proportions of its various constituents vary greatly according to the species, age, and environmental conditions. Cineole, the main constituent sought from Victorian eucalyptus oil, is used mainly for medicinal or pharmaceutical purposes.

In Victoria, eucalyptus oil is extracted commercially from blue mallee (*Eucalyptus polybractea*) because this species gives a high yield, is suited to mechanical harvesting, and has an established traditional market, and because its oil has a high cineole content. Other species are used to a much lesser extent.

Eucalyptus oil is produced mainly from public land held under licence. The licences cover about 25 000 ha of land, of which about 3500 ha are harvested for oil each year. Almost all Victorian eucalyptus-oil comes from the Council's North Central area, the most important locality being near Inglewood. Oil is also produced from the St Arnaud, Wedderburn, Bendigo, and Rushworth areas, which together account for about 49% of the 50 tonnes distilled in Victoria annually.

Until about 1950 Australia was virtually the only source of eucalyptus oil, but now the bulk is produced overseas and Australia contributes only about 15%. The Australian cineole-rich oil industry depends on export markets. Its future is therefore subject to the way its costs and productivity compare with those of overseas producers. There is scope for increased production, based on plantations of cloned high-yielding eucalypt varieties, which could replace oil currently being imported.

Many eucalyptus-oil distillers are middle-aged or older independent operators, most of whom work part-time. Employment in the Victorian eucalyptus-oil production industry (not including further processing) is equivalent to about 18 full-time jobs.

Broombrush

Uses for broombrush include domestic fencing, shade-house construction, feature ceiling panels, and wind-diffusing material for tennis courts. It is cut from broombush (*Melaleuca uncinata*) plants in parts of the Big Desert and Sunset Country in the Mallee area, and the Little Desert in the Wimmera.

Optimum diameter of stems is about 1--2 cm, therefore stems from 10 to 30 years of age are selected for harvesting. Larger and smaller stems remain uncut, so the proportion of stems on a harvested area varies depending on the age-class distribution. Broombush plants are remarkably resilient to disturbance, re-sprouting from rootstocks after fire, severe frost, or cutting. They have a potential life span of at least 80 years, but the natural high fire frequency of the mallee vegetation in which they occur probably prevents most plants from attaining this age.

Significant harvesting began in Victoria fairly recently. Volumes taken out have fluctuated, but in 1983/84 reached

1460 tonnes. The main market is in domestic fencing in suburban Adelaide and Melbourne, where the material is erected as pre-fabricated panels or is packed on site. It costs considerably more than alternatives and its use therefore tends to be restricted to feature fencing associated with front gardens, swimming pools, or garden subdivision. Because it is new to the Melbourne market, statistics on likely future demand are not yet available. At least one harvester is attempting to establish an export market.

Cutting is done manually under licence from the Department of Conservation, Forests and Lands. Licences restrict the numbers of cutters who may operate, and specify fire-protection requirements and the area from which material may be removed. A large proportion of broombrush harvested comes from corridors that are scheduled for fuel-reduction burning as part of the fire-protection planning for the region.

Land Conservation Council Recommendations

The Council has recommended that some 4 416 000 ha be available for hardwood-timber production. This includes uncommitted land, hardwood-production areas, and, more recently, land recommended as State forest. A number of smaller recommendation categories also include timber-harvesting. Areas within which timber production is a permitted major use comprise 20% of the State and 55% of public land in Victoria. In addition, substantial areas of mature forest have been identified for once-only logging, either within parks and conservation reserves or recommended for addition to parks after logging. Figures 1 and 6 illustrate the categorization of public forests.

Following Council's adoption of the concept in 1983, this land is collectively termed 'State forest'. The Council believes that this term best describes public land in timber-production areas and uncommitted land, even though this may contain a range of vegetation types from tall mountain forests through to woodlands, mallee, scrub, heathlands, and swamplands. The name is only used in a descriptive sense, rather than as defined in the *Forests Act* 1958. State forest is discussed more fully in chapter 6.

Public Land Classification

State forest areas have a range of capabilities to meet a range of uses and while some parts are primarily suited to one of these purposes, some parts can be given over to a number of them. In practice the land managers accommodate or conserve these other uses and values to the extent necessary by managing harvesting operations according to management prescriptions, which cover such points as:

* preparation of annual harvesting plans
* delineation of areas to be excluded from harvesting so certain recognized values can be protected
* coupe size and design
* field marking of areas to be harvested or retained
* trees to be retained within harvested areas for seed or habitat

* reserved strips on streams
* felling and utilization prescriptions

In proclaimed water supply catchments, water quality is further safeguarded by limiting the period when operations can occur and, in some instances, by limiting the number and size of coupes in which harvesting may take place in any one year.

Code of Forest Practice

The government is currently preparing a code of forest practice to regulate commercial timber-harvesting operations on both public and private land. It establishes broad guidelines for harvesting operations and will form the basis of detailed prescriptions incorporated in coupe plans, harvesting plans, and forest management plans. A draft code has been released for public comment.

The Council also recommended that some 153 500 ha of public land be managed for softwood-timber production including existing softwood plantations as well as land yet to be planted. Some of this land had been purchased by the government specifically for softwood plantation extension.

The area recommended included provision for a maximum of 110 000 ha that could be planted with softwoods. The balance mostly carries native forests, which are retained within and around the plantation to minimize the environmental and aesthetic effects of plantation establishment. Some of this 110 000 ha had not been planted when a government ban on clearing native forests for softwood plantation establishment came into force in June 1987. The Council's softwood plantation planning guidelines will need to be reviewed in the light of this policy, although they should still apply to existing plantations. Such a review will also need to take into account the guidelines for plantations in the Code of Forest Practice.

In addition, the Council identified a further 30 000 ha (23 000 ha net) that could be available for softwood production in the event that the government decides it would be required. In total, these comprise just over 1% of public land.

Softwood plantations on State forest in Victoria as at March 1987 covered approximately 95 400 ha, 94% of which had been planted since 1960. In its Timber Industry Strategy, the government has made a commitment to expand the area of softwood plantations in several regions in order to provide a sustainable supply of raw material to support large, integrated wood-using industries. The total plantation area is to expand to 125 000 ha by 1996, and increases after June 1987 are to be achieved without clearing native forests.

Evaluation of the Council's Recommendations

Government acceptance of the Land Conservation Council recommendations for parks and reserves on public land has, of necessity, meant that a reduced area of public forest is

available to the timber industry. It should be noted that the area of 'Reserved Forest', which traditionally contains the forests most important for timber production, has increased since 1970, from 10% of the State to 12% at present, as shown in Table 7 and Figure 5.

Table 40

NET PRODUCTIVE AREA[1,2] (HA) AND PERCENTAGE OF TOTAL AREA BY BROAD FOREST TYPES

Forest types	Land use		Total
	Available for timber production	Not available for timber production	
Ash[3] species	225 000 (69%)	100 000 (31%)	325 000
Mixed species	990 000 (78%)	285 000 (22%)	1 275 000
Box/ ironbark	150 000 (75%)	50 000 (25%)	200 000
Red gum[4]	50 000 (83%)	10 000 (17%)	60 000
Total	1 415 000[6] (76%)	445 000[7] (24%)	1 860 000

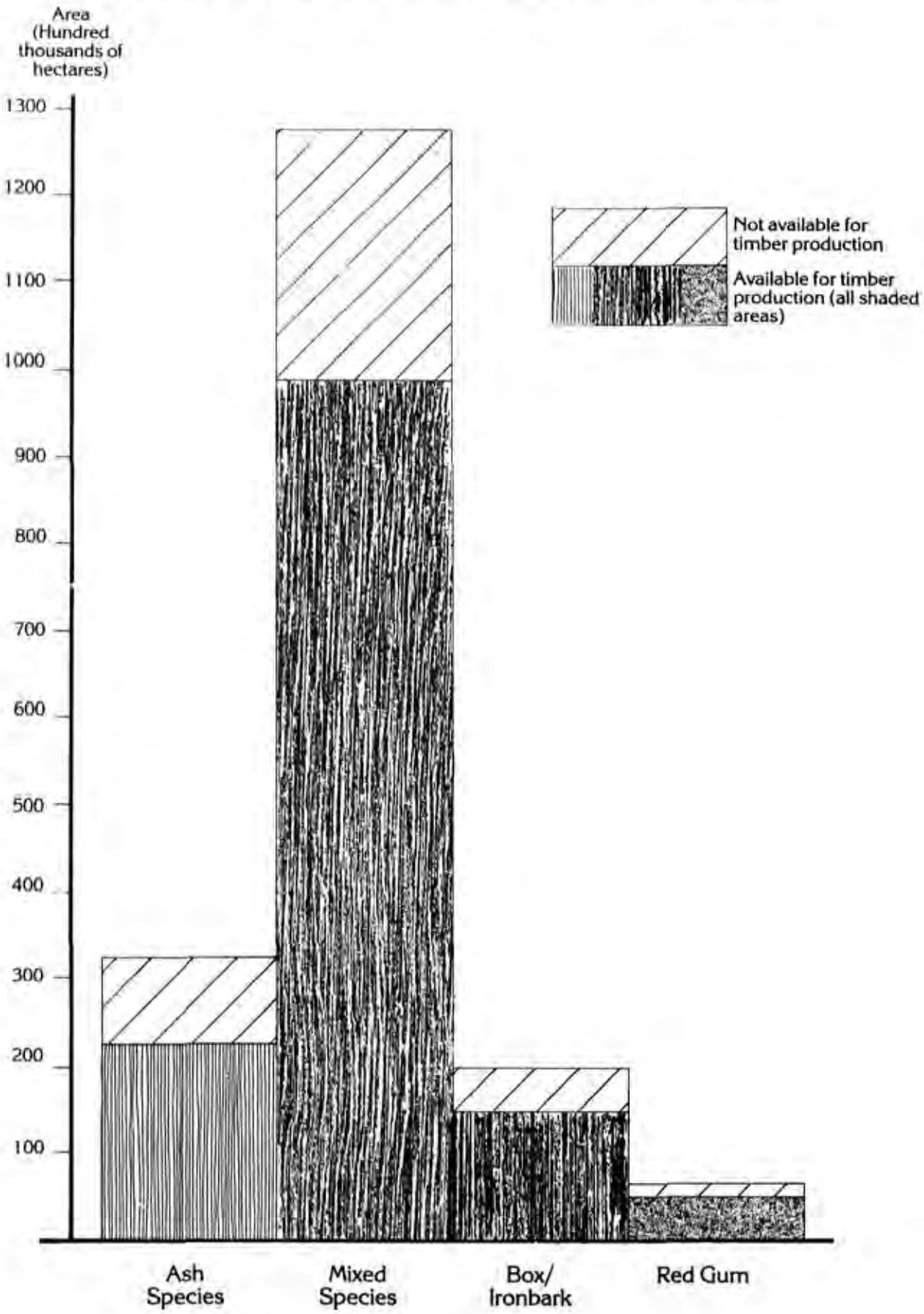
Notes:

1. Includes mature and regrowth forests, and potentially productive unstocked areas.
2. Figures are rounded to nearest 5000 ha.
3. Includes adjustment for Council's East Gippsland Area Review recommendations.
4. Includes adjustment for Council's Murray Valley Area recommendations.
5. Area not available includes parks and reserves, recommended by Council and approved by the government, that exclude timber-harvesting, plus Melbourne and Metropolitan Board of Works catchments.
6. The 'available' net productive area averages 77% of the available gross productive area, varying from 83% (box, ironbark, and red gum) to 75% (mixed species).
7. The 'not available' net productive area is a notional figure indicating what would have been available prior to the establishment of parks and reserves. It averages 73% of the gross productive area, varying from 83% (box and ironbark) to 67% (red gum).

Source: Department of Conservation, Forests and Lands, Public Lands and Forests Division, July 1987.

FIGURE: 11

NET PRODUCTIVE AREAS OF FOREST TYPES



The Council's recommendations have resulted in 2 300 000 ha being included in parks and reserves. This comprises some 26% of the public land in the State. In order to evaluate the impact of these recommendations on the availability of timber, however, it is more relevant to look at the net productive area included in parks and reserves, compared with that still available for harvesting. Net productive area is land actually carrying economic timber resources or capable thereof, excluding the following: steep or rocky land; stream-side buffers; scenic corridors; wildlife corridors; sites of biological significance; and other areas identified as having particular conservation values. Such areas are generally excluded by prescriptions and make up the difference between gross productive and net productive area.

As Table 40 and Figure 11 show, more than three-quarters of the net productive area in the State is available for timber production under the Council's recommendations. To put these figures in context, the available gross productive area is some 1.84 million ha; reserved forest totals 2.71 million ha; and the State forest recommended by Council totals 4.42 million ha.

Alternatively, the State-wide system of parks and reserves contains nearly one-quarter of the net productive forest area on public land, when regrowth stands are included. Note that, of the productive land in parks and reserves, a much smaller proportion currently has mature forest. There are substantial areas of young regrowth, unstocked sites, and overmature forest, and, importantly, large tracts specifically approved for once-only logging.

The above figures include resources within the Melbourne and Metropolitan Board of Works catchments, which are currently unavailable for timber production. While these statistics provide a State-wide perspective, they should be viewed with some caution since variations in the accuracy of resource assessment, and in actual growth rates, could lead to an assumption that an even distribution of age classes would promote a smooth supply of timber. This is not the case in practice because of the loss of timber resources due to wildfires.

Sustainable yield

Selective harvesting of sawlogs early in Victoria's history and the 1939 wildfires have resulted in substantial tracts that, although included in Table 40 as productive area, are now poorly stocked with trees suitable for sawlogs and have no potential for growth of sawlogs. The high level of demand for hardwood timber caused by the housing boom following World War II resulted in the need to harvest timber from some parts of the State at levels that cannot now be sustained.

As indicated earlier, the government is committed to the introduction of a policy of regional sustained yield from Victorian forests and intends to implement this policy in all administrative regions of the Department of Conservation, Forests and Lands within 10 years. To achieve this,

the annual volume harvested must be reduced from the current level, which has averaged approximately 1 000 000 cu.m for the 5 years to 1985/86, to about 860 000 cu.m by 1996. The sustainable yield could increase early next century as more regrowth forests become available.

Table 41 shows the potential long-term sustainable yield of timber that could be derived from the present available net productive areas set out in Table 40 assuming the average annual growth rates shown. Note that the figures in the right-hand column total more than 2 million cu.m - that is, more than double the present average annual cut of 1 million cu.m. To achieve such a yield would, however, require an even-age class distribution in order to maintain an even flow of wood products over a whole rotation, and the rehabilitation of all the unproductive forest stands referred to above.

Table 41

POTENTIAL LONG-TERM SUSTAINABLE YIELD FROM THE AVAILABLE NET PRODUCTIVE AREAS

Forest types	Net productive area (ha)	Average annual growth rate (cu.m per ha)	Sustainable annual yield (cu.m)
Ash type	225 000	2.5	562 500
Mixed species	990 000	1.5	1 450 500
Box/ironbark	150 000	0.3	45 000
Red gum	50 000	0.3	15 000
Total	1 415 000		2 073 000

Source: 'Net Productive Area' - Department of Conservation, Forests and Lands, Public Land and Forests Division. 'Average Annual Growth Rate' - Timber Industry Strategy.

The Council has been acutely aware of the potential effects of making productive forest land unavailable for timber-harvesting, especially where mature forest resources are concerned. It has therefore endeavoured to minimize such losses by the careful selection of boundaries to exclude valuable stands of timber from reserves where possible while retaining representative areas for conservation, including specific habitat requirements, and by providing for stands to be harvested prior to the land's inclusion in conservation reserves where this does not directly conflict with recognized values. This was a major consideration during the preparation of recommendations in the Alpine area. In some cases, however, it has not been possible and the Council has included both mature and regrowth resources in order to protect significant conservation values and to preserve representative examples of mature forest types, habitats, and relatively undisturbed ecosystems in appropriate parts of the State.

In relation to softwoods, the Council has recommended the allocation of sufficient land for plantation establishment in several of its study areas. In fact, under current government policy, some of this land will not be converted to softwood plantation as it carries native forest. Through its recommendations the Council has also encouraged government purchase of suitable freehold land for plantation establishment, and has further recommended that private companies develop or expand their own softwood plantations. As indicated earlier, the volume of softwood sawlogs from State plantations is expected to double by the year 2000, and this will provide a substantial timber resource given that consumption is expected to remain relatively stable, and that resources from private plantations are expected to greatly increase also.

Issues

* Greater emphasis needs to be placed on a more efficient use of wood products available from public land.

* Hardwood pulpwood production as a by-product of sawlog production will continue to be a major issue.

* The issue of clearfelling versus other harvesting or regeneration techniques is currently being investigated.

* State forests are to be managed to achieve sustainable yield of all forest goods and services in accordance with government policy.

* Further research is required into:
  - flora and fauna protection in forests used for utilization
  - impact of various harvesting techniques on flora and fauna, timber yields, and water quality and quantity

* The Code of Forest Practice currently being prepared by the government will ensure that the utilization of forest products is environmentally sensitive and that their provision is consistent with sustainable yield.

* Further protection of the State's flora and fauna will be provided in the proposed Flora and Fauna Conservation Guarantee.

* Consideration could be given to the establishment of hardwood and softwood plantations for intensive timber production.

* The area of public land available for timber production and the sustainable volume of timber that it could provide currently exceed estimated future consumption, although in the short term the volume of mature sawlogs must be reduced to sustainable levels.

* The impact of newly developing forest industries such as broombush cutting and charcoal production require the development of adequate management controls and accurate assessment of available resources.

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17. MINERALS, FOSSIL FUELS, AND STONE

Victoria is a major producer of oil and gas, brown coal, gold, and quarry products. In addition, it currently produces gypsum, kaolin, bauxite, and diatomite, and in the past has also produced iron ore, black coal, tin, copper, and bentonite. Recent successful exploration programs have suggested good prospects for future mining of copper, zinc, lead, silver, and the heavy mineral sands zircon, rutile, ilmenite, and monazite.

In making comparisons with other States' production, care needs to be exercised that comparable figures are being used.

Minerals Extraction

Mining

Excluding coal, petroleum, and quarrying, the mining sector in Victoria produced minerals valued at $30 million in the 1984/85 year, directly employing 650 people with a further 170 people engaged in exploration. The sector is dominated by gold-mining which accounts for more than three-quarters of total sector employment and more than half of total capital turnover. The gold-mining industry comprises two distinct groups:

* small-scale operations including individual miners and prospectors, eductor-dredge operators, and metal-detector operators
* larger formally constituted companies

The small-scale sector includes Miner's Right claim holders, who are not required to provide statistical information on mineral production to the Department of Industry, Technology and Resources. This sector therefore lacks reliable production information. Metal-detecting and prospecting under the authority of a Miner's Right comprise a popular activity and it is estimated that 3000 to 4000 people were engaged in this in 1985 as either a commercial or leisure occupation.

Mining on Miner's Right claims was estimated to involve 630 people, mining or development-lease operations involved 202, and eductor-dredge operations 437, while 12 others carried out operations under tailings treatment licence. People were engaged in these activities on either a principal employment or recreational basis. Production estimates vary widely and 400 kg for 1985/86 is considered a conservative figure.

Six major mines have contributed more than 90% of the State's recorded production since 1970. These are the Stawell Joint Venture, Wattle Gully, Gaffney's Creek, West Bendigo, Wandiligong, and Logan Mines (see Table 42). All

Table 42

GOLD PRODUCTION 1970--85
(After Kinhill Stearns, 1986)

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983*	1983/4	1984/5
Total (kg)	253.3	107.9	167.9	101.4	125.6	195.2	61.9	8.0	11.7	26.3	42.0	86.2	109.7	148.0	149.4	877.2
Value ($000)	256	110	183	99	196	775	182	27	68	178	503	1012	1070	1850	2051	11045
Production by main mines (kg)																
Gaffneys Creek	236.2	106.3	55.3	33.4	28.0	-	-	-	1.2	3.6	2.9	0.6	-	17.8	28.8	75.1
Wattle Gully (at Chewton)	-	-	98.6	54.1	74.7	97.6	54.2	7.9	6.4	18.8	20.2	72.4	96.2	87.6	55.1	6.4
West Bendigo	-	-	-	-	-	-	-	-	-	-	-	-	-	35.8	36.1	58.5
Logan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	18.2
Wandiligong	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.9	49.9
Stawell Joint Venture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	665

* In 1983/84 the time basis of data collection was changed from calendar year to financial year. Totals have been adjusted to reflect this by exclusion of half 1983 production.

of these mining operations occupy mostly public land, although in the Stawell case the underground workings extend below freehold land. Currently there are applications to mine below freehold land at Bendigo and Ballarat.

Exploration

Mineral exploration employed 170 people and involved an expenditure of $15 million in 1984/85, $11 million of which was for gold. This exploration takes place on Exploration Licences that cover areas ranging from 25 ha to 500 sq.km. Current licences cover a large portion of the State, as shown in Map 17.

Mining regulation

The *Mines Act* 1958 is the main Act regulating mining. It provides various mining titles to permit and regulate mineral exploration, mine development and production, and mineral extraction from tailings and dredging.

Regulation is also exercised through statutory planning controls applying to mining on private and public land, and through the statutory requirement for the Department of Conservation, Forests and Lands to be consulted regarding proposed mining or exploration undertakings on Crown land.

The *Mines Act* 1958, *Crown Land Reserves Act* 1978, and *Forests Act* 1958 contain provisions to exclude exploration and mining from certain identified areas. In addition, section 40 of the *National Parks Act* 1975 requires consent of the Minister for Conservation, Forests and Lands for mining proposals in parks included in the schedules to the *National Parks Act*. However, current government policy is that no new exploration or mining be permitted in national parks. Exploration and mining under way prior to the acceptance of new national parks is permitted, subject to specified conditions.

The *Soil Conservation and Land Utilization Act* 1958 provides for control of land disturbance in proclaimed water supply catchments.

Fossil Fuels

Victorian oil and gas reserves

Oil and gas resources in the Gippsland Basin are fundamental to the economy of the State and the nation. The Gippsland Basin contains more than 85% of Australia's declared commercial natural gas reserve. From 1968 to June 1986 Bass Strait has produced 333 000 million litres of oil and is now producing approximately 65% of Australia's requirement. Gas production for the same period has been 66 300 million cu.m. Victoria's royalties total $1271 million over this period and are currently running at a level of $150 million a year. In addition to its share of royalties (about $70 million a year), the Commonwealth receives approximately $4000 million annually in excise duty on petroleum, which represents 0.65% of Commonwealth revenue.

The State has responsibility for exploration and production of oil and gas resources onshore and within 3 nautical miles (territorial sea limit) offshore, and the Commonwealth has responsibility beyond 3 nm offshore. State exploration and production responsibilities outlined in the *Petroleum Act* 1958 are administered by the Department of Industry, Technology and Resources, which also administers the Commonwealth legislation on behalf of the federal government.

Activities beyond 3 nm offshore, including oil and gas production in the Gippsland Basin, are outside the Council's charter. However, considerable exploration activities take place within the 3-nm limit and onshore. The transmission lines all traverse the 3-nm limit of State jurisdiction.

Major basins and exploration areas

The Gippsland and Otway Basins, which underlie much of the coastline of Victoria, are substantially covered by petroleum exploration permits. All of the Otway Basin and 85% of the Gippsland Basin are at present under onshore exploration titles (shown in Map 17). Exploration titles also exist in the Murray Basin.

More than $10 million was spent in 1984/85 supporting new onshore exploration and development tenements.

Onshore natural gas is currently being produced from the Otway Basin near Port Campbell for use in Warrnambool.

Brown coal

Victoria has substantial brown coal resources, most of which are concentrated in the Latrobe Valley. The total resource is estimated to be about 202 000 million tonnes (Mt), of which 43 300 Mt are regarded as readily accessible reserves (Table 43).

Production has totalled 890 Mt since commercial development commenced in the 1920s up until June 1986, and has a present annual rate of about 33 Mt. Most of the coal has been used for electricity-generation. Although production will increase with new uses, it is unlikely to exceed 100 Mt per annum for at least 20 years. The six open-cut mines current in Victoria comprise four located in the Latrobe Valley, one at Anglesea, and one at Bacchus Marsh. Substantial reserves underlie existing towns, industrial developments, and transport infrastructure, while two areas - the Holey Plains State Park and part of the Nooramunga Marine and Coastal Park - are excluded from mining by government policy following Council's recommendations.

Definition of Activities

Fossicking and prospecting

The terms 'prospecting' under a Miner's Right and 'fossicking' are linked in the preamble to Council recommendations for Mineral and Stone production, stating that these activities are legitimate uses of public land and should not

be unduly restricted or regulated. Further, most Council recommendation categories permit fossicking and prospecting where they involve minimal disturbance to soil and vegetation, other than in those limited areas where exclusion of these activities is warranted. Council has regarded prospecting under a Miner's Right and fossicking as essentially recreational pursuits.

Fossicking is a generic term that covers casual working-over of old mining sites and settlements in the hope of finding coins, bottles, etc. This small-scale operation often has only a minimal localized impact, and is not regulated by the *Mines Act* 1958.

Although fossicking is generally understood to include the small-scale searching for minerals, particularly gold, by strict definition any seeking or recovering of minerals is regarded as prospecting, which is a mining activity and is thus defined and regulated by the *Mines Act* 1958. It includes all operations conducted for the purposes of discovering or establishing the presence or extent of mineralization or of a mineral. The term includes any search for or recovery of minerals, including gold, through to all kinds of exploration.

Table 43

ESTIMATES OF BROWN COAL RESOURCES AND READILY RECOVERABLE RESERVES (Mt)

Source	Recoverable reserves		Resources	
Latrobe Coalfields				
Existing open cuts	1 900			
Future development options	5 700			
Prospective stage	9 700			
Identified stage	22 400			
Subtotal		39 700		162 000
Other coalfields				
South Gippsland	1 500		6 400	
Otway Basin	100		9 600	
Murray Basin	2 000		19 600	
Subtotal:		3 600		35 600
Inferior coal		-		4 500
Total		43 300		202 100

Source: Victorian Brown Coal Resources Development Study

Small-scale prospecting such as metal-detecting, panning, etc. requires a Miner's Right, and is often a recreational

pastime. (See chapter 14). A prospector who wishes to establish a claim in order to undertake mining operations at a particular location may apply for a Miner's Right claim.

Larger exploration activities are usually undertaken under an Exploration Licence or Lease, which can extend over large areas and is appropriately regulated and conditioned. Successful exploration would normally lead to application for a Development Lease to allow for more detailed studies or a Mining Lease to allow for mining.

Eductor dredging

Although a form of prospecting, eductor dredging is treated separately by the *Mines Act* 1958 and the Mines (Mining Titles) Regulations 1983.

Eductor dredging for gold in stream-beds is popular activity (as indicated in Table 44). An eductor dredge is designed to recover gold from stream-bed sediments. Gravel and finer sediment are pumped from the stream-bed, passed through a riffle or sluice box - which traps any gold - and discharged back into the stream. The process is small-scale, normally involving one or two operators. The device is usually collapsible and can be transported by a conventional vehicle.

Table 44

EDUCTOR DREDGE LICENCES
1980-1986

Dredge year (Nov--Nov)	Number of licences
1980--81	517
81--82	472
82--83	490
83--84	432
84--85	341
85--86	361
86--87	357

In some rivers mercury, which occurs either naturally or as a result of ore treatment during past gold-mining, is also sought since it is usually in the form of an amalgam - that is, a mixture of mercury and gold.

An interdepartmental committee provides annual advice to the Mining Consultative Committee, which advises the Minister for Industry, Technology and Resources on which streams should be open to dredging. The list of available streams must also be approved by the Minister for Water Resources.

Council's Provision for Mining and Exploration

Area of State accessible for mining

Mineral and petroleum exploration and extraction have often been contentious public land issues. The Land Conservation

Council has sought to balance exploration, production, and conservation demands in its recommendations for public land use, and the wording of its recommendations and policies reflects this.

The reservation of conservation areas following Council recommendations does not automatically exclude exploration for mineral and fossil fuel resources, except in reference and wilderness areas and buffers around water storages. Some areas are specifically recommended for exclusion from these activities on the basis that certain other values are considered to be more important in them, and because exploration and mining are not compatible with their recommended uses.

Other parcels of public land that are not available for exploration or mining include national parks, which are excluded by government policy; and many smaller reserves for specific purposes are individually excepted or exempted from mining under the *Crown Land (Reserves) Act*, the *Mines Act*, or the *Forests Act*. In water supply catchments proclaimed on recommendations of Council, restrictions may also be imposed on certain mining operations.

Council's recommendations are subject to the important principle that some land surfaces, because of their inherent instability or special public significance (for example, community assets or areas with important scenic, archaeological, historical, recreation, or natural conservation values), warrant permanent or temporary exclusion from exploration and/or extraction of 'minerals'. The Department of Industry, Technology and Resources and the land manager (the Department of Conservation, Forests and Lands in most cases) should together determine those areas that should be excluded from, or the conditions under which particular areas of public land should be used for, mineral exploration and production.

It is difficult to accurately determine the proportion of public land that is excluded from exploration and mining as a result of the land use decisions following Council recommendations. Table 45 shows estimates of the area unavailable, by land use category.

Areas recommended by the Council to become national parks cover 1.434 million ha, representing 16% of Victoria's public land and 6% of the State. If national parks and other areas excluded from exploration and mining were added together, these would total 19% of the public land or 7% of the State. However, it is likely that a large proportion of this land would not be prospective for mining.

Predominant control of land use activities on freehold land, including mining, is exercised through municipal planning schemes and Interim Development Orders. These planning controls zone land and indicate permitted uses and conditions of use. Mining is specifically prohibited from certain zones in some planning schemes, and is subject to a planning permit, in addition to a mining title in many of the remaining schemes.

Because of its generally minimal land disturbance, exploration can occur without a planning permit in some zones, but is subject to permit requirements in the majority. In a few zones in cities, for example, exploration is specifically prohibited. Amendments to a planning scheme would be required to gain access to such zones. Current applications in Ballarat and Bendigo illustrate this. While larger companies may pursue such planning scheme amendments, most individuals probably would not.

Table 45

AREA EXCLUDED FROM EXPLORATION AND MINING

Category	Area (ha)	% of public land	% of State
Wilderness areas	152 700	2	> 1
Reference areas	84 460	1	> 1
Total	237 160	3	1
National parks*	1 434 470	16	6
Total	1 671 630	19	7

* National Parks excluded by Government Policy.

Council's provision for brown coal

Final recommendations have dealt with brown-coal-mining in various study areas - South Gippsland Districts 1 and 2, Gellions Run Special Investigation, the Melbourne Area and Melbourne Area District 1 Review. In the case of Melbourne Area District 1 Review, final recommendation R6 for the 'Anglesea Lease Area' proposes that 5960 ha of the 7359 ha of public land should continue to be available for the extraction of brown coal by Alcoa Pty Ltd, under the provisions of the *Mines (Aluminium Agreement) Act* 1961. For the remaining 1399 ha covered by the Act,significant conservation values were identified and the Council recommended that the government enter into negotiations with Alcoa with the aim of reaching agreement to excise this area from the lease and include it in the State's system of conservation reserves.

The South Gippsland Area District 2 includes the major State Electricity Commission-operated brown-coalfields of Yallourn, Morwell, and Loy Yang. Recommendations for coal production cover an area of 15 000 ha for open-cut removal and associated essential developments.

In the South Gippsland Area District 1 final recommendations, Council proposed the establishment of the Holey Plains State Park. Noting that part of the Coolungoolun coalfield underlies some of the park, Council recommended that exploration to prove the quality and extent of the resource should be allowed in this area. Government policy, however, has subsequently excluded its mining.

The Gellions Run Special Investigation divided the known Gelliondale coalfield into two, recommending a flora reserve for the coastal area and leaving the remainder uncommitted. Reservation of an area as a flora reserve is of course not compatible with open-cut coal extraction, and the government has excluded the reserve from future coal-mining. The South Gippsland Area District 2 recommendations later proposed that the flora reserve at Gellions Run be included in the Nooramunga Marine and Wildlife Reserve, a reserve category with equivalent or greater nature conservation status.

Summary of Council's Recommendations

Council recognizes that fossicking, prospecting, exploration, and mining activities are legitimate uses of public land, but must be subject to certain principles and guidelines. These identify instances in which areas of the land surface warrant permanent or temporary exclusion from such activities. In addition, the recreation sections of many of Council's published final recommendations refer to prospecting under a Miner's Right and to fossicking, as Council regards both activities as essentially recreational and therefore acceptable uses of public land, again subject to certain principles and guidelines.

The percentage of land directly excluded from mining and exploration as a result of the Council's recommendations is approximately 3% of public land or 1% of the whole State (see Table 45). As indicated earlier, government policy does not permit new exploration or mining in national parks, and no new mining or exploration will be approved in proposed parks except in some special circumstances where exploration had commenced before the parks were proposed. This policy excludes an additional 16% of public land or 6% of the State.

Stone

The *Extractive Industries Act* 1966 defines 'stone' as rock, gravel, sand, earth, and soil used in the construction industry, and clay used in the brick and ceramics industries. As outlined below most of the extraction of stone from public land takes place under other Acts.

State consumption and demand for stone

Production of stone in Victoria has fluctuated between 30 million and 40 million tonnes per annum since 1971. Crushed and broken stone, sand, and gravel are the major stone products, representing by weight 51%, 19%, and 13% respectively of 1984/85 production.

Most stone resources in Victoria are well distributed and stone can usually be extracted at locations close to point of use, thereby minimizing transport costs. Based on current consumption trends, supplies of most stone products should continue to be locally available for some time, except for some high-quality materials in many parts of the State, and declining supplies of readily available concrete sand in the Melbourne area.

Table 46

STONE PRODUCTION 1984/85

	No of establishments	Sources under the Act[1] Production '000 tonnes	Sources not under the Act[1] Production '000 tonnes	Total Victorian production Production '000 tonnes	Value $000
Clay					
- clay	30	1 290	-	1 290	2 900
- brickclay and shale	3	7	-	7	48
- fireclay	5	55	-	55	370
Total:	38	1 353	-	1 353	3 318
Crushed and broken stone					
- basalt	49	11 969	19	11 989	92 981
- dacite, rhyolite, rhyodacite	5	2 111	-	2 111	21 965
- granite	10	560	515	1 075	7 235
- hornfels	8	1 041	18	1 059	9 572
- limestone	7	338	667	1 006	3 014
- sandstone, quartzite	23	1 125	1 916	3 041	7 482
- shale and schist, other	3	12	54	266	991
Total	105	17 158	3 391	20 551	143 242
Dimension stone					
- granite, marble, slate, limestone, and sandstone	8	28	-	28	1 342
Earth and soil	23	296	226	522	1 992
Gravel	77	2 014	3 191	5 206	13 294
Limestone					
- for agriculture	14	150	-	150	2 445
- for cement	3	2 274	-	2 274	9 496
- for other purposes	2	34	-	34	305
Total	19	2 458	-	2 458	12 247
Salamander	7	169	3	172	491
Sand					
- for concrete	54	4 106			
- for other purposes	83	2 148	1182	7 437	30 805
Total	137	6 254	1 182	7 437	30 805
Scoria	24	1 191	241	1 432	6 689
Tuff	10	177	-	177	429
Other construction materials	2	76	-	76	443
Filling	15	476	250	726	1 609
Grand total	465	31 655	8 487	40 143	215 896

Note:
1. Extractive Industries Act 1966

Source: Department of Industry, Technology and Resources

Regulation of stone extraction

Legislative controls and conditions for extractive activities are specified in various Acts. Although the *Extractive Industries Act* 1966 is the major legislative control for commercial operations on public and freehold land, most of the stone production from public land takes place under the control of other Acts. For operations on freehold land an Extractive Industry Licence is required. Operations on Crown land require an Extractive Industry Lease, for which the approval of the Minister for Conservation, Forests and Lands is necessary. Land alienated in Victoria generally after 1891 is alienated to a depth of 15 m and any operations extending below that depth on such land require a lease in addition to a licence for the surface 15 m. Operations on freehold land where there is no depth limit require only an Extractive Industry Licence.

Stone extraction on public and freehold land

Because of the multiplicity of Acts regulating the control of stone extraction on both freehold and public land and the statistical collection of production data that do not match the various regulatory controls, no estimate of production of stone from public land is readily available.

Production data for sources under the *Extractive Industries Act* and those not under that Act are summarized in Table 46.

For quarries under the Act it is estimated that 2% of the production (630 000 tonnes) comes from public land. For sources outside the Act it is estimated that more than 70% (6 million tonnes) comes from public land.

Most of the production from public land occurs in rural Victoria. The Melbourne and Barwon Statistical Divisions, which together account for about 50% of stone production in Victoria, produce very little from public land.

Freehold and public land differ significantly in the types of material they produce. Freehold land operations account for the bulk of production of all stone products, as the table shows. For freehold land the predominant products are crushed and broken stone (55%) and sand (20%), which together thus account for about 75% of extraction under the Act. For public land the predominant products are crushed and broken stone and gravel comprising in total 78% in approximately equal proportions.

The large percentage on stone costs arising from transportation creates a considerable incentive to extract stone from locations close to the point of use. With the exception of northern and north-western Victoria, well-distributed lower-grade resources occur throughout the State, and it has generally been possible to develop stone quarries close to the point of use. The *Extractive Industries Act* excludes any operations where the depth of extraction is less than 2 m.

The *Mines Act* 1958, through the issue of Tailings Licences, allows for the removal of tailings from current or former

processing sites. This material is commonly used for the same purpose as natural sand and gravel.

Both the *Mines* and *Extractive Industries Acts* are administered by the Department of Industry, Technology and Resources. Except in certain parts of Melbourne where there are proved deposits of stone and where no planning permit is required, quarrying is either a prohibited use or a use subject to a permit. Under the *Extractive Industries Act* a lease or licence cannot be issued until such time as the necessary planning permit is issued.

In addition to the *Extractive Industries Act*, materials that would be classified as stone under that Act may be produced under the *Local Government Act* 1958, the *Soil Conservation and Land Utilization Act* 1958, the *Land Act* 1958, and the *Forests Act* 1958. In contrast to the Extractive Industries Act, under which most production takes place from freehold land, the greater proportion of production under these Acts is from public land. The provisions of these Acts relating to the removal of stone are summarized below.

Under the provisions of section 39 of the *Extractive Industries Act* 1966, government agencies and municipalities carrying out stone extraction for their own purposes are exempt from control unless the depth of extraction exceeds 2 m, in which case the agency or municipality is bound to observe the operating regulations that cover safety aspects, excavation practice, use of explosives, etc. Under a recent amendment to the Act, agencies or municipalities must notify the Department of Industry, Technology and Resources of their intention to extract stone. The Department, however, has no say in the suitability of a particular site, or the availability of alternative sources.

Under section 658(1) of the *Local Government Act* 1958, municipalities have the right to extract gravel and stone from public or freehold land, except where such extraction would affect a watercourse, building, etc. Before commencing any extraction, however, the municipality is bound to notify the Department of Conservation, Forests and Lands, regardless of the extent of the proposed extraction.

Where shallow extraction (less than 2 m depth) exceeds 2000 sq.m, that is, one-fifth of a hectare, the consent of the Department of Conservation, Forests and Lands must be obtained in writing under the *Soil Conservation and Land Utilization Act* 1958. Municipalities have the right to extract from any land, without the consent of the Minister for Conservation, Forests and Lands, provided that the extraction does not exceed 2000 sq.m.

Section 190 of the *Land Act* 1958, however, permits the removal of stone and other construction materials, including timber, from Crown land generally for the construction or maintenance of roads and bridges within the municipality.

Thus, the *Land Act* 1958, which requires the consent of the Minister for Conservation, Forests and Lands for any extraction by municipalities on Crown land, is in direct contrast

to the *Local Government Act* 1958, which only requires municipalities to notify the Department of Conservation, Forests and Lands of any extraction.

Importantly, this provision exempts the municipality from fees or licences other than those charged or issued under the *Mines Act* 1958.

The *Forests Act* 1958, under section 52(1), allows for the removal of 'forest produce', subject to a licence or permit being issued by the Department of Conservation, Forests and Lands, the maximum term of which is 3 years. Forest produce in reserved forest includes stone, gravel, limestone, salt, loam, and brick earth.

Section 82 of the *Mines Act* 1958, as amended, allows for the removal and use of mining tailings for any purpose, under a Tailings Removal Licence granted by the Department of Industry, Technology and Resources. Tailings includes any material discarded by plant used for extracting minerals, and materials produced in the course of mining. It does not include any undisturbed sand and gravel resources on or under an abandoned mining or mine processing site.

A Tailings Removal Licence does not require the consent of the land manager, although applications must be referred to the Department of Conservation, Forests and Lands for comment on appropriate conditions for rehabilitation of the site.

The *Vermin and Noxious Weeds Act* 1958, section 16(1)(b), provides penalties for the removal of stone from ground on which there are noxious weeds without first obtaining the written permission of the Minister for Conservation, Forests and Lands. All land is subject to this provision, including land under an Extractive Industries title or a Tailings Removal Licence, or land reserved for the purpose of stone or gravel extraction.

The *National Parks Act* 1975, under section 40(1) and (2), does not allow the issue of a lease, licence, permit, or other authority under the *Mines Act* 1958, the *Extractive Industries Act* 1966, or the *Petroleum Act* 1958 except with the consent of the Minister for Conservation, Forests and Lands, and subject to any terms and conditions that the Minister may impose.

Council's provision for stone extraction

Council has provided for stone extraction through a range of final recommendations. Its general recommendations and principles and guidelines for stone extraction appear in the chapter on minerals, fossil fuels, and stone, but specific references have been made in various other chapters, under parks, hardwood and softwood production, and uncommitted land.

At or near stone-extraction sites the primary values and uses of recommended parks are adversely affected. In the parks chapters, the provisions for extraction that already

occur prior to a park being recommended fall into three categories. Extraction may be:

* allowed to continue
* allowed to continue pending location of similar sources outside the park
* phased out within a specified time

In the South Gippsland Area District 2 final recommendations, the limestone extraction from within Wilsons Promontory National Park was to continue under present arrangements, unless an alternative source outside the park was found. A similar recommendation was made for the shale quarry within Tyers Regional Park. In the North Central Area final recommendations, various State and regional parks were recommended, encompassing several existing extraction sites.

The Kooyoora State Park recommendation limited the sand pit to its existing size, with all extraction to cease by 1983. The government amended the recommendation, excluding the sand pit from the park, and made it a stone reserve. Similarly, in the Kamarooka State Park recommendations extraction was to cease by 1985.

In this case, particular mention is made of alternative gravel resources made available in the minerals and stone chapter. In connection with the granite quarry within Mt Alexander Regional Park, Council recommended that the feasibility of relocation be investigated. In the Melbourne final recommendations for Angahook State Park, the existing quarry at Bambra Road was to continue but be screened from the road by native vegetation. Similar recommendations are made in the parks chapters of other sets of final recommendations.

Stone extraction is generally accepted as a secondary use in hardwood and softwood production areas, and from uncommitted land. These cover in total some 52% of all public land in the State.

Summary of Council's Recommendations

Council's present policy with regard to the extraction of stone is clear, and has been published in the minerals and stone sections of proposed and final recommendations since 1975. In summary, the Council recommends that specified principles and guidelines be followed, and that for particular proposals the land managers should consult the Department of Industry, Technology and Resources about exploration and extraction from public land.

Council has consistently urged uniformity with regard to the application of these procedures, stressing that all operators - commercial, municipal, and departmental - should work within them. In addition, the Council's policy is that sufficient funds should be set aside to ensure adequate reclamation, and that further funds should be made available to expedite rehabilitation of existing extraction areas on public land.

Council has also urged that royalties and other payments for extraction from public land should be related to the commercial value of the materials, and that extraction should be concentrated in the smallest number of sites, with a preference for deeper, restricted workings rather than shallow surface stripping. Where an area is deemed to be of greater value for other uses, extraction should not be allowed. This is particularly applicable to removal of stone from streambeds and areas adjoining watercourses.

Council's recommendations specifically exclude stone extraction from wilderness and reference areas. Stone extraction is thus excluded from about 2% of the State, or 3% of public land but elsewhere is subject to a number of principles and guidelines set out in the recommendations.

Stone resources potential from public land

A line connecting Cranbourne, Pakenham, Broadford, and Bacchus March encompasses the major suppliers and this area could be loosely defined as the Melbourne supply area, consisting mostly of freehold land. Within these confines the combination of high population concentration and desire for open space and recreation in natural environments places great pressure on limited public land. It thus restricts the prospects for quarry and pit development on public land, despite the potential in some locations. This limitation of source areas is appropriate given community demand for the other uses, although it inevitably results in greater pressure on other stone-resource locations that are accessible at a similar cost.

Outside the Melbourne area other market components are centred on provincial towns and cities and a similar situation often occurs. The extensive tracts of public land distant from Melbourne and the provincial towns and cities contribute a small proportion to total supply, with the range of stone products, type and size of operation, and end-use of the stone being limited. Quarries and pits are often relatively small and intermittently produce gravel, sand, or crushed and broken stone for construction and/or maintenance of lower-standard roads, for which the stone quality is of less importance.

Cost minimization and budget restraints encourage agencies and municipalities to seek the closest practicable source of materials, which has often meant the nearest source on public land. Such sources have in the past presented the least number of problems with regard to access, compensation, and local public relations, regardless of the rights of municipalities to extract road-making materials from freehold land under section 658(1) of the *Local Government Act* 1958.

Major determinants of preferred pit or quarry locations are the existence of suitable deposits in close proximity to point of use and limited budget. These considerations result in little incentive to investigate stone resources over wider areas and develop them in a planned manner, although the absence of such practices is at odds with good natural resource management principles and contrasts with management

planning for other natural resources throughout the State's public land.

Unwise excavations

The Council has stated in recommendations for numerous study areas that a considerable number of unwise excavations have been made on public land. The rehabilitation has been inadequate in many instances, particularly with older excavations. Such practices were common in the past but are no longer acceptable.

Typical shallow gravel excavations, small unplanned sand and gravel pits, and stone quarries involve removal of vegetation and surface stripping, usually to a depth of 50 to 150 cm. Often relatively large areas are stripped and land disturbance can be very conspicuous where such exposures lie alongside the roads on which the gravel is to be used. Many excavators have made little or no effort to revegetate stripped and abandoned areas.

Further problems occur with some sand and gravel pits and stone quarries where development and subsequent rehabilitation of the site are unplanned and haphazard. In a number of cases little is known about the extent and quality of stone, and the development of the pit or quarry is to be a large extent determined by sporadic localized needs, with decisions to expand operations typically made on an *ad hoc* basis.

In many instances large resources of gravels lower down a profile exhibit good road-making properties, but are not utilized either because they have not been assessed or because surface stripping is perceived as a simpler and cheaper alternative. This approach represents inefficient use of the total resource and does not take account of the environmental cost of exploitation in terms of dust, noise, run-off, and visual impacts during operations, followed by long-term visual and erosion problems after operations have ceased. It usually entails little pre-planning for rehabilitation and low standards of performance with progressive and final rehabilitation.

The cost difference between this *ad hoc* approach and gravel extraction from *Extractive Industries Act*-titled operations is significant. The ex-pit value of gravel from non-Act operations, including those described above, was approximately half that of Act-titled operations in 1983/84. No detailed analysis of the reasons for this has been undertaken, but the information supports the view that many untitled excavations have been undertaken on a minimum-cost basis with limited regard to factors such as sensible siting and proper reclamation.

Quarrying in parks and reserves

Following the recommendations of the Council, the government has established an extensive system of parks and reserves across the State. Extraction of stone resources in certain categories of parks and reserves is sometimes contentious.

For reasons of noise, dust, site destruction, and frequent heavy traffic, stone utilization is not compatible with the primary conservation and environmental objects for parks and reserves. In many areas, therefore, stone extraction - particularly in commercial operations - is clearly an inappropriate use.

Council policy provides for stone extraction from public land including parks and reserves, in accordance with guidelines outlined in its recommendations, and for specific sites and conditions as agreed by the land manager and the Department of Industry, Technology and Resources.

Government policy on stone extraction from parks and reserves is not explicit. Section 40 of the *National Parks Act* 1975 makes a provision requiring the consent of the Minister for Conservation, Forests and Lands for extraction, thus indicating that the intent of the legislation is not necessarily to prohibit quarrying in scheduled national parks. The current position is that both private quarrying operations and government agency stone extraction occur in parks and reserves, with private operations being in the minority. In most if not all cases, any private quarrying pre-dates the establishment of the park or reserves.

Issues

Exploration and mining

* Council has consistently put forward the view that where other values are regarded as being more important in certain areas, then mining and exploration should be excluded.

Impacts of mineral resource activity

* Some mining activities are incompatible with other special interests and uses.

* The interpretation and application of Council's exploration and mining policy has led to some significant problems in that the Council's guidelines are of a general nature. They have been interpreted to support both mining and protection of areas, resulting in an inconsistent and ineffective approach to resolving such conflicts in use.

* While adverse affects of mining and exploration may be reduced by careful applications of conditions and supervision of operations, these must still be balanced against the other values of a particular area.

* The Council's guidelines, as written, are broad and not readily applied to individual sites.

* There may be a need to develop detailed sets of guidelines that establish a clear framework for assessing particular values of sites, into which the details of specific mining or exploration applications can be added.

* One issue is whether the terms 'fossicking' and 'prospecting' need to be more closely defined and differentiated in Council's recommendations in order to avoid their confusion, and, furthermore, whether fossicking requires similar legislation to prospecting in order to control any potential for damage.

* Some concern is being expressed about the damage being done by prospectors in particular.

* Eductor dredging - does it have a significant impact, and should rivers proposed for inclusion in schedule 15 of the *Mines (Mining Titles) Regulations* 1983 be assessed with respect to their nature conservation, recreation, and scenic values, and to their bed and bank stability?

* It is considered that the Council's recommendations provide adequately - both now and in the future - for the perceived community needs for minerals and fossil fuel.

* Many mineral deposits that have been found in Victoria are not currently economic, but with changing circumstances may become so in the future; hence we need to retain an exploration or mining option on most public land.

* An issue is whether Council should recognize the primacy of undisturbed conservation values in the important reserves, and should specifically recommend the exclusion of surface-disturbing exploration and mining from some or all of the national and State parks, other major conservation reserves (in line with the policy outlined in the State Conservation Strategy), wilderness areas, and buffer zones around water supply storages.

* It is important to implement the Council's principles and guidelines for mineral exploration and extraction, particularly concerning interdepartmental action to establish and apply procedures excluding certain areas with other values from exploration and/or mining, and provisions for full reclamation or restoration to a standard appropriate to the site.

* The wide distribution of most stone resources throughout the State, together with the large area of the State where stone extraction is an acceptable use, effectively means that the exclusion of the limited areas specified Council recommendations has not materially affected real resource availability, although in some instances it may result in increases in the cost of the resource at point of use. However, local impacts may be more significant in some areas for particular types of stone.

* Recognized environmental concerns are the proliferation of small, badly sited pits and failure to apply appropriate standards of rehabilitation.

* Despite Council's policy, considerable problems associated with stone extraction still persist, mainly with

operations exempt from the provisions of the *Extractive Industries Act* 1966, and arising from contradictions in some of the applicable legislation.

* A perceived need is a State-wide assessment of resources to identify resource qualities, needs, best method and rate of extraction, and most appropriate source of supply for each municipality.

* Application of uniform procedures is required for exploration and extraction of stone by all users, including municipal councils and the Road Construction Authority.

* Provisions are needed for full reclamation or restoration to a standard appropriate to the site. Where abandoned sites require reclamation, it should be carried out at the expense of the operator if this is known.

* Stream-bed extraction should be avoided.

* Site numbers and distribution require rationalization.

* Interdepartmental action is needed to establish and apply procedures to exclude certain areas from extraction.

18. AGRICULTURE

Land settlement

A history of land settlement has been provided in chapter 3, from the perspective of the public land estate. This mentions the early use of land by the squatters, followed by settlement by the selectors. Powell (1973) describes the official process of making areas available for selection, and also the popular process of land choice, by both the squatters and selectors.

Crown land reserves - that is, areas unavailable for agriculture - totalled only about 1 million ha in 1881, some 4.8% of the State. Most of the remainder of the State was available for agriculture one way or another. The question is which areas did the settlers choose?

Squatters, selectors, and potential settlers of the land quickly gained experience in taking up the 'better' land for agriculture. Differences were recognized by subtle changes in vegetation and soil types, along with the obvious topographic and geological distinctions. Both squatters and selectors were mobile, the squatters moving their stock to fresh grasslands on new runs, the selectors shifting as cropped paddocks became exhausted of their small reserves of plant nutrients.

As well as deliberate preferences for land of certain types, the selectors and leaseholders suffered the effects of trial and error in some areas. Steep hills in the Strzeleckis and Otways and fringing the alpine areas, much of the dry Mallee, and leached sand-soil areas in Gippsland and the southwest were selected and farming attempted there. But as the inherent difficulties in farming these areas were soon exposed, many occupants walked off their land and large areas reverted to the Crown.

The State-wide distribution of freehold land today largely comprises those areas that are more suited to farming. Consequently the public land largely consists of those areas never wanted for farming - being too poor, cold, steep, wet, dry or remote - and those that have been abandoned after farming attempts, for the same reasons.

Land systems and preference for farming

No attempt was made last century to systematically retain examples of different land in its natural state. Crown land reserves were set aside for purposes complementary to agricultural or other uses - that is, for roads, water supply, timber, stream frontages, recreation, and public purposes.

Land systems are areas recognized as having repeating patterns of topography, geological material, climate, soils,

and indigenous vegetation, as discussed in chapter 9. The land systems are grouped into 29 geomorphic units. Freehold land occurs preferentially on certain geomorphic units, which are those listed in Table 22, chapter 9, with less than 10% public land.

In the preferred areas, much falls into five major groups: the Quaternary alluvial plains (geomorphic units 4.1, 4.2, 9.1 and 9.2); the Western District volcanic plains (units 7.1 and 7.2); the Wimmera clay plains (units 6.1 and 6.2); the Mallee clay plains (unit 5.1); and the Tertiary loam and clay plains (units 8.1 to 8.4).

Conversely, some geomorphic units largely remain as public land. Examples include units 5.2 and 6.3 (Sunset Country, Big Desert, and Little Desert sands) and units 1.1 to 1.3, 2.2, 3.5 (mountainous areas, mainly on palaeozoic sediments).

In contrast, however, public land remaining in the sedimentary and granitic foothills (unit 2.1) tends to be fragmented and scattered, reflecting areas retained last century as timber reserves and State forest and as auriferous areas, while the remainder is freehold.

The south-western sand belts (in unit 8.1) along the Lower Glenelg River, from Dartmoor to Dorodong, contain virtually all the public land within their general area. Within the sand belts lies a patchwork of freehold and public land, indicating the problems found in settling these areas.

Boundaries between geomorphic units are sometimes distinct and sharp, such as around the volcanic plains and on the fringe of the Big Desert sands. Often, however, they are diffuse, especially where the land changes gradually between adjacent units. The boundaries of freehold land around a unit that is broadly unsuitable for agricultural use often encroach, perhaps optimistically, onto that unit. However, it is these areas that are the least economic.

The basic distribution of freehold and public land is therefore determined by the nature of the land. Nevertheless, the inherent weaknesses of some lands can be and have been overcome with special inputs. The Mallee, for example, became permanently settled following construction of the stock and domestic water-supply channel system; similarly, some areas with leached sandy soils can only sustain grazing after the addition of appropriate trace elements.

Discovery of the latter led to renewed interest in the 1960s in settling some remaining parts of the public land estate, particularly the south-western sand belts. In 1966 the Land Utilization Advisory Council was given the task of identifying appropriate areas of public land in this region for alienation, and Table 8 summarizes the localities it studied from 1966 to 1969, and its recommendations.

Public land in many parts of Victoria has traditionally been 'occupied' for grazing under annual (or longer) licences. The use of the high plains in the Alpine area for grazing by

cattle is familiar to many, as is the red gum forest grazing and annual muster in the Barmah Forest. Road reserves and water reserves have also been traditionally grazed. Less familiar is the widespread use of smaller areas of public land adjacent to farms.

In the Mallee a range of tenures has occurred over public land. These include annual licences, 21-year grazing leases, limited cultivation leases, land in the process of alienation under improvement purchase leases, and agistment rights.

Current Use of Public Land for Agriculture

The major agricultural uses of public land in the various study areas are listed below.

East Gippsland

* forest grazing under lease, often adjacent to freehold land (this provides valuable feed reserves in droughts, and dry grazing areas during floods)
* limited grazing on public land along river and stream frontages
* apiculture - forest areas have a very high capability

Gippsland Lakes Hinterland and South Gippsland

* forest grazing of alpine foothills in the northern areas
* carefully controlled grazing in the northern part of Wilson's Promontory National Park, as a result of historical land tenure agreements (to be phased out by 1992)

Melbourne

* grazing of stream frontages and limited forest areas
* limited but intensive horticulture on the Goulburn River flats
* limited cultivation of stream frontages

North-Eastern and Alpine

* forest and plains grazing in mountain and alpine areas, which provide summer feed and are of considerable value to a limited number of individuals
* substantial use of unused roads and stream frontages for grazing
* limited cultivation for tobacco along the Ovens and King Rivers
* apiculture in mixed-species foothill forests

Murray Valley

* open-range forest grazing of cattle in the Barmah, Gunbower, and Terrick Terrick Forests, either under licence or agistment by adjacent landholders

* grazing on river and stream frontage reserves along the Goulburn, Ovens, and Murray Rivers

* apiculture in the Gunbower, Terrick Terrick, and Killawarra Forests and the Warby Range State Park

* grazing on unused roads

North Central

* grazing of small blocks and stream frontages adjacent to freehold land

* apiculture in forested areas

Wimmera

* high-yield cropping on the Lake Buloke overflow, but subject to risk of inundation

* grazing on Lake Buloke when dry

* grazing of small blocks and stream frontages adjacent to freehold land

* apiculture in the Little Desert, which is used as an important over-wintering refuge for thousands of bee colonies

* grazing and cultivation of roadsides and unused roads

South-Western

* grazing of small blocks and stream frontages adjacent to freehold land

* apiculture in forested areas

Corangamite

* occasional and limited honey production in State forest and in the vicinity of Heytesbury, Cooriemungle, and Framlingham

* grazing of leased lands around lakes and flood-prone land north of Colac

* occasional (illegal) grazing of coastal reserves by livestock during winter or drought years

* grazing of public land along stream frontages, and utility reserves

* grazing on unused roads

Ballarat

* red volcanic soils in the Ballarat water supply catchments leased for potato, prime lamb, beef, and grain production

* apiculture in the forested ranges near Langi Ghiran, Ben Major, Creswick, and Ballarat

* limited forest grazing of beef cattle

Mildura

* extensive grazing of sheep in the Big Desert, Sunset Country, and Millewa

* forest grazing along the Murray River

* cultivation in the Sunset Country, near Robinvale, and other smaller blocks

* apiculture in the Big Desert and Sunset Country, which are important for both over-wintering and honey production

Other aspects of agricultural use of public land

As well as the primary uses of public land listed above, small areas of public land often have major significance for individual landholders. Public land water frontages are of particular importance in this regard. The forage along them is often of better quality than that on adjacent freehold land, and often a licensed water frontage provides an adjoining farmer's only access to permanent water. In fact irrigated grazing of stream frontages takes place in north-eastern Victoria in summer periods and demand for this use is expected to increase. Grazing of water frontages can, however, cause erosion problems, and also water-quality problems in the adjacent streams by increasing sediment and nutrient loads.

Agricultural use of public land, including water frontage reserves, can come into conflict with recreational use, especially in areas closer to Melbourne. Irresponsible recreationists occasionally cause problems by careless use of fire, damaging fences, leaving gates open, and careless shooting. On the other hand exclusive agricultural use of water frontages restricts public access to streams for recreational activities.

As well as using public land for grazing or cultivation, many landholders also value adjoining public land as a source of farm timbers. These timbers, which are harvested in small quantities under licence, are used in the construction of fencing and farm buildings, and for firewood.

Normally agricultural use of land takes place under licences issued under the *Land Act* 1958 or the *Forests Act* 1958. There is, however, a considerable amount of illegal use of public land for grazing or cultivation, especially on

roadsides, unused roads, small blocks, and coastal reserves in the western half of the State. Although the total area affected by these activities is not great, it is still significant in a part of Victoria that has been largely cleared of native vegetation.

Apiculture

The apiculture industry depends on the introduced honey bee (*Apis mellifera*). This social insect collects and stores quantities of plant nectar as a carbohydrate food source and the excess is harvested as honey. Bees also collect pollen and in the process transfer pollen from plant to plant. Pollen is a protein source that is stored, along with nectar, for feeding. The pollination activity of honey bees, especially in relation to agricultural and horticultural crops, is probably more important than their commercial value as producers of honey.

On agricultural and horticultural land, lucerne, seed crops, and various clovers are important sources of nectar and pollen. Declared noxious weeds such as blackberry, thistles, and Paterson's curse are also important sources. On forested lands most of the honey is produced from eucalypts. The best producers are considered to be the box and ironbark species, especially yellow box and red ironbark, and river red gum.

Commercial beekeeping is a migratory industry. Beekeepers regularly move their hives during the honey-producing season to areas of high yield, following the honey flows of different flowering plants. They also travel to over-wintering sites where the bees can build up their stocks of pollen. While apiaries may be located anywhere in the State, commercial beekeepers are largely based in central and north-eastern Victoria.

A survey of honey-producers conducted by the Department of Agriculture in 1982 found that Victoria contains a large proportion of small producers, including hobby producers, who supply very little honey and that most honey is produced by a small number of beekeepers who have large numbers of hives. For the purposes of the survey a commercial beekeeper was defined as one who operated more than 400 hives and who received at least 60% of his or her income from honey and allied apiary products. On this basis, 53 commercial beekeepers were operating in 1980/81. Commercial production averaged 3217 tonnes from 1971/72 to 1980/81; this represents 16% of Australian production. About half of the honey crop is exported.

Beekeepers are issued with licences to work their bees on public land. Licence conditions stipulate area of operations, the occupancy period, and the rental charged. Public land is also used by unlicensed beekeepers who locate the apiary on adjacent private property.

The Council's recommendations allow honey production on virtually all public land except within or near reference areas.

In the case of parks, the Council has usually recommended that the number of existing sites be maintained. However, where beekeeping is not a current park use it has not been permitted, for example, in the Bogong National Park.

Land Conservation Council Provisions for Agriculture

Alienation of public land

Part of the charter of the Land Conservation Council under the *Land Conservation Act* 1970 is to make recommendations to the Minister with respect to the use of the public land in order to provide for the balanced use of land in Victoria; and where the Council recommends alienating any land the recommendation shall include the Council's opinion as to the best method of alienating the land to ensure the most satisfactory use and management of the land in the public interest. The Council has recommended alienation of public land in various of its published final recommendations, and these areas total 96 500 ha.

The Council now takes the view that further large-scale alienation of public land could deplete the public estate of appropriate representation of remaining land systems. Those land systems most sought-after for alienation are those represented least well on public land. Requests in submissions for small-scale alienation in localized areas have been treated on their merits by the Council, but these can have a similar effect; the areas requested are often the only remnants of a particular land system; or the request is for a land component (such as an alluvial valley) that is of value within the public land estate for other purposes, such as recreation or wildlife conservation. Susceptibility to erosion and potential fire danger are also taken into account in assessing applications for alienation.

Land exchange

Exchange of public land for freehold land has also been recommended by the Council on occasions, particularly where the freehold land-owners concerned and the public estate both benefit from the exchange. The Council recently developed a policy framework for assessing land exchanges.

Using this framework the following matters are taken into account (with respect to both the freehold land and the public land proposed for exchange) when the Council is assessing land exchange proposals:

* nature conservation values
* occurrence of commercial resources
* soil conservation and catchment protection
* current and potential uses
* efficiency of land management
* additional public costs that would be incurred

Traditional uses of public land

The Council has considered long-term agricultural uses of public land in its recommendations. With regard to high

plains grazing in the Alpine area, the Council recommended that grazing continue to be excluded from the Mount Buller alpine resort, Mount Hotham--Razorback area, Mounts Feathertop and Bogong, and around Falls Creek, thus reinforcing previous government decisions. In addition, Council recommended that grazing be phased out from the wilderness and reference areas - as, by definition, grazing is an inappropriate use in these areas - and from parts of the Wonnangatta--Moroka and Bogong National Parks, The Bluff--Mount Clear park addition, and the Howitt Plains area, because grazing conflicts with other values and uses in these areas. This leaves grazing on 3688 sq.km or 95% of the area grazed before the 1979 recommendations.

In its Murray Valley final recommendations the Council discussed grazing in the Barmah, Gunbower, Terrick Terrick, Killawarra, and Lower Goulburn River Forests. After full consideration the Council recommended removal of grazing from the proposed Barmah State Park (27% of the Barmah Forest), but that grazing continue in the remainder of the Barmah and Yielima grazing areas. A subsequent amendment in Parliament, however, allowed grazing to continue in the Barmah State Park as well. In the proposed Terrick Terrick State Park, Kooyoora State Park, and the Killawarra Forest, grazing is recommended to be permitted only where necessary for management or fire-protection purposes.

In its previous Mallee study, the Council specified two main recommendations for agricultural use:

* F1 (73 200 ha) - for alienation with erosion-prevention clauses where necessary (some 71 300 ha has since been alienated)

* F2 (34 000 ha) - to be retained as public land but used for grazing and cropping under Limited Cultivation Leases, a new form of tenure allowing supervision by the land managers (there are currently 14 F2 leases covering 9200 ha)

The Mallee area is currently being reviewed by the Council, and the allocation of public land for agriculture is one of the major issues in this review. In particular the F2 areas are being considered in detail.

Future Use of Public Land For Agriculture

In general, land in Victoria that was not alienated following settlement either is unsuitable for intensive agriculture or has been reserved for specific purposes and provision of other community values and is thus unavailable for agriculture.

Substantial areas of public land are currently being used for some purposes, however, under a range of tenures including lease, licence, or agistment. Usually, such use is of considerable value to the individual farmer in improving his economic viability. For example, forest grazing frequently provides summer feed that increases the capacity of the

freehold farm. It may also provide benefits in stock health and greater management flexibility during unfavourable seasons, both drought and flood. In times of drought though, the ability of public land to provide grazing falls and its susceptibility to damage - by both increased erosion and effects on sensitive plant species - rises. Reduction in risk and improved flexibility are likely to be at least as important to many lessees as are production increases *per se*. Use of public land is especially valuable in this sense where the lessee is the adjoining landholder.

Well-managed forest grazing can also provide community benefits through weed control and fire-fuel reduction. On the other hand, adverse effects may include loss of palatable or sensitive native species, reduction in floral diversity, changes in species dominance, weed introduction or spread, and damage to soil structure. Licensed grazing of small public land reserves, including water frontages can cause these effects. Clearly, some significant problems apply throughout the State with regard to standards of management of public lands, by both licensed users and illegal users. In particular, stock access to public land along water frontages can cause water-quality deterioration and stream-bank erosion.

There is thus a recognized need in some areas to improve standards of agricultural management of public lands, but withdrawal of grazing from such lands is not a complete solution unless alternative management is supplied by the Crown. Continued but improved management by adjoining landholders may be the most efficient option, where other important community values are not prejudiced.

Security of leasehold land tenure is an important determinant of the standard of agricultural management likely to be applied. Improvements such as fencing and water supply are expensive, but lessees will invest in such improvements more readily where they are confident that tenure will be secure enough to sustain the expenditure.

In most instances, the Department of Agriculture and Rural Affairs considers that the economic benefits to individuals arising from the use of public land is not reflected in significant improvements in the regional or State economies, because of the relatively small production increases. Improved economic viability of farming enterprises is likely to be reflected, however, in the welfare of local communities. The use of public land for fattening mature stock could provide longer-term benefits.

There are many fragmented and isolated public land allotments throughout the State. The Council has recommended many such allotments for reserves of various types, as they are sometimes the only examples of public land on particular land systems. They are also very important for their nature conservation, landscape, and in many cases recreation values. These are the reasons why the Council has seldom acceded to the many requests for alienation of such areas for adding to adjacent farms. In some places it is recognized that this can lead to interface conflicts.

Considering that relatively few individuals benefit from the use of public land for agriculture, the apparent trend in community values against this use, and a general lack of land suitable for extensive alienation, there is wide agreement on the lack of justification for further substantial allocation of public land to agriculture in Victoria. In some instances, it may even be difficult to sustain arguments for continuation of present agricultural use of some freehold lands, resulting in considerable scope for further return of land of low agricultural potential to the Crown.

Concerns recently expressed about high plains grazing in particular are that the cattle preferentially eat certain alpine herbs thus reducing their distribution, that they cause increases in shrub cover, that they damage the fragile moss-beds around the bogs, and that they foul springs and waterholes with excreta carrying intestinal worms and liver fluke.

The Council has taken the view that these concerns, although real, they do not justify the removal of grazing from areas other than the most sensitive or important for conservation or walking, as previously mentioned. The Council has recommended further studies, however.

Compared with some other activities, beekeeping as a land use has not produced major conflicts. Potential management problems include the physical disturbance associated with installation and removal of hives, clearing for fire protection, and public recreation access to particular sites and water supplies in summer. Because the honey bee is an introduced species, there are also potential ecological problems, including:

* a reduction in nectar supply to native fauna
* long-term decline in native pollinators, as a result of competition
* inefficient pollination and/or increased hybridization of native plants
* increased establishment of feral bee colonies that usurp fauna nesting sites in tree hollows

Silvicultural practices such as thinning in forests may temporarily reduce the availability of a flowering crop, but rapidly result in enhanced crown development and more profuse flowering in the retained trees.

Long-term research into the ecological impact of the introduced honey bee is in progress in South Australia. The results of this and other studies can be incorporated into the Council's recommendations where appropriate.

Issues

In summary, the following major issues need to be faced regarding agricultural use of public land.

* In most of its study areas, the Council has recommended some public land for alienation, usually to consolidate existing farms. However, it has opposed large-scale

alienation, except in the Mallee where extensive areas of public land were already cleared or used for farming. The question is whether further alienation of public land for agriculture is warranted.

* Should public land continue to be used for agriculture under licence, particularly in the Alpine high plains, the Mallee, and the Murray Valley areas?

* The effects of apiculture on natural ecosystems and native flora and fauna require further investigation, particularly in relation to the impact of competition from honey bees on native pollinators, competition with native fauna for nesting and roosting sites, and hybridization of native plants.

* Public land adjoining agricultural areas has traditionally been used to supply farm timbers, although in recent years demand has declined due to the use of alternative materials such as treated pine, steel, and concrete fence posts and other timbers.

Reference:

Evans, S. (1984). An economic survey of the honey industry in Victoria: 1980/81. Department of Agriculture, Victoria, Research Project series No. 186, August, 1984.

19. UTILITIES

Public utilities and associated activities comprise the essential services of water supply, drainage, and sewerage; the provision and reticulation of electricity and gas supplies; the disposal of domestic and industrial waste and toxic waste; the provision of road, rail, air, and communications networks and terminals; the distribution of fuel; the installation of air and marine navigational aids; facilities for the military and police; and a host of other institutional uses including schools, hospitals, prisons, and cemeteries.

Many installations associated with these activities are located on public land, and are vested in a wide range of government departments and statutory authorities, such as the Melbourne and Metropolitan Board of Works, the State Electricity Commission of Victoria, the Departments of Community Services and Health, the Gas and Fuel Corporation, and the Office of Corrections. For the most part the visual impact of these services is considerable, frequently in the form of pylons, pipelines, masts and beacons, and an extensive variety of purpose-designed buildings. As a result of the unequal distribution of associated resources around Victoria, many public utilities fall within the eastern part of the State, and particularly in the Latrobe Valley.

State distribution

Public utilities are significant users of public land in a number of quite localized areas. Most notable are those parts of South Gippsland (in the Latrobe Valley) under the ownership and operation of the State Electricity Commission of Victoria. This land is held mainly for recovery of brown coal (discussed in detail in chapter 17), but also for the siting of power stations and associated works and facilities, including cooling-water ponds.

The Commission also currently holds a number of areas as linear corridors and easements for the purpose of carrying power-transmission lines across country to urban population centres. Similar corridors are used to carry oil and gas pipelines from the Bass Strait fields to the refineries and distribution centres around the State. The policy of the responsible agencies in these instances has commonly been to keep such corridors free of vegetation on the grounds of fire prevention and maintenance access.

Two major areas of public land used for public utilities are the Latrobe Valley Water and Sewerage Board's Dutson Downs waste-disposal facility (9417 ha) and the Melbourne and Metropolitan Board of Works sewage-treatment farm at Werribee (11 600 ha). These installations treat domestic and industrial effluents on a large scale. Neither facility occupies its extensive site fully as yet.

As a secondary function, nature conservation has become significant in both locations. Werribee Farm has emerged as an internationally renowned wetland for the conservation of waterfowl, while part of Dutson Downs is included in the Gippsland Lakes Reserve. Attention to the requirements of nature conservation has become an active part of their management.

The transport network throughout the State occurs almost entirely on public land, and has been extended by land purchase from time to time for specific road or highway projects. Designated road and roadside reserves occupy more than 500 000 ha.

Although these often vegetated strips are normally maintained for access, safety, the protection of adjacent properties, and potential road-widening or track developments, many have become notable in their own right for wildlife habitat. Often these areas hold the only remnant of original or near-original vegetation in landscapes that have been extensively modified. They are thus especially vital as habitat, refugia, and migratory corridors for wildlife living or moving within their vicinity.

While endorsing their primary purpose for transport, the Council has recognized the potential other values of road reserves, and the need for their maintenance for all uses, and this is reflected also in the government's State Conservation Strategy, which highlighted the role of various forms of linear reserve such as roads and railways in urban and rural areas, and riparian and coastal strips, in their habitat-protection function.

The remaining parcels of utility land are scattered throughout the State, frequently clustering near population centres. Their purposes range from the location of airfields, prisons, hospitals, and educational institutions through to cemeteries, rubbish tips, and a variety of special-purpose buildings or structures such as fire lookouts, trigonometrical stations, communication towers, and air and marine navigation installations.

Impact of such structures on other adjacent or associated land uses is generally minimal in terms of area affected, being most often visual where it occurs. Unfortunately the purpose of some utility structures such as communications towers necessitates siting them prominently and intrusively. A longer-term and more random problem is the uncontrolled, indiscriminate and illegal dumping of rubbish in non-allocated areas.

Provision for and Evaluation of Utility Land in Council Recommendations

Public utility land is generally described in 'Utilities and Survey' chapters of Council's recommendations. The Council has made specific recommendations for utilities covering some 45 000 ha of public land, although this is only a proportion of the total amount, given the extensive easements on freehold land.

Council's recommendations make general provision for the remaining utility uses, by means of the following guidelines for management.

* Utilities should be planned to minimize disturbance to public land and protect the values associated with this land. They should not be sited on public land without the agreement of the management authority, and new pipelines and power lines should follow existing easements if possible (this may require widening of some easements).

* Where isolated remnants of the original vegetation remain on land associated with utilities, every effort should be made to protect that vegetation, consistent with management practices.

* Where a pipeline or overhead wires are to follow a road carrying trees and shrubs in a rural district, every effort should be made to locate the easements on private land alongside the road if this is already cleared, rather than clearing roadside vegetation to accommodate them.

* While recognizing the need for clearing or pruning vegetation close to power lines to reduce the associated fire risk, the State Electricity Commission should consult with the Department of Conservation, Forests and Lands regarding the manner in which the risk posed by vegetation can be reduced, while at the same time reducing the environmental impact to a minimum.

* Burning off, slashing, or clearing of vegetation along roadside and in utility easements should be kept to a minimum consistent with providing adequate fire protection. Disused utility easements should be retained as public land where they may have value for use as cycling or walking tracks or where they may eventually be needed again as routes for public transport.

A substantial area is tied up in long-established services. The routes of the State's roads and railways and reserves for many public purposes (such as cemeteries, court houses, and the Melbourne and Metropolitan Board of Works' sewage-treatment farm at Werribee) were laid down in the latter half of last century.

The Council generally makes recommendations for utility services where necessary, reflecting their essential nature, their often specific locational demands, and the relatively small amount of land needed to accommodate them. In doing so, the Council examines alternative sites or routes, and potential conflicts are either resolved or minimized as far as possible.

In this field it is not usually possible for the Council to provide for future requirements of land for additional utility purposes in the absence of firm or detailed planning proposals. The use of further land for these purposes has to be considered as the need arises, although Council has

considered proposals where these exist and where utility agencies are looking ahead to future developments, and has recommended sites accordingly.

Government agencies concerned with the provision and construction of utilities should, in the Council's view, submit proposals involving occupation agreements or the setting aside of sites on public land to the appropriate land managers at an early planning stage. This will assist in achieving the co-ordination that is essential in planning, and may perhaps avoid the necessity for costly resurveys.

Likely future needs

Although future utility needs cannot be known with any certainty, prospective needs can be assessed to obtain a broad picture of likely public land requirements for these purposes. Where appropriate the Council will be involved in recommending sites. Whatever the decision-making process, it will include extensive public consultation and participation.

The generation and reticulation of electricity supplies is expected to continue to take up significant parcels of public land, particularly in the Latrobe Valley. The State Electricity Commission of Victoria holds substantial land over brown-coal deposits in this region, for possible use over the next 30 years, although the total available reserves of brown coal extend far beyond this.

Options for electricity supply and associated public land requirements beyond the mid 1990s are currently being examined by a Parliamentary Natural Resources and Environment Committee Inquiry. At present the Latrobe Valley facilities produce more than 80% of the State's electrical energy requirements.

New electricity transmission lines are likely to be needed, but considerable capacity remains for further installations in existing corridors. Alternative site options for electricity generation are being considered, against the locational requirement of coolant water, and so a range of site possibilities have been 'tagged' for future investigation in the vicinity of Westernport and Port Phillip, in various places around Victoria's hill country, and in the Murray Valley.

The extent of further oil and gas pipelines will be determined to a large extent by the life of the Bass Strait reserves and future rates of utilization. In the long term, as the Bass Strait oil and gas reserves dwindle, there will be a need to consider other sources of energy, including brown-coal-to-oil conversion, solar power, and ethanol fuels. Special siting requirements may therefore have to be considered in the light of technological progress and alternative energy demands.

While most sewerage authority land is not public land under the *Land Conservation Act* 1970, the Council has from time to time made recommendations relating to future use of public land for sewage treatment and disposal.

In the area of solid-waste disposal, problems are being felt in communities of all sizes throughout the State. This is likely to become an increasing issue over time as all the available disused quarries and suitable landfill sites are used up, and other means must be found to dispose of the steadily mounting quantities of industrial and domestic refuse. High-temperature incineration is planned, and sites for this purpose are currently under consideration.

In the fields of transport and communications, most developments are likely to involve upgrading facilities rather than the construction of entirely new routes. The road and rail network has been in place for many years although a considerable amount of road realignment has been undertaken subsequently, while certain stretches of railway line either are now disused or have been dismantled. Further road realignment will doubtless be carried out in the future, but extensive rail development outside the metropolitan region is unlikely, perhaps apart form the suggested high-speed Canberra--Melbourne railway. Telecommunications services are adequate at present, but appropriate upgrading will inevitably take place in step with technological progress - for example, the present construction of transmitting points for cellular telephones.

Any extension to ports and docks would most probably occur on the periphery of existing installations, with the greatest potential for expansion in Westernport. Victoria's needs for airport services are generally well served at the moment, with development potential still at Tullamarine. It remains possible, however, that Melbourne may need another international-standard airport in the years ahead or, alternatively, a replacement facility for Essendon. As yet, no firm plans exist for any of these extensions, although future needs are being kept under constant review.

Certain disused rail routes with particular values could be used for linear conservation reserves and/or recreation areas, while there may be prospects for allowing multiple use in other forms of easement where such opportunities exist. New port and airport developments could be extensive and the impact on coastal plant and animal communities and wetlands adjoining potential sites would need careful attention. In all of these cases, special efforts should be made to ensure optimal site selection and impact reduction during and especially after construction.

Critical needs are currently being identified with regard to small utility areas, and these will need to be addressed in future Council reviews. All are likely to require sites on public land in order to meet rising demand. The Office of Corrections, for instance, is in the process of seeking or acquiring suitable land for new prisons, in addition to sites already held. Concern has been expressed on the need for appropriate cemetery land close to a number of townships throughout the State. The need for more waste-disposal sites and refuse tips is becoming increasingly urgent and is exacerbated by rising costs and increasing distances, which make alternative waste control, recycling, and disposal methods worth urgent investigation.

Disposal of public land

Section 2(1) of the *Land Conservation Act* 1970 defines 'public land' to include land vested in any public authority (including the Melbourne and Metropolitan Board of Works but excluding municipalities and sewerage authorities) outside cities, towns, and boroughs.

Having carried out an investigation in accordance with the procedure laid down in sections 7 or 8, then 9 and 10, the Council makes recommendations to the Minister. Some public authorities accord with the Council's process, and for example the Council has recently made recommendations for land no longer required by the Albury--Wodonga Development Corporation and land surplus to State Electricity Commission of Victoria requirements in the Latrobe Valley.

If the government accepts them, subsequent management of the land is to be in accordance with the recommendations. Having been considered in an exhaustive process involving public participation, and having had its values identified, all public land with specific recommendations must obey the important principle that it be treated equally. At issue is whether one public land management agency should be required to 'purchase' public land from another agency, in order to manage it in accordance with the recommendations. Current government policy is that each agency must identify land surplus to requirements and that any other agency of government, if wishing to retain it as public land, must purchase it. While this is not an appropriate matter for Council to address when making recommendations, it is important that the implementation of significant recommendations is not unduly delayed or prevented due to a lack of funds or rigid time constraints associated with the purchase of these areas.

The Council's recommendations specify uses for public land areas, which any agency can implement. It would be in accordance with the intent of the main recommendations for various agencies to implement them. However, the Council also commonly recommends specific land managers because these have the knowledge and experience to best protect the identified values, that being the statutory object of the whole process, as previously described.

Given limited land-purchase budgets, it is not considered appropriate that certain public land areas with important values not be protected because one arm of government controls them rather than another.

Where Crown land is vested for the time being in, for example, a government utility but is no longer required for its purposes, that land should in the Council's opinion be divested to the agency best equipped to manage and protect public land values - the Department of Conservation, Forests and Lands.

Currently, the government is reviewing the State's holdings of Crown land, with a view to rationalizing ownership. The Land Classification Review Committee is classifying small

parcels of Crown land, such as disused roads, temporary school reserves, etc., as either public land (which is retained and managed by the Department of Conservation, Forests and Lands) or government land (which is transferred to the Department of Property and Services, for possible disposal). Land is classified according to a set of criteria that take into account the conservation values of the land.

Other departments - particularly larger utilities - are also rationalizing their landholdings through the Assets Management Review Committee, an interdepartmental committee of the Department of Premier and Cabinet. This Committee is concerned to dispose of any lands no longer required by a particular department. Council believes that such lands should be assessed for their other values, that is, conservation, recreation, etc. - and, where these are important, they should be protected by retention as public land.

Issues

* Most utility services are vital to the welfare and livelihood of the community at large and it is therefore essential that these be maintained and extended where necessary in order to preserve our current standards and qualities of life.

* It is a function of the Land Conservation Council, under section 5(2)(h) of the *Land Conservation Act* 1970, to ensure that appropriate provision is made for utilities across the entire stock of public land, recognizing at the same time the different types and levels of impact that each may bring to adjoining land uses.

* Where public land has other values, in general it should not be allocated to use for a new utility whose operations commonly reduce such values. However, in many specific cases Council has recommended the use of public land for a utility.

* The management practices of many utilities are orientated towards vegetation control in the interests of unrestricted access and fire control. Refined management techniques may render it possible to meet the needs of government agencies in carrying out their roles, while maintaining habitat values of their easements.

* Linear reserves as a means of fostering flora and fauna conservation are likely to be given greater attention, with the growing realization and acceptance of their importance as remnant habitat for endangered species, as small-scale refugia, and as migration routes. It is therefore important that the most relevant management techniques are devised and employed to reconcile the primary aims of each of these agencies with those also aimed at protecting wildlife, and furthering recreation opportunities.

* The visual impact of utilities is frequently a cause for complaint where these are close to public view (for example, large-scale buildings in rural areas), where they

intrude on otherwise pleasing landscapes (as in power transmission lines and pylons), or where their presence may be a source of offence (as in garbage tips).

* Visual amenity can be preserved in proximity to utility sites or structures - by careful site selection, by appropriate design of the structures themselves, by suitable landscaping, and by effective screening.

* Disposal of land no longer required for utility purposes is an important and current issue. It is important that utilities, and other bodies considering public land disposal, recognize that such areas may have other particular values that warrant their retention as public land.

* Disposal of public land from one government agency to another should not delay or prevent implementation of Council recommendations.

* There is likely to be an increasing need for development of the existing infrastructure on utility land. Such development will have implications for that land as well as for adjoining land, and Council will need to monitor these changes when reviewing its recommendations.

* All public land with recognized values should be managed to protect these values where possible, no matter which arm of government is the manager.

Part IV
DATA COLLECTION AND VALUES ASSESSMENT OF PUBLIC LAND

20. ECONOMIC VALUATION OF PUBLIC LAND

In making balanced land use recommendations the Council has to decide between competing alternative uses for public land, its values, and its resources. If all such factors were easily priced, the Council would be able to make rational judgements between public land use options, based on a comparison of dollar values. In fact many such values and resources are not easily priced.

To pursue this problem the Council commissioned a report by Associate Professor J.A. Sinden of the University of New England. His complete report is available in the Council's library and a summary is provided in this chapter, together with some comments by the Council.

Professor Sinden has taken the approach that the government's three strategies - conservation, economic, and social justice - provide limits on the way land use options could be considered by Council. He proposes that, to meet these constraints, the Council should:

* consider only land use options that meet the objects of the State Conservation Strategy

* compare these options by using an economic framework, to assist in selecting the preferred ones

* choose a method of implementing the preferred options that would not diminish social justice

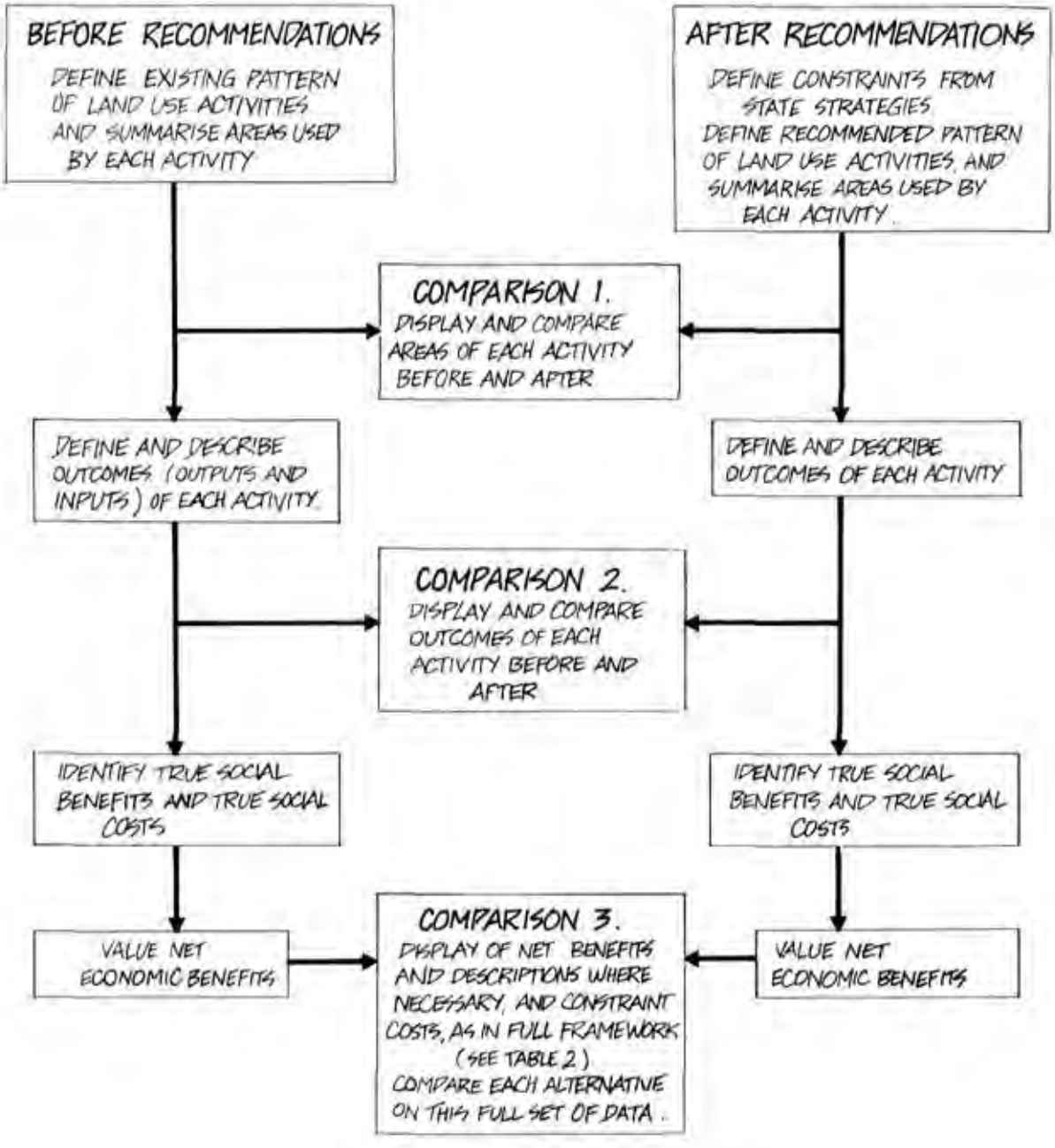
Professor Sinden proposes social benefit/cost analysis as the preferred method for the economic comparison of land use options. This method uses the benefits and costs to society as a whole from a use or product, rather than just its immediate market price. Side-effects and flow-on benefits and costs are therefore included.

Methods for valuing or assessing intangible benefits are described, so that they can be used in a benefit/cost analysis. Table 47 illustrates how such an analysis could be presented, and Figure 12 shows where this analysis could be used in the Council's process, to assist in the formulation of recommendations.

The proposed framework rests on arguments of economic theory, and of welfare economics in particular. Nevertheless, it is developed and applied in a practical way. For example, asking the right questions can be as important as finding complete answers; identifying the right social benefits and costs can assist choices without full economic values; consistent presentation of before-and-after information on recommended changes to land use can improve the available information even when quantities of output are used instead of full economic values; and systematic estimation of the

FIGURE: 12

FLOW DIAGRAM OF THE ECONOMIC FRAMEWORK



costs of recommendations can sometimes be useful when the full benefits cannot be assessed.

This approach is systematic and is orientated to the problem; it should encourage the community-wide perspective of Council and minimize the importance of short-term or local issues.

Social Goals - the Three Strategies

At any given time, each society has several broad goals. These goals provide the standards against which changes in land use can be judged, and provide the concepts to measure the social worth of these changes. As in many developed societies, the government of Victoria has identified three goals, namely improvements in economic efficiency, in social equity, and in environmental quality. In less theoretical but less rigorous terms, these are improvements in: total net income to society; the distribution of that income; and the protection of natural habitats and the quality of the natural environment in which we live. These goals have been comprehensively laid down in the three State Strategies discussed below.

An economic goal - the State Economic Strategy

A fundamental economic goal of every society is to improve the use of its scarce resources to satisfy more of its citizens' wants. The resources of land, labour, and capital are usually scarce, while the wants of the population always seem unlimited. The use of resources imposes costs, and the satisfaction of wants confers benefits, so achievements towards this goal can be assessed in terms of net benefits.

An equity goal - the State Social Justice Strategy

Most populations are strongly motivated to improve equity, or fairness, within their own societies, including improvements in the distribution of income to narrow the gap between rich and poor, in access to social services such as health education, and in the well-being of young, elderly, handicapped, or ethnic groups.

An environmental goal - the State Conservation Strategy

Like members of most societies, Victorians desire improvements in the quality of their environment. To this end, the Government's Conservation Strategy embodies five aims for resource conservation. These are:

* to maintain essential ecological processes and systems
* to preserve genetic diversity
* to ensure sustainable use of renewable resources
* to use non-renewable resources wisely
* to protect natural systems and their diversity for the non-material needs of society

A Framework to Assess Economic Importance

Professor Sinden considers that an economic framework to assist in land use choices must recognize the various State Strategies and, after examination of several such frameworks including environmental impact statements and trade-off tables, he concludes that the benefit/cost analysis method is the best.

An economic framework cannot show which land use alternative is best, even if the choice depended only on the economic information it contained. But it can help to prepare and organize information on benefits and costs of alternatives, and hence can indicate the relative economic importance of each in line with meeting the aims of the three government strategies.

Benefit/cost analysis

This analysis is the systematic assessment of benefits and costs, and the comparison of alternatives in terms of their net benefits to society. It develops the trade-off matrix by: ensuring that all outcomes are true social outcomes; valuing as many of these outcomes as possible; and then structuring the analysis to fit the decision-making context as closely as possible.

Benefit/cost analysis applies economic theory to choices through a problem-solving, scientific method. The problem is defined, alternatives are identified, the outcomes of each alternative are defined and valued, and the net benefits to society are calculated and compared. Constraints such as the Strategies discussed above are part of all such analyses. The references to this chapter describe various approaches to the use of benefit/cost analysis for land use choices.

Identification of social costs and benefits

Any assessment of economic importance must rest on correct identification of what is a true social benefit and what is a true social cost - that is, those that accrue to society as a whole, not just to the parties immediately involved. Factors such as external costs and benefits (externalities or spill-overs) must be included, while transfer costs are omitted. This process of identification is never simple.

A benefit is anything that increases anyone's enjoyment, and a cost is anything that increases anyone's 'pain'. More analytically, a benefit increases net social benefit, while a cost decreases it. So the basis for identification is the question: does the change in the particular outcome change net benefits to society?

The following list gives some guidance for assessing social costs and benefits.

* Include increases in output.
* Include increases in costs, including externalities.
* Include associated output falls including substitutions.

* Include associated falls in costs.
* Exclude transfer payments, such as taxes, subsidies, or government charges.
* Exclude double-counted outcomes.
* Avoid the 'sunk' costs or benefits - that is, those that occur before the land use change.
* Include the 'extras' - that is, costs or benefits that can be avoided by making no land use change.

Table 47

METHODS OF VALUING UNPRICED BENEFITS AND COSTS BY NATURE AND RELIABILITY OF DATA SOURCES (with potential land use applications)

Nature of methods	Nature of required data	Comments
Observed data from actual market exchanges (reliable)		
Estimate demand and supply curves (agricultural products, recreation)	Prices and quantities of the actual good, from each of many observations of market exchange	The methods estimate economic surpluses directly; travel-cost method is used for recreation
Estimate changes in money income (loss from reducing plantation rate to protect water supply, loss from reserving areas for scientific research)	Actual money incomes from relevant cases	Estimates minimum values for total benefits, or losses in income
Estimate savings in cost (benefit from improved provision of a good or service such as recreation, or wildlife preservation)		Value of benefit equals saving in cost
Observed data from related markets		
Interpret changes in land-sale value (benefits from landscape, benefits from heritage preservation, costs from loss of adjoining grazing leases)	Needs data from many comparable sales	Estimates a benefit or cost as the change in land-sale value, due to changes in land characteristics
Interpret values in past decisions (benefits from preservation for wildlife or heritage purposes)	Opportunity costs, or increases in benefit, from many comparable decisions	Estimates benefits or costs as valued by decision-maker
Derive residual value (timber)		Returns of processed product less costs of harvesting, transport, and processing
Questionnaire data (potentially reliable)		
Estimate consumer surplus and total benefits from questionnaire surveys (benefits from existence of habitats, species, genetic diversity; benefits from landscape)		Must be validated

Professor Sinden considers that the land use choices must be made within the context of the three State Strategies, which can be met by imposing constraints on choices. In essence, any new land use alternative will have to exceed (or at least meet) minimum levels of achievement on the economic, social justice, and of course conservation criteria. If

these levels can be specified, land use alternatives can be designed to meet them, or be excluded if they fail them. Then the costs of meeting these constraints can be included as true social costs, and the associated economic benefits can be included as true social benefits.

The constraints ensure that all alternatives under consideration meet the Government's Social Justice Strategy and Conservation Strategy.

Principles of application of benefit/cost analysis

The data within the presentation require that: all easily valued priced outcomes be valued; all easily valued unpriced outcomes be valued and included; all remaining important unpriced outcomes are converted to constraints on the design of alternatives; and all costs to meet the constraints of the State Economic Strategy, the State Social Justice Strategy, and the State Conservation Strategy be valued and included.

Inclusion of the More Unpriced Values

Unpriced values and costs can be included directly in the assessment when they can be valued. When valuation is impossible, they can often still be included in the decision by certain well-established procedures. In general, reliable prices can only be obtained from observations of market exchanges. Nevertheless, methods exist for deriving social values where no market exchanges can be observed, as summarized in Table 47. They have been fully documented (Sinden and Worrell, 1979).

The Availability of Existing Data

For application, the benefit/cost framework requires that:

* effects of land use changes be defined and described (not necessarily valued) in terms of extra net benefits to the whole community

* net benefits be defined and described for the land uses both before and after potential recommendations

* a systematic attempt be made to compare the set of net benefits before to the set of net benefits after

* the necessary constraints be recognized through definition of recommendations, and the costs of implementation

None of these requires valuation *per se*, yet application with partial valuations would improve the information presented for decision.

The Broad Framework

A step-by-step procedure

The procedure outlined in the following points would be one method of incorporating the economic framework suggested

above into the Council's process of formulating land use recommendations:

* the existing pattern of land uses, before any recommendations, is presented in terms of the area of each land use activity

* the after-recommendations pattern of land uses is defined to meet any constraints (explicit or implicit) of the various State Strategies

* the pattern of land uses after the recommendations is presented in terms of areas of each activity

* the changes in areas are tabulated, permitting a systematic comparison of the set of changes without monetary information (this is Comparison 1 in Figure 12)

* the outcomes of the before and after alternatives are defined and described (not valued as yet) in terms of the flow of quantities of goods and services to the community; technical, quantitative descriptions are all that is necessary here

* the changes in outcomes between the alternatives are tabulated, permitting a systematic comparison of the entire set of changes, still without monetary information (this is Comparison 2 in Figure 12)

* net benefits of readily valued outcomes and potentially valued outcomes are now estimated in monetary terms and listed (as in Table 48); hard-to-value outcomes are not valued but their definition and description (from the fifth step above are listed in the final presentation (see Table 48)

* any costs of meeting strategy constraints, that have not shown up as changes in net incomes, are estimated and inserted

* the changes in net economic benefits are tabulated, as in Table 48; this permits a systematic comparison of economic information on the entire set of changes (Comparison 3 in Figure 12)

There may, of course, be more than one recommended pattern of uses and thus more than one after-the-recommendation alternative.

Two illustrative land use alternatives

The hypothetical land use alternatives of Table 48 are an existing pattern of uses and a recommended pattern of uses. For illustration, the recommendations include increases in recreation opportunities, increases in heritage and conservation benefits through reservation of parks and reference areas, and reduction in the area of forest logged, reductions in the area grazed by livestock, changes in the location of areas quarried, and removal of beekeeping to a new site.

Incorporating valuations and constraints

In Table 48, the changes in net social benefits of the readily valued outcomes are included in column 4 of Rows 1 to 4. The values of the presently unpriced, but potentially valued outcomes are included as Row 5, although in this example the row only concerns recreation. The recommended pattern of land uses will have been formulated so as to meet the constraints of the State Strategies, and the social costs of meeting these constraints are included as Rows 8 to 10. The changes in these social costs are noted in column 4 of the respective rows, and these changes are of course the actual values of constraints C8 to C10.

Table 48

AN ILLUSTRATIVE APPLICATION OF COMPARISON 3 IN THE FRAMEWORK

Outcomes	Alternatives		Change in social benefit or social cost $
	Existing land uses	Recommended land uses	
Readily valued outcomes			
1. Agricultural products	Yes	Yes, at reduced level	$-NSB_1$
2. Sawlogs and pulpwood	Yes	Yes, at reduced level	$-NSB_2$
3. Minerals and stone	Yes	Yes, at same level, but at new sites	$-NSB_3$
4. Honey	Yes	Yes, at same level, but at new site	$-NSB_4$
Potentially-valued outcomes			
5. Recreation	Yes	Yes, at increased level and in increased variety	$+NSB_5$
Hard-to-value outcomes			
6. Heritage benefits	Yes	Yes, at increased level	+ ?**
7. Conservation benefits	Yes	Yes, at increased level	+ ?**
Costs of Strategy Constraints			
8. Cost of providing substitutes	Nil	$C8	-C8
9. Cost of ensuring sustainability	Nil	$C9	-C9
10. Cost of employment constraints	Nil	$C10	-C10
Total:			?

Notes:

* NSB Net social benefit; C Cost of constraint
** These unvalued changes are described at this part of the presentation.

The loss in net incomes through any restrictions on forestry, agriculture, mining, or beekeeping are automatically included in the changes NSB_1 to NSB_4. The net benefits of potentially valued outcomes are included directly through Row 5. The benefits of other not-valued outcomes are described in Rows 6 and 7. Together, these inclusions should fully account for unpriced outcomes.

The framework incorporates concepts of natural resource accounting whereby:

* monetary cash flows have been converted to flows of true social benefits and costs for Rows 1 to 5

* the costs of maintaining resource stocks (analogous to capital depreciation) are specifically addressed and included through the constraint-cost 9.

Issues to be Resolved

Needs of the people of Victoria

The broad goals of Council's recommendations are to provide for the balanced use of public land, and to have regard to the present and future needs of the people of Victoria. Apart from information on certain values, however, the resources reports contain little information on the people's desires for the wide range of unpriced land use activities. This lack is unimportant for decisions that impose few social costs, but the information is a vital complement to the existing descriptions of resource availability for all choices that involve substantial social costs.

A product price reflects judgements by all producers and all consumers in a market. Where no markets exist, public participation is a useful and desirable step to obtain this information, but participation can rarely reflect the judgements of all members of the community. The whole prior process of formulation of issues and recommendations may benefit from broad indications of the preferences of the whole community.

One way to obtain such information cheaply is through questionnaire surveys. Surveys could be undertaken as and where required to determine relative preferences for critical land uses. These should take the form of Statewide assessments for general priorities, and local assessments for specific issues.

Partial or complete assessment?

All draft recommendations of Council are considered in detail, with two public consultation periods. The recommendations could incorporate some considered, systematic comparison of benefits and costs; however, many do not justify a full-scale evaluation of all benefits and costs - for example, a phased cessation of logging in a small part of a forest region, a slow or small reduction in the number of permits to graze cattle, or a shift of quarrying a few kilometres. The difficulty of identifying such recommendations from those requiring a full-scale assessment is, of course, clear. For this reason, the proposed framework emphasizes assessment of easily valued outcomes and of costs of constraints. General application of the partial analysis of the framework is considered to be more useful than occasional application of any more-comprehensive analysis.

Collection of the required information

Broadly, one can collect either of two alternatives - relatively precise but less-appropriate values or relatively

imprecise estimates of the appropriate values. In view of the long-term importance of Council's recommendations to the Victorian community, approximations of the right values would seem more useful than precise estimates of less-appropriate information.

Conclusions

Professor Sinden considers that estimation of the economic value of public land can be a complex process and always requires much detailed data. Nevertheless, application of the proposed framework would assist Council's land use choices even when data are sparse. The following summary of the more simpler ways in which the framework can be used provides a relevant summary of the chapter.

* Ask the right, initial questions. These normally are: what are the extra net benefits to the whole community from the recommended change; and what kinds of people will receive the extra benefits and costs?

* Present in a consistent manner the before-the-change and after-the-change information, even if these data are simply the areas and quantities of output.

* Identify the nature of the true benefits and costs to the community, even if full economic values are not available.

* Obtain approximate values of the true social benefits rather than precise values of less-appropriate concepts of benefit.

* Systematically estimate the costs of recommendations.

* Systematically estimate the opportunity costs of recommendations.

* Apply the proposed framework in a partial manner, even when complete application and full valuations are impossible.

Council's Current Process

The Council offers the following comments on Professor Sinden's economic analysis.

In its pursuit of balanced use of public land across the State, over the past 17 years the Council has acknowledged the considerable economic value that the resources on public land have. This is reflected in many recommendations which provide for the commercial utilization of such resources.

While not using a structured economic framework, Council does include economic aspects in its formulation of recommendations, and ensures it is fully informed on the possible impacts of recommendation options.

Indeed, much of the time in preparing recommendations is taken up with identifying the location and economic value of

major resources such as timber, minerals, and road-making materials. This ensures that Council has all the relevant information at its disposal - in particular, information on the impacts of land use changes on, for example, regional employment. This often involves evaluation of resource information compiled by government departments followed by extensive consultation with user groups in both the government and non-government sectors.

The Council's process also has other avenues for users of public land to put their views on expected impacts of Council recommendations. This is a major role of the formal submission periods, particularly the second period where there are specific proposals to comment on. Submissions are often very detailed, and some contain economic appraisals: examples include East Gippsland Area Review submissions from the Victorian Sawmillers Association, Timber Workers' Union, and the Conservation Council of Victoria's 'Jobs in East Gippsland' report. Throughout Council's investigation process, however, views can be and are put to Council members and staff, and to the government.

As its members represent the main users and managers of public land the Council is not a remote body. Each member's organization generally makes a submission, detailing its respective views, and when land use proposals are being considered by the Council, these can be presented and argued.

The Council has extended its standard process when considered necessary (such as for the East Gippsland Area Review and the Alpine Area), and the economic consultancies it has commissioned for various study areas, where there was a perceived need, are listed in Appendix XVII.

For example, when examining the East Gippsland Area Review proposals, Council considered each option for possible reserve status in terms of its conservation values and the timber resource and timber-industry jobs depending on it.

Accordingly when formulating its recommendations the Council is well informed of the impacts on individuals and groups and, when making decisions about competing land uses, always seeks to minimize impacts so far as is possible while protecting other recognized values.

Council has adopted various methods to reduce impact on the use of resources on public land where this has occurred. These include:

* phase-out periods for logging and grazing
* once-only timber harvesting
* deferred reservation until after logging
* removal of use from part of the area only
* limited continued use, or use subject to the land managers' discretion
* site-specific exceptions to the intent of the general recommendation
* careful selection of reserve boundaries to ensure that valuable resources are not unnecessarily excluded from use

Methods for valuing intangibles

The methods outlined by Professor Sinden in his framework are described elsewhere (Sinden and Worrell, 1979). They cover the present ways used, but there are res-ervations about several of them, leading to the view that the methods estimate a minimum value in some circumstances - that is, they reflect only part of the recognized attributes. For example, Kellert (1984) lists the following hard-to-price values of conservation reserves:

* naturalistic/outdoor recreation (appreciation) values
* ecological values, including measures of species diversity, population numbers, significance, representativeness, etc.
* existence (spiritual) values
* scientific/educational values - advancement of knowledge
* aesthetic values
* utilitarian values (present and future material benefits)
* cultural, symbolic, or historic values

It is difficult to imagine opportunity-cost or questionnaire data adequately attributing a value to all of these. It is also significant that these items are important in any assessment of the true economic value of public land.

Problems of the benefit/cost method

The method raises problems concerning: discounting of future benefits; pricing of depleting resources; comparing unlikes; avoidance of sunk costs; and use of employment data.

Discounting of future benefits becomes necessary in benefit/cost analysis, as this uses a comparison on the basis of present values of the flow of net social benefits into the future - that is, the values now of sums available at a specified future date. These are calculated by discounting estimated future benefits and costs back to the present, using an appropriate inflation-free interest rate, to determine what sum if invested now at that (compound) interest rate, would amount to the expected future sum? For example, at an interest rate of 4%, $1000 in 1989 has a present (1988) value of $962, $1000 in 1990 is now $925, in 1991 is now $889 and so on, and in 2006 is less than $500. This means in effect that estimated long-term returns, such as those arising from conservation or sustainable resource use, tend to be discounted to a low present level.

The nature of various conservation values is that they may have a modest economic benefit, measured annually, but that this persists into the distant future. The discounting of this future 'income stream' to present values fails to adequately measure such values, in comparison with immediate resource-sale benefits.

Pricing of depleting resources is more complex than indicated. The main determinants of whether a non-renewable public resource is sold in the market are the costs of extraction,

transport, and processing. The small 'royalties' paid rarely cover supervision, regeneration, and/or reclamation. This implicitly assumes that the resource is never-ending. The market makes no provision to recognize depletion of a non-renewable resource until costs of extraction rise near the end of its life, too late to ensure wise use.

Various non-renewable resources on public land include minerals, stone, and, where forest-age classes are strongly separated, mature forests for timber. Other public land values, such as wilderness or climax forests, can be seen as effectively non-renewable.

Both this question and the discounting discussed above reflect aspects of the problem of inter-generational equity - that is, the effects on future generations of present-day decisions that diminish environmental resources. The difficulty in assigning an economic value to this effect is reflected in its absence from Professor Sinden's analysis.

A major problem with Table 48 in this chapter showing benefits and costs, is that decision-makers are required to balance unlike values - dollar values against nebulous increases/decreases and unknowns. Kellert (1984) describes how intangible values tend to be under-emphasized, and dollar values over-emphasized, in decision-making where benefit/cost tables are used.

In the identification of social benefits and costs it is explained that 'sunk' costs - incurred before the proposed change - should be ignored. This is not suitable for regional or State-wide consideration of an industry or use, where past practices such as unsustainable levels of harvest provide important context for decisions on the future management of resources.

The chapter states that employment trends are likely to be unhelpful indicators of net (economic) benefits. While this may be true, the weighing of local social costs against more general socio-economic and environmental benefits should be given attention in Council and government deliberations; this was the reason for the economic-employment consultancies in the East Gippsland Review investigation.

Issues

* It may be appropriate for the Council to adopt a formal economic framework for comparing recommendation options.

* Some concern has been expressed that past recommendations have paid insufficient attention to economic values although, in most cases where it has perceived significant economic impacts from its recommendations, Council has commissioned studies to evaluate those impacts.

* Council's current approach to the various values contained in public land may contain some deficiencies, but it is questionable whether the benefit/cost method outlined by Professor Sinden provides a better one.

* It may be necessary to conduct surveys of the public's views on particular public land use issues, such as the relative needs for various types of recreation

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21. ENVIRONMENTAL DATA

Victoria is the smallest mainland State with an area of 22 760 000 ha (some 3% of Australia). Nearly 8 775 000 ha is public land, while the balance is held under freehold title.

Data relating to this land are held by a large number of organizations, individuals, government departments, and agencies. For example, about 1.7 million properties in the State that are in freehold ownership. In addition, government departments and agencies adopt advisory, protection, and management roles in regard to various aspects of land use, each role requiring some data collection.

Until relatively recently, much of this information had been collected in an unco-ordinated fashion, and access was in many cases limited. Since the late 1970s there has been a growing awareness of the need to provide an environmental data base that can economically be updated and that is relatively accessible for use by both individuals and organizations.

A Commonwealth--State workshop held in Adelaide, in November 1983, specifically addressed progress towards the establishment of an environmental survey of Australia.

The establishment of an Australia-wide environmental data-bank would benefit the Council, by allowing recommendations to be made in a national context. This is particularly important when recommending areas for the conservation of certain species. A particular plant or animal may be common (or rare) in Victoria, but its status may be the opposite on a national basis. Hence, its relative importance alters in relation to other factors, such as recreational use or resource utilization.

In Victoria many data-bases have been developed that hold environmental data, but these have not been co-ordinated. They include various flora and fauna records and information on hardwood and softwood forests, land capability, archaeological sites, air and water quality, and property dimensions and boundaries.

The two major Victorian computer land information systems currently under development - LANDATA, maintained by a division of the Department of Property and Services, and the Department of Conservation, Forests and Lands' Geographic Information System - are intended, among other things, to co-ordinate this information.

In addition, the Melbourne and Metropolitan Board of Works' Facility Information System and a State Electricity Commission system are under development, both designed to link in with LANDATA.

The intention with LANDATA is to have all the major land data bases computerized and networked over the next 5 years. By the end of stage one, LANDATA will offer five land information products: a land-owner system; a property boundary data-base; a register of government-owned land; public land data; and a directory of natural resources.

The Department of Conservation, Forests and Lands' Geographic Information System will be used in regions for strategic planning, to co-ordinate inter- and intra-departmental policies and activities, and, in the longer term, to evaluate regularly the condition of the State's natural resources.

One of the real benefits of the Geographic Information System can be gained from modelling long-term environmental processes on the computer from limited data, which previously could only be evaluated by many years of field research. Other benefits include more efficient data-recording and handling, and data-integration using sophisticated data-manipulation software to produce results beyond unassisted human capability in a fraction of the time.

As with any system that is large and complex and handles a wide diversity of data, the Geographic Information System is moving only slowly towards achieving its aims. An underlying factor in this is the paucity of staff and limited resources available.

The Land Conservation Council collects and presents environmental data and research results through its processes of public land investigation and recommendation.

Land Conservation Council process

The Council's principal role requires the collection and evaluation of substantial area-specific environmental data. Much of this information is provided by government departments and agencies. Where necessary, the Council commissions additional research to supplement its knowledge of particular areas and issues.

Chapter 4 discusses the process that the Council follows in conducting investigations into public land use.

Each of the stages in a Council investigation is accompanied by data collection and presentation, related to matters as diverse as population demographics, stock and crop production, rainfall, history, and timber-industry employment. Much of this information is available from existing sources, but is seldom specific to the precise area under investigation. It is usually provided on request by government departments, obtained by Council research staff, or through consultancies.

The material collected is incorporated into a descriptive resources report, specific to the area under investigation, which is made available to the public to assist in the preparation of submissions as to how the public land may be used.

Thus, the Land Conservation Council's approach to the development of a limited environmental data-base can be seen to comprise the following:

* preparation and publication of a descriptive resources report - collection and presentation of data relating to one of the areas into which the State has been divided for the purpose

* commissioning research studies into specific aspects relating to the values contained in an area, or land use

Once an investigation is completed, research effort is directed to other areas. No attempt is made to keep the full data-base current, in its diverse forms; thus the descriptive resources report becomes progressively out of date and ultimately no longer represents the actual situation within a study area.

While the establishment of a continuing data-base specific to the Council's needs could be considered, there are alternative reasons for a much more broadly based approach.

Issues

* The Land Conservation Council process has a major requirement for environmental information from diverse sources, in connection with its area-specific investigations.

* The issue is whether Council needs to establish and maintain its own environmental data management system, or utilize the systems being currently developed, particularly LANDATA and the Geographic Information System. Their development offers many opportunities to enhance the Council's decision-making process through the provision of relevant, current data.

22. ENVIRONMENTAL RESEARCH

Environmental research is necessary to ensure that the optimum decisions can be made regarding the use of a resource or the protection of an ecosystem, plant or animal species, water quality, etc. Decisions on land use are necessarily based on the best information available at a certain time. Where apparently conflicting uses of an area cannot be clearly placed in some order of priority, further research is often necessary to more clearly indicate an area's 'best' use. In some cases, the Council has not made specific recommendations, pending the outcome of further research (see Appendix XVIII).

Various government departments - concerned with the environment, agriculture, water supply, and land use - conduct a wide range of research projects within the framework of a variety of research units or institutes (see Table 49). The Department of Agriculture and Rural Affairs has the widest array of specialized units, conducting research into many aspects of agriculture in order to monitor and improve agricultural production and performance. All of these stations are located on public land.

The Department of Conservation, Forests and Lands also has a number of research establishments, utilizing either public land in general or land allocated specifically to research. Public land has been set aside for long-term scientific studies, such as those examining the effects of softwood plantation establishment on streamflow at Stewarts, Long Corner, and Cropper Creeks, and for long-running hydrological investigations at Reefton and in the Parwan Valley. At the same time the Department is carrying out a long-term fire-effects experiment in the Wombat Forest.

The Melbourne and Metropolitan Board of Works maintains catchment experiments at Coranderrk and North Maroondah.

Thus, the government and people of Victoria have a significant and continuing investment in scientific research, the results of which affect both public land and freehold land use.

Provision by Council

The Council has always maintained that its own role in data collection, assessment, and interpretation is essentially directed to the two latter, and indeed the Council's investigations budget hardly permits research other than short-term 'stop-gap' contracts. It has been suggested in submissions, however, that the Council should be playing a more creative, co-ordinating role in directing attention to areas of research that should receive priority, in order to better identify the significance of the natural values associated with public land and ways of managing its capabilities to meet the community's various needs.

Table 49

GOVERNMENT RESEARCH STATIONS AND INSTITUTES*

Managing authority	Research stations and institutes
Department of Agriculture and Rural Affairs	Horticultural Research Institute Rutherglen Research Institute Plant Research Institute Potato Research Station Vegetable and Turf Research Institute Animal and Irrigated Pastures Research Institute Irrigation Research Institute Ovens Research Station Crops Research Institute Mallee Research Station Sunraysia Horticultural Research Institute Animal Research Institute Gilbert Chandler Institute of Dairy Technology Milking Research Centre Pastoral Research Institute Agricultural Engineering Centre Apiculture Research Unit Seed Testing Station
Department of Conservation, Forests and Lands	Arthur Rylah Institute for Environmental Research Marine Science Laboratories Keith Turnbull Research Institute Snobs Creek Fish Hatchery Royal Botanical Gardens and National Herbarium
Melbourne and Metropolitan Board of Works	Forest Hydrology Branch Catchments

* Formally constituted stations and institutes only. Many departments have research groups or units conducting research that are not included here.

Council regards research as a necessary and critical tool in public land use determination and management. (See Appendix XVIII) Council has not provided for research as a separate recommendations chapter in each of its study areas, however, but has either noted a need for additional research or encouraged on-going research through the temporary or permanent reservation of areas of appropriate public land, as and where necessary. In this way, Council has directed and placed a priority on research needs. In some cases, Council has indicated areas where additional research is required in order to test whether results from a particular study are applicable to other areas; that is, Council has

identified uncertainties and gaps in the applicability of some research results.

In general, however, the Council has not included 'scientific research' as one of the regularly recommended appropriate uses for public land other than in education areas and reference areas, relying instead on designating specific areas for specific tasks, or recommending that studies take place.

Issues

* The Council's approach to proposing scientific research projects has varied, as in some instances a study or research need has only been mentioned in the preamble to recommendations, while at other times it has been included as a recommendation.

* Council's role in research has mainly been in identifying topics and areas for research - an important aspect of Council's work, which should perhaps be given more emphasis in future recommendations.

* Specific needs for environmental research have been identified in various of the Council's recommendations and in the Victorian National Parks Association Conservation Review - for example, marine environments and protection of endangered species.

* A formal process needs to be established to convey the results of recommended research back to Council prior to its review of particular issues. In some circumstances it would be appropriate for the Council to review its previous recommendations when these results become available, rather than waiting for its normal 10-year review period.

Part V
DISCUSSION OF ISSUES

23. DISCUSSION OF ISSUES

Throughout this report, a range of issues concerning the Land Conservation Council process, public land use, and future policy relating to land planning have been outlined. These are now discussed below in more detail. The Council would welcome comment on the issues raised as well as others that have not been mentioned. The issues are discussed and grouped according to the chapters in which they were raised although some are relevant to more than one chapter.

Chapter 4 - Land Conservation Council - Operation

Initiation of reviews and special investigations

Under the current procedure the Council carries out area reviews at about 10-year intervals, in accordance with a program approved by the Minister for Planning and Environment, and by the Governor-in-Council, under section 7 of the *Land Conservation Act* 1970. The program can be amended, and has been - for example, to bring forward the current Mallee Area Review. This change occurred in response to community and departmental concerns about certain land uses.

Special investigations are presently initiated by a formal request from the Minister administering the *Land Conservation Act*. However, it has been suggested that, in addition, a process could be established whereby individuals or organizations could write to the Minister requesting a study of a specified area, use, or value.

Amendment of the *Land Conservation Act* 1970

Several of the issues discussed in this chapter may require amendments to the Act in order for them to operate. Some of these are listed here.

* The definition of public land could be expanded to include Crown land in cities, towns, and boroughs. Such areas include many historic sites and buildings, and remnants of land systems almost entirely cleared for agriculture or township use.

* Council is constantly faced with the issue of minor or site-specific changes to its recommendations after their acceptance by government. There is no provision under the *Land Conservation Act* 1970 for the Council to alter its recommendations other than by processes contained within the Act; this can only be done by the government, although the Council may be asked to provide informal advice. It would seem appropriate for the Council to have a formal mechanism whereby it could consider changes to its recommendations between major reviews. This could involve an identifiable process which includes public consultation.

The new *Planning and Environment Act* 1987 may provide an opportunity for the Council to consider such changes by preparing amendments to planning schemes that, under the new Act, may apply to public land as well as freehold land.

* Alteration to the membership of Council (discussed below).

* Changes to the public consultation process (also discussed below).

Membership of Council

The membership of the Council, as described in the 1970 Act, reflected the central requirement that relevant perspectives on public land planning and evaluation should be represented on the Council by people with expertise in relevant areas and a high level of responsibility.

Areas of expertise are soil conservation and catchment protection, timber production and forest management, Crown land administration and survey, fisheries and wildlife, national parks, agriculture, and conservation. The Land Conservation Council was, and is, essentially an 'expert' body consisting of the heads of appropriate departments and services, and the members from outside government with complementary experience.

Until the formation of the Department of Conservation, Forests and Lands in 1983, separate submissions were received from the independent authorities with an interest in land management and planning.

The establishment and consolidation of the Department of Conservation, Forests and Lands which brought together five departments and authorities whose heads were members of the Land Conservation Council, has created some problems for the Land Conservation Council, individual members, the Land Conservation Council process, and public perception of the Land Conservation Council.

The presentation of a joint submission from the Department of Conservation, Forests and Lands means that some of the differences of opinion on facts and interpretation are now reconciled within the department, and other Land Conservation Council members may be denied access to a wider range of material and opinion that was available previously. The government has indicated that a review of the Land Conservation Council membership is required. The essential principle to be applied should be the requirement that appropriate perspectives, rather than organizational interest groups, are represented on the Council. Changes in policy responsibility within the Department of Conservation, Forests and Lands could justify a reduction of the number of members from that department.

A number of proposals have been made for widening the membership of the Land Conservation Council to extend representation.

The principle of appropriate expertise might justify the appointment of a member with experience in the relationship between local government and concerns with State and national governments' policies and planning.

The need to co-ordinate principles and practice in the planning of public land and private land, and the proposal in the draft Lands Bill for a Land Conservation Council role in relation to the planning of public land within cities, towns, and boroughs, suggests the appointment to the Council of the Secretary of the Ministry for Planning and Environment.

Draft proposals for the Lands Bill, currently under discussion, propose that the Council be involved in the re-classification and re-categorization of Crown land in cities, towns, and boroughs. In order for it to do this effectively, the Bill suggests that the Secretary for Planning and another person with expertise in urban planning issues be appointed as Council members.

Other Council membership questions have been raised - for example, the possibility of including representatives from local government, the tourism industry, regional industry, and the Ministry for Planning and Environment. Any review of membership should take these suggestions into account.

As mentioned in chapter 4, the Council was established as a technical advisory body, not as a forum for the many different community groups or for those with an interest in the commercial utilization of public land resources. Where an organization has a clear interest and can assist the Council by providing information and expertise, its representatives have been included on study groups, for example, the Ministry for Planning and Environment, Melbourne and Metropolitan Board of Works, and the State Electricity Commission have been represented on recent study groups. All organizations and individuals have the formal submission periods to present their views, and those with particular interest are contacted by Council's research staff in the course of investigations. These arrangements have been effective and should continue. In addition, the Council's chairman and staff are always available to discuss issues of concern with any person or community group.

Need for continual reviews

Current Council policy is to review areas previously studied at about 10-year intervals. The bases for this policy are:

* substantial areas were left as 'uncommitted land' in the earlier studies

* some of the Council's policies have changed or have been modified since the earliest studies

* an inadequate information base existed at the time of the earlier studies

* much new information of relevance has been produced

* more information is now available about the status of floral and faunal species

* unresolved issues remain from earlier studies

* demands for public land use have altered

* values of public land resources change as exploration, research, and technology progress

Accordingly, the Council considers that reallocation or adaptation of resources must be expected, in order to meet changed demands. Planning is also a dynamic process and as such any planning mechanism must allow for periodic review in the light of changed circumstances.

Reviews have been carried out under this policy for the South-western Area District 1, North-eastern (Benalla--Upper Murray) Area, East Gippsland Area, and Melbourne Area District 1; others are in progress for the Mallee Area and Melbourne Area, District 2. Future reviews are scheduled for the South Gippsland District 1 and Corangamite Areas.

The need for reviews can easily be illustrated: by the wealth of new information published in the review reports, in particular flora and fauna surveys in the East Gippsland and Mallee Areas; by the number of new recommendations made - some 230 for the South-western District 1, Melbourne 1, and North-eastern (Benalla--Upper Murray) Reviews; and by the continuing public interest in the planning of public land use, indicated by the 6750 submissions received during the East Gippsland Area review.

The 'trigger' for a review varies. For East Gippsland, the need for a review of 'special uncommitted land' and other unresolved issues was underlined by concern about protection of botanically significant areas, particularly on the Errinundra Plateau. The scheduled Mallee Area review was brought forward in response to proposed clearing of habitat of threatened bird species and links between major blocks of public land.

South-western District 1 and North-eastern (Benalla--Upper Murray) Reviews were initiated to update recommendations for these areas in the light of current Council policies and new information, as well as (for the south-west) to consider softwood plantation needs, and (for the north-east) to make recommendations for areas no longer required by the Albury--Wodonga Development Corporation. For Melbourne Area District 1 the reasons for the review included the need to take into account new information from recent studies, the resolution of particular issues, such as that relating to the Alcoa (Anglesea) lease area, and the recognition of the importance of small blocks of public land, particularly for flora, bushland, and streamside reserves.

Future reviews could be scheduled according to a priority order, which could respond to government requests or policies, perceived threats to certain values in a region of the State, or public requests for an area to be reviewed.

The Council recognizes that industries using public land require stability of access to resources on public land, and that it would not be appropriate to carry out repeated reviews of all areas. Rather, reviews should be carried out where the reasons discussed above apply. For example, the present Melbourne Area District 2 review includes the Central Highlands forests and the Melbourne and Metropolitan Board of Works catchments, which are likely to raise particular public interest, as are the areas in the Otways to be reviewed with the Corangamite Area.

Future reviews could also have an increased 'monitoring' role by considering existing land use recommendations in the light of changing community demands.

Chapter 5 - Public Consultation

The current process for public consultation is laid down in the *Land Conservation Act* 1970, extracts from which have been published in every one of the Council's resources reports. Chapter 5 has discussed its operation and achievements.

Some comments have been made on a perceived need to improve the Council's process, to obtain 'better' public consultation. Other processes are used in town planning. These involve a single period for submissions (or objections), followed by opportunities for appearance before a panel or appeal to a tribunal. These 'checks and balances' emphasize a fundamental difference between planning systems for freehold and public land. On freehold land the owner expects to do what she or he wants, with minimal restraint. Public land users on the other hand do or should recognize that the land is owned by all, and that their use should not limit the ability of others to use or enjoy it.

Freehold-land-use proposals are often site-specific, and the town-planning process allows those neighbouring the site or otherwise concerned to have several opportunities to put their case.

The Council's process on the other hand is designed to obtain both broad-ranging and specific information and opinions in the first round, and opinions and comments on the published proposals in the second round.

Note that planning schemes or amendments commonly involve exhibition of a single copy of the proposal in each of a few public locations, such as Shire offices. Land Conservation Council reports and recommendations, by contrast, are published and several thousand copies printed, so that they can be studied in detail at home or office.

Each process appears to be well suited, in general, to its task. However, some specific aspects of public consultation could improve the Council's process, and these are include:

* exhibition, in suitable locations, of the report or proposed recommendations on which public comment is sought, to increase public awareness

* organized opportunities, in the region under study, to meet the Council Chairman and staff and discuss points of view

* public meetings in the region to discuss viewpoints and to allow a planned presentation of information

* written reports, summarizing the content of submissions, to be incorporated with proposed and final recommendations (that is, following each submission period)

* informal hearings following publication of the proposed recommendations, to enable people to inquire as to the result of their submission, and to provide a channel for follow-up

* extended submission periods (that is, greater than the standard 60 days) to allow opportunity for better development of submissions

* the publication of an issues paper to focus public attention on major land use problems

* consideration, and publication in recommendations, of other land use proposals put to Council by community groups and organizations

Some of these proposals have been used by Council. Consideration needs to be given to the incorporation of appropriate measures into a revised consultation procedure.

Written reports on submissions and informal hearings could both be valuable additions to the consultation process. While written reports would not add materially to the consideration given to submissions by Council members, they would provide the public with summarized information on submission content and numbers, which at present is only available by inspection of individual submissions. It has been suggested that hearings may increase public confidence in the procedures. Consideration would need to be given to the circumstances they would be appropriate for, and how many members of Council would participate.

Requirements for written summaries on the submissions received, and extended submission periods would require amendment of the *Land Conservation Act* 1970.

Chapter 6 - Public Land Classification

The large number of different categories of reservations recommended by the Council reflects the development of Council's policies over time to meet the various issues that were raised in different parts of the State. A number of suggestions for rationalization or modification of Victoria's public land classification system have been made. These have included:

* reduction of the number of categories of parks and reserves, so as to achieve a degree of uniformity with classifications in other Australian States

* modification of Council recommendations so as to conform with IUCN definitions of conservation reserves

* grouping of Council recommendations into like-use categories such as those shown in Table 11 and suggested in the proposed changes currently being considered in the Lands Bill

It may also be appropriate to review the schedules of the *National Parks Act* 1975 so that these better reflect the hierarchy of parks according to their values and size.

Suggestions have been made - by the Victorian National Parks Association and in the Australian Labor Party (Victorian Branch) 1983 Environmental Policy, among others - that the system of parks and reserves in this State is complex and leads to public confusion. The Council would maintain that, while some benefits accrue from having a uniform system of parks and reserves throughout Australia, the category of reserve designated for an area should reflect that areas's intended primary use as well as the aims and requirements of management. Such a designation avoids confusion about the intent of the reserve, and reduces the possibility of future *ad hoc* decisions varying its uses to accommodate contemporary pressures.

Pressure has also been exerted for the Council to conform in its recommendations to the IUCN definitions of conservation reserves. One of the IUCN criteria for national parks is the absence or phasing out of exploitative activities. It would be unfortunate, however, if the rigid application of such criteria led to the apparent downgrading of parts of the Victorian system of national and State parks because of small areas with continuing exploitative uses. A 10 000-ha park, for instance - representing important Victorian land types, vegetation associations, and habitat types - should not be downgraded for the sake of, say, a continuing 10-ha quarry lease. Another example would be the downgrading of Cobberas--Tingaringy National Park and other parts of the Alpine area because of grazing. A better proposal would be to list all parks that on their conservation values justify IUCN National Park status, but to note those with existing minor exploitative uses.

At the same time, the Council recognizes that it has, in its recent East Gippsland and Melbourne Area District 1 Review final recommendations, departed from its policy of designating land according to a systematic reservation classification system based on scientific assessment and representation of land systems. Instead of maintaining its previous policy it has accepted the *status quo*, continuing the classification as national parks of areas now popularly known as national parks but not meeting the Council's criteria with respect to size, representation of land types and features of national significance.

The many types of recommended reservation that have developed over the life of the Council could be rationalized. However, it is important that the primary use of each reserved area be recognized both in its form of reservation

and in the requirements of management. The 17 categories shown in Table 11 group the various reservations into like-uses. This grouping could be one approach to reducing the number of reservations while retaining the intent of having them thus defined. The categories are similar to those outlined in the draft Lands Bill.

With regard to the *National Parks Act* 1975 schedules, one review proposal suggests three schedules, with schedule A having national parks, schedule B State parks, and schedule C other parks. If such revision were effected, the Council's existing policy would support uniform management of parks in schedules A and B, recognizing their places in the national and State park system. Schedule C parks on the other hand could have slightly different management aims, recognizing the broader objects of non-national 'parks' under section 4(b) of the *National Parks Act* 1975.

Chapter 7 - Current Status of Public Land Use

A number of important issues have arisen concerning the current status of public land since the Council began its work in 1970.

The most significant is that, although governments have approved most of the Council's recommendations, it has taken a considerable time for these to be implemented, and no material action has yet been undertaken for many of them. This issue highlights the lack of resources available to the land managing agencies, particularly the Department of Conservation, Forests and Lands, to implement the recommendations. Existing administrative implementation procedures are often complex and time-consuming, and need to be streamlined or modified to enable the implementation of approved recommendations to proceed more rapidly. The draft Lands legislation provides an opportunity for simplifying these processes.

Various categories of land have been given a low priority for implementation in the past. The most obvious is the Council's system of education areas, where only 1 of 55 recommended areas has been reserved and that one temporarily.

The government's conservation strategy places strong emphasis on the need to raise public awareness about environmental matters and increase public involvement in such issues. The document stresses the importance of environmental education in achieving the desired objects.

The strategy included a specific action aimed at increasing awareness of sites designated by the Council as education areas, and at developing appropriate education programs for their use. The Council believes that such areas should be given a higher priority for reservation and development, in line with the government's objects for environmental education.

Implementation of other reserve categories - such as scenic, historic, streamside, and natural features reserves, and regional parks - should also be given a higher priority.

The Council is concerned that, in some instances, government-approved recommendations are being varied by the departments responsible for their implementation, thereby downgrading the reserve system established by the Council and approved by government. Government agencies should try to ensure that implementation proceeds in accordance with approved recommendations.

There is a need to monitor the implementation of government-approved land use recommendations to ensure that conservation and other values are being adequately protected. This involves the consideration of both administrative and management implementation. The Government's Conservation Strategy also underlines this need.

At the present time responsibility for this task has not been assigned to any agency or government department, but it is important if the government is to achieve its environmental objects.

The Council is also concerned that sections of the community are ill-informed about the Council's process, its system of reserves, and the uses of public land as approved by government. The Council needs to increase public awareness and look at new ways of involving the community in public-land use issues such as those discussed in chapter 4 and in the section above on public consultation. A particular aspect that requires attention is the need to inform the public about government variations to the Council's final recommendations.

The delays being experienced between government acceptance of the recommendations and their formal implementation have, in the past, resulted in some damage to values, even though Council has maintained that management prior to implementation should be in accordance with accepted recommendations. This has often been due to the lack of legal powers available to managing authorities unless land has been formally reserved. However, the proposed Lands legislation should assist greatly in resolving this problem, as all areas of land for which recommendations have been made and accepted would be automatically reserved if and when the new Act comes into operation.

Information about the distribution and requirements of native flora and fauna is still very imperfect. The questions relating to adequacy of representation cannot therefore be answered satisfactorily until further information is obtained. The Council has thus adopted a policy of setting aside relatively large ecologically viable areas specifically for conservation where the impact of other uses is minimized. In other areas of public land the Council's recommendations emphasize the need to take account of nature conservation values.

Chapter 8 - Nature Conservation

Various studies have been carried out to assess the status of Victorian nature conservation. While differing in detail, they have generally concluded that a substantial

proportion of the native flora and fauna found in Victoria is now adequately represented in the conservation system, although gaps remain, which have been identified by Frood and Calder (1987).

For flora, the needs are:

* a limited number of further reserves to protect particular plant communities that are currently poorly protected (see Appendix VII)

* small reserves to protect occurrences of rare or endangered species, where they are identified

* attention in land management to the preservation requirements of particular species or plant communities

* further research to identify those preservation requirements, where necessary

The Council's process is appropriate for making recommendations to cover the first two needs, and Council should continue to identify such areas in future reviews. Communities in greatest need of protection occur in scattered remnants with various present uses. It may be appropriate to request the Council to conduct State-wide Special Investigations for such communities, using the normal process, to identify appropriate areas for reservation.

From time to time, the Council has also made recommendations suggesting broad directions for land management, and outlining research needs as indicated above.

Particular habitats of concern

The following habitat types have been identified by Frood and Calder (1987) as being poorly protected:

* lowland plains (extending to fertile foothill country and the north-west)

* riparian habitats and wetland areas, including saline marshes

* significant habitats near intensively utilized areas (such as settlements, coastal fringes, and some heavily used scenic and recreation areas)

Potential to increase representativeness

Observations have been made in various parts of this report that the degree of protection necessary to ensure the continuing survival of some species and their habitats is either felt or known to be inadequate, and therefore in need of reinforcement. The problem of 'adequacy' of representation has been discussed and is shown to be a concept requiring further research. Nevertheless, enhanced protection needs have been recognized in a number of specific areas, where early moves towards further reservation might commence. These include:

* protection of remnant vegetation in areas predominantly used for agriculture - for example, small conservation reserves, linear reserves, etc.

* far north-west - chenopod shrublands; Mallee woodlands; those land systems depleted by agriculture; and the Raak (PYf2, Pz2 and Pcz2) land systems

* wet sclerophyll and closed forests of central Victoria

* some forest 'alliances' are reasonably well-conserved in the broad sense, but the range of variation is not represented - for example, candlebark, peppermint, and messmate forests with grassy understoreys are poorly reserved in relation to shrubby versions

* some key areas of limited extent where competitive uses occur - for example, at Anglesea and Gellions Run (uncommitted land) - include species and communities that are not adequately included in the adjacent reserves

* reservation of forest types of the western highlands is still inadequate

Remnant areas of habitat

Retaining examples of the biota of the most depleted land types may involve a change in values and perspective of reservation. Linear reserves (road, rail, and water frontage) are currently under pressure from clearing, leasing for grazing, and fire-break construction, etc. While the first two are primarily used for transport, until portions of these are actively managed for conservation there can be little hope for the long-term survival of relics of many of the lowland plant communities.

Similarly, in largely cleared areas, the survival of local populations of the fauna that did not rapidly become extinct following settlement depends on fragmented relic vegetation.

Much could be done to improve (and retain) the effectiveness of small refugia for conservation purposes - for example, ecological management (weed control, appropriate fire-regimes, grazing controls, and cessation of destructive practices involving soil disturbance), and linkage with other such remnant areas where possible.

There is an urgent need to investigate those vegetation units that do not occur or are only very poorly represented on public land and to identify priorities to protect adequate examples of these. This may be achieved under the provisions of the *Flora and Fauna Guarantee Act* 1988.

Similar comments to those for vegetation would apply to Victoria's native fauna. Where specific sites have rare or endangered species, then special-purpose reserves may need to be recommended through the Council's process. Areas with a high diversity of fauna could also be identified for protection in larger reserves, to complete the system of representative reserves. Both of these needs could be effected by

Council's regional reviews, or by special investigations where appropriate.

A preliminary assessment of the adequacy of reservation with respect to native faunal habitat indicates that woodlands and grasslands of the western and northern plains are inadequately protected.

The potential for adequate representation of these habitats on public land is very limited and purchase and restoration of freehold land may be the only means of achieving the required protection. The other major deficiency in habitat representation in conservation reserves is associated with the Mallee region. Large areas of public land still remain in this area and thus the potential for further representation of these habitats is high. The Council is giving consideration to this in its current review of the Mallee.

Wildlife reserves recommended by Council have two shortcomings, with regard to the protection for native fauna their title implies. First, the standard wording of Council's recommendations for wildlife reserves is imprecise, and does not specify whether such reserves are to be sanctuaries or open to game-shooting. Second, the range of habitat types included in the system is limited, with wetland bird habitat comprising 134 of the 152 wildlife reserves.

In its early sets of recommendations, Council established the 'wildlife reserve' category without specifying uses, because the breeding requirements of certain species were not well-enough known to enable anybody to recommend the appropriate number of sanctuaries. Given that recommendations have now been made across the State, and that many research projects and surveys have been carried out over the last 16 years, it would seem that future public land use reviews could make more detailed and specific recommendations for wildlife reserves.

The Council's approach to conservation of wildlife has in general been to recommend that large areas of each habitat type be protected, so that the natural range of faunal species can thrive. This differs from the approach of reserving limited areas that at present contain small populations of individual endangered species. The latter is piecemeal, is unlikely to ensure survival of these species, and does not treat natural systems as an ecological unit.

Wildlife reserves are usually limited in area, and so they potentially suffer the drawbacks of that second approach. However, where remnants of public land in a generally freehold area do have wildlife habitat values, if appropriate they should be given protection. If the Council's intention is to include a range of habitat types in such small reserves, then an amended approach will be necessary. These matters could be addressed by two studies: a State-wide Special Investigation of wetlands, and a State-wide Special Investigation of fauna conservation needs.

Many nature conservation, other values, and various uses are associated with public land in valleys and river systems. A

special investigation by the Council of the ecological, recreational, scenic and cultural values of rivers and streams, and their appropriate uses, is now under way.

Other nature conservation issues

Other perceived needs in nature conservation, which relate to public land and which could be addressed by special investigations, are as follows:

* uses of marine areas
* uses of rainforests
* uses of specific forests areas with regard to their ecological condition
* uses of wilderness
* land system representation in reserves, and appropriate uses

Most of these would involve consideration of alternative and sometimes conflicting uses, and development of a balance between them, involving public consultation. The Council's process is thus ideally suited to these studies.

The Government's Conservation Strategy endorses the need for the above studies, in various chapters and actions.

As part of the implementation program of this strategy, the Land Conservation Council will aim at extending the system of already established reserves. It will pay particular attention to appropriate small-scale refugia and corridors in the form of bushland reserves, cave reserves, public land water frontage and streamside reserves, and linear road and railway reserves, and also to public-utility holdings.

Conservation requirements of particular species

The Council's recommendations are for broad public land use categories, with certain uses and management requirements specified. Frood and Calder (1987) have highlighted the need for more detailed attention to the habitat requirements or life cycle of particular species that may suffer from normal land management regimes. This is particularly true of the large areas of State forest recommended by Council. In making recommendations for State forest, and earlier for hardwood production and uncommitted land, the Council has often recommended that specific sites or areas of habitat significance be protected by temporary reservation or by prescription. Further attention to the specific requirements of species, communities, or habitats may be required in future, perhaps as part of a special investigation.

Further needs

Declaration of biological reserves alone is not sufficient - proper management is critical to maintain those features that are represented. Certain species remain threatened despite their presence in reserves (notably through grazing pressure from kangaroos and introduced stock). Inadequacies in the current status of knowledge about habitat requirements and the impact of human disturbance on fauna are of

major concern. While mosaics of vegetation age-classes can be desirable for the range of habitats they provide, this range should also include ecologically mature vegetation. The varying ecological requirements of different communities and species needs to be recognized by management. Further ecological research, the implementation of findings, and monitoring are therefore urgently required.

Knowledge of the non-target effects from the use of baits (notably 1080) is inadequate. Increased protection for species that appear to be declining or vulnerable is required. The effects of intensive utilization can be serious for species with specialized habitat requirements, notably those that make use of hollows - the loss of (ecologically) mature trees, for example, could reduce nesting sites, and hence populations, to critical levels.

Species with large home-ranges (such as predatory birds) can be vulnerable due to small territorial spans - reservations of sufficient extent to support viable populations may be a problem. Species with localized breeding colonies can also be vulnerable - for example, cave-breeding bats depend on a small number of maternity caves.

Ecological problems facing remaining bushland

In addition to considering the allocation of further land into the reserve system to extend the protection offered, it is essential also, Frood and Calder (1987) consider, to give equal consideration to the kinds of problems that continue to threaten the survival of ecosystems, which cannot be remedied by reservation alone. There are parallel requirements for appropriate management in addressing each of these problems, each of which will require its own solution, and possibly different solutions in different areas. Those so far identified include:

* alteration to ground-layer or soil characteristics (particularly in grassy understoreys and water frontages), salting, and other erosion processes such as stream entrenchment

* loss of specific habitats (such as nest-hollows, riparian fringes) at various successional stages - in particular, 'mature' vegetation in forests as a consequence of too-frequent harvesting, and species-rich early post-fire examples of grasslands and some heathlands

* inappropriate fire regimes, and management based on inadequate research

* potential for piecemeal destruction of remnant biota across large areas of freehold land in the State

* degradation of habitats by grazing impact, including damage by excessive kangaroo and rabbit populations and other inadequately understood disturbance factors

* introduced weed and faunal species, particularly through the inadequacy of some preventative measures

* pollution and poisons - pesticide accumulations have been recorded in some species, and this can severely limit breeding success through factors such as egg-shell thinning; decreases in water quality can lead to the deterioration of aquatic ecosystems

* water supply: alteration of river flows can have a range of effects, from limiting breeding success or survival of dependant species, to alteration of riverine forests through desiccation

Chapter 9 - Land Systems

The maps and descriptions provided in this report and in Rowan (1988) represent a major advance providing increased public access to information about the 711 land systems in the State. For the first time, land systems have been mapped on a consistent basis and are described using a standardized nomenclature. This will facilitate future planning and management of both public land and freehold land.

In relation to the work of the Council, it has enabled an assessment of the degree to which the State's land systems are represented on public land and within major conservation reserves. This assessment shows that some 45% of the State's land systems occur predominantly on freehold land and the only possibility for adequate representation of these is land purchase. This lack of representation is concentrated into several regions of the State including the northern riverine plains and in western Victoria on the Wimmera Plains, the Western District volcanic plains and the western Victorian uplands.

Of the 711 land systems in the State 394 (55%) occur on public land, with 227 (58%) of these adequately represented in the reserve system. Table 22 in Chapter 9 identifies the major gaps in representation and this information can be used by the Council to fill those gaps in future reviews of public land. This is in line with the Government's Conservation Strategy which states as one of its objectives 'to protect representative and ecologically viable samples of all Victoria's natural ecological systems, including land systems...' (p.28).

However, a more detailed assessment of these deficiencies will be required in future investigations for the reasons outlined in chapter 9.

Chapter 10 - Ecological Reference

Selection of areas

Various land use authorities both here and overseas have adopted different approaches to the selection of areas suitable for scientific reference and the appropriate tenure for their protection, control, use, and management.

The Council's approach to selection is based on land system representation; this basis can include values and features

such as undisturbed vegetation communities, undisturbed catchments, or other features that are usually associated with a particular land system. Conventionally a catchment is selected to topographically define the boundaries of the reference area. It may be necessary to reconsider some of the early reference area recommendations to ensure that whole catchments are included, where appropriate.

In selecting areas for scientific reference, some authorities elsewhere use criteria that resemble Council's criteria for recommending land for education purposes or for preservation of particular species of flora and fauna, rather than those used here for reference.

Suggestions have been made that the use of land systems as a basis for selecting reference areas may limit representation of some major vegetation types, some geomorphic features such as lakes, and other areas such as marine environments.

Tenure and protection of reference areas

The advantages of having specific legislation such as the *Reference Areas Act* 1978 for the establishment, protection, and control of reference areas are that it:

* facilitates strict control by the responsible Minister
* ensures maintenance of the area's value for reference in perpetuity
* provides a mechanism for uniform management and protection
* vests responsibility for administration in a committee independent of any single land management authority
* allows day to day management to be carried out by the authority responsible for the adjoining public land, who is logistically best suited to manage the area
* ensures that no one authority or department can gain control of a reference area at the expense of another user group

Further, legislation is superior to zoning for ensuring the long-term maintenance of an area's value for reference. Proposals in the draft Lands Bill maintain the protection afforded to reference areas under the existing *Reference Areas Act* 1978.

Reference area viability

The definition of viability needs to be explored, as it may be necessary to enlarge some reference areas in order to achieve genetically viable populations of a particular species or suite of species, or to include larger sub-catchment units. Such expansion may have to be at the expense of having a less viable reference area in terms of management, so trade-offs will have to be identified. Other issues that need to be examined in seeking viability for a particular

species, or for management, will be location, extent, prior use, presence of vermin and noxious weeds, and the ability to define appropriate buffer zones.

Land system representation

As mentioned earlier, 80% of Rowan's land systems do not occur within the State's array of reference areas. Many of these land systems have been altered by development for agriculture, and are subject to a number of agricultural practices such as fertilizing and ploughing. Accordingly, it may be expected that problems arising from the use of these lands could become apparent in the future. In addition only small parcels of public land are found on these land systems and those parcels have generally been disturbed in the past by a number of land use practices such as grazing and timber production.

In order to achieve representation in reference areas of the State's major land systems, these land systems and the public land found on them could be examined more closely and areas suitable for reference be identified. This identification process may mean a relaxation of certain criteria used in selecting reference areas, such as size, location, degree of past disturbance, and the location and size of the protecting buffer areas.

Chapter 11 - Education

This review has identified a number of issues related to the nature of education areas and their use.

* A concerted and sustained program throughout the education community is required to advertise the existence and utility of education areas. Both the concept of these areas and the opportunities they can provide those involved in environmental education are poorly understood. A specific action of the Government's Conservation Strategy is to promote a greater understanding of environmental education in the community. Promotion and use of education areas is one means of achieving this action.

* A program is required to promote the use of education areas and to assist in their use. This could be facilitated by the establishment of an 'Education Areas Advisory Committee'.

* There is a need to develop curricula materials based on the use of education areas in general and for the use of each area specifically through co-operation between the land manager, user groups, and other people with environmental education interests.

* The Council's education areas should be reviewed in terms of the range of land systems needing to be represented, and new or alternative areas should be sought if it is considered necessary. Those areas to which access will be a continuing problem should also be reviewed with the view to possible relocation.

Chapter 12 - Historic Sites

The process for identification of historic sites by the Land Conservation Council has evolved over a period of 15 years, with variable and inconsistent results. It has placed a heavy concentration on relics, which has been the main criterion for historic designation, and such relics have generally only been highlighted for special management in two situations:

* in broad areas, where many relics form a wide aggregation

* on small blocks where relics are prominent

As previously discussed, most historic sites identified in Council recommendations relate to mining history. Other themes have not received the same level of attention due to the paucity of relics on land within Council's charter. The information base contains gaps, both in the consultants' studies conducted for the Council, and in those study areas where consultants were not employed - Wimmera, South-western Area Districts 1 and 2, Murray Valley, Corangamite, Melbourne Area District 2, North-eastern Area Districts 3 and 5, Alpine, South Gippsland Area Districts 1 and 2, and Gippsland Lakes Hinterland.

While the outcome of the process may therefore be regarded as incomplete, the period of evolution has been useful in determining the role of the State in preserving and managing historical places on public land.

The major issue, is in the nature and extent of Council's current and future history-oriented surveys. The process of policy development regarding historic sites has meant that some areas of the State have not been examined extensively, if at all. In this connection, for future studies Council should perhaps consider the historical significance of a study area as a whole and allocate resources accordingly, rather than concentrating on what is essentially an inventory of sites, without further analysis. Guidance should be obtained from the Department of Conservation, Forests and Lands Historic Places Branch and from the Ministry for Planning and Environment, Heritage and Environment Division, about better ways to reflect the appropriate areas for future historic areas and reserves.

Extension of the Council's jurisdiction to areas of public land within cities, towns, and boroughs, regardless of the current management status, would enable it to conduct more complete historical studies. Alternatively, the responsibility could be placed on other agencies such as municipalities to carry out or commission historical surveys.

The Government's Conservation Strategy calls for the protection, restoration, and enhancement of rivers, wetlands, and the coast to ensure maintenance of cultural features, and requires the preparation of a Victoria heritage plan to guide the conservation and preservation of the State's cultural heritage.

Protection of Aboriginal Archaeological Sites

As only a very small proportion of the State has been systematically surveyed, it is probable that thousands of sites have yet to be identified. Aboriginal archaeological sites are a non-renewable resource and form an important part of Victoria's heritage. They are, however, under threat from various activities on public land including mining, forestry, and tourism, and to avoid inadvertent damage there is an urgent need for detailed site surveys to be carried out.

Surveys of this kind will also assist in obtaining a better understanding of the total resource and hence, enable a more systematic approach to the protection of a representative sample of Aboriginal sites. At present, however, the approach should be one of protecting the range of the archaeological resource and, in order to achieve this, it is suggested that emphasis be given to the protection of the various components of the landscape rather than concentrating on specific sites. This approach has the added benefit of preserving the relations between the archaeological resources and their environment, thus aiding an understanding of the archaeological history from both research and public education viewpoints.

In the past the Council's approach to the protection of Aboriginal archaeological heritage has been inconsistent and it would be appropriate in the future to develop policies, in conjunction with the Victoria Archaeological Survey and Aboriginal groups, for the protection of this heritage and to formulate appropriate land use recommendations. This would require a definition of archaeological significance that could be used to rank sites for the purposes of making recommendations.

In some areas investigated by the Council, particular reference has been made in the recommendations to the presence of Aboriginal archaeological sites and the responsibility of the land manager to protect such sites. However, land managers often face difficulties in the protection of sites because they lack detailed information about the location and management requirements of such areas.

Chapter 13 - Landscape

Proposals aimed at the protection and preservation of landscape have been contained in Council's final recommendations for most study areas, although without a specific chapter allocation. Instead, they have been addressed in a wide range of chapters and land use categories. The problem with this approach is that landscape may appear to be seen as less important than the other uses considered in specific chapters. It is acknowledged, however, that gaps do occur - particularly in Council's earlier recommendations - and this tends to indicate that landscape values and issues, like many other aspects of the recommendations, have evolved over the period of the Council's existence.

It is perhaps timely, then, to examine all areas of the Victorian public land estate from the current stance, and bring

up to date those areas that were viewed from the earlier standpoint. It may also be appropriate to include a separate chapter on landscape in future resources reports and recommendations.

As Appendix XI indicates, many of Victoria's public land areas identified as having high scenic quality are included in reserves that protect their landscape values. While large areas of public land recommended as reserves are in themselves major landscape features, the Council emphasises throughout that the small blocks of public land scattered through freehold tracts have equal importance - providing native vegetation and landscape diversity and interest in areas otherwise largely cleared of trees. In this way, many small or linear areas of public land can contribute markedly to a generally freehold landscape.

A further element of landscape protection is that applied to protect a small proportion of a large public land area, such as State forest in which clear-felling operations may reduce landscape values. In these cases, it is the land manager's responsibility to prepare and apply detailed landscape protection prescriptions where appropriate. The Council's role in such areas has been to recommend the application of suitable landscape protection prescriptions.

Future recommendations could perhaps give more attention to landscape as the context within which a large range of activities take place. Landscape assessment is relatively new and appropriate assessment methodologies are still being developed and refined. However, current techniques could be adopted by the Council to provide more detailed information and thus give greater emphasis to landscape values when preparing land use recommendations.

Perception testing, which is essentially a method of polling the public to determine the key landscape features, particularly on a local scale, is one method that Council could use. More detailed landscape assessments could also be appropriate.

Landscape chapters in future Council resources reports for a region could include descriptions and a map of landscape units, with their perceived relative value according to a systematic assessment procedure.

The importance of landscape values should be recognized in two particular areas: first, those areas where aesthetic appreciation of the surroundings is a primary reason for a recommendation - for example, in some parks and scenic reserves; and second in public land areas identified as having high landscape value but recommended for timber-harvesting, mining, extractive industries, utility easements, or other uses that may compromise landscape values.

Chapter 14 - Recreation

The underlying question of this chapter is whether Council's recommendations make adequate public land available for the community's desired range of recreational activities, both

now and in the future. Recreation and space in which to pursue given recreational activities are extremely important to the community, and its diversity means that many individual recreation groups will not be totally satisfied with the area available to them.

Given this diversity, Council considers it has met recreation demands, with most public land being available for recreation, many areas being specifically recommended for recreation uses, and a reasonable balance being struck between most activities, with almost every form of recreation allowed somewhere on public land. However, higher-profile activities with greater potential for environmental impact - especially use of off-road and over-snow vehicles, deer-hunting, and fossicking - may require more careful regulation to protect the environment in some areas. In addition there is a need to provide appropriate locations where high-impact activities can be pursued exclusively. The Council has been careful, however, to ensure that land allocated for various recreational activities is available to the whole community, rather than to particular user groups that require exclusive use of an area.

Hunting

Council's recommendations allow continued use for duck-, deer-, or vermin-hunting in most public land. Hunting is currently only excluded from national and State parks, reference areas, flora and fauna and flora reserves, wilderness areas, education areas, and most regional parks. Some proposed additions to the Alpine National Park also allow limited hunting. The remaining areas in which it is permitted total 5 203 740 ha, or some 74% of the State's public land. In addition, more than half the wildlife reserves recommended by Council have provision for hunting.

Hunting can clearly conflict with nature conservation and other forms of recreation. It may be appropriate for Council to develop further its policy on hunting to define areas for this use more clearly, and to remove it from unsuitable ones.

Fishing

Fishing is an implicit recommended use in most public land, including many categories of reserves.

Fresh-water fishing is only specifically excluded from particular areas where it may endanger rare fish, such as the trout-cod in the Seven Creeks Wildlife Reserve. Some other areas are excluded by management plan. While fishing is generally a low-impact sport, heavy use of any one area can lead to degradation of values.

The Council's policy on fishing requires development so that areas available for this recreation are identified, and that, if appropriate, it is excluded from certain areas.

Among its aims, the Government's Conservation Strategy includes protection of natural systems for the non-material

needs of society, and lists outdoor recreation and tourism as broad conservation issues for priority action. Under the objects for reviving rivers, coasts, and wetlands, these areas are to be protected, restored, and enhanced to provide (among other things) for present and future recreational uses.

Chapter 15 - Water Supply Catchments

The following issues relating to water supply catchments require resolution:

* the types and intensities of use that can be made of land in catchments providing water supply for domestic purposes

* the appropriate level of control over land use in catchments

* the most effective mechanisms of catchment protection under a range of circumstances

* the extent to which freehold and public land managers have a responsibility to moderate their practices because they are within a catchment

These have been addressed in chapter 15, so far as they relate to Council's public land use and water supply catchment roles. The Council has attempted to follow an approach between the two poles of 'closed catchments' and unconstrained use of catchment land.

This approach - involving the Department of Conservation, Forests and Lands, the water supply authorities, the Council, and the various land managers - has had success, given the limited frequency of water-borne disease occurrences resulting from the State's mixed-use catchment supplies. However, further effort towards better catchment protection is required to enable all water supply samples to meet international quality standards.

The small number of prosecutions for failure to comply with catchment protection provisions may suggest ineffective enforcement.

Catchment proclamation:

* creates an awareness of the use of an area as a catchment for water supply, within the community and by public authorities

* initiates processes contained in several existing Acts, such as the Mines Act, Extractive Industries Act, etc., for referral of proposals for detailed comment

* is intended to be shown on maps used in conjunction with the single planning schemes set up under the *Planning and Environment Act* 1987, and this will further increase awareness, and facilitate referral of development proposals for expert advice

* provides a line of defence against potential catchment management problems in that it improves information and awareness

* is an essential first step, which may lead to detailed catchment management conditions

* provides for special attention in the management planning processes of the Department of Conservation, Forests and Lands and in certain Codes of Practice prepared by the Department

The Council provides advice on catchment controls to the Minister for Conservation, Forests and Lands that is clearly useful and valued because it is broadly based, and independent.

The Land Protection Division has proposed four alternatives for the preparation of land use determinations to reduce the current backlog of investigations. Several of the alternatives could be used in particular catchments and the Council would consider any proposals, provided water supply and other values are adequately protected.

The Land Protection Bill 1987 contains an expansion of the consultation process associated with the declaration of catchments or approval of catchment protection plans. However, this does not replace the very important forum and opportunity for expression of a range of viewpoints provided by the Land Conservation Council. Such an opportunity ensures that a balance between alternative catchment management philosophies is achieved.

Closed catchments

With regard to closed catchments, the Council's view - published in all its relevant recommendations since 1974 - is that, in most situations a water supply authority does not need to control and manage all land in its water catchment.

Council is currently reviewing the use of public land in the Melbourne Area, District 2, which includes the Melbourne and Metropolitan Board of Works catchments. Their use is probably the most significant catchment issue and much new information about these areas has been gathered since the Council conducted its first investigation. This will be taken into account when the Council prepares its new recommendations.

Groundwater

The major groundwater issues involving public land concern aquifer recharge and pollution. Access to public land for groundwater investigations could also be an issue, particularly if extensive drilling programs are required in areas of high conservation value.

Aquifer recharge zones contain large areas of public land. Recharge is important, in returning fresh water to aquifers that would otherwise be depleted. Excessive rates of recharge, however, are responsible for raising water levels

and pressure in specific saline groundwater areas, resulting in salinity problems.

Recharge areas in the uplands, a substantial distance from groundwater-use areas or regions of salinization, are important contributors to these problems.

Too little recharge or over-use may allow aquifer depletion. On the other hand deforestation in recharge areas across Victoria has caused widespread increases in groundwater levels and consequently increases in stream salinities and land salinization.

Groundwater resource investigations and assessment, and the study of groundwater-related problems, often require access to public land. Most groundwater studies involve drilling and the installation of permanent monitoring bores. It may also require geophysical surveys involving some clearing of vegetation along survey lines.

Chapter 16 - Timber and Other Forest Produce

Several issues associated with the use of State forest for timber production have yet to be resolved. A growing body of evidence suggests that the wood fibre harvested from public forests could be utilized more efficiently than at present. This could be achieved in a variety of ways, including improvements in sawing techniques and log selection ensuring that sawn timber produced is commensurate with the quality of the log. Millable timber, although generally of a lower quality, is currently left in the bush in many areas of the State. Such timber has the potential to sustain certain products and, if so used, could allow high quality sawlogs to be deployed towards higher-value output.

Coupled with the greater efficiency of wood fibre use is the issue of 'woodchipping' or 'pulpwood production'. In some parts of Victoria, pulpwood is harvested from forests along with sawlogs in an integrated operation. In others, however, pulpwood utilization is not permitted and a potential resource is being wasted, with the result that potential revenue to the State and associated employment in the private sector is forgone.

On the other hand, some groups in the community consider that the current sawlog-harvesting methods such as clear-felling are very wasteful and other methods, including group selection, should be adopted. This may in turn reduce the environmental impact of logging, although that claim is yet to be verified. These alternative techniques could reduce the volume of pulpwood harvested from an area in a given time, but any harvesting operation would always produce some non-sawlog material.

State forest covers about half of all Victoria's public land and, as such, is of major significance as floral and faunal habitat. Concern has been expressed about the effect of timber-harvesting operations on these values. The distribution, biology, and habitat requirements of many species of flora and fauna are poorly known, and there is therefore an

ongoing need for research in these areas to identify as-yet-unknown values in State forest.

The Government has produced its Timber Industry Strategy, which addresses these and many other issues relating to timber production in Victoria and provides a framework for the ways it proposes to deal with them. For example, it is committed to: regional sustainable yield in all forest goods and services; the dominance of sawlog-driven activities; operational trials to determine the impact of using silvicultural practices other than clear-felling in certain types of forests; providing the maximum opportunity for all felled logs to be processed as sawlogs; the allocation of sawlogs by quality and species to companies with appropriate processing facilities; and to the provision of a government-controlled mechanism for the sale of non-sawlog material. Many of these aspects are part of the Government's Value-Adding Utilization System, presently undergoing a 3-year trial period. Conversion of quality timber into products of the highest value will have particular emphasis.

The Government is also committed to increased protection of the environment and has undertaken to introduce:

* a legislated Code of Forest Practices that lays down operational standards associated with forest use

* a legislated Native Flora and Fauna Conservation Guarantee

* a definition of rainforest and exclusion of timber-harvesting from all stands

* pre-logging surveys to identify significant flora and fauna habitats for exclusion from logging

* the cessation by July 1987 of clearing native forest for pine plantations

* the establishment of 2000 ha of native hardwood plantations per annum for intensive timber production

Most of these initiatives have been effected or are continuing, and the Council supports them, but for pulpwood harvesting has proposed (in the recommendations of the East Gippsland area review) that several other conditions be imposed to control the expansion of this industry. These include specifying in legislation the area to be available for pulpwood harvesting, together with the maximum volumes of sawlog and pulpwood that can be utilized consistent with the maintenance of regional sustainable yields.

Many of these issues will not be resolved in the short term and will require an ongoing commitment by government to the community to ensure that forest management is modified accordingly.

Availability of public land for timber production involves a number of issues. Tables 40 and 41 indicate that more than three-quarters of the suitable timber-producing public

land in the State is available, and that it has the potential, in the future, to produce twice the current cut of about one million cubic metres of hardwood. Aside from this, the Forests and Forest Products Industry Council has estimated that total sawlog volumes in Victoria will increase to 2.9 million cubic metres by 2000. Large areas of government, private, interstate, and overseas softwood plantations will mature over the next few decades, and softwoods are increasingly being substituted for hardwoods. The conclusions appear to be: that the area recommended by Council for hardwood production substantially exceeds the medium and long-term needs; and that, in the shorter term, the Timber Industry Strategy is addressing the more immediate shortfall in mature timber availability.

The Government's Conservation Strategy contains numerous references to timber production, including:

* renewable resources such as timber should be used at a sustainable rate

* forest management is identified as a conservation issue for priority action

* the separate chapter - protecting the forests - calls for the protection of both the ecological conditions in forests and the forest environment during harvesting

* actions include protection of rainforests, assessment of the ecological condition of forests, identification of ecologically mature forests, protection of water quality, flora, and fauna by prescriptions, and research into harvesting methods

The impact of new developing forest industries such as broombush cutting and charcoal production require the development of adequate management controls and accurate assessment of available resources.

Minerals, Fossil Fuels, and Stone

Mineral exploration and mining

Under the Council's recommendations most public land is available for exploration and mining. However:

* Some exploration and mining activities are incompatible with other special interests and uses.

* Council has consistently put forward the view that mining and exploration should be excluded from certain areas where other values are regarded as being more important. While adverse effects of mining and exploration may be reduced by careful application of conditions and supervision of operations, in areas so identified conditions provide inadequate protection.

* The Council's written guidelines are broad and not readily applied to individual sites. The interpretation and application have led to some significant problems. They

have been interpreted to support both mining and protection resulting in an inconsistent and ineffective approach to resolving such conflicts in use.

* Detailed sets of guidelines may need to be developed that establish a clear framework for assessing particular values of sites, into which the details of specific mining or exploration applications can be added.

* Further research is needed to ascertain whether eductor dredging has a significant impact on aquatic values, and whether rivers proposed for inclusion in Schedule 15 of the *Mines (Mining Titles) Regulations* 1983 should be assessed with respect to their nature conservation, recreation, and scenic values, and bed and bank stability.

* The *Mines Act* 1958 is currently under review and it is anticipated that a number of these issues will be addressed in that review.

Fossicking and prospecting

The terms 'fossicking' and 'prospecting' need to be more closely defined and differentiated in Council's recommendations in order to avoid their confusion; furthermore, fossicking may require similar legislation to prospecting in order to control any potential for damage. Some concern is being expressed about environmental damage resulting from activities associated with prospecting under a Miner's Right.

Other issues

* It is considered that Council's recommendations for public land provide adequately - both now and in the future - for the perceived community needs for minerals and fossil fuels. Only some 5% of the State is excluded from mineral exploration and mining under the Council's recommendations, while most of the fossil fuel resources in the State remain available for utilization.

* Many mineral deposits that have been found in Victoria are not currently economic, but with changing circumstances it may be preferable to retain an exploration or mining option, except in Wilderness and Reference Areas. In contrast, however, Council could recognize the primacy of undisturbed conservation values in other important reserves, and specifically recommend the exclusion of surface-disturbing exploration and mining from some or all of the parks in the national and State park system and other major conservation reserves. There is concern that important values are being disturbed by exploration and mining activity on public land, particularly in the North Central Area of the State.

Stone extraction

The wide distribution of most stone resources throughout Victoria, together with the large area of the State where stone extraction is an acceptable use, effectively means

that the limited areas specifically excluded from stone extraction by Council recommendations have not materially affected general resource availability, although in some instances they may mean increases in the cost of the resource at point of use. However, local impacts may be more significant in some areas for particular types of store.

Recognized environmental concerns are the proliferation of small, badly sited pits, and failure to apply appropriate standards of rehabilitation in some areas.

* Despite Council's policy, considerable problems associated with stone extraction still persist, mainly with operations exempt from the provisions of the *Extractive Industries Act* 1966, and arising from contradictions in some of the applicable legislation.

* A perceived need is a comprehensive State-wide assessment of resources on all land to identify resource qualities, needs, best method and rate of extraction, and most appropriate source of supply for each municipality. This would avoid the approach of using the 'closest parcel of public land' for extraction.

* Interdepartmental action is needed to establish and apply procedures to exclude certain areas from extraction.

* Uniform procedures for exploration and extraction of stone should be applied by all users, including municipal councils and the Road Construction Authority.

* Provisions are needed for full reclamation or restoration to a standard appropriate to the site. Where abandoned sites require reclamation, this should be carried out at the expense of the operator is this is known.

* The numbers and distribution of sites require rationalization, and stream-bed extraction should be avoided where possible.

Chapter 18 - Agriculture

In general, land in Victoria that was not alienated following settlement is either unsuitable for intensive agriculture - having been reserved for specific purposes and provision of other community values - or unavailable for agriculture.

Substantial areas of public land are currently being used for some purposes, however, under a range of tenures including lease, licence, or agistment. Usually, such use is of considerable value to individual farmers in improving their economic viability. For example, forest grazing frequently provides summer feed, which increases the capacity of the freehold farm. It may also provide benefits in stock health and greater management flexibility during unfavourable seasons, both drought and flood. Reduction in risk and improved flexibility are likely to be at least as important to many lessees as are production increases *per se*. Use of public land is especially valuable in this sense where the

lessee is the adjoining landholder. In times of drought though, the ability of public land to provide grazing falls and its susceptibility to damage - by both increased erosion and effects on sensitive plant species - rises.

Security of leasehold land tenure is an important determinant of the standard of agricultural management likely to be applied. Improvements such as fencing and water supply are expensive and lessees will invest in such improvements more readily where they are confident that tenure will be adequately secure to warrant expenditure. As previously explained, however, very few areas of public land are under lease for agricultural use.

In most instances, the Department of Agriculture and Rural Affairs considers that the economic benefits to individuals arising from use of public land is not reflected in significant improvement to the regional or State economies, because of the relatively small production increases. Improved economic viability of farming enterprises is, however, likely to be reflected in the welfare of local communities.

Well-managed forest grazing may provide community benefits, through weed control and fire-fuel reduction. On the other hand, adverse effects can include loss of native species, reduction in floral diversity, changes in species dominance, weed introduction or spread, and damage to soil structure.

Licensed grazing of small public land reserves, including water frontages, can perform useful functions, including fire-fuel reduction and control of pest plants and pest animals. Clearly, however, some significant problems remain throughout the State with regard to standards of management of public lands, by both licensed users and illegal users. In particular, stock access to water-frontage reserves can cause water-quality deterioration and stream-bank erosion.

There is a recognized need in some areas to improve standards of agricultural management of public lands, but withdrawal of grazing from such lands is not a complete solution unless alternative management is supplied by the Crown.

Continued but improved management by adjoining landholders may be the most efficient option for achieving improved management, where other important community values are not prejudiced.

Agricultural industries are attempting to diversify to cope better with economic problems. Subject to sensitivity to other community values, public land (in particular wetlands other than those of high conservation value) may offer some scope for diversified enterprises, such as the growing of yabbies and shrimps.

Many fragmented and isolated public land allotments occur throughout the State. The Council has recommended many such allotments for reserves of various types, as they are sometimes the only examples of public land on particular land systems. They are also very important for their nature conservation, landscape, and in many cases recreation values.

These are the reasons why the Council has not acceded to all requests for alienation of such areas for addition to adjacent farms. In some areas it is recognized that this can lead to interface conflicts. However, in most study areas the Council has recommended that some public land be alienated, although - apart from the Mallee, where extensive areas of public land were already cleared or used for farming - it has opposed large-scale alienation.

The fact that relatively few individuals benefit from the use of public land for agriculture, the apparent trend in community values against this use, and a general lack of land suitable for extensive alienation together indicate the wide agreement that there is no justification for further substantial allocation of public land to agriculture in Victoria. In some instances, it may even be difficult to sustain arguments for continuation of present agricultural use of some freehold lands, leaving as a result scope for return to the Crown of land of low agricultural suitability.

Some concern has recently been expressed about High Plains grazing, in particular, that the cattle preferentially eat certain alpine herbs, thus reducing their distribution; that they cause increases in shrub cover; that they damage the fragile moss-beds around the bogs; and that they foul springs and waterholes.

The Council has taken the view that these anxieties, while they are real, do not justify the removal of grazing from areas other than the most sensitive or important for conservation or walking, as previously mentioned. The Council has, however, recommended further studies.

Public land adjoining agricultural areas has traditionally been used to supply farm timbers under permit, although in recent years demand has declined due to the use of alternative materials such as treated pine, steel, and concrete fence-posts and other items. The establishment of woodlots on freehold land also reduces the reliance on public land.

Issues in public land apiculture

Beekeeping produces some conflicts that can be significant. Potential management problems include the physical disturbance associated with installation and removal of hives, clearing for fire protection, and public recreation access to particular sites and water supplies in summer. Because the honey-bee is an introduced species, there are potential ecological problems, including:

* a reduction in nectar supply to native fauna
* long-term decline in native pollinators, as a result of competition
* inefficient pollination and/or increased hybridization of native plants
* increased establishment of feral bee colonies, which usurp fauna-nesting sites in tree hollows

Long-term research into the ecological impact of the introduced honey-bee is in progress in South Australia. The results of this and other studies can be incorporated into the Council's recommendations where appropriate.

Silvicultural practices such as thinning in forests may temporarily reduce the availability of a flowering crop but rapidly results in enhanced crown development and more profuse flowering in the retained trees.

Chapter 19 - Utilities

Most utility services are vital to the welfare and livelihood of the community at large and it is therefore essential that these be maintained and extended where necessary in order to preserve our current standards and qualities of life. It is a function of the Land Conservation Council under section 5(2)(h) of the *Land Conservation Act* 1970 to ensure that appropriate provision is made for utilities across the entire stock of public land, recognizing at the same time the different types and levels of impact that each may bring to adjoining land uses.

An important feature of the major utilities is that they are often ratepayer- or user-financed, and can thus afford to purchase the most appropriate freehold land for their activities. Where public land has other important values, in general it should not be allocated to new utility use, whose operations commonly reduce such values. However, in many specific cases Council has recommended the use of public land for a utility use.

In general, existing utility services meet current needs and retain some spare capacity. Present services are located so as to serve community requirements in these areas. Where appropriate, plans are in train to accommodate foreseen or forecast short-falls for up to 10 years. It may be, however, that significant changes could take place in the use-intensity of certain public utility areas, depending on the interplay of changes in certain community needs, changes in community values, shifting economic considerations, the application of new technology, and enhanced conservation/recreation management regimes, all of which the Council will need to monitor carefully.

In the Government's Economic and Energy Strategies, and the State's brown coal reserves have been identified as one of nine economic competitive strengths, and not only in the field of power-generation - other forms of processing for energy production are possible. The continuing development of these resources will impinge on associated utility land and other adjacent areas, particularly in the construction of future power stations.

Even where existing power transmission easements occur, past management practices were heavily orientated towards vegetation control in the interests of unrestricted access and fire control, more perhaps than is necessary to achieve these goals. Refined management techniques may facilitate meeting the needs of government agencies in carrying out

their roles, while maintaining habitat values of such corridors and easements.

Linear reserves as a means of fostering flora and fauna conservation are likely to be given greater attention, with the growing realization and acceptance of their importance as remnant habitat for endangered species, as small-scale refugia, and as migration routes. Powerline and pipeline easements and roads and railway lines (both in use, or dismantled) and their associated reserves form a network of sometimes only partly disturbed corridors throughout the State, across many land types. Their conservation value is starting to be recognized by the land managers (such as the State Electricity Commission of Victoria, Road Construction Authority and V/Line), and it is, therefore, important that the most relevant management techniques are devised and employed to reconcile the primary objects of each of these agencies with those also aimed at protecting wildlife, and furthering recreation opportunities.

The visual impact of utilities is frequently a cause for complaint where these are close to public view (for example, large-scale buildings in rural areas), where they intrude on otherwise pleasing landscapes (power-transmission lines and pylons), or where their presence may be a source of offence (as in garbage tips).

The Department of Conservation, Forests and Lands' Visual Management System, described in the Council's recommendations for the Alpine Area Special Investigation, may offer a means of identifying important landscapes to be avoided by utilities.

Visual amenity can be preserved in proximity to utility sites or structures by careful site selection, in the design of the structures themselves, by suitable landscaping and by effective screening or buffering using embankments, water bodies, or belts of trees. The use and maintenance of native vegetation for landscaping and screening offers additional benefits in extending habitat while preserving aesthetic values, and it would be appropriate if such measures were adopted wherever possible in meeting these ends.

Disposal of land no longer required for utility purposes is an important and current issue. It is important that utilities, and other bodies considering public land disposal, recognize that such areas may have other particular values that warrant their retention as public land and these need to be identified and evaluated prior to a decision being made to dispose of them. However, in certain circumstances, it may no longer be appropriate for utility agencies to manage public land and it can be transferred to another agency. Such a transfer should not delay or prevent the implementation of Council's recommendations.

There is likely to be an increasing need for development of the existing infrastructure on utility land. Such development will have implications for that land as well as for adjoining land and Council will need to monitor these changes when reviewing its recommendations.

Chapter 20 - Economic Evaluation of Public Land

Some criticism has been levelled at the Council and its process in that insufficient attention has been given to identifying the economic impact of its recommendations.

However, whenever decisions are to be made that are likely to involve significant impacts on economic activity, the Council has endeavoured to provide an economic evaluation of its recommendations. Examples include studies of grazing on public land in the Alpine and Murray Valley Areas and timber production in the Alpine and East Gippsland Areas.

While these studies would not be regarded as a full cost--benefit analysis as described by Professor Sinden, they have certainly provided valuable information on which to judge the impact of the Council's recommendations. While the cost--benefit approach appears more systematic and comprehensive, the issue of unpriced values in the analysis is still a major problem.

As indicated in chapter 20, the cost--benefit approach also has other problems that can introduce inaccuracies to the analysis, and to the decision-making stage.

It may be appropriate, however, for the Council to adopt a more formal framework for assessing the economic impact of its recommendations. This could involve surveys of public views on particular land use issues, such as the need for various types of recreation.

Chapter 21 - Environmental Data

The Land Conservation Council process has a major requirement for environmental information from diverse sources relating to its area-specific investigations. The Council has contributed to the broader dissemination of environmental information through the publication of descriptive resources reports for these investigations, and in commissioning short-term research into particular issues.

The nature of Council's investigations program has meant that data, once published, have not been kept up to date until an area is reviewed. While such reviews have taken place at about 10-yearly intervals, there is a need to access a broader-based, current information system. Establishment and maintenance of its own wide-ranging data base would be beyond the Council's staff and budget resources.

Two systems under development in Victoria - LANDATA and the Department of Conservation, Forests and Lands' Geographic Information System - have been described. Their development offers many opportunities, including the enhancement of the Council's decision-making process through the provision of relevant, topical data.

Frood and Calder (1987) refer to 4000 papers, reports, and books showing the enormity of accessing environmental data. As well as the Geographic Information System, a uniform environmental data base for written material is another need.

Chapter 22 - Environmental Research

The Council's approach to proposing scientific research projects has varied. Occasionally it has only mentioned a study or research need in the preamble to recommendations, and at other times it has included one as a specific recommendation. The latter approach is preferable as, once approved, the study becomes a policy of the government and the relevant authority is required to undertake the work and committed to making budget provision for it. Council's role in research has mainly been in identifying, directing and prioritizing areas for research, but this important aspect of its work should perhaps be given more emphasis in recommendations, particularly as the use of public land in the State is reviewed.

Specific needs for environmental research have been identified in various of the Council's recommendations, and in Frood and Calder (1987). Broad areas of need are marine environments and protection of endangered species - in particular, conservation genetics, habitat requirements, and impacts of some land use activities. As research possibilities are immense but budgets limited, it is important that research be directed to priority areas. However, it is also important that the results of research projects recommended by the Council are conveyed to the Council, perhaps via a formal process. In some circumstances it would be appropriate for the Council to review these research results as they become available, rather than waiting for its normal 10-year review period.

APPENDICES

Appendix I

PUBLIC LAND USE CATEGORIES AND COUNCIL RECOMMENDATIONS

The following recommendations for use are general ones. Other uses may also be permitted for specific parks, reserves or areas and these are given in the recommendations for the study area concerned.

All recommendations have the following beginning: 'That the area (shown on recommendation maps) be used to:'

Category	Recommendations
National park	provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments
	conserve and protect natural ecosystems
	supply water and protect catchments[1]
State park	provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments
	conserve and protect natural ecosystems
Wilderness	provide opportunities for solitude and unconfined forms of recreation in substantially unmodified natural environments
	that its value for providing solitude be maintained by controlling the numbers of people using the wilderness at any one time
	that construction of roads or tracks and the entry of vehicles not be permitted, other than for the management purposes
Regional park	provide opportunities for informal recreation for large numbers of people
	conserve and protect natural ecosystems to the extent that this is consistent with the above
Multi-purpose park[2]	provide opportunities for recreation and education in natural environments
	conserve and protect the native animals and plants and landscape

Appendix I (continued)

Category	Recommendations
Multi-purpose park (continued)	produce hardwood timber (other exploitative uses permitted on a continuing basis in accordance with the recommendations)
Coastal park	provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments conserve and protect natural ecosystems, and that the management authority zone the park to accommodate the legal recreational activities traditionally associated with the area, such as surfing, fishing, gemstone collecting, camping, walking, and horse-riding
Reference area	maintain natural ecosystems as a reference to which those concerned with studying land for particular comparative purposes may be permitted to refer, especially when attempting to solve problems arising from the use of land, and that activities - such as grazing, exploration for minerals and gold, mining, logging and beekeeping - that conflict with the purposes of a reference area not be permitted, and any such activities cease when these recommendations are adopted
Marine reserve	conserve and protect significant marine ecosystems provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments
Marine and wildlife reserve	conserve and protect marine (or natural) ecosystems, particularly the habitat of international migratory waders provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments

Appendix I (continued)

Category	Recommendations
Gippsland Lakes reserve	provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments
	conserve and protect natural ecosystems and geomorphological and historical features
	ensure the conservation of both aquatic and terrestrial flora and fauna
Wildlife reserve	conserve the habitat of native animals, particularly water birds
	(and for) public recreation and education where this does not conflict with the primary aim
Wildlife management co-operative	conserve wildlife and for commercial and recreational activities, and
	that the managers prepare a management plan in consultation with the appropriate government departments with responsibility for various actiities associated with the area, and then submit the plan to them for agreement
Flora reserve	conserve particular species or associations of native plants
Flora and fauna reserve	conserve native plants and animals
Natural features and scenic reserve	maintain natural landscapes and features
	provide opportunities for recreation and education
	supply water and protect catchments and streams
	conserve native plants and animals
Water production[3]	(for) water supply purposes
	other activities permitted by the water supply authority after consultation with the Land Protection Division and the Environment Protection Authority

Appendix I (continued)

Category	Recommendations
Water supply, regulation and drainage	store and distribute water for irrigation and domestic purposes and flood mitigation
	dispose of drainage water
	(for) nature conservation and recreation to the extent consistent with the primary purpose
Education area	study the nature and functioning of reasonably natural ecosystems in a manner such that the integrity of these ecosystems is maintained as far as is practicable
	compare the ecosystems within education areas with other nearby natural and modified systems
	observe and practise methods of environmental analysis, and the field techniques of the natural sciences
	conduct simple long-term experiments aimed at giving an understanding of the changes occurring in an area with time
Historic area[4]	protect specific sites that carry or contain relics of buildings, equipment, construction works, and artefacts associated with the history of the locality
	provide opportunities for recreation and education associated with the history of the locality
Historic reserve[4]	protect specific sites that carry or contain the relics of buildings, equipment, construction works, and artefacts associated with the history of the locality
	provide opportunities for recreation and education associated with the history of the locality
Coastal reserve	provide opportunities for informal recreation for large numbers of people, and also for recreation related to enjoying and understanding nature

Appendix I (continued)

Category	Recommendations
Coastal reserve (continued)	protect and conserve natural coastal landscapes, ecosystems, geomorphlogical, archaeological and historic features, for public enjoyment, inspiration, education and scientific study
	ensure the conservation of aquatic, littoral and terrestrial flora and fauna
	provide facilities for shipping, fishing and boating, together with the necessary navigation aids
Scenic coast	give special emphasis to the protection of the outstanding natural landscape qualities in planning and management of the area
Public land water frontage	protect adjoining land from erosion by the maintenance of adequate vegetation cover and provide for flood mitigation
	maintain the character and quality of the local landscape
	conserve native flora and fauna
	provide opportunities for low intensity recreation
	allow access to water for grazing of stock by adjoining landholders under licence where appropriate
Streamside reserve	provide passive recreation such as picnicking, walking, angling
	provide opportunities for camping at the discretion of the local land manager if this does not conflict with the water quality of the adjacent stream
	conserve flora and fauna
	maintain the quality and character of the local landscape
	provide grazing, at the discretion of the land manager, if this does not conflict with the maintenance of the water quality of the adjacent stream or with the above uses

Appendix I (continued)

Category	Recommendations
River Murray reserve	protect natural and scenic values
	conserve native flora and fauna
	allow flood mitigation and streambank protection
	provide opportunities for informal recreation
Geological reserve	preserve features of geological interest
	provide opportunities for recreation and education to the extent that this is consistent with the above
Cave reserve	conserve and protect important geological, archaeological and biological features
	provide opportunities for recreation, education and scientific study where appropriate
Bushland reserve	maintain the character and quality of the local landscape
	permit passive recreation such as picnicking and walking
Scenic reserve	preserve scenic features and lookouts
Lake reserve	(for the following)
	recreation
	nature conservation
	scientific study
	water supply
	drainage
	(other uses, where appropriate)
Roadside conservation	(for) communication, transport, access, surveys and utilities, and that, when widening or re-alignment of roads is proposed, sites of geological, historical, habitat or botanical significance that may be affected be investigated and every effort made to retain and preserve them

Appendix I (continued)

Category	Recommendations
Highway park	(for) picnicking and to provide relaxation for the travelling public maintain the character and quality of the local landscape
Recreation reserve	be used for organized sports (football, horse-racing, golf etc) and informal recreation (picnicking, camping etc) as permitted by the land manager
Alpine resort	(as) alpine resort, and that development, planning and implementation in each one minimize the environmental and visual impact of facilities, consistent with the efficient planning and management of a ski resort
Hardwood (timber) production	produce hardwood timber in a manner having due regard for landscape values as seen from main roads outside the forest major secondary uses be to provide opportunities for open-space recreation and education conserve native plants and animals, and provide opportunities for the development of wildlife conservation techniques produce honey, forage, gravel, sand and other forest products as defined in the *Forests Act* 1958 water production values be recognized and protected the special values located in portion of some areas be protected (by creation of reserves under section 50 of the *Forests Act*, or by the implementation of management prescriptions
State forest	supply water and protect catchments and streams produce hardwood timber conserve native plants and animals, and provide opportunities for the development of wildlife conservation techniques

Appendix I (continued)

Category	Recommendations
State forest (continued)	provide opportunities for open-space recreation and education
	produce honey, forage, gravel, sand, road-making materials, and other forest products
	provide opportunities for mineral exploration and mining
	protect the special values as described (by reservation or mangement prescriptions)
Eucalyptus oil production	produce eucalyptus oil
	provide opportunities for open-space recreation and education
Softwood production	produce softwoods
	provide other goods and services compatible with the primary use
	provide opportunities for recreation
Forest area	conserve fauna and flora, and preserve scenic values
	protect the adjacent area recommended for softwood production
	low-intensity hardwood production, recreation, education, forest grazing, honey production, and mining where these activities do not conflict with the primary use above
	supply water and protect catchments where these lie within water supply catchments
Minerals and stone	permit fossicking and prospecting under Miner's Right, involving minimal disturbance of soil or vegetation, on public land other than:
	those areas specifically excluded in the recommendations (see the chapters on reference areas and water use and regulation)
	those areas that the land manager and the Department of Industry, Technology and Resources together may determine, and

Appendix I (continued)

Category	Recommendations
Minerals and stone (continued)	that areas of public land currently exempted or excepted from occupation for mining purposes under a Miner's Right or from being leased under a mining lease, remain so excepted or exempted unless the land manager and the Department of Industry, Techology and Resources together determine that such exemption or exception should no longer apply, and that public land (other than reference areas) continue to be available for exploration under licence and for extracon of 'gold', 'minerals', and 'petroleum', subject to the previous item and the stated principles and guidelines, and that public land (other than reference areas) continue to be available for exploration for 'stone' subject to stated principles and guidelines
Coal production	(for) the production of brown coal and associated necessary developments, and where not immediately required, provide for existing uses and producion of those goods and services required by the community, including agriculture and forestry, where this can be done without seriously reducing the long-term ability of the land to meet future demands for coal production and associated developments maintain natural features of the land, where appropriate, until such time as it is required for the winning of brown coal and related activities
Hydroelectricity production	transport, store, and regulate water for the generation of electricity operate, maintain and protect hydroelectric installations provide low-intensity recreation and protect nature conservation values in parts of the area, consistent with State Electricity Commission requirements

Appendix I (continued)

Category	Recommendations
Agriculture	(for) agriculture
	(for) agricultural research purposes
Utilities and survey	provide access and services (on) existing easements, and
	that new powerlines, pipelines, communications equipment and other utilities be planned to minimize disturbance to public land
	that existing legal use and tenure continue for areas reserved for utility purposes such as airports, public buildings, municipal depots, cemeteries, schools and garbage depots, and
	that the minimum area necessary for access to and maintenance of navigations aids, communication installations and trigonometrical stations be temporarily reserved
Township land	meet future requirements (being public land in townships, other than those areas that have been specifcally reserved) - it should remain as unreserved Crown land
Uncommitted land	maintain the capability of the land to meet future demands
	produce those goods and services required by the community that can be supplied without seriously reducing the long-term ability of the land to meet future demands
	that the land be Crown land withheld from sale
Other reserves and public land	continue existing legal use and tenure (being small areas of public land not specifically mentioned in Council recommendations)
	where the land is not reserved for a specific purpose at present, such areas to be used in a way that will not preclude their reservation in the future for as-yet-unknown public purposes

Appendix I (continued)

Category	Recommendations
Revegetation area	foster the re-establishment of tree species native to the area, or tree species suitable for firewood production, and that, when revegetation is completed, the areas become State forest (or other appropriate reserves)

Notes:

1. This part-recommendation applies to all parks in the Council's system where these are within water supply catchments.

2. From the recommendation for the Yarra Valley multi-purpose park, Melbourne Area; slightly different recommendations were made for the Mt Lawson (now a State park) and Mt Pilot multi-purpose parks.

3. These uses apply to water storage areas, diversion works, associated facilities and buffer zones, where land use determinations have been made.

4. Historic areas and reserves differ in that areas are relatively large, represent a range of historical themes, and may contain interpretative centres and recreational facilities. In the small historic reserves, development of recreational facilities would be minimal, although some aids to interpretation could be provided.

Appendix II

DEFINITION OF 'INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES' CONSERVATION AREAS

Category 1 Scientific research/strict nature reserve

These areas possess some outstanding ecosystems, features, and/or species of flora and fauna of national scientific importance. They are generally closed to public access, recreation, and tourism. They often contain fragile ecosystems, life forms, or sites of important biological or geological diversity, or have particular importance for the conservation of genetic resources. Size is determined by the area required to ensure their integrity to accomplish the scientific management goal and provide for their protection.

Category 2 National park

National parks are relatively large land or water areas that contain representative samples of major regions, features, or scenery of national or international significance where plant and animals species, geomorphological sites, and habitats are of special scientific, educational, and recreational interest. They contain one or several entire ecosystems that are not materially altered by human exploitation and occupation.

Category 3 National monument/national landmark

This category normally contains one or more natural features of outstanding national significance such as a geological formation, or a unique natural site, animal or plant species, or habitat that, because of uniqueness or rarity, may be threatened and should be protected. The specific feature to be protected ideally has little or no evidence of man's activities. These features are not of the size nor do they contain a diversity of features or representative ecosystems that would justify their inclusion as a national park.

Category 4 Nature conservation reserve

Such a reserve is desirable when protection of specific sites or habitats is essential to the continued existence or well-being of individual biotic species of resident or migratory fauna with national or global significance. Although a variety of (protected) areas fall within this category, each would have as its primary purpose the protection of Nature and not the production of harvestable, renewable resources, although that may play a role in the management of a particular reserve. Its size - or in certain instances seasons in which special management is necessary - will depend upon the habitat requirement or specific characteristics of the species to be protected. These reserves may not require vast areas, but could be relatively small - consisting of nesting areas, marshes, lakes, estuaries, forest, or grassland habitats.

Category 5 Protected landscape

The scope and character of areas that fall within this category are necessarily broad because of the wide variety of semi-natural and cultural landscape that occurs within various nations. This may be reflected in two types of areas: those whose landscapes possess special aesthetic qualities resulting from the interaction of people and land; and those that are primarily natural areas managed intensively for recreation and tourism.

Category 6 Resource reserve

A category 6 reserve will normally comprise an extensive and relatively isolated and uninhabited area having difficult access, or one that is lightly populated yet may be under considerable pressure for colonization and greater utilization. In many cases, little study or evaluation has occurred, and the consequence of converting these lands to agriculture, mineral or timber extraction, or the construction of roads, etc. is unclear.

Category 7 National biotic area/anthropological reserve

Category 7 reserves are characterized by natural areas where modern technology has not significantly interfered with or been absorbed by the traditional ways of life of the inhabitants. They may be remote and isolated and their inaccessibility may be maintained for a considerable time. The societies are considered relatively unique and may have particular significance for maintaining genetic diversity and/or for research on the evolution of humans. People are an integral component of these predominantly natural areas, and depend heavily upon the natural environment for food, shelter, and other basic material to sustain life. Extensive cultivation and other major modifications of the vegetation and animal life are not permitted.

Category 8 Multiple-use management area/ Managed resource area

Each such area contains considerable territory suitable for production of wood products, water, pasture, wildlife, and outdoor recreation. Parts of it may be settled and may have been altered by humans. Generally, these forest or other wildland areas do not possess nationally unique or exceptional natural features.

Appendix III

INTERSTATE DEFINITIONS OF NATIONAL PARKS

State/Territory	Definition
Australian Capital Territory	—
External territories	Relatively large areas which contain representative samples of major natural regions, features or scenery of national or international significance where plant and animal species, geomorphological sites, or habitats are of special scientific, educa-tional, and recreational interest.
New South Wales	Relatively large areas set aside for their features of predominantly unspoiled natural landscape, flora and fauna, permanently dedicated for public enjoyment, education and inspiration and protected from all interference, other than essential management practices, so that their natural attributes are preserved.
Northern Territory	Large areas of unspoiled landscape reserved for public enjoyment, education and inspiration.
Queensland	Relatively large areas of natural landscape with a high level of diversity of flora and fauna, and which may be of historic interest. They are permanently dedicated for public enjoyment and education and are protected from all interference other than essential management practices to ensure that the natural attributes are preserved.
South Australia	Protected areas of national significance by reason of the wildlife or natural features of those lands. Generally they are contiguous areas of substantial size, preferably tens of thousands of hectares, with conrolled provision for public visitation and enjoyment. They are reserves encompassing many natural values including scenic beauty, wildlife, history and inspiration to visitors.

Appendix III (continued)

State/Territory	Definition
Tasmania	Extensive areas for the conservation of natural ecosystems, enjoyment and study of the natural environment and public recreation/tourism.
Victoria	Crown land characterized by its predominantly unspoilt landscape and its flora, fauna or other features, which is reserved and protected permanently for the benefit of the public.
Western Australia	Established to preserve for all times scenic beauty, wilderness, native wildlife, indigenous plant life and areas of scientific importance, and to provide for the appreciation and enjoyment of those things by the public in such a manner and by such means as will leave them unimpaired for the future.

Land Conservation Council, Victoria

An extensive area of public land of nation-wide significance because of its outstanding natural features and diverse land types, set aside primarily to provide public enjoyment; education, and inspiration in natural environments.

Source: Occasional Paper No.10 - 1984; Australian National Parks and Wildlife Service. The Land Conservation Council definition is appended for comparison.

Appendix IV

INTERSTATE DEFINITIONS OF MAJOR CONSERVATION RESERVES (Other than National Parks)

State/Territory	Equivalent definition	Land use[1] categories
Australian Capital Territory	**Nature reserve:** land set aside for conservation and also for compatible recreational use.	3,4,5,6,7
	Reserve: land set aside for both conservation and compatible recreational use.	
External territories	**National nature reserves:** nationally significant areas set aside primarily for nature conservation.	3
New South Wales	**Nature reserves:** areas of special scientific interest containing wildlife or natural phenomena where management practices aim at maximizing the value of the area for scientific investigation and education purposes.	4
	State recreation areas: permanent reservations in the form of large regional parks established to provide recreational opportunities in an outdoor environment.	10
	Historic sites: areas preserved as the sites of buildings, objects, monuments or landscapes of national importance.	9
Northern Territory	**Conservation reserves:** areas set aside for conservation of flora, fauna or for anthropological, natural or scientific values.	1,4
	Nature parks: land reserved primarily for its suitability for public recreation and enjoyment in a natural environment.	10
	Game reserves: set aside for maintenance of game which can be harvested under permit.	7

Appendix IV (continued)

State/Territory	Equivalent definition	Land use[1] categories
Northern Territory (continued)	**Historical reserves:** areas set aside for their historical significance even though they may be used for other purposes such as recreation.	9
Queensland	**Environmental parks:** natural areas, less outstanding in size or natural attributes than national parks, totally protected for public enjoyment.	3,4
	Fauna reserves: areas of land held permanently in their natural state. They are undisturbed other than by naturally-occurring processes and are closed to the public.	1
	Fauna refuges: land declared to preserve habitat and protect fauna.	4
South Australia	**Conservation parks:** lands that should be protected or preserved for the purpose of conserving any wildlife or the natural or historic features of those lands.	3,4
	Game reserves: lands which should be preserved for the conservation of wildlife and management of game. Game reserves may be set aside for the purpose of fishing or hunting. These areas have an important conservation role and may be declared open at prescribed times for strictly controlled hunting.	7
	Recreation parks: lands that should be conserved and managed for public recreation and enjoyment. These areas protect natural values, landscape and historic sites but may also provide facilities for public recreation in a natural setting.	10

Appendix IV (continued)

State/Territory	Equivalent definition	Land use[1] categories
Tasmania	**State reserves:** generally small reserves set aside for scenic and recreational reasons and/or to protect geological sites.	7
	Nature reserves: areas set aside because of the significance for nature conservation. Public use is not encouraged where this might be detrimental, although provision may be made for appropriate tourism and recreational activities.	3,4
	Historic Sites: areas of significance in terms of European exploration, settlement or use, with encouragement of and recreational use.	9
	Game reserves: essentially significance in nature reserves except that specific provisions are made for hunting and the maintenance of game populations.	7
	Conservation areas: large multiple-use reserves set aside primarily to protect animals and their habitats and to provide for recreation and controlled use of resources.	9,10
Victoria	**State parks:** primarily reserved for public recreation and the conservation of the natural environment.	3
	Other parks: areas with scenic, historical,archaeological, biological, geological or other features of scientific interest that are worthy of preservation but, whether by reasons of the limited size of the areas or the limited significance of the features, are not suitable for reservation as national parks; areas that demonstrate human effect on	1,3,4,7, 9,10,18

Appendix IV (continued)

State/Territory	Equivalent definition	Land use[1] categories
Victoria	**Other parks (continued)** the environment whether through agricultural or pastoral pursuits or otherwise; areas in or adjacent to urban areas of natural beauty or interest or otherwise suitable for recreational use; areas of natural beauty or interest primarily for recreational and educational purposes but parts of which may be used for primary industry, hunting, shooting, fishing or other activities appropriate to the areas; and areas in their natural state for scientific study or reference.	
	State game reserves and State nature reserves defined as land reserved primarily for management and conservation of wildlife and any recreational use providing it does not conflict with the primary aim. State game reserves are wetlands open to duck hunting in season, while State nature reserves are wetlands and drylands closed to hunting at all times.	4,7
Western Australia	**Reserves:** usually small areas set aside for recreation and the conservation of flora and fauna.	4
	Nature reserves: defined by the *Wildlife Conservation Act* as land reserved for the conservation of flora and fauna.	1

Notes:

1. From Table 11
2. The table incorporates only those areas managed by each State's equivalent to the National Parks and Wildlife Division and/or Fisheries Division.

Source: Occasional Paper No.10 - 1984; Australian National Parks and Wildlife Service.

Appendix V

ANALYSIS OF RECORDS OF THREATENED FAUNA IN VICTORIA

Species	ARI no.	Conservation reserves	Other reserves	State forest areas etc	Freehold or modified	Total
Mammals						
Tiger quoll	17	25	9	33	41	108
Ningaui	19	-	-	4	1	5
Brush-tailed phascogale	21	16	10	17	65	108
Eastern barred bandicoot	33	3	3	-	30	36
Mountain pigmy-possum	44	2	0.5	1.5	-	4
Little pygmy-possum	46	1.5	0.5	4	2	8
Leadbeaters possum	50	3	5	13	4	25
Yellow-bellied glider	51	31.5	7	19.5	21	79
Squirrel glider	53	3	7.5	5	27	42
Brush-tailed rock wallaby	72	14.5	1	4	4.5	24
Long-footed potoroo	73	1.5	0.5	4	-	6
Eastern horseshoe-bat	94	3	2	4	2	11
Yellow-bellied sheathtail-bat	96	1	0.5	0.5	2	4
Common bentwing-bat	123	11	1.5	8	9	29
Large-footed myotis	125	2.5	1.5	2.5	7.5	14
Great pipistrelle	140	11.5	4	10.5	7	33
Mitchells hopping-mouse	161	3	1	5	6.5	15
Smoky mouse	166	18.5	1	19	1.5	40
Heath mouse	169	11	2	5	13	31
Dingo	190	24	2	26.5	17.5	70
Birds						
Bush thick-knee	174	28	77	41	90	236
Brolga	177	26	41	23	52	142
Black-eared miner	967	4	1	4	3	12
Rufous-crowned emu-wren	528	8	3	14	7	32
Red-lored whistler	402	10	1	21	5	38
Superb parrot	277	2	6	3	3	14
Osprey	241	1	0.5	1	0.5	3
Malleefowl	7	15	5	23	14	57
Red-tailed black cockatoo	264	17	15	13	24	69
Orange-bellied parrot	305	5	1	2	3	11
Regent honeyeater	603	9	16	13	18	56
Little penguin	5	44	5	10	22	81
Square-tailed kite	230	12	7	8	13	40
Plains-wanderer	20	1	2	1	2	6
Sooty owl	253	22	10	14	14	60
Glossy black cockatoo	265	10	3	5	5	23
Painted snipe	170	5	7	4	6	2
Fairy tern	118	23	4	11	13	51
Ground parrot	311	26	4	6	7	43
Turquoise parrot	302	7	10	5	18	40
Hooded plover	138	53	8	6	29	96
Australian bustard	176	4	3	4	4	15
Masked owl	250	7	2	6	6	21
Little tern	117	20	4	4	14	42
Rufous bristle-bird	521	18	11	7	14	50
Magpie goose	199	4	3	2	5	14
Regent parrot	278	26	13	42	43	124
Grey-crowned babbler	443	18	38	22	32	110
Freckled duck	214	25	27	12	23	87

Appendix VI

RECOMMENDATIONS FOR WILDLIFE AND FLORA AND FAUNA RESERVES IN RELATION TO STATE WILDLIFE RESERVES

KEY:

Type of recommendation

F&F - Flora and Fauna Reserve
WMCA - Wildlife Management Cooperative Area

Manager

AWDC - Albury--Wondonga Development Corporation
CF&L - Department of Conservation, Forests and Lands
CL&S - (obs.) Department of Crown Lands & Survey
EWT - (obs.) Euroa Waterworks Trust
FCV - (obs.) Forests Commission, Victoria
FWD - (obs.) Fisheries and Wildlife Division
Min Con - (obs.) Ministry for Conservation
NPS - (obs.) National Parks Service
RWS - Rural Water Commission
SANPWS - South Australian National Parks & Wildlife Service
Sh. - Shire
SRWSC - (obs.) State Rivers & Water Supply Commission
WB - Water Board

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
NORTH-EAST 1	Wildlife	C1 (C2)	SWR 49 *	FWD
1973	Wildlife	C2 (C3)	SWR 50 *	FWD
	Wildlife	C3 (C4)	SWR 51 *	FWD
STH GIPPSLAND 1	Coastal reserve	6a	Public Purposes	Min Con
1973	Wildlife	6b(part)	SWR 27	(FWD)
	Wildlife	6b(part)	SWR 2	(FWD)
	Waste disposal	6c	-	(Now W.M.C.A)
SOUTH-WEST 1	Wildlife	C1	SWR 17 *	FWD
1973	Wildlife	C2	SWR 29 *	FWD
	Wildlife	C3	*	FWD(see A8,SW1R)
	Wildlife	C4	SWR 46	FWD
	Wildlife	C5	SWR 45 *	FWD
	Wildlife	C6	SWR 44 *	FWD
	Wildlife	C7	SWR 43 *	FWD
	Wildlife	C8	SWR 40 *	FWD
	Wildlife	C9	SWR 41 *	FWD
	Wildlife	C10	SWR 48	FWD(see B4, SW2)
	Wildlife	C11	SWR 47 *	FWD
	Wildlife	C12	-	FWD,FCV
	Wildlife	C13	-	FWD,FCV
	Wildlife	C14	SWR 38	FWD
	Wildlife	C15	SWR 42 *	FWD
NORTH-EAST 2	Wildlife	C1 (C1)	Con.Wild.,Water & Rec	FWD(in cons. with EWT)
1974	F&F	L7 (H1)	-	FCV
	F&F	L8 (H2)	-	FCV

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
EAST GIPPSLAND	Wildlife	C1	SWR 14	FWD
1977	Wildlife	C2	SWR 28 *	FWD
	Wildlife	C3	SWR 16 *	FWD
	F&F	F11	SWR 130, Pres.Nat.Plants (T)	FWD
MALLEE	Wildlife	D1	SWR 134	FWD
1977	Wildlife	D2	SWR 90 *	FWD
	Wildlife	D3	SWR 39 *	FWD
	Wildlife	D4	SWR 22	FWD
	Wildlife	D5	SWR 71	FWD
	Wildlife	D6	SWR 72 *	FWD
	Wildlife	D7	SWR 73	FWD
	Wildlife	D8	SWR 7	FWD
	Wildlife	D9	SWR 74	FWD
	Wildlife	D10	SWR 75	FWD
	Wildlife	D11	SWR 76	FWD(in cons. with SRWSC)
	Wildlife	D12	SWR 77	FWD(in cons. with SRWSC)
	Wildlife	D13	SWR 78	FWD(in cons. with FCV)
	Hardwood	E8	-	FCV(in cons. with FWD)
	Hardwood	E9	-	FCV(in cons. with FWD)
	F&F	G1	-	FCV
	F&F	G2	Pres.Nat.Plants (P)	FCV
	F&F	G3	Pres.Nat.Plants (P)	CL&S
	F&F	G4	-	FCV
	F&F	G5	-	CL&S
	F&F	G6	Pres.Nat.Plants (P)	FCV
	F&F	G7	-	FCV
	F&F	G8	-	CL&S
	F&F	G9	Con.Area.Nat.Int.(P)	CL&S
	F&F	G10	SWR 79	FWD
	F&F	G11	-	CL&S
	F&F	G12	Pres.Nat.Plants (P)	FCV
	F&F	G13	Pres.Nat.Plants (P)	FCV
	F&F	G14	-	CL&S
	F&F	G15	-	FCV
	F&F	G16	-	CL&S
	F&F	G17	Pres.Nat.Plants (T	FCV
	F&F	G18	SWR 80	FWD
	F&F	G19	SWR 81 Pres.Nat.Plants (P)	FWD
	F&F	G20	SWR 135	FWD
	F&F	G21	Pres.Nat.Plants (P)	FCV
	F&F	G22	SWR 82	FWD(rec. varied)
	F&F	G23	-	CL&S
	F&F	G24	Pres.Nat.Plants (T)	FCV
	F&F	G25	Pres.Nat.Plants (T)	FCV
	F&F	G26	SWR 83 *	FWD
	F&F	G27	SWR 84	FWD
	F&F	G28	SWR 91	FWD
	F&F	G29	SWR 85 *	FWD
	F&F	G30	SWR 86	FWD
	F&F	G31	SWR 87 *	FWD
	F&F	G32	SWR 88 *	FWD
	F&F	G33	-	CL&S

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
MALLEE (continued)	Water	018	-	SRWSC(in cons. with FWD)
		019	-	SRWSC(in cons. with FWD)
		020	-	SRWSC(in cons. with FWD)
		021	-	SRWSC(in cons. with FWD)
MELBOURNE 1977	State park	A12	SWR 59, Public Park (T)	FWD
	Wildlife	C1	SWR 60 *	FWD
	Wildlife	C2	SWR 12	FWD
	Wildlife	C3	SWR 61	FWD
	Wildlife	C4	SWR 37 *	FWD
	Wildlife	C5	SWR 10	FWD
	Wildlife	C6	SWR 62 *	FWD
	Wildlife	C7	SWR 63 *	FWD
	Wildlife	C8	-	FWD
	Wildlife	C9	SWR 64 *	FWD
	Wildlife	C10	SWR 65 *	FWD
	Wildlife	C11	SWR 66 *	FWD
	Wildlife	C12	-	FWD
	Wildlife	C13	SWR 23 *	FWD
	Wildlife	C14	SWR 4,5,89	FWD(rec. varied)
	Wildlife	C15	SWR 132	FWD
	Wildlife	C16	SWR 54	FWD(in cons. with P&H)
	Wildlife	C17	SWR 15	FWD
	Wildlife	C18	*	FWD
	Wildlife	C19	SWR 26	FWD
	Wildlife	C20	SWR 131	FWD
	W.M.C.A.	C21)	Harold)	
	W.M.C.A.	C22)	Holt)	
	W.M.C.A.	C23)	Marine Reserve,)	FWD
	W.M.C.A.	C24)	section 79A,)	
	W.M.C.A.	C25)	Fisheries Act)	
	W.M.C.A.	C26	-	FWD(in consultation)
	W.M.C.A.	C27	-	FWD(in consultation)
	W.M.C.A	C28	-	FWD(in consultation)
	F&F	H20	SWR 67 *	FWD
	F&F	H21	SWR 68 *	FWD
	F&F	H22	SWR 69	FWD
	F&F	H23	SWR 70	FWD
	F&F	H24	SWR 151	FWD
	F&F	H25	SWR 150	FWD
	F&F	H26	SWR 149	FWD
CORANGAMITE 1978	Wildlife	C1	SWR 93 *	FWD
	Wildlife	C2	SWR 94	FWD
	Wildlife	C3	SWR 95	FWD
	Wildlife	C4	SWR 96 *	FWD
	Wildlife	C5	SWR 97 *	FWD
	Wildlife	C6	SWR 98 *	FWD
	Wildlife	C7	SWR 99 *	FWD
	Wildlife	C8	SWR 100 *	FWD
	Wildlife	C9	SWR 101 *	FWD
	Wildlife	C10	SWR 102 *	FWD
	Wildlife	C11	SWR 103 *	FWD
	Wildlife	C12	SWR 104 *	FWD
	Wildlife	C13	SWR 105 *	FWD

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
CORANGAMITE	Wildlife	C14	SWR 106 *	FWD
(continued)	Wildlife	C15	SWR 107 *	FWD
	Wildlife	C16	SWR 108 *	FWD
	Wildlife	C17	SWR 109 *	FWD
	Wildlife	C18	SWR 110 *	FWD
	Wildlife	C19	SWR 111 *	FWD
	Wildlife	C20	SWR 112 *	FWD
	Wildlife	C21	SWR 113 *	FWD
	Wildlife	C22	SWR 114 *	FWD
	Wildlife	C23	SWR 115	FWD
	Wildlife	C24	SWR 116 *	FWD
	Wildlife	C25	SWR 117 *	FWD
	Wildlife	C26	SWR 118 *	FWD
	Wildlife	C27	SWR 119 *	FWD
	Wildlife	C28	SWR 120	FWD(in cons. with SRWSC)
	Wildlife	C29	SWR 121 *	FWD
	Wildlife	C30	SWR 122	FWD(in cons. with SRWSC)
	Wildlife	C31	SWR 123 *	FWD(in cons. with SRWSC)
	Wildlife	C32	SWR 124 *	FWD
	Wildlife	C33	SWR 125	FWD(with SRWSC and Sh. Belfast)
	Wildlife	C34	SWR 126 *	FWD
	Wildlife	C35	SWR 19	FWD
	Wildlife	C36	SWR 127 *	FWD(plantation by FCV)
	Wildlife & geology	C37)	SWR 8	FWD(not implemented)
	F&F	H5	-	CL&S
	F&F	H6	Pres.Ecol.Sig.(P)	CL&S
	F&F	H7	SWR 128 *	FWD
	F&F	H8	Man. Wild. (P)	FWD
	F&F	H9	Pres. F&F (P)	CL&S
	F&F	H10	Pres.Nat.Plants (P)	FCV
	F&F	H11	-	FWD(in cons. with FWD)
	F&F	H12	Pres.Nat.Plants (P)	FCV
	F&F	H13	-	FCV(in cons. with Colac W.B.
	F&F	H14	-	FCV
	Lakes reserve	N52	SWR 153	(FWD)
	Lakes reserve	N1--51, N53--64	various[2]	CL&S(in cons. with FWD and SRWSC)
	-	-	SWR 129	Freehold land?
	-	-	SWR 52	Freehold land?
ALPINE	National park	A3 (part)	SWR 3	NPS
1979,83	F&F	K1	Pres.Nat.Plants (P)	CL&S
NORTH CENTRAL	Wildlife	C1	SWR 136	FWD
1981	Wildlife	C2	SWR 137	FWD
	Wildlife	C3	SWR 138	FWD
	Wildlife	C4	SWR 139	FWD
	Wildlife	C5	SWR 140	FWD
	Wildlife	C6	SWR 141	FWD
	Wildlife	C7	SWR 142	FWD
	Wildlife	C8	SWR 143	FWD(in cons. with SRWSC)
	Wildlife	C9	SWR 144	FWD(in cons. with SRWSC)
	Wildlife	C10	SWR 53	FWD
	Wildlife	C11	SWR 56	FWD

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
NORTH CENTRAL	Wildlife	C12	SWR 57	FWD
(continued)	Wildlife	C13	SWR 24	FWD
	Wildlife	C14	SWR 145	FWD
	Wildlife	C15	SWR 146	FWD
	Wildlife	C16	SWR 147	FWD
	Wildlife	C17	SWR 148	FWD
	Water	D50	-	SRWSC(in cons. with FWD)
	Water	D51	-	SRWSC(in cons. with FWD)
	Water	D52	Water Supply (P)	SRWSC(in cons. with FWD)
	Water	D53	-	SRWSC(in cons. with FWD)
	Water	D54	-	SRWSC(in cons. with FWD)
	F&F	H21	-	FCV(in cons. with FWD)
	F&F	H22	Pres. F&F	NPS(in cons. with FWD)
	F&F	H23	-	FCV(in cons. with FWD)
	F&F	H24	-	NPS(in cons. with FWD)
	F&F	H25	-	CL&S(in cons. with FWD)
BALLARAT	Wildlife	C1		FWD
1982	Wildlife	C2		FWD
	Wildlife	C3		FWD
	Wildlife	C4		FWD
	Wildlife	C5		FWD
	Wildlife	C6	SWR 6	FWD
	Wildlife	C7		FWD
	Wildlife	C8		FWD
	F&F	G5		FCV(in cons. with FWD)
	Lake reserve	M1-3	-	CL&S
	Lake reserve	M4,M5	Pro. of Catch	CL&S
STH GIPPSLAND 2	Marine	A6	) Marine Parks,	NPS, FWD
1982	Marine & wildlife	A7	) section 79A	NPS, FWD
	Marine & wildlife	A8	) Fisheries Act	NPS, FWD (SWR 20)
	Marine & wildlife	A9	)	NPS, FWD
	Wildlife	C1	-	FWD
	Wildlife	C2	-	FWD
	Wildlife	C3	-	FWD
	Wildlife	C4	SWR 1	FWD
	Wildlife	C5	-	FWD
	W.M.C.A.	C6	-	FWD(in consultation)
	F&F	G13	-	FCV(in cons. with FWD)
	F&F	G14	Schedule 2 N.P.A	NPS
	F&F	G15	-	FCV
	Coastal reserve	J1-4	-	CL&S(in cons. with FWD)
	Coastal reserve	J2	Protection Coastline	CL&S(in cons. with FWD)
	Coastal reserve	J3		CL&S(in cons. with FWD)
	Coastal reserve	J4	Protection Coastline	CL&S(in cons. with FWD)
SOUTH-WEST 2	State park	B4	SWR 25, 48 schedule 2 N.P.A.	NPS(in cons. with FWD)
1982	Wildlife	D1		FWD(in cons. with SANPWS)
	Wildlife	D2	-	FWD
	Wildlife	D3	-	FWD
	Wildlife	D4	-	FWD
	Wildlife	D5	-	FWD
	Wildlife	D6	-	FWD
	Wildlife	D7	-	FWD

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
SOUTH-WEST 2	Wildlife	D8	-	FWD
(continued)	Wildlife	D9	-	FWD
	Wildlife	D10	-	FWD
	Wildlife	D11	-	FWD
	Wildlife	D12	-	FWD
	Wildlife	D13	-	FWD
	Wildlife	D14	-	FWD
	Wildlife	D15	-	FWD
	Wildlife	D16	-	FWD
	Wildlife	D17	-	FWD
	Wildlife	D18	-	FWD
	Wildlife	D19	-	FWD
	Wildlife	D20	-	FWD
	Wildlife	D21	-	FWD
	Wildlife	D22	-	FWD
	Wildlife	D23	-	FWD
	Wildlife	D24	-	FWD
	Wildlife	D25	-	FWD
	Wildlife	D26	-	FWD
	Wildlife	D27	-	FWD
	Wildlife	D28	-	FWD
	Wildlife	D29	-	FWD
	Wildlife	D30	-	FWD
	Wildlife	D31	-	FWD(in cons. with FCV)
	Wildlife	D32	-	FWD
	Wildlife	D33	-	FWD
	Wildlife	D34	-	FWD
	Wildlife	D35	-	FWD
	Wildlife	D36	-	FWD
	Wildlife	D37	-	FWD
	Wildlife	D38	-	FWD
	Wildlife	D39	-	FWD
	Wildlife	D40	-	FWD
	Wildlife	D41	-	FWD
	Wildlife	D42	-	FWD
	Wildlife	D43	-	FWD
	Wildlife	D44	-	FWD
	Wildlife	D45	-	FWD
	Wildlife	D46	-	FWD
	Wildlife	D47	-	FWD
	Wildlife	D48	-	FWD
	Wildlife	D49	-	FWD
	Wildlife	D50	-	FWD
	Wildlife	D51	-	FWD
	Wildlife	D52	-	FWD
	Wildlife	D53	-	FWD
	Wildlife	D54	-	FWD
	Wildlife	D55	-	FWD
	Wildlife	D56	-	FWD
	Wildlife	D57	-	FWD
	Wildlife	D58	-	FWD
	Wildlife	D59	-	FWD
	Wildlife	D60	-	FWD
	Wildlife	D61	-	FWD
	Wildlife	D62	-	FWD
	Wildlife	D63	-	FWD

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no	Manager/comments
SOUTH-WEST 2	Wildlife	D64	-	FWD
(continued)	Wildlife	D65	-	FWD
	Wildlife	D66	-	FWD
	Wildlife	D67	-	FWD
	Wildlife	D68	-	FWD
	Wildlife	D69	SWR 21 *	FWD
	Wildlife	D70	-	FWD
	Wildlife	D71	-	FWD
	Wildlife	D72	-	FWD
	Wildlife	D73	-	FWD
	Wildlife	D74	-	FWD
	Water	E1	-	Sh.Kowree(in cons. with FWD)
	Water	E5	-	SRWSC(in cons with FWD)
	Hardwood	F2	-	FCV(in cons. with FWD)
	Hardwood	F4	-	FCV(in cons. with FWD)
	Hardwood	F6	-	FCV(in cons. with FWD)
	Hardwood	F9	-	FCV(in cons. with FWD)
	Hardwood	F10	-	FCV(in cons. with FWD)
	Hardwood	F13	-	FCV(in cons. with FWD)
	F&F	H13	-	NPS(in cons. with FWD)
	Coastal reserve	J1	Prot. Coastline	CL&S(in cons. with FWD)
	Lakes reserve	N1--N23	-	CL&S(in cons. with SRWSC & FWD)
GIPPSLAND LAKES	Gippsland Lakes reserve	A6(part)	SWR 13 *	)
HINTERLAND	Gippsland Lakes reserve	A6(part)	SWR 32 *	) NPS & FWD
1983	Gippsland Lakes reserve	A6(part)	SWR 55 *	)
	Gippsland Lakes reserve	A6(part)	SWR 9 *	)
	F&F	H9		NPS
	F&F	H10		NPS
	F&F	H11		NPS
	F&F	H12		CL&S
	-	-	SWR 11	McLeod Morass is in the Township of Bairnsdale;
	-	-	SWR 12	Sale Common is in the Township of Sale
SOUTH-WEST 1 (R)	State park	A8	-	NPS(see C3, SW1)
1983	Wildlife	C16	SWR 92	FWD
	F&F	G8	-	FCV(in cons. with FWD)
MURRAY VALLEY	Wildlife	C1	-	CF&L
1985	Wildlife	C2	-	CF&L
	Wildlife	C3	-	CF&L
	Wildlife	C4	SWR 34	CF&L
	Wildlife	C5	-	CF&L
	Wildlife	C6	-	CF&L
	Wildlife	C7	-	CF&L
	Wildlife	C8	-	CF&L
	Wildlife	C9	SWR 36	CF&L
	Wildlife	C10	SWR 35	CF&L
	Wildlife	C11	-	CF&L
	Wildlife	C12	-	CF&L
	Wildlife	C13	-	CF&L
	Wildlife	C14	-	CF&L

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments
MURRAY VALLEY (continued)	Wildlife	C15	-	CF&L
	Wildlife	C16	SWR 133	CF&L
	Wildlife	C17	-	CF&L
	Wildlife	C18	-	CF&L
	Wildlife	C19	-	CF&L
	Wildlife	C20	-	CF&L
	Wildlife	C21	-	CF&L
	Wildlife	C22	-	CF&L
	Wildlife	C23	-	CF&L
	Wildlife	C24	-	CF&L
	Wildlife	C25	SWR 31	CF&L
	Wildlife	C26	-	CF&L
	Wildlife	C27	-	CF&L
	Wildlife	C28	-	CF&L
	Wildlife	C29	SWR 33	CF&L
	Wildlife	C30	-	CF&L
	Wildlife	C31	-	CF&L
	W.M.C.A	C32	-	FWD(in consultation)
	W.M.C.A	C33	-	FWD(in consultation)
	Water	D53	-	RWC
	Water	D56	-	RWC,FWD
	F&F	G9	-	CF&L
	F&F	G10	-	CF&L
	F&F	G11	-	CF&L
	Lake reserve	N1--3	-	CF&L
EAST GIPPSLAND REVIEW 1986	Wildlife	C4	-	CF&L
	W.M.C.A.	C5	-	CF&L (in consultation)
	F&F	F12	-	CF&L
NORTH-EAST (BENALLA--UPPER MURRAY REVIEW 1986	Wildlife	C5	-	AWDC--CF&L
WIMMERA 1986	Wildlife	C1	-	CF&L
	Wildlife	C2	-	CF&L
	Wildlife	C3	-	CF&L
	Wildlife	C4	-	CF&L
	Wildlife	C5	-	CF&L
	Wildlife	C6	-	CF&L
	Wildlife	C7	-	CF&L
	Wildlife	C8	-	CF&L
	Wildlife	C9	-	CF&L
	Wildlife	C10	-	CF&L
	Wildlife	C11	-	CF&L
	Wildlife	C12	-	CF&L
	Wildlife	C13	-	CF&L
	Wildlife	C14	-	CF&L
	Wildlife	C15	-	CF&L
	Wildlife	C16	-	CF&L
	Wildlife	C17	-	CF&L
	Wildlife	C18	-	CF&L
	Wildlife	C19	-	CF&L
	Wildlife	C20	-	CF&L
	Wildlife	C21	-	CF&L

Appendix VI (continued)

LCC study area	Type of recommendation	LCC rec. no.	Reserve no.[1]	Manager/comments1
WIMMERA	Wildlife	C22	-	CF&L
(continued)	Wildlife	C23	-	CF&L
	Wildlife	C24	-	CF&L
	Wildlife	C25	-	CF&L
	Wildlife	C26	-	CF&L
	Wildlife	C27	-	CF&L
	Wildlife	C28	-	CF&L
	Wildlife	C29	-	CF&L
	Wildlife	C30	-	CF&L
	Wildlife	C31	-	CF&L
	Wildlife	C32	-	CF&L
	Wildlife	C33	-	CF&L
	Wildlife	C34	-	CF&L
	Wildlife	C35	-	CF&L
	Wildlife	C36	SWR 138 (part)	(see C3, N.C.)
	Wildlife	C37	-	CF&L
	Wildlife	C38	-	CF&L
	Wildlife	C39	-	CF&L
	Wildlife	C40	-	CF&L
	Wildlife	C41	-	CF&L
	W.M.C.A.	C42	SWR 30	CF&L(in consultation)
	W.M.C.A.	C43	-	CF&L(in cons. with various groups)
	F&F	F11	-	CF&L
	F&F	F12	-	CF&L
	F&F	F13	-	CF&L
	F&F	F14	-	CF&L
	F&F	F15	-	CF&L
	F&F	F16	-	CF&L
	F&F	F17	-	CF&L
	F&F	F18	-	CF&L
	F&F	F19	-	CF&L
	F&F	F20	-	CF&L
	Lake reserve	N1--10	-	CF&L(in cons. with RWC)
MELBOURNE 1,	Marine reserve	A15	Sec. 79A	FWD
REVIEW	F&F	H3	-	CF&L
1987	F&F	H4	-	CF&L

Notes:

1. State Wildlife Reserves (SWR) marked * are also reserved under the Crown Land (Reserves) Act 1978 as reserves for the protection of wildlife (mostly permanent, some temporary). Other reserves under this Act are shown by abbreviated reserve type - e.g., Pres.Nat.Plants (P) is a permanent reserve for the preservation of native plants; con.area.nat.int (T) is a temporary reserve for the conservation of an area of natural interest.

2. Corangamite Area Lake Reserve recommendations N3--7, 9, 10, 13, 14, 17, 18, 21--25, 27--32, 35, 36, 39--43, 45--51, 54--59, 62 and 63 have been reserved under the Crown Land (Reserves) Act 1978 as reserves for the protection of the bed and banks of lakes (all temporary except N63).

Appendix VII

MAJOR DEFICIENCIES IN THE REPRESENTATION OF PLANT COMMUNITIES IN THE CONSERVATION RESERVE SYSTEM

Codes in brackets following dominance associations refer to Vegetation Provinces as shown on Map 10:

M:	Mallee
NP:	Northern Plains
LD:	Little Desert
WVP:	Western Volcanic Plains
WCP:	Western Coastal Plains
GCP:	Gippsland (Coastal) Plains
WH:	Western Highlands
EH:	Eastern Highlands
O:	Otway Ranges
SG:	South Gippsland Highlands (including Wilsons Promontory)

CATEGORY 1: VEGETATION UNITS IN URGENT NEED OF PROTECTION

1. Grasslands of lowland plains

Dominated by indigenous perennial tussock grasses, with intertussock herbs. Floristic composition varies regionally and locally with site factors.

Dominance associations:

(a) *Themeda australis* - *Stipa* spp. - *Danthonia* spp. (NP, WVP, GCP).

(b) *Poa* spp. - *Danthonia* spp. (WVP, WCP).

(c) *Enteropogon acicularis* - *Stipa* spp. - *Danthonia* spp. (NP).

(d) Various grassland--sedgeland/herbfield communities of shallow swamps and depressions (complex of communities, including saline swamps) (mostly NP, WVP, GCP).

(Total of seven vegetation units)

All these units are very poorly represented on public land. There are scattered remnants of some units on linear reserves, but adequate representation would require land purchase and restoration works.

2. Grassy woodlands of lowland plains and fertile hilly areas

Series of associations including gum, box and ironbark eucalypts, and/or she-oaks, cypress pines, silver banksia and wattles. Understorey of similar character to tussock grasslands, but grading to shrubby in some variants.

Dominance associations:

(a) *Casuarina stricta--Banksia marginata--Acacia* spp. (NP, WVP, GCP).

(b) *Eucalyptus camaldulensis* (NP, WVP and WH).

(c) *E. camaldulensis--E. tereticornis* (GCP).

(d) *E. microcarpa--E. melliodora* (including in association with one or more of *Casuarina luehmannii, Callitris columellaris, E. largiflorens, E. leucoxylon, E. behriana,* and also *E. odorata* stands) (various associations) (NP, WVP and WH).

(e) Woodlands dominated by one or more of associated species in (d) above (NP, WH, WVP).

(f) *E. viminalis--E. ovata--E. pauciflora* (WH, WVP, WCP, GCP).

(g) *E. melliodora--E. blakelyi--E. albens* (WH, EH).

(Total of 16 vegetation units)

Reservation status of these grassland types ranges from poor to nil, and woodlands moderate to nil (Scarlett and Parsons, 1982) generally totally unreserved. The indigenous grassy vegetation types of the heavier soils of the Volcanic Plains and of the Murray Valley Plains (outside riverine forests), are particularly poorly represented in both reserves and on public land. The association of *Banksia marginata* and *Casuarina stricta* is almost extinct. Grassy woodland variants occur in some forest areas, often in ecotonal sites, as remnants of the communities of more fertile soils of adjacent agricultural areas, and on alluvial soils in valleys. Isolated small blocks of public land, roadsides and railways are potentially of high significance for these communities.

3. Open forests, woodlands and grassland communities of lower altitude snowplains and cold montane plateaux

Grassy ground layers of the communities of these habitats can have affinities with lowland vegetation types. Dominant species:

E. pauciflora, E. rubida, E. stellulata, E. camphora (with *Themeda australis--Poa* spp. ground layer) (EH).

(Total of seven vegetation units)

These communities are poorly reserved and very little remains on public land. Some remnants occur on the margins of public land and road reserves.

4. Montane bog communities of lower altitude snowplains, cool air drainage lines and various montane plateau areas

Dominant species:

Sclerophyllous shrubs (eg. *Hakea microcarpa*, *Baeckia* spp., *Callistemon sieberi*, *Epacris* spp.), sphagnum and sedges (EH).

Lower altitude variants of the sub-alpine bog-heath communities are poorly reserved across their range, which extends into wet sclerophyll forest in the central highlands. These small areas can be of critical importance for restricted taxa. These communities are poorly known, with variants in the Delegate--Errinundra--Nunniong, Koetong--Lucyvale and Upper Yarra--Baw Baws areas.

5. **Mallee woodlands, grasslands and saltbush shrublands**

Lightly treed to treeless communities of the north-west, including associations of mallee eucalypts, cypress-pines and belah. Understoreys range from shrubby (sclerophyllous or saltbush dominated) to grassy or herbaceous. These grade into the box eucalypt woodlands of the Northern Plains. Clearing has been very selective of land-types.

Dominant species:

(a) Mallee communities of heavier soils including various associations of *E. gracilis*, *E. oleosa*, *E. calycogona*, *E. behriana* and *E. porosa*. ('Big mallee' and mallee--box eucalypt woodland).

(b) *Casuarina cristata*.

(c) *Callitris preissii--Casuarina luehmannii*.

(d) *Stipa* spp. - *Danthonia* spp.

(e) *Maireana* spp.

(f) *Atriplex vesicaria--Sclerolaena* spp.

(Total of 13 vegetation units)

These units are generally degraded but there is relatively extensive representation on public land in the Mallee, except for 'Big Mallee' which occupies the better quality soils that have been taken up for agriculture. Representation of these units in the reserve system, particularly of undisturbed examples, is inadequate.

6. **Other open forests and woodlands of relatively fertile soils in hilly areas and near the coast**

While they are not readily defined by existing alliance descriptions, other open forest and woodland formation of relatively fertile soils in highland areas have been depleted by clearing for agriculture. These vegetation complexes cover a wide range of eucalypt associations,

and can include species of the lowland woodlands and dry or moist forest types. Understoreys range from grassy (eg. with *Poa*, *Themeda*, *Danthonia*) to grassy-heathy or shrubby.

Dominant species of some variants:

(a) Complexes including *E. melliodora*: eg. with *E. rubida*, *E. goniocalyx* and/or *E. radiata* (WH, EH).

(b) ... and grading into *E. radiata* (or *E. obliqua*), with *E. viminalis* and *E. ovata* or *E. yarraensis* (WH, EH, GCP), with grassy to shrubby understoreys. *E. aggregata* is very localized in frost hollows near Woodend (EH). Lower strata include *Themeda* and *Poa* dominated understoreys.

(c) *E. bosistoana* woodlands and open forests of alluvial flats in Gippsland (GCP).

(Total of twelve vegetation units)

Much of the protection of the range of these communities will depend on refugia and small remnant areas. Important stands of *E. bosistoana* occur on uncommitted land in the Cann River Valley (otherwise limited reservation at Holey Plains SP and Croajingolong NP). Protection of further areas of the box-peppermint grassy forest types is required. Limited occurrences remain around the margins of agricultural districts and on small blocks of public land.

7. Wetlands and riparian communities

An extremely diverse range of plant communities occurs in wet sites of the lowland plains. Carr (1984) lists 13 swamp of lake (wetland) community types from the Wimmera alone. Riparian vegetation is also extremely difficult to characterize on the basis of dominant species.

Characterization:

(a) Various sedge, rush, reed and grassland or herbfield communities of lowland swamps (all provinces).

(b) *Muehleckbeckia cunninghamii* low shrubland (WVP, NP) (including grasslands and *E. largiflorens* woodland).

(c) Riparian scrub, sedgeland and forest communists (all provinces, particularly lowlands).

(Total of seven vegetation units)

Wetland communities have good representation in reserves of near-coastal east Victoria, but elsewhere protection is mainly in Wildlife Reserves which may not necessarily provide for the protection of the vegetation communities present. The complexity of these vegetation types means that more thorough investigation is necessary to assess

their representation. For example, swamps in close proximity can have totally different floristic composition. Some relatively undisturbed relic shallow swamps in agricultural areas are of extremely high botanical importance.

Most riparian vegetation of the lowlands has been drastically altered and, apart from the riverine forests of the Murray River system, has often been reduced to small disturbed fragments. Grazing and stream-entrenchment have led to depletion of specific habitats - eg. sedge and herbaceous communities of lowland drainage lines. Relatively intact riparian vegetation is of importance wherever it occurs.

Greater representation of riparian systems, is desirable, particularly of associations such as *Bursaria spinosa--Hymenanthera dentata* on the Volcanic Plains. Scrubs of Lignum have some reservation in the parks of the north-west but these have been disturbed by grazing kangaroos, rabbits and stock. Elsewhere lignum swamps lack reservation outside restricted areas in Wildlife Reserves on the Northern Plains and to the west of Melbourne.

CATEGORY 2: VEGETATION UNITS IN HIGH NEED OF PROTECTION

8. Melaleuca scrubs and low woodlands

Communities in which *Melaleuca* spp. are dominant occur on a range of soil types. Some of these have been extensively depleted by land clearing and swamp draining, or in the case of those dominated by species of wide ecological amplitude, at least over part of their habitat range. Commentary on depleted vegetation types follows:

(a) *M. lanceolata* low woodland: Near coastal communities (west of Westernport Bay) have been depleted by clearing. They have some reservation in the south-west (eg. Discovery Bay CP), and at Cape Schanck and potentially Point Nepean, but over most of their distribution are confined to vulnerable relics. The species occurs in a wide variety of habitats, including mallee scrub (where it is most secure), heavy soils on the drier Northern Plains (relics only), coastal limestone and dune systems (eg. Pt Lonsdale) and coastal river flats (Anglesea). Greater protection for relics is required.

(b) *M. neglecta* heath: Greatly reduced in south-west Victoria, (eg. around saline clay pans). Some reservation in Little Desert NP and Dergholm SP.

(c) *M. halmaturorum* low woodland: Has some reservation on saline flats of far west/north-west Victoria, but protection is uncertain due to stock-grazing in Pink Lakes SP. Small stands in Little Desert NP.

(d) *M. ericifolia* scrubs: Scrub of *M. ericifolia* has reservation in coastal swamps (eg. Wilsons Promontory NP, Nooramunga MWR), but variants of inland swamps and valley flats between Melbourne and South Gippsland are mostly confined to relics. Occurrences in atypical habitats (eg. isolated near Portland on limestone (WR), also formerly at You Yangs (destroyed, possibly *M. ?ternifolia*)) are also of particular interest. *M. ericifolia* has a wide further ecological amplitude, and relics require greater protection in habitats where largely cleared.

(Total of nine units)

9. Inland salt-marsh communities (NP, M, WVP)

Reserves are urgently required on the gypseous Raak Plains. Extensive areas of gypseous flats and clay plains in the northern Wimmera have also been almost totally alienated, and support a number of species of extremely restricted occurrence on public land. On public land, important saltmarsh relics also occur in small fringes around saline lakes. Inland samphire communities can be dominated by a wide range of species - it is important for future reserves to include this spectrum of zonation. Land acquisition appears to be warranted in the northern Wimmera and on the Raak Plains.

(Total of nine units)

10. Wet sclerophyll forest--cool temperate rainforest

Dominant species:

(a) *E. regnans* (and/or *E. nitens*, *E. fastigata*) (EH,SG,O).

(b) *Nothofagus cunninghamii--Atherosperma moschatum* (EH,SG,O).

(Total of two vegetation units)

Further representation of variants in the Central Highlands between Kinglake and Mt Baw Baw is required. Mature and mixed age stands are of great ecological importance. Good examples occur on public land.

11. Riverine forests

Dominant species:

E. camaldulensis; E. largiflorens

(Total of 14 vegetation units)

Further protection is required for areas of river red gum-dominated forests on the riverine plains. The differences in vegetation composition between north-west Victoria, the Grampians, and the Murray Valley plains should be appreciated.

While black box-dominated forests and woodlands are considered to have a moderate reservation status, information is inadequate, and includes overlap with the savannah vegetation of the lowland plains (e.g. at Leaghur Forest Park). More open grassy communities of black box can be of extremely high botanical importance. Veteran stands of both black box and river red gum are important wherever they occur.

CATEGORY 3: FURTHER CONSERVATION MEASURES REQUIRED

12. Forests and heathy woodlands of the ranges and coastal areas

The alliance perspective alone is adequate to assess the current conservation status of forest types. An exten-sive gap in the protection of lower altitude forests occurs west from the Gippsland Lakes to the Drouin area.

The NPS (1984) consider the various associations of both *E. obliqua* and *E. radiata* to be inadequately reserve, with major deficiencies in the Western Highlands, South Gippsland Highlands (where mostly cleared) and Gippsland Coastal Plains. These dominance groupings include a range from damp sclerophyll forest to woodlands of the coastal plains (with heathy or grassy understoreys). *E. muellerana*-dominated communities as occur at Hedley Range and Mullundung Forest are inadequately protected, differing floristically from stands in Wilsons Promontory NP.

Selection of sites most suitable for pines has the potential to be selective of particular ecological patterns (eg. sites with deep loamy soils) within the category of peppermint-stringybark forests. While structural descriptions of these forests may be available, floristic communities have yet to be surveyed for extensive areas, particularly to the north of the Dividing Range and west of Melbourne. Variants occurring near the edges of agricultural land and in valleys can be of importance in representing vegetation similar to that selectively utilized for agriculture. Reservation must seek a balance between representation of variation in a number of smaller reserves, and selection of areas of sufficient size to ensure long-term viability of populations of all faunal species.

Some noticeable gaps in the protection of representative forest types are:

(a) Mature examples of forests used for hardwood production (eg. with veteran *E. obliqua*, *E. sieberi*).

(b) Moist sclerophyll forests in general: The distribution of reserved land is far from even: Geographical gaps, or areas where reserves are of relatively small size or lower conservation ranking are apparent.

(c) *Callitris* forests: In the Beechworth district, reservation is (currently) restricted to reserves of lower conservation status (RP, MPP).

(d) Sclerophyll forests--woodlands east of Melbourne: Protection of the remnant vegetation including *E. cinerea* ssp. *cephalocarpa* is inadequate. Heathy woodlands and wet-heath/swamp scrub communities require greater protection. The variants of sclerophyll woodland in the proposed Bunyip SP are otherwise very poorly protected.

(Total of 14 vegetation units)

CATEGORY 4: ADDITIONAL FEATURES REQUIRING PARTICULAR ATTENTION

(a) Localized species, eg. small stands of *Casuarina obesa* in north-west Victoria. *Eucalyptus cyanophylla* has localized occurrences in mallee scrub formations in the far-north-west and is unreserved. *E. dealbata* is known in Victoria only from a very small roadside population in north-east Victoria.

(Total of one vegetation unit)

(b) Areas of high botanical importance which can be under-estimated by broad structural descriptions--eg. Anglesea River Catchment, Gellions Run, communities associated with near coastal limestone and 'perched' swamps of the Kanawinka fault in south-west Victoria.

(c) Relics of scrub or heath-grassland complexes in areas where clearing has been extensive (eg. west Gippsland, south-west Victoria).

Source: Based on Frood and Calder (1987).

References

National Parks Service (1984). 'The Adequacy of Reservation of Plant Communities within the Reserve System.' NPS submission on Conservation Strategy. Discussion Paper (NPS: Melbourne.)

Scarlett, N.H. and Parsons, R.F. (1982). Rare Plants of the Victorian Plains. In 'Species at Risk in Australia' (eds). R.H. Groves and W.D.L. Ride (Australian Academy of Science: Canberra.)

Appendix VIII

LAND SYSTEMS OF VICTORIA

(Available on request from the
Land Conservation Council in microfiche form)

Appendix IX

REPRESENTATION OF LAND SYSTEMS IN RESERVES

Explanation of symbols:

Land Systems - These are arranged into geomorphic units (Table 20) which are designated 1.1 to 9.3. Symbols for landform, lithology, and climate are shown in Table 21. Subscript numbers differentiate land systems according to variations in the more diverse features, soils and vegetation.

LCC Areas:

ALP	Alpine (Special Investigation)
BAL	Ballarat
COR	Corangamite
EG(R)	East Gippsland Review
GLH	Gippsland Lakes Hinterland
HE	Hill End (Special Investigation)
LV	Latrobe Valley (Special Investigation)
MAL	Mallee
M1(R)	Melbourne District 1 Review
MEL2	Melbourne (District 2 part)
MV	Murray Valley
NC	North Central
NE(R)	North-eastern (Benalla--Upper Murray) Review
NE3,5	North-eastern Districts 3, 4 and 5 (parts)
SG1	South Gippsland District 1
SG2	South Gippsland District 2
SW1(R)	South-western District 1 Review
SW2	South-western District 2
WIM	Wimmera

Land System Extent (some intermediates are also shown)

VS	Very small
S	Small
M	Moderate
E	Extensive
VE	Very extensive

Conservation Reserves

Recommendation numbers from the LCC area studies and reviews shown, for national, State and coastal parks, wilderness, reference areas, and flora, flora and fauna, and wildlife reserves.

Adequate Representation

Shown by + where considered adequate.

Freehold

Percentage of each land system occurring on freehold land.

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Freehold (%)
CENTRAL VICTORIAN UPLANDS					
EAST VICTORIAN UPLANDS					
1.1 DISSECTED UPLANDS					
$Ss5_1$	NC	S	H18-19	+	50
$Ss6_1$	M1(R)	S	-		96
	MEL2		-		
$Ss6_2$	NE(R)	VS	-		92
$Ss6_3$	ALP	VS	A3	+	-
$Ss6_4$	EG(R)	M	A1-2, A4	+	10
$Ss7_1$	MEL2	S	B10-11	+	80
$Ss7_2$	MEL2	VE	A6, A9, H4	+	50
	NE(R)		B2		
	ALP		-		
$Ss7_3$	MEL2	M-E	A6, B8-9, H6-7		25
$Ss7_4$	MEL2	M	A6, C13	+	83
$Ss7_5$	NE3,5	S	-		75
	NE(R)				
$Ss7_6$	NE3,5	S-M	-		40
$Ss7_7$	NE3,5	S	A2	+	25
	ALP		A6		
$Ss7_8$	NE3,5	M	B6		25
	NE(R)				
$Ss7_9$	ALP	S	A3	+	13
	EG(R)		A1		
$Ss7_{10}$	ALP	S	A19, C13	+	40
$Ss7_{11}$	MEL2	VE	-		3
	SG1		-		
	GLH		A2, H4		
	EG(R)		A3, A11-12, B4, F1-3		
$Ss7_{12}$	EG(R)	S	A6-7	+	15
$Ss7_{13}$	EG(R)	E	A3, A6-7, A13, B10	+	2
$Ss7_{14}$	EG(R)	M	A13, B9	+	8
$Ss8_1$	MEL2	S	H12		83
$Ss8_2$	MEL2	M	B14-15	+	2
$Ss8_3$	MEL2	VE	A1,	+	-
	ALP		A11-15, C2, C6-8, G2		
	GLH		-		
$Ss8_4$	MEL2	VE	-	+	-
	ALP		A2, A7, A13, A16, A19-20, A23-24		
	NE3,5		A1,		
$Ss8_5$	MEL2	VE	A6-7, A9	+	3
	ALP		A1-3, A6-7, A18, A20-21		
	NE3,5		A1		
	NE(R)		A22, D18		
$Ss8_6$	ALP	M	A3, A24-25, C17	+	-

Appendix IX (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.1 DISSECTED UPLANDS (continued)					
$Ss8_5$	ALP	VE	A1, A3, A9, A11-12, A14, B1, C7-8, D26, D32	+	2
	GLH		A2		
	MEL2		A1		
$Ss8_8$	ALP	M	A3, A25, C17	+	-
$Ss8_9$	ALP	S-M	A3	+	5
$Ss8_{10}$	ALP	S	A3, D14	+	2
$Ss8_{11}$	MEL2	E	A10, B18, E1-2	+	5
	GLH		C1		
$Ss8_{12}$	EG(R)	E	F12		-
$Ss9_1$	MEL2	M	-	+	
	ALP		A2-3, A14-16, C5, D2, D5, D31		
$Ss9_2$	ALP	S-M	A3, A21, C21	+	-
Ssv6	EG(R)	VS	-		70
Ssv7	NE3,5	VS	-		80
Ssv8	EG(R)	M	A4	+	4
$Sg6_1$	NE(R)	S-M	G1, G3		97
	MEL2				
$Sg6_2$	EG(R)	M	A1, A3	+	45
	ALP		A3		
$Sg6_3$	EG(R)	S	A2, A4	+	80
$Sg6_4$	NE(R)	S-M	-	+	55
	MV		A3, B5		
	NE(R)				
$Sg7_1$	NE(R)	E	A5, B1-3, G3, H1	+	50
	MEL2		H5, H20		
	NE(R)		A6-7, B7		
$Sg7_2$	NE(R)	S-M	B5		45
$Sg7_3$	NE(R)	S-M	-		75
$Sg7_4$	NE(R)	S	-	+	90
$Sg7_5$	ALP	S	A4	+	20
$Sg7_6$	ALP	M	A3-4, A26	+	50
$Sg7_7$	ALP	VS	C15	+	-
$Sg7_8$	EG(R)	S-M	A1, B1	+	25
	ALP		A3		
$Sg7_9$	GLH	S	-	+	20
	ALP		-		
	EG(R)		A3		
$Sg7_{10}$	ALP	S	-		70
	GLH		-		
$Sg7_{11}$	EG(R)	M	A13, B15	+	15
$Sg7_{12}$	EG(R)	E	A6-7, A13, B11	+	5
			F2-3, F7		
$Sg8_1$	MEL2	S	B7	+	45
$Sg8_2$	MEL2	VS	-		75
$Sg8_3$	MEL2	E	A1, A11, B17	+	5
$Sg8_4$	ALP	M-E	A2, A13	+	8
	NE(R)		A3, A19		

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.1 DISSECTED UPLANDS (continued)					
$Sg8_5$	NE(R)	M	A8, G7		20
$Sg8_6$	NE3,5	M	A1, B4	+	5
$Sg8_7$	ALP	VS	A20	+	-
$Sg8_8$	ALP	S	A19	+	20
$Sg8_9$	ALP	M	A19-20, C12	+	8
$Sg8_{10}$	ALP	S	D25		10
$Sg8_{11}$	ALP	VS	A3	+	-
$Sg8_{12}$	ALP	S-M	A3, A27	+	3
$Sg8_{13}$	ALP	VS	A3	+	-
$Sg8_{14}$	EG(R)	E	A8, B6	+	2
$Sg8_{15}$	ALP	S	A3, D30	+	4
$Sg8_{16}$	ALP	M-E	A19, C12		55
$Sg8_{17}$	ALP	E	A1, A3, A19-20	-	15
	GLH		-		
	MEL2		-		
$Sg8_{18}$	MEL2	S	A1		10
$Sg8_{19}$	ALP	VS	A27	+	-
Sg9	ALP	M	A2-3, A7, A17, A26-27	+	-
	NE3,5		A1		
$Sgs7_1$	NE(R)	M-E	A1-2, B10, B13	+	25
$Sgs7_2$	NE(R)	E	A1, A4, A7, B10-12, G7	+	30
$Sgs8_1$	NE(R)	S	-		10
$Sgs8_2$	ALP	VS	A2	+	-
$Sv7_1$	NE(R)	E	A5, G5		70
	NE3,5		A2, B2-3		
$Sv7_2$	GLH	S	A1, D5, H6-7	+	8
	ALP		A4		
	EG(R)		A3, A5		
$Sv7_3$	MEL2	S	A24	+	73
$Sv8_1$	MEL2	S	A24, B12-13	+	20
$Sv8_2$	MEL2	E	A8, A24, B12-13, C12	+	10
$Sv8_3$	MEL2	VS	A24	+	90
$Sv8_4$	MEL2	S	A7	+	5
$Sv8_5$	ALP	S-VS	A9	+	-
$Sv9_1$					
$Svs7_1$	NE(R)	VS	-	+	90
$Svs7_2$	GLH	M	A1-2, D3		45
$Svg7_1$	NE(R)	S	A1, B9, G8	+	25
$Svg8_1$	NE(R)	S	A1, B8	+	15
$S17_1$	ALP	VS	-		100
$S17_2$	GLH	VS	-		95
Sf8	MEL2	VS	-		100
	LV				
	SG2				
$Gs4_1$	NC	M	-		45
	MV				
$Gs4_2$	NC	M	H8		70
$Gs5_1$	NC	VE	B6, H19		80
	MEL2		-		

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.1 DISSECTED UPLANDS (continued)					
$Gs5_1$ (cont.)	MV		B4, C22, C24, G7, G11		
$Gs5_2$	NC	VS	H18		85
$Gs6_1$	M1(R)	E	G3		99
	MEL2		-		
	NE(R)		-		
	MV		-		
	NE(R)		-		
$Gs6_2$	MV	S	B15		50
	NE(R)				
$Gs6_3$	NE(R)	VS	-		75
$Gs7_1$	MEL2	S	-		92
$Gs7_2$	MEL2	VS	-		100
$Gs7_3$	MEL2	M-E	A6, B10, C13		90
$Gs7_4$	MEL2	E	A6-7, A9, H6-7		94
$Gs7_5$	NE(R)	S	-		100
$Gs7_6$	NE3,5	M	A1-2		80
	NE(R)				
$Gs7_7$	NE3,5	VS	-		100
$Gs7_8$	MEL2	S	-		95
$Gs7_9$	ALP	M	A19-20		90
$Gs7_{10}$	ALP	S	A1, A12	+	20
	GLH		A2		
$Gs7_{11}$	GLH	M	C3	+	25
	ALP		A3		
$Gs8_1$	MEL2	M	A6	+	45
$Gs8_2$	MEL2	M	B15	+	-
	GLH		-		
	ALP		D27, D29		
$Gs8_3$	NE(R)	S	-		30
$Gs8_4$	ALP	S-M	A21, C16	+	5
$Gs8_5$	ALP	S-M	A21, C16, D25	+	65
$Gs8_6$	ALP	M	A4, A14, C8	+	-
	GLH		H6		
Gs17	ALP	VS	-		85
	GLH		H6		
Gsv6	EG(R)	M	A3-4, A8, B2 B5, B8	+	25
Gsg6	EG(R)	M	A8		85
$Gsg8_1$	EG(R)	M	A4, A8	+	8
$Gsg8_2$	EG(R)	S	B5		43
Gg5	MV	M	C26		98
Gg6	M1(R)	M	-		94
	MEL2				
	NE(R)				
	MV		G10		
$Gg7_1$	MEL2	S-M	A11		65
$Gg7_2$	MEL2	M	-		95
	NE(R)		A5, C1		
$Gg7_3$	NE3,5	M	-		60
	NE(R)				

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.1 DISSECTED UPLANDS (continued)					
$Gg7_4$	NE3,5	M	-		80
	NE(R)		-		
$Gg7_5$	NE(R)	M	A1, A6, B7, B12		70
$Gg7_6$	GLH	VS	-		-
$Gg7_7$	ALP	M	-		95
$Gg8_1$	MEL2	M	B8	+	16
$Gg8_2$	NE(R)	E	H1		90
	MEL2				
$Gg8_3$	NE(R)	VS	-		25
$Gg8_4$	NE(R)	M	-		85
	ALP		-		
	NE3,5		-		
$Gg8_5$	ALP	VS	-		-
$Gg8_6$	ALP	S	A23		-
$Gg8_7$	ALP	VS	-		-
$Gg8_8$	MEL2	S-M	B16		-
$Gg8_9$	MEL2	S	A1	+	-
$Gg8_{10}$	GLH	VS	-		40
$Gv7_1$					
$Gv7_2$	NE3,5	VS	-		35
$Gv7_3$	ALP	S-M	A4		92
$Gv7_4$	MEL2	S-M	-		95
$Gv7_5$					
$Gv8_1$	MEL2	VS	A24	+	65
$Gv8_2$	MEL2	S	C13		90
$Gv8_3$	ALP	S	A20	+	25
$Gv9_1$					
Gvs_4	MV	VS	-		100
Gvs5	MV	S	-		95
Gvsgf5	NC	VS	-		95
Gvsgf6	NC	VS	-		100
Gl7	GLH	VS	H7		82
Gf7	MEL2	VS	A10, E1-2	+	-
Gfc8	MEL2	S	B20		10
	SG2				
Pf6	MV	S	-		98
$Pf7_1$	MEL 2	S	-		97
$Pf7_2$	MEL2	VS	-		100
$Pf7_3$	MEL2	S	-		98
$Pf7_4$	MEL2	S	A11	+	90
$Pf7_5$	NE(R)	S-M	A5		98
$Pf7_6$	NE(R)	VS	-		25
$Pf7_7$	ALP	M	-		94
$Pf7_8$	GLH	VS	-		100
Pf8	NE3,5	M	A1-2		32
	ALP		A1-2, A13		
Pv7	MEL2	VS	-		100
Ffc6	MEL2	S	-		100
	M1(R)				
$Ffc7_1$	MEL2	M	G11		97
$Ffc7_2$	NE3,5	M-E	A1-2		82

Appendix IX (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.1 DISSECTED UPLANDS (continued)					
$Ffc7_2$ (cont.)	ALP		A3		
	NE(R)		A7, C4-5		
$Ffc7_3$	ALP	M	A1, C3	+	60
	EG(R)		-		
$Ffc8_1$	ALP	VS	-		100
1.2 DISSECTED PLATEAU (WELLINGTON UPLANDS)					
$Ss7_1$	MEL2	VS	-		75
$Ss7_2$	ALP	E	A1, A8, B1	+	15
	GLH		A2, B1		
$Ss7_3$	GLH	M	B1, D4	+	20
$Ss8_1$	NE3,5	M-E	A2	+	40
	MEL2		-		
	ALP		A1, A7-8		
$Ss8_2$	ALP	M	A1, A8, B1	+	-
$Ss8_3$	ALP	S	A1	+	-
	GLH		-		
$Ss9_1$	ALP	S-M	A1, A7-8	+	-
$Ssv8_1$	ALP	M	A1, A9	+	-
$Sv7_1$	MEL2	VS	-		100
$Sv7_2$	GLH	VS	B1	+	20
$Sv8_1$	NE3,5	M	A2, B1	+	-
	ALP		A5-6		
$Sv8_2$	ALP	VS-S	A1, A8, B1	+	-
Sf8					
$Gs7_1$	MEL2	M-E	-		99
	NE(R)		-		
$Gs7_2$	ALP	M	A1	+	35
	GLH		A2, D4		
$Gs8_1$	NE(R)	M-E	A2	+	37
	NE3,5		B1		
	ALP		A1, A5-6		
$Gs8_2$	ALP	S	A1	+	-
$Gg6^1$	GLH	VS	-		65
$Gv7_1$	NE3,5	S	A2	+	-
	NE(R)		-		
$Gv8_1$	NE(R)	VS	-		30
	NE3,5		-		
$Gv8_2$	NE(R)	S	B4	+	20
	NE3,5				
Ffc7	ALP	VS	A1	+	55
1.3 HIGH PLAINS					
$Gs9_1$	ALP	VS	A1, A6	+	-
$Gs9_2$	ALP	S	A3, A23	+	-
$Gs9_3$	ALP	S-M	A1, A3, A8-9	+	-
			A14, C1		
$Gs9_4$	ALP	VS			
$Gsg9_1$	ALP	S	A1	+	5

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
1.3 HIGH PLAINS (continued)					
$Gsv9_1$	ALP	S	A1, A9, B1	+	-
$Gg8_1$	ALP	S-M	A3	+	-
$Gg9_1$	ALP	M-E	A2-3, A14, A19, C9-11, D27	+	-
$Gg9_2$	ALP	S-M	A3, C17	+	-
$Gg9_3$					
$Gg9_4$	MEL2	S-M	A1, B19	+	-
$Gv9_1$	ALP	M	A1-2, A27, C6, D27-28	+	5
	MEL2		A8		
$Gv9_2$	ALP	S	A1	+	-
CENTRAL VICTORIAN UPLANDS					
WEST VICTORIAN UPLANDS					
2.1 DISSECTED UPLANDS					
Ss3	WIM	VS	F20	+	75
$Ss4_1$	NC	S	H21		84
	WIM		H22		
$Ss4_2$	NC	VS	H10	+	50
$Ss4_3$	NC	S	-		55
	WIM		-		
$Ss4_4$	M1(R)	VS	A1	+	35
$Ss5_1$	NC	VS	-		100
$Ss5_2$	NC	S	A1, H24	+	25
$Ss5_3$	NC	S	-		95
$Ss5_4$	NC	S	B5	+	65
$Ss5_5$	NC	S	H25		50
$Ss5_6$	M1(R)	S	A1-2, A7	+	70
$Ss6_1$	NC	S	H24	+	35
	BAL		A1, B1		
	M1(R)		H3		
$Ss6_2$	BAL	E-VE	A3, B2, G2, G5	+	55
	M1(R)		A5, B5-6		
$Ss6_3$	BAL	S	-		92
	NC				
$Ss6_4$	NC	S-M	H12, H16		40
	BAL				
	M1(R)		G15		
$Ss6_5$	NC	VS	H16		90
$Ss6_6$	NC	VS-S	-		100
	M1(R)				
$Ss6_7$	NC	M	-		98
$Ss7_1$	NC	S	-		40
	BAL				
$Ss7_2$	BAL	S	-		70
$Ss7_3$	BAL	M	G1		70
	NC				

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
2.1 DISSECTED UPLANDS (continued)					
$Ss7_4$	BAL	M	-		65
$Ss7_5$	M1(R)	VS	-		100
$Ss7_6$	M1(R)	M	A5, B4, G2, G16, G18, G19	+	30
$Ss7_7$	M1(R)	VS	-		10
Ss8	M1(R)	S	-		3
	BAL				
Sg3	WIM	VS	-		95
	NC		-		
$Sg4_1$	WIM	S	-	+	35
	NC		A2, B2		
$Sg4_2$	M1(R)	S	-		70
Sg5	NC	S	-		85
$Sg6_1$	NC	VS	-		20
$Sg6_2$	NC	S	-		100
$Sg6_3$	M1(R)	VS	-		100
$Sg6_4$	NC	VS	-		30
$Sg7_1$	BAL	M	A1-2, B1	+	50
	M1(R)				
$Sg7_2$	M1(R)	S	-		50
$Sg7_3$	M1(R)	M	-		100
$Sg7_4$	BAL	VS	-		100
$Sv7_1$	M1(R)	VS	-		55
$Sv7_2$	M1(R)	S	-		100
Gs3	NC	S	H22	+	70
$Gs4_1$	NC	S	B3, H22	+	70
$Gs4_2$	NC	E	A3, A5, H4, H14, H21		73
$Gs4_3$	NC	M	A3, A5, H10	+	60
$Gs4_4$	NC	S	-		100
$Gs4_5$	NC	S	H9		95
	MV				
$Gs4_6$	NC	S	-		50
$Gs4_7$	NC	VS	-		90
$Gs5_1$	SW2	M	H5		93
$Gs5_2$	SW2	M	-		100
	COR				
$Gs5_3$	NC	M-E	A4		60
$Gs5_4$	NC	E	A5, H6, H25		75
$Gs5_5$	NC	M	-		45
$Gs5_6$	M1(R)	S-M	A1	+	60
$Gs5_7$	NC	S	-		100
$Gs6_1$	SW2	M	-		75
	BAL		-		
	NC		-		
$Gs6_2$	M1(R)	S-M	-		85
	BAL		-		
	NC		-		
$Gs6_3$					
$Gs6_4$	NC	M	-		65
	BAL				
$Gs6_5$	BAL	VS	-		100

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
2.1 DISSECTED UPLANDS (continued)					
$Gs6_6$	NC	S	-		80
	BAL		-		
$Gs6_7$	NC	VS	-		100
$Gs7_1$	M1(R)	S	G15		75
$Gs7_2$	M1(R)	M	A6		73
$Gs7_3$	BAL	S	-		97
$Gs7_4$	BAL	VS-S	-		96
$Gs7_5$	M1(R)	S	-		80
Gs8	M1(R)	M	B1		45
	BAL				
Gg3	MV	S-M	A1, B1, G3, G9	+	82
Gg4	NC	S	A2		90
$Gg5_1$	SW2	S	-		94
	NC				
$Gg5_2$	BAL	M	-		100
	COR		-		
$Gg5_3$	NC	VS	-		50
$Gg5_4$	M1(R)	VS	-		60
$Gg5_5$	NC	M	-		97
$Gg5_6$	NC	VS	-		88
$Gg6_1$	BAL	VS	-		100
$Gg6_2$	NC	VS	-		100
$Gg6_3$	NC	S	-		88
	BAL		-		
	M1(R)		-		
$Gg6_4$	NC	S	-		100
$Gg6_5$	M1(R)	VS	-		96
$Gg7_1$	BAL	S	-		97
$Gg7_2$	BAL	S	-		97
$Gg7_3$	M1(R)	S	-		98
$Gg7_4$	M1(R)	S	-		97
$Gg7_5$					
$Gg7_6$	MEL2	VS	-		100
Gv4	NC	S	HS		99
Gv5	COR	S	-		100
Gvs4					
Gvs5					
Gvs6	SW2	VS	A1		98
Gf4	NC	S	-		100
$Pf3_1$	WIM	S	-		99
$Pf3_2$	WIM	VS	-		100
$Pf4_1$	WIM	VS	-		97
$Pf4_2$	NC	M	-		99
$Pf4_3$	NC	S	A2, B2		99
$Pf4_4$	NC	S	-		100
$Pf4_5$	NC	S	H2		94
$Pf4_6$	NC	S	-		100
$Pf4_7$	NC	S	-		95
	WIM				
$Pf4_8$	NC	M	C2, H21		94
$Pf4_9$	NC	M	-		98
$Pf4_{10}$	NC	M	-		98

Appendix II (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
2.1 DISSECTED UPLANDS (continued)					
$Pf4_{11}$	NC	M	-		100
$Pf4_{12}$	NC	M	-		75
$Pf4_{13}$	M1(R)	S	-		98
$Pf4_{14}$	NC	VS	-		100
$Pf4_{15}$	NC	S	-		100
$Pf4_{16}$	NC	S	-		100
$Pf4_{17}$	NC	VS-S	A2		60
$Pf4_{18}$	NC	S	A2		77
$Pf5_1$	NC BAL	S-M	-		97
$Pf5_2$	NC BAL	M	H23, H34		88
$Pf5_3$	NC	S	H13	+	83
$Pf5_4$	NC	VS	-		100
$Pf5_5$	M1(R)	S	A1, B1-2, H3	+	65
$Pf5_6$					
$Pf5_7$	NC	S	A4		99
$Pf5_8$	NC	VS	-		100
$Pf5_9$	NC	S	-		97
$Pf6_1$	SW2	M	A1, D72, H5		90
$Pf6_2$	SW2 BAL	M	A1, D70-71, D73-74		95
$Pf6_3$	BAL	M	-		98
$Pf6_4$	BAL M1(R)	S	C8 -		97
$Pf6_5$	NC	S	A1	+	85
$Pf6_6$	NC BAL	M	A1 -		98
$Pf6_7$	NC BAL	VS			
$Pf7_1$	BAL	S-M	A2, G1		92
$Pf7_2$	BAL M1(R)	S	A2		97
$Pf7_3$	BAL	VS	-		95
2.2 PROMINENT RIDGES (GRAMPIANS)					
Ss4	SW2	VS	B1	+	-
Ss6	SW2	VS	-		40
Ss7	SW2	E	A1, C6	+	1
Gg7	SW2	S-M	A1, C5	+	45
Pf4	SW2	VS	B1	+	80
Pf6	SW2	S	D69, H6		99
Pfc7	SW2	S-M	A1, C3	+	3
Pc7	SW2	M	A1	+	7
2.3 DISSECTED TABLELAND (DUNDAS TABLELAND)					
Gs7	SW2	S	B2	+	25
Gf6	SW2 SW1(R)	E	-		98

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
2.3 DISSECTED TABLELAND (DUNDAS TABLELAND) (continued)					
Gf7					
Pf5	SW2	VS	-		100
Pf6	SW2 SW1(R)	E	C4, D67		95
Pf7	SW2	M	A1	+	95
Pfc7	SW2	VS	A1		5
RPc6	SW2	VS	-		75
RPc7	SW2	S	-		70
2.4 DISSECTED TABLELAND (MERINO TABLELAND)					
Gs6	SW1(R) SW2	M			100
Pf6	SW1(R) SW2	VS			100
SOUTH VICTORIAN UPLANDS					
3.1 DISSECTED FAULT BLOCKS (OTWAY RANGES)					
$Ss7_1$	COR	M-E	A1, A4-5 B4, H13	+	20
$Ss7_2$	COR	S-M	A4		20
$Ss7_3$	COR	M	A1-2, A4	+	30
$Ss7_4$	COR	S	A1, H14	+	10
$Ss7_5$	COR	VS	A5, H12		30
Gs7	COR	S	A1, A4, B4, H13	+	8
Gs8	COR	S	-		60
3.2 MODERATELY DISSECTED BLOCK (BARRABOOL HILLS)					
$Gs5_1$	M1(R)	VS	-		100
$Gs5_2$	M1(R)	S	-		100
3.3 MODERATELY DISSECTED RIDGE (MORNINGTON PENINSULA)					
Sg7	MEL2	VS-S	-		85
Gs7	MEL2	S	-		95
Gvf7	MEL2	S	-		97
Pvf7	MEL2	S	C16, C18, H15		97
$Pf7_1$	MEL2	S-M	-		99
$Pf7_2$	MEL2	VS	C18, C28, H17		98
$Pf7_3$	MEL2	VS	C14		77
$Pf7_4$	MEL2	VS	-		100
PCc7	MEL2	S	C14, H18		94
3.4 DISSECTED FAULT BLOCKS (SOUTH GIPPSLAND RANGES)					
$Ss7_1$	MEL2 SG2	E	-		100

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Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)	
3.4 DISSECTED FAULT BLOCKS (SOUTH GIPPSLAND RANGES) (continued)						
$Ss7_2$	SG2	SM	A3, G3, G12	+	65	
$Ss8_1$	MEL2	VE	A2, A10, B5		65	
	SG2		G5-6			
	SG1					
$Ss8_2$	MEL2	S-M	-		80	
	SG2					
$Ss8_3$	MEL2	S	-		85	
	SG2					
Sf8	MEL2	VS	-		90	
	SG2					
Gs7	SG2	M	-		100	
$Gv7_1$	SG2	M	A5		97	
$Gv7_2$	SG2	S	-		100	
$Gv7_3$	SG1	S-M	-		97	
	SG2					
Gf7	MEL2	M-E	-		98	
Pf7	MEL2	M	-		100	
3.5 DISSECTED OUTLIER (WILSONS PROMONTORY)						
$Sg7_1$	SG2	M	A1, B2	+	-	
$Sg7_2$	SG2	VS	A1	+	-	
Pfc7	SG2	VS	A1, B2	+	-	
$Pc7_1$	SG2	VS	A1	+	-	
$Pc7_2$	SG2	S	A1	+	-	
$Pc7_3$	SG2	S	A1	+	-	
MURRAY BASIN PLAINS						
RIVERINE PLAIN						
4.1 PRESENT FLOODPLAIN (MURRAY VALLEY)						
Ffc2	MAL	M-E	D1		20	
Ffc3	MAL	M-E	D9		30	
	MV		C4, C14-15			
Ffc4	MV	M	A2, B2-3, C17-18, C30, C33	+	20	
Pfc5	MV	S-M	G8		30	
	NE(R)					
Pfc6	NE(R)	S	-		95	
	NE3,5		-			
FWcf2	MAL	M	A2, C4	+	1	
Lf2	MAL	VS	-		100	#
Lf3	MAL	VS	-		100	
4.2 OLDER ALLUVIAL PLAIN (SHEPPARTON)						
Pf2	MAL	E	C2		68	

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
4.2 OLDER ALLUVIAL PLAIN (SHEPPARTON) (continued)					
$Pf3_1$	MAL	VE	G30, G32-33, D8-12		96
	MV		C4-5, C11-13, C15-16		
	NC		-		
	WIM		-		
$Pf3_2$	MAL	E	-		100
	WIM		-		
$Pf3_3$	NC	S	-		100
$Pf3_4$	MV	M-E	C3, C6-7,		95
$Pf4_1$	MV	VE	C19, C29		98
	NC		C9		
$Pf4_2$	MV	E-VE	C17-18, G5		98
	NC		-		
$Pf4_3$	MV	M	-		99
$Pf4_4$	MV	M	-		99
$Pf4_5$	NC	M	C8		96
$Pf4_6$	MV	S-M	-		98
$Pf4_7$	WIM	M	-		99
$Pf4_8$	NC	S	-		100
$Pf4_9$	NC	M	-		99
$Pf5_1$	MV	M	C26-28		94
$Pf5_2$	MV	E	-		97
	NC		C16, G3		
$Pf5_3$	MV	M	C21, C23, C28		98
$Pf5_4$	MV	M	-		97
	NC		-		
$Pf5_5$	MV	M	C31		89
	NC		C14-15		
$Pf6_1$	MV	E	C24		99
	NC		-		
	M1(R)		-		
	NE(R)		G2		
$Pf6_2$	MV	S-M	-		97
$Pf6_3$	NE3,5	M-E	-		100
	MV		-		
$Pf6_4$	MV	S	C24-25		65
	NE(R)				
$Pf6_5$	NE(R)	M	-		97
$Pf7_1$	NE(R)	M	-		96
$Pf7_2$	NE(R)	S-M	-		97
Pfc4	MV	E	A2, C30		99
Pfc5	MV	S	-		93
PEfc2	MAL	S	-		50
Lf2	MAL	VS	-		20
Lf3	MAL	S	-		85
FLf3	MV	M	C1-2, C9-10	+	70
	WIM		C38-40, C43		
FLf4	MV	M	-	+	75
	NC		C10-13		
FLfc4	MV	S-M	C32	+	65
PRf4	WIM	VS	-		100

Appendix IX (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
MURRAY BASIN PLAINS					
MALLEE DUNEFIELD					
5.1 LOW CALCAREOUS DUNES					
EPRcf2	MAL	VE	A2-3, C3		10
EPRcf3	MAL	M	D3		94
EPcf2	MAL	M-E	A2-3, C5		10
PEcf2	MAL	S	-	+	-
EPRfc2	MAL	E	A2, G1-2		85
EPRfc3	MAL	VE	A1, A3, D3, D5, G11, G15-16		98
EPfc2	MAL	M-E	-		60
EPfc12	MAL	M	-		-
PREfc3	WIM	VE	-		99
	MAL		A1, G22, G28		
PREfc4	WIM	S	F10		99
RPEfc2	MAL	VE	C1, C3, D1, G6-9		75
RPEfc3	MAL	S	G13-14		95
PREfc12	MAL	M-E	-		25
PEfc2	MAL	VE	RF, G4-5, G20-21		94
PEfc3	MAL	S	-		96
WPRf3	MAL	VE	AR, D8		100
PWRf3	WIM	VE	-		100
	MAL		AR, G31		
PWRf4	WIM	M	C36		98
	NC		C3		
PWRfz3	WIM	M	-		-
PWRfz4	SW2	M	D42		90
	WIM		C26, F13-F15		
Rf2	MAL	S	G1-2	+	65
Rf3	MAL	VS	G14		75
PYfz2	MAL	S-M	-		8
PYfz3	MAL	E	A3, C6, G28	+	30
PYcf2	MAL	S	-		-
Pz2	MAL	S-M	RF	+	-
Pcz2	MAL	M	RF		20
Lf3	MAL	M	G24-25		94
$Pf3_1$	MAL	M	G27, G29		97
	WIM		-		
Ffc3	WIM	S-M	F9		93
	MAL				
5.2 HIGH SILICEOUS DUNES (BIG DESERT/SUNSET)					
IPRc2	MAL	S	-		-
IPRc3	MAL	VE	A1, B1, C7	+	3
IPRc4	MAL	M	B1, C10, D6	+	25
IPc2	MAL	M-E	A2-3, C5	+	-
EPRc2	MAL	M-E	A3	+	7
EPRc3	WIM	E-VE	A1, B1, C9, D4-5	+	15
	MAL				

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
5.2 HIGH SILICEOUS DUNES (BIG DESERT/SUNSET) (continued)					
EPRc4	WIM	E-VE	F11	+	84
	MAL		B1, C10, D6		
EPc2	MAL	M-E	A2-3, C5	+	-
EPc12	MAL	E	-		4
Pfc2	MAL	M-E	A3	+	-
$Pf3_1$	MAL	S	A1		88
Ffc3	MAL	M	A1, C8	+	5
MURRAY BASIN PLAINS					
WIMMERA PLAIN					
6.1 CLAY PLAINS (NHILL)					
PRf3	WIM	E	C31-32, F16, F18		97
	NC		C4		
PRf4	WIM	E	C8-11, C16-17, C27-29, C34,		98
	NC		H21		
PRf5	NC	VS	-		96
RPcf4	WIM	S	A1, C12		97
$Pf4_1$	WIM	M-E	C42, F19		96
	SW2		F12		
	NC				
$Pf4_2$	SW2	S-M	-		100
$Pf5_1$	SW2	M	D58, D63-65		90
$Pf5_2$	SW2	M	D60-D61		99
	NC				
$Pf5_3$	SW2	S	A1	+	85
$Pf5_4$	SW2	S	-		90
	NC		H23		
Pc4	SW2	VS	-		98
Pc5	SW2	S	A1		98
$Pf3_1$	WIM	S	-		98
6.2 RIDGES AND FLATS (GOROKE)					
RPc4	WIM	M	F3	+	62
	SW2		B1, C1		
RPc5	WIM	M	C18	+	30
	SW2		C2, H13		
RPc6	SW2	S	-		60
PRfc4	WIM	S-M	C22		95
	SW2				
PRfc5	WIM	M	C4-5, C18, C20		95
	SW2		D28		
PRfc6	SW2	M	D3, D5-6		98
	SW1(R)		A10		
PRfc7					
PRcf5	SW2	S			65

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
6.2 RIDGES AND FLATS (GOROKE) (continued)					
PRc7					
PRf4	SW2	S-M	D45-49		95
PRf5$_1$	WIM	S-M	C2-3		97
	SW2		-		
PRf5$_2$	SW2	S-M	D2		99
PRf5$_3$	SW2	M	D11, D24-27, D29-32, D35, D40-41, H13		92
PRf6	SW2	M	D13-16, D18-21, D36-37		95
Pf5	SW2	S	D1		98
Pfz5	SW2	S	D51, D53-57, H13	+	75
6.3 LOW SILICEOUS DUNES (LITTLE DESERT)					
EPRc4	WIM	E	A1, B2, M1	+	30
EPRc5	WIM	S	A1, B1	+	3
IPRc4	WIM	VS	A1, B2	+	10
IPRc5	WIM	VS	A1	+	-
WEST VICTORIAN VOLCANIC PLAINS					
7.1 UNDULATING PLAIN					
Pvf4$_1$	M1(R)	E	-		94
Pvf4$_2$	NC	S	-		99
Pvf4$_3$	NC	S	-		100
Pvf5$_1$	BAL	VE	-		99
	COR		-		
	M1(R)		G10, M1		
Pvf5$_2$	NC	S	-		100
Pvf5$_3$	BAL	M	C6		96
	COR				
Pvf5$_4$	M1(R)	M	-		95
Pvf5$_5$	NC	VS	-		100
Pvf5$_6$	NC	S	-		100
Pvf5$_7$	NC	S	-		100
Pvf5$_8$	NC	VS	-		100
Pvf6$_1$	SW2	M	-		100
	BAL				
Pvf6$_2$	SW2	VE	-		100
	BAL		-		
	COR		C15, C17		
Pvf6$_3$	COR	E	C3		99
	SW2				
	SW1(R)				
Pvf6$_4$	SW1(R)	M-E	-		100
	SW2				
Pvf6$_5$	M1(R)	M	-		98
	COR		-		

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
7.1 UNDULATING PLAIN (continued)					
Pvf6$_5$ (cont.)	BAL		-		
	NC		C5		
Pvf6$_6$	M1(R)	M-E	-		98
Pvf6$_7$	BAL	VS	-		100
	NC				
Pvf6$_8$					
Pvf6$_9$	BAL	VS	-		100
	NC				
Pvf6$_{10}$	BAL	VS	-		100
Pvf7$_1$	SW1(R)	E	A1, B3, C12-13		60
	SW2				
	COR				
Pvf7$_2$	COR	M	-		99
	M1(R)		G17		
Pvf7$_3$	BAL	S	-		95
	M1(R)		-		
Pvf7$_4$	M1(R)	VS	-		100
Pvf7$_5$	M1(R)	S	-		97
Pvf7$_6$	M1(R)	VS	-		98
Pvf7$_7$	M1(R)	S-M	-		99
Pvf7$_8$	M1(R)	S	-		99
Pvf7$_9$	M1(R)	S	-		99
Pvf7$_{10}$	BAL	VS	-		100
Pvf7$_{11}$	M1(R)	VS	-		100
Pvf7$_{12}$	BAL	M	G4		95
	M1(R)		-		
Pvf8	BAL	S-M	-		95
	M1(R)		-		
Pf4$_1$	M1(R)	S-M	C8		96
Pf5$_1$	M1(R)	M	H4		92
	BAL		-		
	COR		G3		
Pf5$_2$	BAL	S	-		99
	COR		C10		
Pf5$_3$	COR	M	C22, C24		80
Pf5$_4$	M1(R)	S	-		60
Pf6$_1$	COR	M	C18-19, C36		95
Pf6$_2$	COR	S	C15		98
Pf6$_3$	COR	S	C23, N52		85
Pf7$_1$	COR	S-M	-		99
Pf7$_2$	COR	S	-		100
Gv5	NC	VS	-		100
Gv6$_1$	BAL	VS	-		100
	NC		-		
Gv6$_2$	BAL	VS	-		95
Gv7	BAL	VS	-		100
Gv8	M1(R)	VS	-		
Gs5$_2$	COR	VS-S	-		100
Gg5$_2$	COR	VS	-		100
Pv7$_1$	COR	VS	-		100
Pv4$_1$	NC	VS	-		100

Appendix IX (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Freehold (%)
7.2 STONY UNDULATING PLAIN					
$Pv5_1$	COR	M-E	C6, C8, C11-13		97
	BAL		C5		
$Pv5_2$	NC	S	-		95
$Pv5_3$					
$Pv6_1$	SW2	E	B3		89
	COR				
$Pv6_2$	NC	S	-		100
$Pv6_3$	M1(R)	M	-		98
	MEL2		-		
$Pv6_4$	NC	VS	-		85
	BAL		-		
$Pv7_1$	SW1	E	C10, G4		87
	SW2		B4, C7		
	COR		C30, C33, C37		
$Pv7_2$	M1(R)	VS	-		80
$Ss6_2$	MEL2	VS	-		100
SOUTH VICTORIAN COASTAL PLAINS					
8.1 RIDGES AND FLATS (FOLLETT)					
PCfc6	SW2	M	H4		65
	SW1(R)		-		
PCfc7	SW1(R)	S	A10	+	25
PCc6	SW1(R)	M	A10, C15, G2	+	25
$PCc7_1$	SW1(R)	E	A1-2, B2, C2, C7, G3, G5	+	50
$PCc7_2$	SW1(R)	M	B4, C15, G8	+	55
PCcf7	SW1(R)	M	A1		85
Pfcl7	SW1(R)	M	-		92
	SW2		-		
$Pf6_1$					
$Pf6_2$	SW1(R)	S	-		70
$Pf6_3$	SW1(R)	S-M	G2, G8		85
Pf7	SW1(R)	M-E	B4, C6-8, C15-16		85
Gf6	SW1(R)	S	A10		95
$Gf7_1$	SW1(R)	S	-		99
$Gf7_2$	SW1(R)	S	-		85
8.2 DISSECTED PLAIN (PORT CAMPBELL)					
Pc7	COR	S	-		40
$Pcf7_1$	COR	S	-		50
$Pcf7_2$	COR	VS	A3	+	90
$Pf5_1$	COR	S	-		85
	M1(R)		G14		
$Pf5_2$	COR	S	-		99
	M1(R)		C1		

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Freehold (%)
8.2 DISSECTED PLAIN (PORT CAMPBELL) (continued)					
$Pf5_3$	COR	S	-		100
$Pf6_1$	COR	S	-		85
$Pf6_2$	COR	S	-		100
$Pf6_3$	COR	S	C27		99
$Pf7_1$	COR	M	-		100
$Pf7_2$	COR	S	A1-2, B2	+	35
$Pf7_3$	COR	S	-		75
$Pf7_4$	COR	M	A2-3, B8, H2		95
$Pfc7_1$	COR	M	B7, H10		75
$Pfc7_2$	COR	S	H12		60
$Pfc7_3$	COR	M			94
Ff6	COR	VS	-		100
$Ff7_1$	COR	S	-		96
$Ff7_2$	COR	S	C28-29		98
PGf7	COR	M	B6, H2		75
PGfc7	COR	VS	A2, H3	+	55
Gf5	M1(R)	VS	G14	+	85
$Gf6_1$	COR	S	A4, G13		50
	M1(R)				
$Gf6_2$	COR	S	A4, H9		40
$Gf7_1$	COR	S	A4	+	10
	M1(R)				
$Gf7_2$	COR	S	A2, H11		45
$Gf7_3$	COR	S	-		75
$Gf7_4$	COR	S	-		80
$Gfc7_1$	COR	S	A5	+	35
$Gfc7_2$	COR	S	A1		60
Gfl5	M1(R)	S	-		100
Gc7	COR	S-M	A5, B5, H11	+	15
Gcf6	COR	S-M	A4	+	5
	M1(R)				
Gcf7	COR	S	A5, B5, H11	+	5
8.3 SAND AND CLAY PLAIN (MOORABBIN)					
Pf5	M1(R)	VS-S	-		88
Pf6	M1(R)	VS	-		100
Pfc5	M1(R)	S	C2		95
Pfc6	M1(R)	S	C2		96
Pvf6	M1(R)	VS	-		100
8.4 FANS AND TERRACES (WESTERN PORT)					
PCc7	MEL2	S	A12, B21, H24	+	50
PC7					
Pcf7	MEL2	M	A12, B22	+	45
$Pf7_1$	MEL2	VS	-		100
$Pf7_2$	MEL2	VS	C28, H24	+	85
$Pf7_3$	MEL2	S			100
$Pf7_4$					

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
8.5 BARRIER COMPLEXES (DISCOVERY BAY/GIPPSLAND LAKES)					
Pc7	MEL2	VS	-		100
PCc4	M1(R)	VS	C7	+	10
PCc5$_1$	M1(R)	S	-		80
PCc5$_2$	SG1	S	-		-
PCc5$_3$	GLH	VS	A6	+	60
PCc5$_4$	SG1	VS	6a	+	20
PCc5$_5$	SG1	S	6a	+	15
PCc6$_1$	M1(R)	VS	G14	+	20
PCc6$_2$	M1(R)	VS	C2-4, C6	+	35
	SG1		6a		
PCc6$_3$	SG2	VS	-		-
PCc6$_4$	SG1	VS	6a	+	70
PCc6$_5$	SG1	VS	6a	+	80
PCc7$_1$	SW1(R)	M	A5, A9	+	40
	SW2		-		
	COR		A3, H5		
PCc7$_2$	SW2	VS	-	+	20
	SW1(R)		A5		
PCc7$_3$	M1(R)	VS	A4	+	25
PCc7$_4$	COR	S-M	A2	+	40
	MEL2		C18-19		
	SG2		A1, A3, A8		
PCc7$_5$	MEL2	S-M	A27	+	85
PCc7$_6$	EG(R)	M	A6, A15-16	+	-
			B12, C1		
PCc7$_7$	EG(R)		A6, A16,	+	12
			B8		
PCc7$_8$					
PCcf5$_1$	SG1	VS	6a	+	70
	GLH		6a		
PCcf5$_2$	SG1	S-M	6a	+	50
	GLH		A6		
PCcf7$_1$	EG(R)	S	A6, A16, C1-2	+	20
PCcf7$_2$	SG2	M	A1, A8, C1	+	80
PCcl7	MEL2	S-M	A27	+	86
PClc7$_1$	SW1	E	A1-2, A5,	+	40
			B1, C2, G4		
PClc7$_2$					
PClc7$_3$					
Pf6	SG2	S	A8, C4	+	55
Pf7	SG2	S-M	A1, A3, A8	+	40
Pzfc5	M1(R)	VS			100
SOUTH VICTORIAN RIVERINE PLAINS					
9.1 PRESENT FLOODPLAINS (GIPPSLAND)					
Ff6$_1$	GLH	M	-		100
Ff6$_2$	GLH	M	-		100
Ff7$_1$	MEL2	S-M	-		100
Ff7$_2$	MEL2	S-M	-		100

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
9.1 PRESENT FLOODPLAINS (GIPPSLAND) (continued)					
Ff7$_3$	MEL2	M	C14		97
Ff7$_4$	MEL2	S	-		100
Ff7$_5$	MEL2	VS	-		100
Ff7$_6$	SG2	S	-		99
Ff7$_7$	MEL2	S-M	-		98
Ff7$_8$	EG(R)	E	A16, C3, F4		55
Ffc5	GLH	S	A6	+	40
	SG1		6a, 6b		
Ffc6$_1$	SG1	S	6a, 6b	+	45
	GLH		A6		
Ffc6$_2$	GLH	S	A6	+	70
	SG1		6b		
Fc5	GLH	VS	-		100
Fc6$_1$	GLH	S	-		99
Fc6$_2$	GLH	S	H9	+	80
9.2 INTERMEDIATE TERRACES (GIPPSLAND)					
Pf6$_1$	GLH	VS	-		100
Pf6$_2$	SG1	VS	-		100
	GLH				
Pf6$_3$					
Pf6$_4$	SG1	VS	-		100
	GLH				
Pf6$_5$	SG1	S	-		100
	GLH				
Pf6$_6$	SG1	S-M	-		100
	GLH				
Pf7$_1$	SG1	S-M	-		98
Pf7$_2$	SG1	S-M	-		100
Pcf6	GLH	S	A6	+	75
Ffc7	SG2	M	-		100
Gcf7$_1$	SG2	S	-		100
Ffc7$_2$	SG2	M	-		100
PCcf5$_3$	GLH	S	-		97
9.3 HIGH TERRACES AND FANS (GIPPSLAND)					
Pf5$_1$					
Pf5$_2$					
Pf6$_1$	GLH	M	A6, H9-10		90
Pf6$_2$	GLH	S	-		96
Pf6$_3$	GLH	VS	-		90
Pf7$_1$	GLH	VS	-		100
Pf7$_2$	GLH	S	-		92
	LV				
Pf7$_3$	GLH	VS	-		100
Pf7$_4$	LV	S	-		50
Pf7$_5$					
Pf7$_6$	EG(R)	VE	A6, A11-13, A16,	+	5
			B12-14, F4		

Appendix II (continued)

Geomorphic units and land systems	LCC area	Land system extent	Conservation reserves	Adequate rep'n	Free-hold (%)
9.3 HIGH TERRACES AND FANS (GIPPSLAND) (continued)					
$Pf7_7$	SG1	VS-S	-		95
$Pf7_8$	SG1	VS-S	-		100
$Pf7_9$	SG2	S	-		100
$Pfc6_1$	SG2	S-M	-		99
$Pfc6_2$	SG2	M	C4		99
$Pfc7_1$	SG1	M	B^31		96
$Pfc7_2$	SG2	E	A3, G7, G9, G15		57
$Pfc7_3$	SG2	M	-		96
Pcf6	SG2	S-M	G11		86
	SG1		2a		
PCcf5	SG1	M	-	+	55
	GLH		A6, H5, H10		
PCc6	SG2	M	G11		79
	SG1		-		
	GLH		H5		
$PCc7_1$	SG1	M	B^31	+	35
	SG2		G13		
$Gfc7_1$	SG1	M	-	+	40
	GLH		A2, A6, D4		
$Gfc7_2$	SG2	M	-	+	45
	LV		-		
	MELB2		A10, E1		
	HE				
	SG1				
$Gfc7_3$	GLH	E	H2	+	25
	EG(R)		A2, C1, F3-4		
Gf6	GLH	M	A6		98
$Gf7_1$	GLH	M	A2		54
	EG(R)				
$Gf7_2$	SG2	M	-		75
	LV				
	MELB2				
Gcf6	GLH	M-E	-		85
$Gcf7_1$	SG1	VS	-		97
$Gcf7_2$	SG2	S	A10, G10, G15		60
Gc6	SG2	M	-	+	53
	SG1		2a		
$Gc7_1$	LV	S-M	A^21	+	55
	SG1		2a		
$Gc7_2$	SG1	S	-		75
$Gc7_3$	SG1	S	B^31		5
	SG2		-		
Pf7	SG2	S-M	-		85
	LV				
Ffc6	SG2	VS	C4	+	85
$Ffc7_1$	SG2	S	-		97
$Ffc7_2$	SG2	S	-		98
$Ffc7_3$					

Note:

This table was compiled from 1:500 000 series maps. Some land systems listed in the table are too small to show at this scale. Where such land systems are included above, no information on representation is provided.

Appendix X

REFERENCE AREAS

Investigation Areas, Land Systems and Status

Investigation Area	Reference area details			
	Recommendation no	Area (ha)	Land system	Status*
South-western 1 (1973)	B1	971	8.1/PCcf7 8.5/PClc7$_1$	P
	B2	728	7.1/Pvf7$_1$ 8.1/PCc7$_1$	P
	B3	384	7.1/Pvf7$_1$	UP
	B4	2 226	8.1/Pf7 8.1/PCc7$_2$ 8.1/PCc6^2	P
South Gippsland 1 (1973)	NA			
North-eastern 1 (1974)	B1	1 750	1.1/Sg7$_1$ 1.1/Gg7$_5$	P
	B2	1 030	1.1/Svg8$_1$ 1.1/Gg7$_5$	UP
	B3	480	1.1/Svg7$_1$	UP
	[relocated in review]			
	B4	1 390	1.1/Sgs7$_2$ 1.1/Sgs7$_1$ 1.1/Sg8$_5$	P
	B5	540	1.1/Sgs7$_2$ 1.1/Sg8$_5$	P
	B6	850	1.1/Gg7$_5$ 1.1/Sgs7$_2$	P
	B7	1 300	1.1/Sgs7$_1$ 1.1/Ffc7$_2$	P
North-eastern 2 (1974)	B1	480	1.1/Sg7$_1$	P
	B2	390	1.1/Sg7$_1$ 1.1/Ss7$_2$	P
	B3	400	1.1/Gg8$_2$ 1.1/Sg7$_1$	P
	B4	320	1.1/Sv7$_1$ 1.2/Gv8$_2$	P
Melbourne (1977)	B1	125	2.1/Pf5$_5$	P
	B2	270	2.1/Pf5$_5$ 2.1/Ss5$_6$	P
	B3	125	2.1/Gs8	P
	B4	200	2.1/Ss7$_6$	P
	B5	440	2.1/Ss6$_2$	P
	B6	360	2.1/Ss6$_2$	P
	B7	420	1.1/Sg8$_1$ 1.1/Gg8$_1$	P

Appendix X (continued)

Investigation Area	Reference area details			
	Recommendation no	Area (ha)	Land system	Status*
Melbourne (1977) (continued)	B8	1 090	1.1/Gg8$_1$ 1.1/Ss7$_3$	P
	B9	250	1.1/Ss7$_3$ 1.1/Gs8$_1$	P
	B10	100	1.1/Ss7$_1$ 1.1/Gs7$_3$	P
	B11	300	1.1/Ss7$_1$	P
	B12	240	1.1/Sv8$_1$ 1.1/Sv8$_2$	P
	B13	720	1.1/Sv8$_1$ 1.1/Sv8$_2$	P
	B14	1 050	1.1/Ss8$_2$	UP
	B15	770	1.1/Gs8$_2$ 1.1/Ss8$_2$	UP
	B16	130	1.1/Gg8$_8$	P
	B17	330	1.1/Sg8$_3$	UP
	B18	470	1.1/Ss8$_{11}$	P
	B19	80	1.3/Gg9$_4$	P
	B20	460	1.1/Gfc$_8$ 1.1/Ss8$_{11}$	P
	B21	570	8.4/PCc7	P
	B22	290	8.4/Pcf7	P
East Gippsland (1977)	B1	590	1.1/Ss7$_9$ 1.1/Sg7$_8$	UP
	[relocated in review]			
	B2	550	1.1/Ss8$_{12}$ 1.1/Gsv6	UP
	B3	1 400	1.1/Ss8$_{12}$ 1.1/Sg7$_{11}$	UP
	B4	600	1.1/Ss7$_{11}$	UP
	B5	840	1.1/Gsv6 1.1/Gsg8$_2$	UP
	[enlarged in review]			
	B6	370	1.1/Ss8$_{12}$ 1.1/Sg8$_{19}$	UP
	B7	645	1.1/Gsv$_6$ 1.1/Sg8$_{16}$	P
	[enlarged in review]			
	B8	1 000	8.5/PCc7$_7$	UP
	B9	380	1.1/Ss7$_{14}$	UP
	B10	650	1.1/Ss7$_{13}$	UP
	B11	430	1.1/Ss7$_{11}$ 1.1/Ss7$_{12}$ 1.1/Ss7$_{13}$	P
	B12	670	8.5/PCc7$_6$ 8.5/PCc7$_7$ 9.3/Pf7$_6$	UP
	B13	1 200	9.3/Pf7$_6$	P
	B14	1 000	9.3/Pf7$_6$	P

Appendix X (continued)

Investigation Area	Reference area details			
	Recommendation no	Area (ha)	Land system	Status*
Mallee (1977)	C1	1 400	5.1/RPEfc2 5.1/PREfcl2	UP
	C2	700	4.1/Ffc2 4.2/Pf2	UP
	C3	8 400	5.1/EPRcf2 5.1/RPEfc2	P
	C4	400	4.1/FWcf2	UP
	C5	1 000	5.1/EPcf2 5.2/IPc2 5.2/EPc2	UP
	C6	1 100	5.1/PYfz3	UP
	C7	1 900	5.2/IPRc3	UP
	C8	400	5.2/Ffc3	UP
	C9	900	5.2/EPRc3	P
	C10	2 500	5.2/EPRc4 5.2/IPRc4	P
North-eastern 3,4 & 5 (1977)	B1	940	$1.2/Gv8_1$ $1.2/Sv8_1$ $1.2/Gs8_1$	P
	B2	440	$1.1/Sv7_1$	P
	B3	590	$1.2/Gs8_1$ $1.1/Sv7_1$ $1.1/Pf8$ $1.2/Ss8_1$	UP
	B4	1 120	$1.1/Sg8_6$	UP
	B5	1 130	$1.1/Sg7_2$ $1.1/Sg7_3$	P
	B6	630	$1.1/Ss7_8$ $1.1/Ffc7_2$	P
Corangamite (1978)	B1	205	$3.1/Ss7_3$ $8.2/Gfc7_2$	P
	B2	370	$8.2/Pf7_2$ $3.1/Ss7_1$ $3.1/Ss7_3$	P
	B3	155	$3.1/Ss7_1$	UP
	B4	120	$3.1/Gs7$	P
	B5	340	8.2/Gc7 8.2/Gcf7	UP
	B6	300	8.2/PGf7	UP
	B7	415	$8.2/Pfc7_1$	UP
	B8	70	$8.2/Pf7_4$	P
	B9	140	$7.1/Pvf7_1$	UP
Alpine (1979)	C1	500	$1.2/Ss8_2$ $1.3/Gsv9_1$	UP
	C2	500	$1.1/Ffc7_3$ $1.1/Ss8_7$ $1.1/Ss8_3$	UP
	C3	200	$1.1/Ss8_7$ $1.1/Ffc7_3$	UP

Appendix X (continued)

Investigation Area	Reference area details			
	Recommendation no	Area (ha)	Land system	Status*
Alpine (1979) (continued)	C4	300	1.1/Ss8$_3$	UP
	C5	680	1.1/Ss8$_3$ 1.1/Ss9$_1$	UP
	C6	850	1.3/Gv9$_1$ 1.1/Ss8$_3$ 1.1/Ss9$_1$	UP
	C7	970	1.1/Gs8$_6$ 1.1/Ss8$_3$ 1.1/Ss8$_7$	P
	C8	710	1.1/Gs8$_6$ 1.1/Ss8$_3$ 1.1/Ss8$_7$	P
	C9	650	1.3/Gg9$_1$ 1.1/Ss8$_4$	P
	C10	320	1.3/Gg9$_1$	UP
	C11	250	1.1/Sg9$_1$ 1.3/Gg9$_1$	UP
	C12	1 190	1.1/Sg8$_9$ 1.1/Sg8$_{16}$	P
	C13	240	1.1/Ss7$_{10}$ 1.1/Gs7$_9$	P
	C14	320	1.1/Ss8$_5$	UP
	C15	550	1.1/Sg7$_7$	UP
	C16	330	1.1/Gs8$_4$ 1.1/Gs8$_5$	P
	C17	940	1.3/Gs9$_2$ 1.1/Ss8$_8$ 1.1/Ss8$_6$	UP
	C18	360	1.1/Ss9$_2$	UP
North Central (1981)	B1	200	2.1/Ss6$_1$	UP
	B2	325	2.1/Sg4$_1$ 2.1/Pf4$_3$	UP
	B3	450	2.1/Gs4$_1$	P
	B4	225	2.1/Gs4$_2$	UP
	B5	500	2.1/Ss5$_4$	UP
	B6	460	1.1/Gs5$_1$	UP
South-western 2 (1982)	C1	430	6.2/RPc4	UP
	C2	700	6.2/RPc5	UP
	C3	510	2.2/Pfc7	UP
	C4	380	2.3/Pf6	P
	C5	280	2.2/Gg7	UP
	C6	675	2.2/Ss7	UP
	C7	400	7.2/Pv7$_1$	UP
South Gippsland 2 (1982)	B1	80	-	UP
	B2	770	3.5/Pfc7 3.5/Sg7$_1$	UP
	B3	750	8.5/PCc7$_4$	UP
	B4	180	9.3/Gcf7$_2$	UP

Appendix X (continued)

Investigation Area	Reference area details			
	Recommendation no	Area (ha)	Land system	Status*
South Gippsland 2 (1982) (continued)	B5	55	9.3/Pfc7$_2$ 3.4/Ss8$_1$	UP
Ballarat (1982)	B1	70	2.1/Sg7$_1$	UP
	B2	100	2.1/Ss6$_2$	UP
Gippsland Lakes Hinterland (1983)	C1	930	1.1/Ss8$_{11}$	UP
	C2	620	1.1/Ss8$_7$ 1.1/Ss7$_2$ 1.1/Ss8$_3$	UP
	C3	490	1.1/Gs7$_{11}$ 1.1/Ss7$_{11}$	UP
Murray Valley (1985)	B1	120	2.1/Gg3	UP
	B2	160	4.1/Ffc4	UP
	B3	120	4.1/Ffc4	UP
	B4	120	1.1/Gs5$_1$	UP
	B5	170	1.1/Sg6$_4$	UP
Benalla--Upper Murray Review (1986)	B14	140	1.2/Ss8$_1$	UP
	B15	90	1.1/Gs6$_2$	UP
Wimmera (1986)	B1	2 240	6.3/EPRc5	UP
	B2	3 200	6.3/EPRc4 6.3/IPRc4	UP
East Gippsland Review (1986)	B15	1 290	1.1/Sg7$_{11}$	UP

* **P** : Proclaimed under the *Reference Areas Act* 1978
UP: Not proclaimed

Appendix XI

COUNCIL RECOMMENDATIONS FOR EACH LANDSCAPE CHARACTER TYPE

Principal landscape, character type, and frame of reference	High-scenic-quality description	Council recommendations
1. Murray Basin plains		
Mallee sub-type		
Landform:	Distinctive dune formations	Wyperfeld and Hattah--Kulkyne National Parks; Pink Lakes State Park
Vegetation:	Strongly defined, diverse vegetation	Hattah--Kulkyne and Little Desert National Parks, Pink Lakes State Park
Water-form:	Any permanent water-form	Murray River, Hattah Lakes, Pink Lakes
Wimmera sub-type		
Landform:	Isolated peaks and ridges	Mt Arapiles--Tooan State Park
Vegetation:	Strongly-defined patterns, diversity, contrast	Many wildlife, lake, bushland, and road reserves
Water-form:	Any permanent water-form	Wildlife, lake reserves
Northern District plains sub-type		
Landform:	Isolated peaks or ranges	Warby Range and Terrick Terrick State Parks

Vegetation:	Diversity of species, height and density	Echuca Regional Park, various road and streamside reserves, highway parks
Water-form:		Lakes Marmal, Boort, and Moodemere, River Murray Reserve, Echuca Regional Park
2. Western plains		
Landform:	Volcanic cones, craters, craggy peaks, ridges rising from plain with near-vertical walls	Lower Glenelg and Mount Richardson National Parks, Dergholm State Park; isolated peaks or ranges; gorges; Tower Hill Geological Monument
Vegetation:	Strongly defined patterns, eucalypt forest, scattered conifers, riparian vegetation	Carlisle State Park, various bushland reserves, road reserves
Water-form:		Various lake reserves, streamside reserves
3. Southern lowlands		
Landform:	Isolated peaks, distinctive gorges, or deep valleys with steep sides	Lake Tyers--Nowa Nowa, Mitchell River, Holey Plains State Park, various natural features zones, various natural features and scenic reserves
Vegetation:	Strongly dissected patterns; unique specimen stands	Various bushland and streamside reserves
Water-form:	Lakes, reservoirs, etc.	Gippsland Lakes Reserve, streamside reserves, various wildlife reserves

Appendix XI (continued)

Principal landscape, character type, and frame of reference	High-scenic-quality description	Council recommendations
4. West central hills		
Landform:	Isolated peaks, ranges, hills or cones; sharp peaks and/or sharply serrated ridges; rock outcrops or boulders, well-defined, steep-sided valley gorges	Kara Kara, Kooyora, Langi Ghiran, and Mt Buangor State Parks; Mt Alexander, One Tree Hill, and Eaglehawk Regional Parks; geological reserves
Vegetation:	Strongly defined patterns of combinations of eucalypt, streamside vegetation, and scattered exotics; unique stands of vegetation form, colour, texture, and spacing	Reference areas and flora reserves such as Mt Erip, Ben Major, Inverleigh and Mt Warrenheip; various bushland reserves, and roadside conservation highway parks
Water-form:	Lakes, reserves, rivers, streams, and swamps	Various streamside reserves, lake reserves such as Salt Lakes, Lakes Colac, Burrumbeet, and Learmonth; sections of Wimmera River, Avoca River, Campaspe River in streamside reserves
5. Foothills		
Landform:	Sharp peaks and/or ridges; isolat-peaks or with distinctive forms; well-defined 'V'-shaped valleys; large rock faces or rocks dominating the surrounding landscape	Part of Croajingolong National Park; Lind, Alfred, Coopracambra--Kaye, Mt Burrowa--Pine Mountain, Mt Barlow National Parks; part of Lake Tyers State Park; Mts Samaria, Granya, and Lawson; Lerderderg, Kinglake, Cathedral Range, Eildon State Parks; and You Yangs, Steiglitz, Macedon, Dandenongs and Tyers, Beechworth, and Baranduda Range Regional Parks

Vegetation:	Strongly defined patterns, resulting from combinations of eucalypt forest, open grassland, and scattered conifers	Bunyip State Park; Hepburn, Yea River, and Fraser Regional Parks; various flora reserves and bushland reserves
Water-form:	Major streams, lakes, and reservoirs	Glenmaggie Regional Park, various streamside reserves, Wodonga Regional Park, and various wildlife reserves
6. Eastern highlands		
Landform:	Peaks or plateaux with distinctive form and colour; distinctive razorbacks, ridges; sharply defined 'V' valleys, unusual in gorge, depth, etc; massive rock outcrops, boulders	Tingaringy, Snowy, Coopracambra--Kaye, Errinundra Plateau, Wonnangatta--Moroka, Bogong, and Baw Baw National Parks; Alpine Park additions, various natural features and scenic reserves
Vegetation:	Strongly defined patterns of combinations of eucalypt forest, alpine meadows, water-associated vegetation, bare soil, and rock forms; seasonal colour, distinctive vegetation unusual in density, growth, habitat, etc.	Various national parks as listed above, various flora and flora and fauna reserves
Water-form:	Major streams or portions of other streams with flow character such as falls, rapids, cascascades; bogs and lakes	Various natural features zones, various streamside reserves; sections of various national parks as listed above
7. Western highlands		
Landform:	Steep, exposed slopes over 30°, with uneven peaks and serrated ridges; deep gorges with near-vertical walls and/or irregular	Grampians National Park, Black Range State Park

Appendix XI (continued)

Principal landscape, character type, and frame of reference	High-scenic-quality description	Council recommendations
7. Western highlands (continued)		
Landform: (continued)	configuration; massive rock outcrops or exposed cliffs; large feature landforms that are highly dominant	
Vegetation:	Strongly defined patterns resulting from combinations of patterns, eucalypt forest, conifers, and treeless areas	Grampians National Park, Black Range State Park, various flora reserves - e.g., H5 in Parish of Moyston, H6 in Parish of Ballawin
Water-form:	Streams, lakes, reservoirs, swamps	Various wildlife reserves, e.g. Mount William Swamp, Lake Muirhead, various water-production areas - e.g., Wartook Reservoir, Lake Bellfield, etc.; various public-land water frontages and stream-side reserves
8. Southern uplands		
Landform:	Large rock outcrops; isolated peaks, focal points	Cape Otway and Western Entrance National Parks and Angahook--Lorne State Park
Vegetation:	Distinctive stands of vegetation	Cape Otway National Park, Carlisle and Tarra Valley--Bulga State Parks, Mt Worth Regional Park, Cooks Gully, Yerang Park, and Mulundung Flora Reserves
Water-form	Permanent streams, lake, or reserve	Cape Otway National Park, Angahook--Lorne State Park, Mirboo and Mt Wilson Regional Parks, Barwon Forest Hardwood Production

9. Coastline

Landform:	Rock stacks, cliffs, sandy beaches, rocky islands, distinctive focal points; peaks, steep gorges, or ridges	Port Campbell, Cape Otway, Western Entrance, Wilsons Promontory, Croajingolong National Parks; Angahook--Lorne and Lake Tyers, State Parks; Discovery Bay, Bay of Islands, Point Lonsdale Wildlife Co-op Scenic, Venus Bay--Waratah Bay and Sydenham Inlet--Cape Conran Coastal Parks; Cape Schank--Arthurs Seat Regional Park; Scenic Coast-line - Warrnambool to Lorne, Lorne to Point Road-knight, Point Addis to Bells Beach, Point Nepean to West Head, Flinders to Griffith Point, Kilkunda, San Remo to Black Head, McLoughlin's Beach--Seaspray, Lakes Entrance to Lake Tyers, Corringle Creek to Pearl Point, Tamboon Inlet to Mallacoota, Cape Howe, Cape Patterson to Entrance Point; Gippsland Lakes Coastal Reserves; Lady Julia Percy Island Wildlife Reserve
Landform (continued)		
Vegetation:	Strongly defined patterns of various communities, unusual seasonal colour wind-shaped form, unusual to surrounding vegetation	Cape Otway and Wilsons Promontory National Parks; Venus Bay--Waratah Bay Coastal Park; Lake Tyers State Park
Water-form:	Unusual shoreline fresh-water flow characteristic	Port Campbell; Cape Otway; Wilsons Promontory National Park; Discovery Bay Coastal Park

Appendix XII

PROVISION FOR RECREATION ACTIVITIES IN COUNCIL RECOMMENDATIONS

Table 1 combines various recreation activities into a hierarchy of recreation groups, with descriptions of their requirements from public land. Recreation uses within each group are broadly compatible or have a similar degree of requirement for natural surroundings. Uses in higher-numbered groups can be carried out in lower-numbered locations, although the surroundings may not be as pleasant. The absence of a recreation use from a higher-numbered group indicates that it is considered incompatible with other uses in that group, or with maintenance of surroundings.

Table 1

RECREATION USES AND GROUPS

Recreation group	Description	Recreation uses (examples)
1	High-intensity formal or spectator-sport forms of recreation, requiring constructed playing-fields, runs, ranges, or tracks, with natural surroundings being secondary.	Football/cricket/soccer grounds Downhill skiing Horse-racing Caravan parks Rifle/pistol ranges Car-racing
2	Organized, active, intensive, or high-impact forms of recreation, carried out in natural surroundings but requiring or causing substantial modification to the environment. This includes all motorized recreational vehicle use and all forms of recreation that harvest or extract resources from public land.	Motorized recreation, including four-wheel-drive vehicle use, car rallies, and other recreational-vehicle use (subject to specification of areas) Hunting (firearm) of ducks, deer, and vermin Fossicking Prospecting Eductor dredging (specified streams) Youth camps Deer-stalking Horseriding Pleasure driving (on surfaced roads) Landscape appreciation Picnicking Sailing Power-boating Appreciation of natural surroundings Appreciation of historical features Extensive camping Angling Bushwalking Rogaining Bow-hunting Commercial tours
3	Informal or low-intensity recreation, with development of picnic, barbecue, camping or other facilities where appropriate. While the intensity of recreation is low, the numbers of people using the facilities are high. In larger areas the facilities would be located at points within well-accessed natural surroundings.	Landscape appreciation Informal recreation Pleasure driving (on formed roads Picnicking (designated sites) Appreciation of natural surroundings Appreciation of historical features Camping (developed sites) Angling Walking Bow-hunting
4	Passive or low-impact forms of recreation, with limited or no development of facilities, intended for use by a few people at a time.	Appreciation of flora and fauna Picnicking (natural surroundings) Camping (designated sites) Walking Bushwalking Cross-country skiing Angling Canoeing Appreciation of historical features

Table 1 (continued)

Recreation group	*Description*	*Recreation uses (examples)*
5	Recreation only where this is associated with the natural environment, such as appreciation of flora and fauna, solitude, or wilderness.	Appreciation of flora and fauna Wilderness experience Solitude Walking Bushwalking Extensive camping
6	No recreation permitted.	—

Table 2 shows the Council's land use categories, extracts relating to recreation from the wording of typical recommendations for each category, and the relevant recreation group from Table 1. As both tables illustrate, the Council has provided either specifically or broadly for the complete range of recreation activities, and has made recommendations supporting the recreational use of most public land, while guiding particular recreation types to areas where they will not conflict with other recreation forms or other recommended land uses. This table shows that in large areas of State forest or large parks, several intensities of recreation may be appropriate. In such areas the Council has recommended that the relevant land manager determine the detailed mixture of recreation opportunities through the preparation of management plans.

Table 2

COUNCIL RECOMMENDATIONS AND RECREATION GROUPS

Recommendation category	Extracts from recommendations relating to recreation	Recreation group (see Table 1)
Recreation *reserves*		1
Alpine resorts		1
Lake reserves	Water-based recreation	2
Wildlife reserve hunting		2
State forest	Open-space recreation (including hunting)	2,3,4 (subject to location, road closures, specification of streams, hunting season, or other limitation)
Coastal reserves		3
Scenic reserves	Opportunities for recreation	3

Table 2 (continued)

Recommendation category	Extracts from recommendations relating to recreation	Recreation group (see Table 1)
Streamside reserves	Passive recreation such as picnicking, walking, and angling	3
Multi-purpose parks	Informal recreation; able to be used by large numbers of people	3
Road reserves		3 (majority of roads, roadside picnic areas)
		4 (unused road reserves, specified roads with significant species)
Regional parks	Informal recreation; able to be used by large numbers of people	3 (bulk of park area)
		4 (areas with significant species in some parks)
Natural features and scenic reserves	Opportunities for recreation	3,4 (depending on access and occurrence of rare plants)
Public land water-frontage reserves	Low-intensity recreation	4
Historic reserves	Recreation associated with the history of a locality (development of recreational facilities would be minimal)	4
Historic areas	Recreation associated with the enjoyment and understanding of the history of an area	3,4 (depending on access, safety, and degree of interpretation provided at the site)
Bushland reserves	Passive recreation such as picnicking and walking	4

Table 2 (continued)

Recommendation category	Extracts from recommendations relating to recreation	Recreation group (see Table 1)
Flora and flora and fauna reserves	Passive recreation such as nature study picnicking	4
Wildlife reserves	Recreation only where this does not conflict with the conservation of the habitat of native animals	5 (sanctuaries, others in non-hunting period)
Coastal parks		5/3
Wilderness areas	Solitude and unconfined forms of recreation (without vehicles) in unmodified natural environments, subject to control of the numbers of people	5
National and State parks	Recreation associated with the enjoyment and understanding of natural environments	5 (bulk of park area)
		4 (designated remote camp-sites, walking tracks, cross-country ski trails)
		3 (developed camping areas, picnic areas, scenic drives)
Water production	Use for water-supply purposes	6 (buffer strips etc.)
Reference areas	Maintenance of natural ecosystems as a reference	6

Appendix XIII

RECREATION SETTINGS

The Department of Conservation, Forests and Lands has developed a recreation planning method to identify the variety of recreation 'settings' available, particularly on a regional basis. This method involves the identification of five classes of recreation-opportunity setting, based on access, facilities, level of use, and management criteria (CF&L 1985a). The settings range from 'remote' through to 'developed'.

Class I **Remote**

Essentially unmodified environments of large size where interaction between users is very low and evidence of other users is minimal. Evidence of restrictions and controls is absent. Motorized access by the public is not permitted. The recreation emphasis is on tranquility and self-reliance. Such areas offer a high degree of challenge and risk opportunity.

Class II **Semi-remote**

Predominantly natural or natural-looking environments of moderate to large size. Interaction between users is low, but there may be evidence of other users. Minimum on-site controls and restrictions are obvious. Limited vehicle tracks exist, for vehicle access if permitted. Probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance is high to moderate. Such areas offer a moderate degree of challenge and risk.

Class III **Roaded natural**

Natural-looking environments with moderate evidence of the sights and sounds of humans. Interaction between users may be low to moderate, but evidence of other users is prevalent. Opportunities for both motorized and non-motorized forms of recreation are available with a high degree of interaction with the natural environment. Impressions of nature are not dominated by modifications and recreation facilities.

Class IV **Semi-developed**

Substantially modified natural environments. Sights and sounds of humans are readily evident, and interaction between users is often moderate to high. Includes facilities designed for use by large numbers of people and those provided for special activities.

Class V Developed

Substantially urbanized environments, although the background may have natural-looking elements. Vegetative cover is often exotic and usually heavily managed. Sights and sounds of humans are predominant and large numbers of users can be expected. Opportunities for competitive and spectator sports and for passive uses are common.

Table 1 shows recreation opportunity settings for relevant recommendation categories of the Council, and indicates the probability of finding each setting on land in each category.

The Department of Conservation, Forests and Lands has recently undertaken an assessment (based on the Department's 18 administrative regions) of the availability of recreation opportunities on all public land in each region. The provisional findings of this assessment are given in Table 2, and indicate that the regions have varying percentages of each recreation opportunity class.

Table 1

RECREATION OPPORTUNITY SETTINGS IN VARIOUS *LAND USE CATEGORIES*

Recreation opportunity settings					
Land use category	Remote	Semi-remote	Roaded natural	Semi-developed	Developed
National park	****	***	**	*	n/a
State park	****	***	**	*	n/a
State forest	***	***	****	**	*
Coastal	****	***	***	**	**
Wilderness	****	n/a	n/a	n/a	n/a
Historic	n/a	***	****	***	**
Regional	n/a	**	***	****	***
Scenic	n/a	**	****	***	***
Flora/fauna wildlife	**	****	n/a	n/a	n/a
Game	n/a	**	****	**	n/a
Marine	****	***	**	**	*
Miscellaneous	n/a	**	***	***	****

Note:

Probability of finding the recreation opportunity in a particular category of park or reserve:

**** Very high
*** High
** Medium
* Low
n/a Not usually applicable

Table 2

RECREATION OPPORTUNITIES ON PUBLIC LAND
(number of parks within each CF&L region)

Region	Remote	Semi-remote	Roaded natural	Semi-developed	Developed
Alexandra	0	7	19	12	0
Bairnsdale	1	14	16	5	2
Ballarat	0	4	13	16	1
Benalla	0	2	5	6	0
Bendigo	0	4	31	18	0
Central Gippsland	3	6	18	8	3
Colac	0	4	34	11	2
Dandenong	0	3	24	29	5
Geelong	0	8	16	15	3
Horsham	1	2	8	7	0
Melbourne	0	1	5	4	7
Mildura	2	7	17	2	1
North-east	3	10	21	12	0
Orbost	4	6	13	6	1
Portland	1	9	34	13	0
Yarram	1	7	15	10	3

The estimation of different recreation settings on public land in Victoria shows that the largest proportion of the State's public land is available for recreation in 'roaded natural' settings, with quite extensive areas also providing 'semi-remote' and 'semi-developed' settings (see Figure 10, chapter 14).

It is not surprising that 'developed' settings make up only a small proportion of the State's public land. These settings require considerable investment in terms of facility provision, maintenance, and visitor infrastructure, and so facilities are usually located in townships. Since such locations are often those most heavily used and the majority of visitors wish only to travel short distances, settings of this nature are common in resort towns and other urban areas. As there is generally little need for their provision on public land, however, they are not considered in detail by Council.

Caravan parks, motels etc, located on freehold land all contribute to the total availability of developed settings for recreation in Victoria.

Appendix XIV

COUNCIL'S WATER PRODUCTION RECOMMENDATIONS

KEY:

Abbreviations for catchment status:

-	- not proclaimed
P	- proclaimed
LUN	- has a land use notice
LUD	- has a land use determination
P, LUN	- catchment proclaimed, part has a land use notice
-,P	- part catchment proclaimed, part not proclaimed

Abbreviations for investigation needs:

-	- no perceived need
P	- proclamation investigation needed
LUD	- land use determination investigation needed
LUD(R)	- review of existing LUD needed
*	- investigation in progress

These 'investigation needs' are notional, being based on one step up from the present catchment status. Appendix XV lists all the catchments shown as having an investigation need for proclamation (P), and shows their order of priority for investi-gation.

Other abbreviations used:

RWC	- Rural Water Commission
SECV	- State Electricity Commission of Victoria
LVW&SB	- Latrobe Valley Water and Sewerage Board

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
South Gippsland 1 1973	-	Merriman Creek	Seaspray	-	-	P	-
	-	Seaspray Bores	Seaspray	-	-	P	-
South-western 1, 1973, and Review, 1983	D1	Drajurk (Tullich) Bores	Casterton	-	-	P	-
	D2	Weecurra Bores	Merino	P	Merino	LUD	88
	-	Heywood Bore	Heywood	-	-	P	-
	-	Portland Bores	Portland	-	-	P	-
North-eastern 1 1973 and North-eastern 2 1974 - see North-eastern (Benalla--Upper Murray) Review 1986							
Mallee 1976	-	Cowangie Bore	Cowangie	-	-	P	-
	-	Murrayville Bore	Murrayville	-	-	P	-
East Gippsland 1977	D1	Rocky River	Orbost	LUD	Rocky River	-	27
	D2	Cann River	Cann River	P	Cann River	LUD	48
	D3	Betka River	Mallacoota	P	Betka River	LUD	42
Melbourne 1977	D1	Tylden Reservoirs	Kyneton	LUD	Kyneton	LUD (R)	15C
	D2	Kitty English and Bowden Rd	Macedon	LUD	Macedon	LUD (R)	14
	D3	Macedon Offtakes	Woodend	LUD	Woodend	LUD (R)	12
	D4	Turritable Creek Offtake	Mt Macedon	LUD	Mt Macedon	LUD (R)	13
	D5	Stony Reservoir	Macedon	LUD	Macedon	LUD (R)	14
	D6	Stony Creek	Mount Macedon	LUD	Mt Macedon	LUD (R)	13
	D7	Smokers and Falls Creeks	Woodend	LUD	Woodend	LUD (R)	12
	D8	Barringo Creek	Sunbury--Gisborne	LUD	Gisborne--Sunbury	LUD (R)	9
	D9	Main Creek	Riddells Creek	LUD	Riddells Creek	LUD (R)	8
	D10	Charlies Creek	Sunbury	LUD	Sunbury	LUD (R)	17
	D11	Main Creek	Sunbury	LUD	Sunbury	LUD (R)	17
	D12	Garden Hut Creek	Lancefield	LUD	Lancefield	LUD (R)	10

D13	Bolinda Creek	Romsey	LUD	Romsey	LUD (R)	11
D14	Bolinda Creek	Sunbury	LUD	Sunbury	LUD (R)	17
D15	Hazel and Harpers Creeks	Kilmore	LUD	Kilmore	LUD (R)*	20
D16	Goodmans Creek	RWC	LUD	L. Merrimu	-	34
D17	Merrimu Reservoir	RWC	LUD	L. Merrimu	-	28
D18	Djerriwarrah Reservoir	Melton	LUD	Djerriwarrh	-	18
D19	Micks Creek	Healesville	LUD	Micks Creek	-	40
D20	Bunyip River	Mornington Peninsula	LUD	Bunyip River	-	21
D21	Upper Tarago	Warragul	LUD	Tarago River	-	32
D22	Tarago Reservoir	Mornington Peninsula	LUD	Tarago River	-	32
D23	Healesville Offtake	Healesville	LUD	Healesville	LUD (R)	24
D24	McCraes Creek	Gembrook) Cockatoo) Emerald)	LUD	McCraes Ck	-	29
D25	Thomson River	1 and 2	LUD	Thomson R (1&2)	LUD (R)*	43
D26	Trigger Creek	Erica	LUD	Tyers R	-	19
D27	Moondarra Reservoir	LWW&SB	LUD	Tyers R	-	19
D28	Jim Crow Creek	Newstead	P	Cairn Curran	LUD	16
-	Trentham Bore	Trentham	-	-	P	-
D29	Wombat Reservoir	Daylesford	P	Cairn Curran	LUD*	16
D30	Bullarto Reservoir	Daylesford	P	Cairn Curran	LUD*	16
D31	Coliban River	Malmsbury	P	Eppalock	LUD	15
D32	Malmsbury Reservoir	RWC	P	Eppalock	LUD	15
D33	Lauriston Reservoir	RWC	P	Eppalock	LUD	15
D34	Upper Coliban Reservoir	RWC	P	Eppalock	LUD	15
-	Newham Parish	-	LUD	Eppalock	LUD (R)	15A
D35	Rosslynne Reservoir	RWC	LUD	Rosslynne Res.	-	37
-	Woodend Bore	Woodend	-	-	P	-
D36	Mollison Creek	Pyalong	P	Mollison Creek	LUD	89
D37	Goulburn River	Seymour	-	-	P	-
D38	Falls Creek	Seymour, Trawool	-	-	P	-
D39	Sunday Creek	Broadford	P	Sunday Creek	LUD*	85
D40	Hellhole Creek	MMBW	-	-	P	-
D41	Mud Creek	MMBW	-	-	P	-

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
Melbourne 1977 (continued)	D42	Stony Creek	MMBW	-	-	P	-
	D43	Silver Creek	MMBW	-	-	P	-
	D44	Wallaby Creek	MMBW	-	-	P	-
	D45	Yea River	Yea	-	-	P	-
	D46	Goulburn River	Alexandra	-, P	-, Upper Goulburn	P	-
	D47	Rubicon River	Thornton	-	-	P	-
	D48	Lake Eildon	RWC	LUD, P	Upper Goulburn	LUD	4A, 4
	D49	Delatite River	Mansfield	LUD	Upper Delatite	-	48
	D50	Moorabool River	Bannockburn	P	Moorabool R.	LUD	50
	D51	Stony Creek	Geelong	LUD	Stony Creek	-	51
	D52	Bostock Reservoir	Geelong	P	Moorabool R.	LUD	50
	D53	Korweinguboora Reservoir	Geelong	P	Moorabool R.	LUD	50
	-	Gordon Bore	Gordon, Mt. Egerton	-	-	P	-
	D54	Colbrook Reservoir	Ballan	-	Pykes Creek	P	-
	-	Ballan Bore	Ballan	-	-	P	-
	D55	Pykes Creek Reservoir	RWC	-	-	P	-
	D56	Lerderderg River	RWC	P	L. Merrimu	LUD	44
	D57	Melton Reservoir	RWC	-, P	(Various)	P	-
	-	Parwan Creek	-	P	Parwan	LUD	3
	D58	Yan Yean Reservoir	MMBW	-	-	P	-
	D59	Running Creek	Hurstbridge	P	Running Creek	LUD	49
	D60	Toorourrong Reservoir	MMBW	-	-	P	-
	D61	Yering Weir	MMBW	-	Lower Yarra	P	-
	-	Steavenson River	Buxton	-	-	P	-
	D62	Beauty Spot	Marysville	-	-	P	-
	D63	Steavenson River	Marysville	-	-	P	-
	D64	Labertouche Creek	Drouin	P	Drouin	LUD	31
	D65	Beaconsfield Reservoir	RWC	-	-	P	-
	D66	Lysterfield Reservoir	NP&WD	-	-	-	-
	D67	Donnellys Creek	MMBW	-	-	P	-
	D68	Sawpit Creek	MMBW	-	-	P	-

D69	Maroondah Reservoir	MMBW	-	-	P	-
D70	Grace Burn Creek	MMBW	-	-	P	-
D71	Coranderrk Creek	MMBW	-	-	P	-
D72	Don River	Woori Yallock/ Launching Place	-	-	P	-
D73	Yarnanthan Creek	Warburton	-	-	P	-
D74	Cement Creek	MMBW	-	-	P	-
D75	O'Shannassy Reservoir	MMBW	-	-	P	-
D76	Armstrong Ck (West)	MMBW	-	-	P	-
D77	Armstrong Ck (East)	MMBW	-	-	P	-
D78	Upper Yarra Reservoir	MMBW	-	-	P	-
D79	McMahons Creek	MMBW	-	-	P	-
D80	Starvation Creek	MMBW	-	-	P	-
D81	Four Mile Creek	Warburton	-	-	P	-
D82	Britannia Creek	Yarra Junction	P	Britannia Creek	LUD	64
D83	Deep Creek	Noojee	-	-	P	-
D84	Brewery Creek	Woods Point	P	Upper Goulburn	LUD	4
D85	Thomson (Stage 3)	MMBW	P	Thomson (Stage 3)	LUD*	76
-	Blue Rock Reservoir	RWC	LUD	Tanjil	-	62
-	Tanjil R (Moe)	Moe	LUD	Tanjil	-	62
D86	Bunyip River	Koo-wee-rup	-	-	P	-
-	Lang Lang Bore	Lang Lang	-	-	P	-
D87	Tennent Creek Reservoir	RWC	P	Tennent Creek	LUD	54
D88	Lance Creek Reservoir	RWC	P	Lance Creek	LUD	53
D89	Bellview and Ness Creeks	Korumburra	P	Bellview Creek etc	LUD	93
-	Little Bass River	Poowong--Loch	P	Little Bass R.	LUD	92
D90	Ruby Creek	Leongatha	P	Ruby Creek	LUD	94
D91	Rollo Creek	Yarragon	P	Rollo Creek	LUD	71
-	Yarragon Bore	Yarragon	-	-	P	-
D92	Sunny Creek	Trafalgar	P	Sunny Creek	LUD	68
-	Trafalgar Bore	Trafalgar	-	-	P	-
D93	Narracan Creek	Moe	P	Narracan Creek	LUD	66
D94	Little Narracan Creek	Thorpdale	P	Narracan Creek	LUD	66
D95	Yallourn Storage	SECV	-	-	-	-

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
North-eastern, 3, 4, and 5 1977	D1	Fifteen Mile Creek	Glenrowan	P	15 Mile Creek	LUD	81
	D2	King River	Moyhu	P	Ovens R. (Wang)	LUD	98
	D3	Jessies Creek	Whitfield	P	Ovens R. (Wang)	LUD	98
	D4	Lake William Hovell	RWC	P	King R (L.W.H.)	LUD	58
	D6	Buffalo Creek	Myrtleford	-	-	P	-
	D7	Lake Buffalo	RWC	P	Buffalo River	LUD	86
	-	Buckland River	Porepunkah	P	Buckland River	LUD	59
	-	Harrietville Offtake	Harrietville	P	Ovens R. (Bright)	LUD	83
	D8	Bakers Creek	Bright	P	Bakers Gully	LUD	56
	D9	Ovens River	Bright	P	Ovens R. (Bright)	LUD	83
Corangamite 1978	D1	Upper Barwon	Geelong	LUD	Upper Barwon	LUD (R)*	2
	D2	South Otway Pump 2	Warrnambool etc	LUD	Gellibrand (SO)	-	61
	D3	South Otway Pump 1	Warrnambool etc	LUD	Gellibrand (SO)	-	61
	D4	Gellibrand Pump	Warrnambool etc	LUD	Gellibrand	-	35
	D5	Gellibrand Pump	Warrnambool etc	LUD	Gellibrand	-	35
	D6	Arkins Creek	Warrnambool etc	LUD	Gellibrand	-	35
	D7	West Gellibrand Dam	Colac	LUD	Gellibrand	-	35
	D8	Olangolah Weir	Colac	LUD	Gellibrand	-	35
	D9	West Barham River	Apollo Bay	P	West Barham	LUD	73
	D11	Skenes Creek	Skenes Creek	LUD	Skenes Creek	-	69
	D12	Allen Reservoir	Lorne	P	Lorne	LUD	23
	D13	Erskine River	Lorne	P	Lorne	LUD	23
	D14	Barramunga Creek Pump	Geelong	LUD	Gellibrand	-	35
	D15	Lardner Creek	Gellibrand	LUD	Gellibrand	-	35
	D16	Goslings Creek		)	Pennyroyal,	)	
	D17	Matthews Creek	Geelong	P)	Matthews, and	) LUD*	67
	D18	Pennyroyal Creek		)	Goslings Creeks	)	
	-	Mortlake Spring and Bore	Mortlake	-	-	P	-
	-	Port Campbell Bore	Pt. Campbell, Timboon	-	-	P	-
	-	Port Fairy Bores	Port Fairy	-	-	P	-

	-	Penshurst Spring and Bore	Penshurst	-	-	P	-
	-	Eureka Creek	Glenthompson	-	-	P	-
	-	Peterborough Bore	Peterborough	-	-	P	-
	-	Caramut Spring and Bore	Caramut	-	-	P	-
		Koroit Bore	Koroit	-	-	P	-
	D23	Barwon Downs Bore	Geelong etc.	-	-	P*	-
Alpine 1979, 1983	E1	Mount Tabor Creek	Dartmouth	LUN	Hume	LUD	1A
	E2	Dartmouth Reservoir	RWC	LUN, P	Hume	LUD	1A, 1
	-	E. Kiewa system	SECV	LUD, P	Upper Kiewa	LUD	25A, 25
	E3	W. Kiewa	Mt Beauty	P	Upper Kiewa	LUD	25
	E3	Simmonds Creek	Mt Beauty	P	Upper Kiewa	LUD	25
	E4	Livingstone Creek	Omeo	P	Hume	LUD	1
	E5	Tambo River	Swifts Creek	P	Tambo	LUD	77
North Central Area 1981	D1	Lake Eppalock	RWC	LUD, P	Eppalock	LUD	15B
	D2	Sugarloaf Reservoir	Avoca	LUD	Avoca	-	46
	D3	Lead Reservoir	Avoca	LUD	Avoca	-	46
	-	Avoca Bore	Avoca	-	-	P	-
	D4	Landsborough Reservoir	Landsborough	LUD	Wimmera (Malakoff)	-	7A
	-	Forest Creek	Amphitheatre	-	-	P	-
	D5	Redbank Reservoir	Redbank	-	-	P	-
	-	Teddington Reservoir	Stuart Mill	-	-	P	-
	D6	Bealiba Reservoir	Bealiba	P	Bealiba	LUD	72
	D7	Evansford Reservoir	Maryborough	P	McCallums Creek	LUD	74
	D8	Mosquito Flat Reservoir	Tullaroop	P	Tullaroop Res.	LUD	65
	D9	Tullaroop Reservoir	RWC	P	Tullaroop Res.	LUD	65
	D10	Cairn Curran Reservoir	RWC	LUN, P	Cairn Curran	LUD	16A
	D11	Laanecoorie Reservoir	RWC, Dunolly	P	Laanecoorie	LUD	87
	D12	Loddon River Pump	Korong	P, -	Laanecoorie	P	-
	D13	Campaspe River Pump	Axedale	P, -	Eppalock	P	-
	D14	Caledonia Reservoir	Heathcote	P	Eppalock	LUD	15
	D15	Tooborac Reservoir	Tooborac	P	Eppalock	LUD	15
	D16	Campaspe River Pump	Goornong	P, -	Eppalock	LUD	15
	D17	Goulburn River Pump	Murchison	P, -	Upper Goulburn	P	-

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
North Central Area 1981 (continued)	D18	Loddon Weir	RWC	P, -	Laanecoorie	P	-
	D19	Spring Gully Reservoir	Bendigo	-	-	P	-
	D20	Crusoe, No 7 and Big Hill Reservoirs	Bendigo	-	-	P	-
	D21	Sandhurst Storage	Bendigo	-	-	P	-
	D47	Elmore Bores	Elmore	-	-	P	-
Ballarat 1982	D1	Langi Ghiran Reservoir	Ararat	-	-	P*	-
	D2	Hickmans Creek	Elmhurst	P	Wimmera	LUD	7
	D3	Mt Cole Reservoir	Ararat	P	Wimmera	LUD	7
	D4	Fiery Creek	Beaufort	-	-	P*	-
	-	McLeod Creek	Buangor	P	Wimmera	LUD	7
	D5	Doctors Creek Reservoir	Lexton	P	Laanecoorie	LUD	87
	D6	Talbot Reservoir	Talbot	P	McCallum Creek	LUD	74
	D7	Evansford	Maryborough	P	McCallum Creek	LUD	74
	D8	Musical Gully Reservoir	Beaufort	-	-	P*	-
	D9	Troys Reservoir	Beaufort	-	-	P*	-
	D10	Waterloo Reservoir	-	P	Trawalla Creek	LUD	-
	D11	Hepburn Lagoon	RWC	P	Cairn Curran	LUD	16
	D12	Newlyn Reservoir	RWC	P	Tullaroop	LUD	65
	D13	Cosgrave Reservoir	Creswick	P	Creswick	LUD	57
	D14	Russells Reservoir	Creswick	P	Creswick	LUD	57
	D15	Dean Reservoir	Creswick	P	Creswick	LUD	57
	D16	White Swan Reservoir	Ballarat	P	Ballarat	LUD	63
	D17	Gong Gong Reservoir	Ballarat	P	Ballarat	LUD	63
	D18	Kirks Reservoir	Ballarat	P	Ballarat	LUD	63
	D19	Pincotts Reservoir	Ballarat	P	Ballarat	LUD	63
	D20	Beales Reservoir	Ballarat	P	Ballarat	LUD	63
	D21	Wilsons Reservoir	Ballarat	P	Ballarat	LUD	63
	D22	Moorabool Reservoir	Ballarat	P	Ballarat	LUD	63
	D23	Korweinguboora	Geelong	P	Moorabool	LUD	50

	D24	St. Enochs Spring	Skipton	-	-	P	-
	D25	Lal Lal Reservoir	Ballarat,	P, LUN	Lal Lal	LUD	41, 41A
			Geelong	P, LUN	Lal Lal	LUD	41, 41A
	D28	Waubra Bore	Waubra	-	-	P	-
	D30	Learmonth Bores	Learmonth	-	-	P	-
	-	Mininera Bore	Mininera	-	-	P	-
	D53	Streatham Bore	Streatham	-	-	P	-
South Gippsland 2 1982							
	D1	Little Morwell River	Mirboo North	LUD	Mirboo North	-	26
	D2	Billy Creek	Morwell	LUD	Billy Creek	-	30
	D3	Tarra River	Yarram	LUD	Tarra River	-	38
	D4	Ruby Creek	Leongatha	P	Ruby Creek	LUD	94
	D5	Tarwin River	Meeniyan	-	-	P	-
	D6	Tarwin River	Dumbalk	-	-	P	-
	-	Dumbalk Bore	Dumbalk	-	-	P	-
	D7	Battery Creek	Fish Creek	P	Battery Creek	LUD	95
	D8	Deep Creek	Foster	P	Deep Creek	LUD	96
	D9	Agnes River	Toora	P	Agnes River	LUD	97
	D17	Boolarra Offtake	Boolarra	P	Walkley Creek	LUD	75
	-	Hazelwood Pondage	Churchill	-	-	P	-
South-western 2 1982	E1	Lake Wallace	Edenhope	-	-	P	-
	E2	Rocklands Reservoir	RWC	LUD, P	Rocklands	LUD (R)	6A
	E3	Mackenzie River Diversion	Horsham	P	Wimmera	LUD	7
	E4	Wartook Reservoir	RWC	P	Wimmera	LUD	7
	E5	Lake Lonsdale	RWC	P	Wimmera	LUD	7
	E6	Glenorchy Weir	Glenorchy	P	Wimmera	LUD	7
	E7	Lake Fyans	RWC, Stawell, Ararat	P	Wimmera	LUD	7
	E8	Panrock Creek Reservoir	Great Western	P	Wimmera	LUD	7
	E9	Dairy Creek Diversion	Halls Gap	P	Wimmera	LUD	7
	E10	Lake Bellfield	RWC	P	Wimmera	LUD	7
	E11	Moora Moora Reservoir	RWC	P	Rocklands	LUD	6

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
South-western 2 1982 (continued)	E12	Stawell Weir	Stawell	P	Wimmera	LUD	7
	E13	Wannon Diversions	RWC	-	-	P	-
	E14	Stony Ck., Willaura Res.	Willaura etc	P	Wimmera	LUD	7
	-	Willaura Bore	Willaura etc	-	-	P	-
	E15	Mason Creek Weir	Lake Bolac	-	-	P	-
	E15A	Picnic Road	Ararat	-	-	P*	-
	-	Olivers Gully	Ararat	-	-	P	-
	E16	Four Diversions	Hamilton	P	Rocklands	LUD	6
	E17	Gap Creek	Hamilton	-	-	P	-
	E18	Waterworks Creek	Hamilton	-	-	P	-
	E19	Brown Creek	Hamilton	-	-	P	-
	-	Hamilton Bore	Hamilton	-	-	P	-
	E20	Waterfall Gully	Dunkeld	-	-	P	-
	-	Dunkeld Bore	Dunkeld	-	-	P	-
	E21	Konong Wootong Reservoir	Coleraine/ Casterton	-	-	P	-
	E22	Groundwater Bores	Goroke	-	-	P	-
	E31	Groundwater Bores	Apsley	-	-	P	-
	E32	Groundwater Bores	Harrow	-	-	P	-
	E37	Groundwater Bores	Pomonal	-	-	P	-
Gippsland Lakes Hinterland 1983	E1	Lake Glenmaggie	RWC	P	Glenmaggie	LUD	5
	E2	Thomson River	Heyfield	-, P	-	P	-
	E3	Macalister River	Maffra	-, P	-	P	-
	-	Briagolong Bore	Briagolong	-	-	P	-
	-	Boisdale Bore	Boisdale	-	-	P	-
	E4	Mitchell River	Bairnsdale	P	Mitchell River	LUD	70
	E5	Mitchell River	Bairnsdale	-, P	-	P	-
	E6	Mitchell River	Lindenow	-, P	-	P	-
	E7	Nicholson River	Lakes Entrance	P	Nicholson River	LUD*	45
	E8	Tambo River	Bruthen	P	Tambo River	LUD	77

	E9	Buchan River	Buchan	P	Buchan River	LUD	79
	E10	Boggy Creek	Lakes Entrance	P	Boggy Creek	LUD	78
Murray Valley 1985	D28	Strathmerton Bore	Strathmerton	-	-	P	-
	D29	Katunga Bore	Katunga	-	-	P	-
East Gippsland Review 1986	D4	Brodribb River	Orbost	P	Brodribb	LUD	91
	D5	Bemm River	Orbost	P	Bemm River	LUD	90
	-	Mallacoota Bore	Mallacoota	-	-	P	-
North-eastern (Benalla--Upper Murray) Review 1986	D1	Lake McCall-Say	Benalla	LUD	Ryans Creek	-	36
	D2	Loombah Weir	Benalla	LUD	Ryans Creek	-	36
	-	Nine Mile Creek	Longwood	-	-	P	-
	D3	Mountain Hut Creek)					
	D4	Waterhouse Reservoir)	Euroa	P	Seven Creeks etc	LUD	80
	D5	Gooram Diversion Weir)					
	D6	Polly McQuinns Reservoir)					
	D7	Honeysuckle Creek	Violet Town	P	Honeysuckle Creek	LUD	47
	D8	Lake Eildon	RWC	LUD, P	Lake Eildon	LUD(R)	4A
	D9	Lake Nillahcootie	RWC	P	Lake Nillahcootie	LUD	33
	D10	Ovens River	Wangaratta	P	Ovens R. (Wang.)	LUD	98
	D11	Diddah Diddah Creek	Springhurst	P	Diddah Diddah Creek	LUD	82
	-	Springhurst Bore	Springhurst	-	-	P	-
	D12	Barambogie Reservoir	Chiltern	-	-	P	-
	D13	Barambogie Springs	Chiltern	-	-	P	-
	-	Barnawartha Bore	Barnawartha	-	-	P	-
	D14	Lake Kerferd	Beechworth	P	Nine Mile Creek	LUD	55
	D15	Nine Mile Creek	Beechworth	P	Nine Mile Creek	LUD	55
	D16	Nine Mile Creek	Yackandandah	P	Nine Mile Creek	LUD	55
	D17	Clear Creek Storage	Yackandandah	P	Nine Mile Creek	LUD	55
	D18	Wodonga Creek	Wodonga	P, -	-	P	-
	D19	Kiewa River	Lower Kiewa	P, -	-	P	-

Appendix XIV (continued)

LCC area	LCC rec. number	Offtake name	Supply for	Catchment status	Name of catchment	Investigation needs	Number on Map 14
North-eastern (Benalla--Upper Murray) Review 1986 (continued)	D20	Lake Hume	RWC	LUN, P	Lake Hume	LUD*	1A
	D21	Bellbridge Offtake	Tallangatta	LUN, P	Lake Hume	LUD*	1A
	D22	Tallangatta Offtake	Tallangatta	LUN, P	Lake Hume	LUD*	1A
	D23	Murray River Offtake	Walwa	LUN, P	Lake Hume	LUD*	1A
	D24	Cudgewa Creek Offtake	Cudgewa	LUN, P	Lake Hume	LUD*	1A
	D25	Corryong Creek Offtake	Corryong	LUN, P	Lake Hume	LUD*	1A
Wimmera, 1986	-	Kaniva Bores	Kaniva	-	-	P	-
	-	Kiata Bore	Kiata	-	-	P	-
	-	Lillimur Bore	Lillimur	-	-	P	-
	-	Miram Bore	Miram	-	-	P	-
	-	Nhill Bores	Nhill	-	-	P	-
	-	Serviceton Bore	Serviceton	-	-	P	-
Melbourne 1, Review 1987	D97	Bolwarrah Weir	Geelong	P	Moorabool R.	LUD	50
	D98	Moorabool (Sheoaks)	Geelong	P	Moorabool R.	LUD	50
	D98A	Monument Creek	Lancefield	P	Monument Creek	LUD	60
	-	Lancefield Bore	Lancefield	-	-	P	-
	D99	Painkalac Creek	Aireys Inlet	LUD	Painkalac Creek	-	52

Appendix XV

WATER CATCHMENTS NOT YET PROCLAIMED
Priority for Investigation

KEY:

Codes for Supply System Type

	Code
Urban use:	
. offtake from headwater tributaries or springs	OTH
. offtake from unregulated (flows) river	OTU
. offtake from regulated (flow) stream	OTR
. storage - catchment reservoir	SC
. storage - service or terminal reservoirs with catchment	SS
. storage - irrigation	SI
. storage - natural or modified lakes	SL
. groundwater - bore/well (local or shallow aquifer)	GL
. groundwater - bore/well (regional or deep aquifer)	GR
. groundwater - bore/well (recharge area unknown)	G
Irrigation or stock and domestic use:	
. storage - catchment reservoir	ISC
. storage - off-stream reservoir with catchment	ISO

Priority of Investigation for Proclamation

	Priority
Scores of 14--17	1
Scores of 10--13	2
Scores of 6--9	3

AWRC drainage basin	Description			Assessment	
	Catchment name	Townships supplied or authority	Type	Score	Priority
2 Kiewa	Kiewa River	Kiewa	OTU	13	2
	Wodonga Creek	Wodonga	OTR	11	2
3 Ovens	Barambogie Creek	Chiltern	SC	17	1
	Murray River	Wahgunyah	OTR	10	2
	Murray River	Yarrawonga	OTR	10	2
	Borefield	Chiltern	GL	13	2
	Borefield	Barnawartha	GL	11	2
	Springhurst Well	Springhurst	GL	12	2
4 Broken	Broken Creek	Numurkah	OTR	11	2
	Broken Creek	Nathalia	OTR	11	2
	Boosey Creek	Tungamah	OTR	10	2
	Back Creek	Devenish/ St. James	OTR	12	2
	Lake Mokoan	Various	ISO	13	2
	Murray River	Cobram	OTR	11	2
	Murray River	Barmah	OTR	12	2
	Broken Creek	Goorambat	OTR	12	2
	Broken Creek	Tungamah	OTR	10	2
	Borefield	Katunga	GL	10	2
	Borefield	Strathmerton	GR	8	3

Appendix XV (continued)

AWRC drainage basin	Description			Assessment	
	Catchment name	Townships supplied or authority	Type	Score	Priority
5 Goulburn	Goulburn River	Alexandra	OTR	11	2
	Goulburn River	Molesworth	OTR	10	2
	Goulburn River	Seymour	OTR	10	2
	Goulburn River	Murchison	OTR	10	2
	Goulburn River	Shepparton	OTR	11	2
	Goulburn River	Toolamba	OTR	11	2
	Goulburn River	Mooroopna	OTR	11	2
	Rubicon River	Thornton	OTH	13	2
	Falls Creek	Trawool	SC	10	2
	Nine Mile Creek	Longwood	SC	14	1
	Yea River	Yea	OTU	12	2
	Steavenson River	Marysville	OTH	13	2
	Steavenson River	Buxton	OTU	11	2
	Wallaby/Silver Creeks	MMBW	OTH	12	2
	Goulburn Weir	Nagambie; various	ISC	12	2
	Greens Lake	Various	ISO	11	2
	Waranga Basin	Various	ISO	11	2
6 Campaspe	Campaspe River	Axedale	OTR	11	2
	Campaspe River	Goornong	OTR	12	2
	Campaspe River	Rochester	OTR	11	2
	Murray River	Echuca	OTR	11	2
	Borefield	Elmore	GL	12	2
7 Loddon	Loddon River	Kerang	OTR	11	2
	Loddon River	Bridgewater	OTR	12	2
	Serpentine Creek	Serpentine	OTR	12	2
	Gunbower Creek	Cohuna	OTR	11	2
	Taylors Creek	Gunbower	OTR	11	2
	Spring Gully Reservoir	Bendigo	SS	16	1
	Cockatoo Hill Reservoir	Bendigo	SS	15	1
	Green Gully Reservoir	Lockwood	ISO	7	3
	Lockwood/Marong Reservoir	RWC	ISO	6	3
	Kerang Lakes	RWC	ISO	6	3
	Kow Swamp	RWC	ISO	6	3
	Gunbower Creek (Koondrook Weir)	Koondrook	OTR	11	2
	Tandarra Storage	RWC	ISO	6	3
	Murray River	Swan Hill	OTR	11	2
	Murray River (Torumbarry Weir)	Various	OTR	12	2
8 Avoca	Teddington Reservoir	Stuart Mill	SC	15	1
	Redbank Reservoir	Redbank	SC	15	1
	Forest Creek	Amphitheatre	SC	13	2
	Borefield	Avoca	GL	14	1
14 Mallee	Murray River	Mildura	OTR	11	2
	Murray River	Red Cliffs	OTR	11	2
	Murray River	Robinvale	OTR	11	2
	Borefield	Murrayville	GR	10	2

Appendix XV (continued)

AWRC drainage basin	Description			Assessment	
	Catchment name	Townships supplied or authority	Type	Score	Priority
14 Mallee (cont'd)	Borefield	Cowangie	GR	10	2
	Lake Culullerraine	Meringur	ISC	12	2
15 Wimmera	Richardson River	Donald	OTR	12	2
	Borefield	Kiata	GR	12	2
	Borefield	Nhill	GR	12	2
	Taylors Lake	Wimmera/Mallee	ISO	13	2
	Pine Lake	Wimmera/Mallee	ISO	8	3
21 East Gippsland	Borefield	Mallacoota	GL	15	1
24 Mitchell	Mitchell River	Lindenow	OTU	12	2
25 Thomson	Macalister River	Maffra	OTR	11	2
	Thomson River	Heyfield	OTR	11	2
	Thomson River (Cowarr Weir)	Toongabbie	OTR	10	2
	Borefield	Boisdale	GL	12	2
	Borefield	Briagolong	GL	12	2
	Borefield	Sale	GL	10	2
26 La Trobe	Loch River	Noojee	OTH	13	2
	Deep Creek	Noojee	SC	14	1
	Borefield	Yarragon	GR	12	2
	Borefield	Trafalgar	GR	8	3
27 South Gippsland	Tarwin River (East branch)	Dumbalk	OTH	14	1
	Tarwin River	Meeniyan	OTU	13	2
	Tennent Creek (Candowie No. 2)	Phillip Island	SC	14	1
	Merrimans Creek	Seaspray	OTU	13	2
	Borefield	Seaspray	GL	14	1
	Borefield	Dumbalk	GL	13	2
28 Bunyip	Borefield	Lang Lang	GR	9	3
29 Yarra	Plenty River (Toorourrong)	MMBW	SC	13	2
	Yan Yean Reservoir	MMBW	SC	13	2
	Upper Yarra Reservoir	MMBW	SC	12	2
	Armstrong Creek	MMBW	OTH	12	2
	O'Shannassy River	MMBW	SC	12	2
	Cement Creek	MMBW	OTH	12	2
	McMahons Creek	MMBW	OTH	12	2
	Starvation Creek	MMBW	OTH	12	2
	Maroondah Reservoir	MMBW	SC	13	2
	Coranderrk (Badger) Creek	MMBW	OTH	12	2
	Silvan Reservoir	MMBW	SS	12	2

Appendix XV (continued)

AWRC drainage basin	Description			Assessment	
	Catchment name	Townships supplied or authority	Type	Score	Priority
29 Yarra (cont'd)	Sugarloaf Reservoir	MMBW	SS	12	2
	Lower Yarra (Yering Gorge)	MMBW	OTU	12	2
30 Maribyrnong	Borefield	Lancefield	GL	13	2
31 Werribee	Korweinguboora Creek	Ballan	SC	15	1
	Pykes Creek Reservoir	Myrniong	SI	13	2
	Borefield	Ballan	GL	12	2
	Melton Reservoir	RWC	ISC	8	3
32 Moorabool	Borefield	Gordon	GL	14	1
33 Barwon	Borefield	Geelong	GR	15	1
35 Otway	Borefield	Peterborough	GR	9	3
	Borefield	Port Campbell	GR	9	3
36 Hopkins	Langi Ghiran Reservoir	Ararat	SC	17	1
	Picnic Road Reservoir	Ararat	SS	17	1
	Fiery Creek	Beaufort	OTH	17	1
	Musical Gully Reservoir	Beaufort	SS	16	1
	Troys Reservoir	Beaufort	SS	16	1
	Eureka Creek	Glenthompson	SC	14	1
	Masons Creek	Willaura	OTH	15	1
	St Enochs Spring	Skipton	OTH	15	1
	McLeods Creek	Buangor	OTH	15	1
	Spring	Mortlake	OTH	15	1
	Spring	Caramut	OTH	12	2
	Borefield	Caramut	GL	12	2
	Borefield	Learmonth	GL	14	1
	Borefield	Mininera	GL	14	1
	Borefield	Mortlake	GL	14	1
	Borefield	Streatham	GL	14	1
	Borefield	Willaura	GL	15	1
	Wannon River (Lake Bellfield)	Wimmera/Mallee	OTH	15	1
37 Portland	Borefield (proposed)	Macarthur	GR		
	Borefield	Heywood	GR	11	2
	Borefield	Koroit	GL	13	2
	Borefield	Port Fairy	GR	10	2
	Borefield	Portland	GR	11	2
38 Glenelg	Konong Wootong Res.	Coleraine	SC	16	1
	Wannon River Tribs.	Hamilton	OTH	15	1
	Waterfall Creek	Dunkeld	OTH	15	1
	Spring	Penshurst	OTH	12	2
	Borefield	Casterton	GL	12	2
	Borefield	Dunkeld	GL	14	1
	Borefield	Hamilton	GL	13	2

Appendix XV (continued)

AWRC drainage basin	Description			Assessment	
	Catchment name	Townships supplied or authority	Type	Score	Priority
38 Genelg (cont'd)	Borefield	Penshurst	GL	12	2
	Borefield	Harrow	GR	11	2
	Borefield (proposed)	Branxholme	GR		
	Borefield (proposed)	Dartmoor	G		
39 Millicent Coast	Lake Wallace	Edenhope	SL	13	2
	Borefield	Apsley	GR	11	2
	Borefield	Kaniva	GR	11	2
	Borefield	Lillimur	GR	11	2
	Borefield	Goroke	GR	11	2
	Borefield	Miram	GR	11	2
	Borefield	Serviceton	GR	11	2

Appendix XVI

WATER SUPPLY CATCHMENT LAND USE CONTROLS

Catchments Considered by the Land Conservation Council[1];
with Land Use Determinations or Land Use Notices

Name of catchment	Year of gazettal of determination or notice	Area (sq.km)	Study area
Rocklands (Parishes of Tyar, Daahl, Yat Nat)	1959	160	South-western 2
Riddells Creek	1960	5	Melbourne
Lancefield	1961	19	Melbourne
Romsey	1961	9	Melbourne
Gisborne-Sunbury	1961	6	Melbourne
Woodend	1961	4	Melbourne
Eppalock (Shire of Newham/Woodend)	1962	14	Melbourne
Upper Barwon	1963	145	Corangamite
Macedon and Mount Macedon	1964	5	Melbourne
Sunbury	1964	18	Melbourne
Djerriwarrh Reservoir	1964	26	Melbourne
Kilmore	1965	5	Melbourne
Healesville	1966	3	Melbourne
Eppalock (Kyneton Water Supply)	1966	12	Melbourne
Eppalock (northern section) (see note 2)	1966	258	North Central
McCraes Creek	1966	5	Melbourne
Lake Merrimu	1966	85	Melbourne
Billys Creek	1966	21	South Gippsland 2
Rocky River	1967	23	East Gippsland
Bunyip River	1968	39	Melbourne
Lake Merrimu (Goodmans Creek)	1969	39	Melbourne
Tarra River	1971	28	South Gippsland 2
Lake Cairn Curran (land use notice)	1972	55	North Central

Tarago Reservoir	1973	114	Melbourne
Micks Creek	1973	5	Melbourne
Lal Lal Reservoir (land use notice)	1973	18	Ballarat
Thomson River (Stages 1, 1(a), and 2) (see note 3)	1974	332	Melbourne
Ryans Creek	1974	78	North-East
Mirboo North	1974	8	South Gippsland 2
Tyers River	1975	317	Melbourne
Avoca Town Water Supply	1975	10	North-Central
Upper Goulburn (Eildon)	1977	868	Melbourne/North-eastern 2
Rosslynne Reservoir (Jackson Creek)	1977	85	Melbourne
Stony Creek	1978	26	Melbourne
Painkalac Creek	1981	34	Melbourne/Corangamite
Gellibrand River	1983	669	Corangamite
East Kiewa U2	1984	18	Alpine
Lake Hume (land use notice)	1984	5 350	
Skenes Creek	1984	8	Corangamite
Lake Eppalock environs (see note 2)	1985	258	North Central
Malakoff Creek	1985	29	North Central
Tanjil River	1985	510	Melbourne
Upper Delatite River (Mansfield)	1985	240	Alpine/Melbourne
Nicholson River	See note 4	451	Gippsland Lakes Hinterland
Thomson Reservoir (see note 3)	See note 4	487	Melbourne
Total: 43 land use determinations		10 899	

Notes:

1. The Land Utilization Advisory Council considered draft land use determinations prior to establishment of the Land Conservation Council.
2. The 1985 determination reviewed and superseded the 1966 determination for the same area.
3 The current determination reviews and supersedes the 1974 determination, and extends it to the Thomson (Stage 3) Catchment.
4. Not yet approved.

Appendix XVII

CONSULTANCIES COMMISSIONED BY THE LAND CONSERVATION COUNCIL

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Appendix XVIII

RESEARCH AREAS IDENTIFIED OR RECOMMENDED BY COUNCIL

Study area	Recommendations	Rec. No.	Subject	Implementation
South Gippsland 1	Final 1973	6(a)	Gippsland Lakes: following a review of existing data, it will be necessary to improve the collection of information about trends in the quality and nature of the lake environment and the management and care of this environment	Various research programs
		6(c)	Effluent and industrial-waste disposal: full investigation into effects of effluent and industrial waste on the environment, and alternative methods of disposal	Limited studies
North-eastern 2	Final 1974	B1-B4	Reference area: scientific study related to the impact of man's activities on soil or ecosystems	This recommendation applies to all reference areas; some studies are under way (see chapter 10)
East Gippsland	Final 1977	N4	Tostaree Pilot Farm: continuation recommended, but East Gippsland Review noted that the farm was no longer required	
Mallee	Final 1977	(F1)	Grazing management: that the responsible departments should expand research, and extend activities as a matter of urgency, into researching the systems of grazing management best suited to the public land in the Mallee, or effects of grazing on natural ecosystems	No specific research studies; limited investigations of altered management
		(F3)	Agricultural research: that the Mallee Research Farm and Irymple Technical School Farm continue to be used for agricultural research and education	Areas still available and used for teaching and research

Melbourne	Final 1977	A29(3.0)	Recreational use of catchments: support for the proposal by MMBW to investigate the effects that low-intensity recreational use could have on water quality	Limited studies
		A29(4.9)	Hydrological research area: to investigate different types of silviculture and timber utilization techniques on the volume and timing of water yield	Extensive research by MMBW (and CFL at Reefton) into various effects of different methods of timber utilization; findings documented and available
		Q3 to Q7	Agricultural research: that the various research farms and institutes continue to be used for agricultural research	These areas are still available and used for research
North-eastern 3,4,&5	Final 1977	Q2	Agricultural research: that the Tobacco Research Station should be used for agricultural research	Area still available and used for research
Alpine	Proposed 1978	A23(g)	Experimental logging: streamflow and water quality resulting from logging	Calibration, roading, and logging completed, project currently being written up
		(J1)	Wildlife: further research into the ecological requirements of species necessary to determine effects of various land management practices	Ongoing research at Arthur Rylah Institute for Environmental Research.
Corangamite	Final 1978	Q5	Agricultural college: that the Glenormiston Agricultural College continue in its present usage	Area still available and used for teaching and research
Alpine	Final 1979	(Q20)	Grazing impact: research necessary to monitor the effects of grazing on catchment hydrology and nature conservation values	Various detailed studies have investigated grazing; results include that, where flora conservation is important, grazing is inappropriate

Appendix XVIII (continued)

Study area	Recommendations	Rec. No.	Subject	Implementation
Alpine (continued)		U2(e)	Experimental logging: continued use of two catchments for sediment and turbidity research	See A23(g) (above)
North Central	Final 1981	(G1-G4)	Eucalyptus oil production: research regarding production of eucalyptus oil: effects due to frequency and methods of harvesting	No specific activity
Ballarat	Final 1982	(F1)	Softwood production: that the demonstration forest of the Victorian School of Forestry continue to be available for research	Remains available for research
South Gippsland 2	Final 1982	M1(c)(d)	Education areas: (c) observe and practice methods of environmental analysis and the techniques of the natural sciences (d) conclude simple long-term experiments	This recommendation applies to all education areas; limited activity is taking place in some areas set aside for education
South-western 2	Final 1982	(U1)	Uncommitted land: includes areas on which further study is required to determine the capability of the land to satisfy particular present or future demands	No specific activity - new information will be considered when this area is reviewed
Alpine (Special Investigation)	Final 1983	A17(a)(b)	Experimental logging: hydrological research be allowed in East Kiewa catchment	See A23(g) (above
		(E1-E5)	Water production: Council recognizes the need for research to provide additional information for formulating management guidelines	No specific activity; various relevant studies have been carried out or are in progress

Alpine (Special Investigation) (continued)		(O6-O9)	Alpine resort development: detailed studies required to determine likely effects of development on the environment at Cobungra Gap and Mount Fainter before these are further considered	No studies have been carried out
South-western 1, Review	Final 1983	L2	School plantations: that areas set aside for school plantations be primarily used as a teaching resource	Remain available as a teaching resource in many places; some are being reviewed
Murray Valley	Final 1985	(I1)	Pest species control: finance and staff are required to research and implement methods for control of pest species	Contining research at Keith Turnbull Research Institute: CFL Regions have ongoing programs for pest control
		D61	Agroforestry and pasture research: government to encourage research into tree-growing assistance schemes, agroforestry, cropping and grazing techniques, and the use of deep-rooting pastures as methods of alleviating dryland salting	Salinity research is a major ongoing government initiative, involving research teams from DITR, DARA, CF&L, and RWC
		Q1-Q4	Agricultural research and education: that areas listed be used for Agricultural research by continuing with present tenure and use	Areas available and used for research
		(U2-U51)	Revegetation of areas	Several regions of CF&L including Benalla are involved in revegetation programs to combat salinity
East Gippsland - Review	Final 1986	E6,E7	Waygara, Cann River - salting risk: applicability of results from studies into salting, to land clearing in these areas, needs to be investigated	No studies to date

Appendix XVIII (continued)

Study area	Recommendations	Rec. No.	Subject	Implementation
East Gippsland - Review (continued)		E8,E9	Forestry education and research: West Errinundra and Lower Snowy River areas be used for education and research associated with forestry management operations	No studies to date
		(15)	Eductor dredging: further studies are required into effects of eductor dredging on stream ecology, siltation, etc.	No further studies have been conducted; limited analysis of the effects already completed by EPA and DITR
		L8	Bemm River--Cape Conran road: to investigate whether a tourist road would compromise or degrade significant values	No study to date
		L9	Catchment management: that further research be undertaken to identify the extent of habitat degradation of Mallacoota Inlet and its catchment and that appropriate measures be taken to minimize or eliminate further deterioration	No specific actvity
		L10	Fish catch decline: that further studies be undertaken to identify the causes of the decline in fish catches in the Inlet and that appropriate action be taken to rectify this situation	No specific activity
Wimmera	Final 1986	A1(d)	Introduced bees: studies should be commenced to investigate how South Australia findings on the effects of bees/bee colonies on honeyeaters, flora and insects apply to the Little Desert	No activity to date
		(A1)	Fire effects: research into optimum fire intervals etc. in fuel-reduction burns in the Little Desert.	No activity to date

C43(a)	Lake Buloke: research program for Lake Buloke, etc., to investigate processes, particularly effects of salinity, inundation, levees; notes (i): Lake Buloke research to be given high priority	No activity to date
(K2)	Wimmera River: methods of control of excess aquatic weed growths need to be investigated	Various related studies

Notes:

1. Recommendation numbers in brackets indicate that, while not expressed explicitly in the recommendations, the research need is embraced by that recommendation.
2. Research needs shown as General Recommendations occur in many sets of recommendations and are only described once.