserve illustrating features of the 1976 Fire Management Plan.

only a short interval before fuels build up to >10 t/ha.

- what is an effective scenario for fuel reduction burning?
- consideration of fuel type, spatial considerations etc.



1. Inland heath
2. Coastal heath
3. Inland heath (Banksia ornata omitted)

(Jones, Groves and Specht 1968)

Two Peoples Bay — ungrazed
-- grazed

- sampling methodology caused differences in the Trends

Combination of grazing + burning → degeneration.