PROPOSED RECOMMENDATIONS

MURRAY VALLEY AREA

LAND CONSERVATION COUNCIL, VICTORIA
MELBOURNE, JUNE 1984

TELEPHONES:
267 1311, 267 1098

GOVERNMENT OF VICTORIA

LAND CONSERVATION COUNCIL

464 ST. KILDA ROAD. MELBOURNE. VICTORIA. 3004

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MURRAY VALLEY

These Proposed Recommendations are published to allow all who are interested the opportunity to comment by making written submissions to the Land Conservation Council.

All such submissions received on or before Friday, 14 September 1984 will be considered by the Council before Final Recommendations are made on the future use of public land in the Murray Valley Area.

for T. KUNARATNAM
Secretary

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INTRODUCTION

The Murray Valley Investigation

The Land Conservation Council was established by the *Land Conservation Act* 1970. As one of its three functions, it makes recommendations to the Minister for Planning and Environment with respect to the use of public land, in order to provide for the balanced use of land in Victoria. This report contains the Council's proposed recommendations concerning the public land in the Murray Valley area. Notices showing the boundary of the study area and advising that an investigation was to be carried out were published in the *Victorian Government Gazette* of 16 April 1982 and in local and other Victorian newspapers in April 1982. A descriptive resources report was published on 3 October 1983. Extracts from the *Land Conservation Act* 1970 covering the procedure to be followed in formulating recommendations were included in the report. The Council received 278 submissions on the future use of public land. Individuals, associations, companies and local and State government bodies, representing a wide cross-section of the community, made helpful submissions covering the most feasible forms of land use for the district.

After considering these submissions and having visited the study area, the Council has prepared these proposed recommendations. They will be distributed to all who made submissions, and their publication will be followed by another 60-day period for further submissions. After this the Council will prepare recommendations for presentation to the Minister and Parliament.

The recommendations in the text are grouped under major headings, such as Parks, State Forest and so on. The text is accompanied by a map at the scale of 1:250,000 which covers the whole study area and gives a broad view of the recommended land uses. Other more detailed maps show areas recommended for agriculture (by alienation) and the proposed River Murray Reserve. Additional information on boundaries is held by the Land Conservation Council.

Land uses

It is important to realize that each primary use has a number of compatible secondary uses. In addition to nominating the best uses for the land, the recommendations indicate what is considered to be the most appropriate form of tenure for the land and the group within the new Department of Conservation, Forests and Lands that should be responsible for the preparation of management plans.

The Council recommends the establishment of nine parks in areas of particular importance for recreation and nature conservation; reference areas and education areas (covering part of the range of land types found in the study area); flora and fauna reserves for areas of value for conservation of habitat and representative plant communities; and wildlife reserves for several sites containing valuable faunal habitats. A number of areas are recommended as historic and scenic reserves, and substantial areas are recommended as State Forest.

Where demands from competing uses vie for a given area of land, it is not possible to satisfy them all. Wherever possible, these recommendations attempt to achieve balance in providing for the present needs of most forms of use while retaining flexibility and the opportunity to adjust to future changes in such demands. They do so by placing as much of the public land as possible under forms of use that do not have a major impact on the natural ecosystem.

Flexibility in planning is essential. Our knowledge of many resources (for example, minerals) and of the distribution and ecology of plants is very imperfect. There must be many places in Victoria where special values remain unrecognized and for which no special provision can be made in present planning. Furthermore, future demands for resources on public land may

require alteration or modification of these recommendations, which are based on the best information presently available. The Council is aware that review will be necessary to ensure that future land use is in the best long-term interest of the community.

Table 1 summarizes the recommendations in terms of the major forms of use.

TABLE 1

PUBLIC LAND USE

Land use Categories	Area (ha)	Percentage of all land covered by these recommendations	Percentage of all public land covered by these recommendations
State Parks	17,230	1	13
Regional Parks	2,500	<1	2
Reference Areas	450	<1	<1
Wildlife Reserves	5,230	<1	4
Wildlife Management Co-operative Areas	3,550	<1	2.5
Water Use and Regulation	11,920	<1	9
River Murray Reserve	3,800	<1	3
State Forest	62,260	4	46
Flora Reserves	600	<1	<1
Flora and Fauna Reserves	400	<1	<1
Bushland Reserves	1,340	<1	1
Historic Reserves	75	<1	<1
Scenic Reserves	28	<1	<1
Streamside Reserves	1,260	<1	1
Highway Parks	62	<1	<1
Education Areas	540	<1	<1
Lake Reserves	900	<1	<1
Agricultural Research & Education and Alienation	3,660	<1	2.5
Mineral and Stone	250	<1	<1
Revegetation Areas	1,050	<1	<1

Other land uses collectively make up the balance.
Figures are rounded.

The Department of Conservation, Forests and Lands

The former Departments of Crown Lands and Survey and State Forests and three agencies of the Ministry for Conservation — namely the Fisheries and Wildlife Division, the National Parks Service, and the Soil Conservation Authority — have been amalgamated to form the new Department of Conservation, Forests and Lands.

The functional arms will include the Fisheries and Wildlife Service, National Parks Service, State Forests and Lands Service, and the Land Protection Service, and these will be located in Melbourne. The last will comprise those groups formerly in the Soil Conservation Authority and the Vermin and Noxious Weeds Destruction Board who were involved in policy development, technical standards, program development, and research.

The functional arms will be responsible for developing policy options, management plans, and annual programs for public land throughout the State, with appropriate professional inputs from the Fisheries and Wildlife Service and the Land Protection Service.

Public land management will be implemented by the Regional Management Division in accordance with the approved annual program and the guidelines and technical standards provided by the head office functional groups.

The State will be divided into 18 regions; each regional group will be responsible for the management of all public land in that region, irrespective of whether an area is national or State park, State forest, or some other reserve set aside for a particular form of community use.

Particular attention has been given to fire prevention and suppression. Fire-protection services for public land will be provided and co-ordinated by the Regional Management Division. Organizational arrangements to provide the services will be similar to those that have operated effectively in the Forests Commission. The amalgamation provides the significant additional benefits: direct involvement of much larger forces of staff and employees in prevention and suppression; and better co-ordinated and more readily available support forces of manpower and equipment. All these elements collectively will enable more effective fire-prevention and fire-suppression programs to be achieved on public lands of the State.

Interim arrangements

The Department is currently operating with an interim structure consisting of the National Parks Service, the Soil Conservation Authority, the Fisheries and Wildlife Division, a Forests Division, and a Lands Division. Throughout the text that follows, reference is made to these interim arrangements. However, the recommendations themselves nominate one of the functional arms that will be established in the future to be responsible for the preparation of management plans.

The creation of the Department of Conservation, Forests and Lands and the establishment of the interim structure referred to above have not altered the responsibilities of the Forests Commission outlined in the *Forests Act* 1958. Consequently, reference is made to the Forests Commission and its responsibilities for fire protection in various parts of the text.

The Australian Heritage Commission

The Australian Heritage Commission is a Commonwealth statutory authority established under the *Australian Heritage Commission Act* 1975 as the government's policy, advisory, and administrative body responsible for the National Estate. The National Estate is defined in the legislation as 'those places, being components of the natural environment of Australia, or the cultural environment of Australia, that have aesthetic, historic, scientific or social significance or other special value for future generations, as well as for the present community'.

Australia's 'National Estate' is thus a wide-ranging concept that covers a variety of features.

The natural environment includes:

* national parks, nature reserves, and other places for the protection of flora and fauna.
* the coastline and islands
* inland water expanses, rivers, lakes, and other wetlands
* special land forms, geological features, caves, forests, woodlands, and grasslands
* areas of scientific interest

The cultural environment includes:

* Aboriginal rock art sites, ceremonial grounds, and sacred sites.
* Aboriginal quarries and shell mounds, camp sites, and fishtraps
* important historical and archaeological sites (both Aboriginal and European) such as old missions and cemeteries
* historic buildings and structures, either individual or in groups, including sawmills, tramlines, loading wharves, derricks, punts, equipment, and their relics
* historic towns and precincts

Establishment of the Heritage Commission

Public response to the original Committee of Inquiry into the National Estate (which reported to Federal Parliament in 1974) demonstrated that Australians do have a strong concern for the environment and that the cause of much previous neglect and destruction was a lack of public education regarding the need and means to preserve the National Estate. The Committee of Inquiry therefore recommended the establishment of a national body to be concerned with national policy and co-ordination. As a signatory to several international conventions and recommendations (the most important of these being the World Heritage Convention), Australia also has an international responsibility to protect its National Estate. Accordingly the *Australian Heritage Commission Act* was passed in 1975 and the first Commission was appointed in 1976.

Functions

One of the Commission's major responsibilities is to prepare and maintain a Register of National Estate places. The Register is thus an inventory of the significant parts of the cultural and natural environment of Australia.

Compilation of a comprehensive Register will take many years and will be a continuing process, but all registrations will have the same status irrespective of the time of their entry. There are no gradings between different categories of places in the Register and all places registered are professionally assessed in terms of the National Estate values.

The effect of registration

Registration of a place formally recognizes its National Estate values and in turn imposes some constraints on the actions of Commonwealth Ministers and authorities. The *Act* provides that Commonwealth Ministers and their agencies must not take any action that would adversely affect any place in the Register — unless there is no feasible or prudent alternative, unless all action is taken to minimize damage where no such alternative exists, and unless the Commission is informed and given time to comment. The Commission, under its *Act*, has no power with respect to the action that might be taken by State governments, local governments, private land-owners, or institutions, nor does it imply any particular attitude by the Commission or the Commonwealth to the ownership, management, or use of a place listed in the Register. Registration of a natural area does not, for example, mean that the Commission or the Commonwealth holds a view that the area should be a national park or public reserve. Rather, it means that the place has been recognised as an important component of the National Estate. The significance of the area may have been retained or enhanced because of or in spite of past management. Registration, therefore, should not be interpreted as endorsing or condemning any particular management practice or regime.

Traditional uses such as forest harvesting and silviculture, farming, fishing, recreation, and water regulation would be permitted to continue, as these have influenced the landscape as it presently exists and have played a role in the development of Australia.

Nomination of places for the Register

Any member of the public is entitled to nominate a place for the Register, and a special form has been prepared to assist in this regard. As the Register is an ongoing project, places may be nominated at any time.

Before a place is entered in the Register, the Commission is required to enter it on an interim list and to inform the community of this through a public notice. Any individual or organisation may lodge in writing to the Commission an objection to the proposed registration of a place. The minimum time for public comment is 3 months from the date of the public notice.

Within the Murray Valley area, the Barmah Forest has been nominated for listing in the National Estate Register. Its natural and cultural values make it worthy of recognition as part of the National Estate, since it includes some of the most important waterfowl habitats in the State as well as the most extensive and best-developed red gum forest with its associated flora and fauna remaining on public land. The forest has been associated with European history since the earliest settlement of Victoria and, prior to this, was closely associated with Aboriginal culture. Many relics of these past associations — including carved trees, canoe trees (scars), middens, and burial grounds — occur throughout the forest.

The Barmah Forest in Victoria however, forms only part of a total forest complex that extends across the River Murray. Together, the Barmah Forest and the Millewa Forest Group in New South Wales form a major physiographic and cultural unit straddling the River Murray. Some features of the riverine ecosystem are to be found on only one side of the river, which makes it important to consider the area as a whole. These forests have also supplied Melbourne and New South Wales markets with durable timbers for more than 100 years. They remain forested and productive, in the second and even third generation of trees. The New South Wales Forestry Commission has nominated the New South Wales portion of this area, thus ensuring that the whole of this important riverine ecosystem will be considered for inclusion in the Register.

Recommendation

I That the government endorse the nomination of the whole of the Barmah and Millewa Forest Group, which together constitute a riverine ecosystem of national significance, for listing in the National Estate Register.

General Recommendations

The following recommendations qualify those in the body of the text.

The Council wishes to stress the need for adequate management and protection of public land, as it has made its recommendations on the assumption that sufficient manpower and finance will be provided for the appropriate management. Unless these resources are provided, the Council's recommendations cannot be effectively implemented. Council emphasizes that vermin and noxious weeds pose problems in the management of public land in the Murray Valley area. Finance and staff are required to research and implement methods for control of pest species. Council therefore recommends:

II That the authorities responsible for managing and protecting the public land be given the resources necessary for the task.

The Council has previously proposed certain additional arrangements for protecting public land from fire. These arrangements have now been incorporated into an amendment to the *Forests Act* 1958. The amendment creates the designation 'protected public land', which may include public land that is not State forest or national park. The Forests Commission is now required to protect all three of these from fire. Although the establishment of the new Department of Conservation, Forests and Lands will bring about certain changes in the organisation of fire protection operations, current responsibilities are as outlined below:

(*a*) Under the provisions of the *Forests Act* 1958 and notwithstanding anything to the contrary in any other *Act*, it is the duty of the Forests Commission to suppress fires in every State forest and national park, and on all protected public land. This includes, for example, all land under the management and control of the National Park Service.

(*b*) In the event of fire in any area for which the Forests Commission has fire-suppression responsibility, the Forests Commission has powers of entry under both the *Forests Act* 1958 and the *Country Fire Authority Act* 1958. Decisions as to the most appropriate course of action required to suppress the fire and as to the most appropriate equipment to be used, are the responsibility of the Forests Commission alone.

(*c*) The Forests Commission provides the State with an efficient fire-prevention and suppression organization. The fire-fighting resources of the National Parks Service are available to the Commission for fire-suppression operations, and are used as such under the direction of the Forests Commission. They are used in conjunction with, and not as a replacement for, the resources of the Commission.

(*d*) Fire-prevention works in State forests are the sole responsibility of the Forests Commission. In parks, on land reserved under section 4 of the *Crown Land (Reserves) Act* 1978, and on protected public land, however, fire-prevenion works are undertaken only with the agreement of the person or body managing the land.

(*e*) To facilitate co-operative arrangements for fire prevention in areas under the management and control of the National Parks Service, the Service and the Forests Commission have established a joint fire-protection committee.

(*f*) In addition, under the *National Parks Act* 1975, the Director of National Parks shall ensure that proper and sufficient measures are taken to protect each national park, and other parks managed by the National Parks Service, from injury by fire.

(*g*) The two organizations that share the duty of fire prevention and suppression in rural Victoria, namely, the Forests Commission and the Country Fire Authority, have excellent arrangements for mutual co-operation, which have operated successfully for many years.

Accordingly, the Council recommends:

III That, for fire-protection purposes, public land that is not State forest or national park be examined, and appropriate areas be declared protected public land under the *Forests Act* 1958.

IV That mineral exploration licences held over the area continue except in so far as they affect reference areas.

The Council expects that, as a result of further study and investigation, many more areas with special values will be identified. Present planning cannot specifically provide for the conservation or utilization of these values. The Council therefore recommends:

V That, when significant new discoveries are made on land within their administration, government agencies enlist the best advice available on the importance of such discoveries and how they should be managed. Advice from organizations other than government authorities and academic institutions should be sought whenever appropriate.

The Council also recognizes that in some cases, existing legislation will have to be amended in order to effectively implement the recommendations in this report. It is aware that this may result in a delay, in some cases of several years, before some of its recommendations can be implemented. It is concerned that, where implementation of the recommendations would involve a change of management authority, management efficiency could be reduced during the delay period. The Council believes that the government should direct that existing responsibilities for management are to continue until recommendations are implemented.

The following recommendations concern various aspects associated with the implementation of recommendations:

VI That the present legal status and management responsibilities for public land continue until the resources required to implement the recommendations are available.

VII That, as the boundaries of many areas have not been precisely surveyed, they be subject to minor modification, road excisions, easements, and other adjustments that may be necessary.

VIII That in cases where occupation does not agree with title, the Department of Conservation, Forests and Lands may at its discretion make adjustments to boundaries of public land when implementing these recommendations.

IX That the recommendations in this publication do not change the status of roads passing through or abutting public land that are at present declared roads under the *Country Roads Act* 1958.

X That, where areas of public land are not specifically referred to in these recommendations, present legal uses and tenure continue.

A. PARKS

Victoria contains substantial areas of public land that have been retained in a relatively natural state. The number of people using these areas for recreation is increasing and will probably continue to do so. Pressures for the use of public land in ways that would change its condition are also increasing. Council believes that it is essential to reserve, now, viable samples of the various land and vegetation types, together with the outstanding natural features, that occur on public land. These areas can best be reserved in a system of parks.

The Murray Valley area has several areas left that can remind us of the earlier landscape, flora, and fauna. Such lands are a valuable part of our heritage and must be protected for the benefit, education, and enjoyment of present and future generations. This principle of land use is a major consideration in determining that areas should be reserved as parks.

A park is defined here as 'an area of land in a natural or semi-natural condition reserved because of its scenery, floral and faunal content, historical interest, or other features, which is used by the public primarily for open-space recreation and education'. This definition encompasses many different types of parks; they vary mainly in size and content and in the types and intensity of uses to which they are subjected. Definitions of different types of parks are needed to clarify the main purposes for which each one is created, and will help planners, managers, and users of parks.

It is necessary to establish the management aims that apply to areas or zones within parks. Among these, the conservation of native flora, fauna, and other natural features would be an essential part of national and State park management. This should include the identification and strict protection of significant ecological systems as well as the development and use of techniques (including husbandry techniques and population manipulation) to enable species of particular interest to be studied and special values associated with flora and fauna to be maintained or enhanced.

The location and management of areas zoned for intensive recreation will require special care to prevent damage to the environment.

This publication presents recommendations concerning parks in terms of the uses to which the land should be put. Parks have also been placed into categories, according to the scheme of classification suggested below.

The categories are not to be confused with the existing terminology of national park, forest park, etc., which mainly denotes tenure and the managing body rather than the intended uses. For instance, some of the present national parks are more akin in character to a State or regional park than to the national park of nation-wide significance outlined in the classification.

PARK CATEGORIES

National park

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.

The conservation of native flora, and other natural features would be an essential part of national park management. Interpretative services would be provided. Development of facilities would be confined to a very small portion of the park. Activities would largely consist of sightseeing and the observation of natural features. Wilderness zones, which are relatively undisturbed tracts of land used for solitude and wide-ranging forms of recreation, could be designated within a national park.

State park

An area of public land, containing one or more land types, set aside primarily to provide public enjoyment, education and inspiration in natural environments.

State parks should include samples of major land types not already represented in national parks and, as in national parks, the conservation of native flora and fauna would be an essential feature of management. Interpretative services would be provided. Development of facilities would be limited to a very small portion of the park. Activities would largely consist of sightseeing and the observation of flora, fauna and other natural features. Regardless of which authority is the manager, the State parks recommended by the Council are intended to complement the national parks so that together they form a State-wide system.

Regional park

An area of public land, readily accessible from urban centres or a major tourist route, set aside primarily to provide recreation for large numbers of people in natural or semi-natural surroundings.

These parks would be intensively developed for informal recreation and could include road systems. Although natural beauty would enhance their value, closeness to an urban centre is more important than natural attributes. Other uses — such as pump and pumpline sites — may be permitted where they are compatible with the primary use.

PARK MANAGEMENT

It should be emphasised that the parks recommended below will be available for public use. An essential aim in their reservation is to provide for the enjoyment of the public, and therefore public access will be maintained. Indeed, additional access may be provided to interesting areas by way of nature trails and walking tracks.

Council recognizes that wildfires, however caused, must be prevented from threatening life, property, and natural resources in the State. The measures necessary to control wildfires must be taken in parks as in other areas. In all parks the suppression of fires remains the responsibility of the Forests Commission.

In the event of fire in any park, decisions as to the most appropriate course of action required to suppress the fire, and the most appropriate equipment to be used, are the responsibility of the Forests Commission alone. The fire-fighting resources associated with parks are available to the Commission for fire-suppression operations, and are used under the direction of the Forests Commission in conjunction with, and not as a replacement for, the resources of the Commission.

Fire-prevention measures such as maintenance of fire-access tracks and protective burning will also be required in those areas of parks that have strategic importance for fire control.

The particular measures to be taken in individual parks will be incorported in the protection plans prepared by the Forests Commission in consultation with the park manager.

The two organizations that share the duty of fire prevention in rural Victoria — namely, the Forests Commission and the Country Fire Authority — have excellent arrangements for mutual co-operation that have operated successfully for many years.

The control of vermin and noxious weeds within parks will remain the responsibility of the Lands Division.

Public land in this study area includes several areas of regional importance for the production of honey. Where these areas are recommended as part of parks, honey production should be permitted and the number of apiary sites maintained.

Current legal access will continue to be available to freehold land enclosed by any of the recommended parks.

STATE PARKS

Terrick Terrick State Park

This park is situated on the Terrick Terrick Range and contains the largest and most significant area of white cypress pine (*Callitris columellaris*) forest and woodland formation remaining in Victoria. The range, composed of Palaeozoic granite, rises some 100 m above the essentially featureless northern plains and is a major landmark and scenic feature in the area.

Vegetation here prior to European settlement consisted of a mosaic of box eucalypts and white cypress pine woodlands. Some areas contained pure woodlands of box or white cypress pine, while in others a mixture of the types occurred. The vegetation structure of the park today is mostly an open forest - woodland I of white cypress pine, due largely to extensive regeneration of white cypress pine following a wildfire in the 1880s and subsequent silvicultural activities that have reduced the density of yellow and grey box.

Other vegetation communities occurring in the park include: native grasslands dominated by various wallaby grasses (*Danthonia* spp.); and spear grasses (*Stipa* spp.); groves of buloke (*Casuarina luehmannii*); wattle scrub on the granitic hills dominated by *Acacia deanei* ssp. *paucijuga*; open forest - woodland II of grey and yellow box; and areas of white cypress pine containing some grey and yellow box. Understorey vegetation is virtually absent on the granitic outcrops, but the outwash slopes carry native grasses and shrubs, including berrigan (*Eremophila longifolia*) and a number of species of saltbush such as *Atriplex semibaccata*.

The park is a significant relic of the northern plains flora. Prior to settlement and development of the region for agriculture the vegetation types represented in the park were widespread. Some species found here — such as berrigan, hooked needlewood (*Hakea tephrosperma*), desert cassia (*Cassia nemophila*), pimelea daisy-bush (*Olearia pimeleoides*), and small leaved clematis (*Clematis microphylla*) — are at the south-eastern edge of their distribution. Some specimens of slender cypress pine (*Callitris preissii*) occur and the rare woolly cloak fern (*Cheilanthes lasiophylla*) has also been recorded here.

The size of the park, its relative isolation, and its importance as the only viable remnant of the northern plains land type considerably enhance its significance and value for fauna conservation. Its diverse habitats support native mammal and reptile fauna and some 100 recorded species of birds. These include the uncommon bush thick knee, fork-tailed kite, and several species of parrots including a colony of mallee ringnecks. Four resident colonies of the uncommon grey crowned babbler also occur within the park.

The granite outcrops and forest - woodland environments of the park provide a range of recreational opportunities. Mount Terrick Terrick and Regal Rock are popular destinations, and they provide excellent views of the park and the surrounding plains. Other recreational opportunities include picnicking and nature study.

Recommendation

A1 Terrick Terrick State Park

That the area of 2,600 ha shown on the map be used to

(*a*) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments

(*b*) conserve and protect natural ecosystems

that

(*c*) a management plan be prepared for the restoration of the forest to a structure more closely resembling the naturally occurring mosaic of cypress pine and grey and yellow box

(*d*) apiculture be permitted

(*e*) grazing be permitted on such areas and at such times as is considered necessary for management purposes

and that the area be reserved under section 4 of the *Crown Land (Reserves) Act* 1978 and be included in a schedule to the *National Parks Act* 1975 with management plans prepared by the National Parks Service.

Note:
Achievement of objective (*c*) would make quantities of pine timber available from time to time.

Barmah State Park

The Barmah Forest in Victoria and the Millewa Forest Group in New South Wales together comprise a delta-like section of floodplain formed as a result of the interruption of the Murray River course by uplift along the Cadell Fault.

During floods, much of the Murray flow leaves the main channel below Tocumwal forming an extensive temporary lake, resulting in the development of the most extensive area and best example of river red gum forest in Australia. The Council believes that it is important to include in the system of parks at least a portion of such a significant area.

The proposed park includes examples of the range of vegetation types found in the riverine environment. Red gum open forests and woodlands occur throughout and characteristically have a well-developed ground cover of various native grasses, without shrubs.

In its western portion the park contains excellent examples of the more frequently flooded parts of the forest system, and extensive rushlands and grasslands surround the permanent swamps on the Top Island. By contrast, the eastern portion includes examples of the less frequently flooded red gum forests and a number of mixed box woodlands that have developed on slightly elevated sandy ridges that occur throughout the forest. These box ridges also support an interesting and relatively diverse understorey including some species that are rare or uncommon in the Barmah Forest. This component of the riverine ecosystem is poorly represented on public land.

The park also includes frontage to the Murray River and incorporates the existing Ulupna Island Flora and Fauna Reserve and adjoining red gum forest. More than 178 species of plants have been recorded in the Ulupna Reserve, which has not been utilized for timber or grazed as intensively as other areas in the Murray Valley.

Red gum forests and woodlands support the highest faunal species diversity of any habitat in the study area. Species requiring tree hollows for nesting are well represented in the park, the squirrel glider and brush-tailed phascogale being the most significant. More than 100 species of native birds have been recorded and again those requiring nesting hollows are well represented. In addition the park includes a substantial representative sample of the Barmah wetlands — one of ten Victorian sites recently accepted for listing by the Ramsar Convention as "Wetlands of International Importance especially as Waterfowl Habitat".

A major aim of park management is to conserve and protect in a relatively natural state a representative sample of the components making up the red gum forest ecosystem. Grazing by domestic stock is an incompatible use and Council has therefore recommended that it be phased out.

Some of the most popular and heavily used recreation areas along the Murray River are located within the park. Major recreational pursuits include fishing, boating, swimming, walking, horse-riding, and pleasure driving and these activities are usually centred around camp sites established at numerous points along the Murray. A major camping area has been established at Morgans Beach but facilities are limited. In addition, numerous sites along the river are used by small groups of campers and Council believes that dispersed camping in such areas should continue to be permitted in the park.

The Aboriginal people have a long and continuing association with the Barmah Forest and adjacent New South Wales forests, which they consider living examples of Aboriginal cultural heritage and an important part of their ancestral homelands. The park contains relics of Aboriginal occupation such as canoe trees, middens, and other culturally significant localities. The Council believes that local Aboriginal communities should be involved in the preparation of a management plan for the park and that the managing authority should give consideration to the employment of some local Aborigines.

A number of historic sites associated with the river-boat era and early sawmilling activities are also located within the park.

The Barmah and adjoining New South Wales forests have important functions in relation to river regulation and flood mitigation along the Murray. At the same time, the maintenance and productivity of the red gum forest relies on an adequate flooding regime and Council believes this should be a major aim of water management. Some damage to the forest has already occurred due to river regulation and this will increase unless preventive measures continue to be taken in the near future. A more detailed discussion of river regulation and forest management is provided in Chapter D, Water Use and Regulation.

River regulation is governed by the River Murray Commission although the distribution of water throughout the forest can be controlled to some extent by the authorities managing the public land. Consultation between the land managers and the River Murray Commission will be necessary to ensure that the requirements of forest management receive due consideration when decisions concering water regulation are made.

The border between Victoria and New South Wales forms an artificial division of the riverine ecosystem. Together, the Barmah Forest in Victoria and the Millewa Forest group in New South Wales form a major physiographic and cultural unit and the Council believes that it would be desirable for the management of these areas to be co-ordinated.

In particular, the Barmah Lakes in Victoria and the Moira Lakes in New South Wales comprise one of the most significant waterfowl habitats along the Murray River system. These permanent lakes and wetland systems include some important water-bird rookeries and provide habitat for a range of other native animals and plants including extensive moira grasslands. They also form a major recreational focus for many people pursuing water-based recreation activities such as boating, fishing, swimming, and nature study. The Council believes that the Barmah Lakes area should be reserved in order to protect its important conservation values. The New South Wales Forest Commission has also decided to 'preserve' the Moira Lakes area, which will lead to the establishment of a Flora Reserve under the *Forestry Act* of New South Wales. Uses such as timber-harvesting, grazing, and duck-shooting would not be permitted in this reserve.

All components of the riverine ecosystem are represented on public land in Victoria except for the prominent sand ridges supporting box-cypress pine woodlands with an understorey vegetation consisting of common fringe myrtle, wedge leaf hop bush, and a variety of native grasses and herbs. This component is, however, relatively common throughout the adjoining New South Wales forests, and some 50 ha of it is already included in the Sanddune Pine Flora Reserve, which is also part of the system of New South Wales Flora Reserves established under the *Forestry Act*. This reserve therefore has major significance in the system of conservation reserves, in both Victoria and New South Wales, incorporating the various components of the riverine ecosystem.

Recommendation

A2 Barmah State Park

That the area of 7,700 ha shown on the map be used:

(*a*) to provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments

(*b*) to conserve and protect natural ecosystems

(*c*) as part of the river regulation and flood mitigation system of the Murray River

that

(*d*) the Fisheries and Wildlife Division prepare plans for the conservation of wildlife, and these be incorporated into the management plan

(*e*) grazing be phased out by no later than 3 years after the acceptance of this recommendation

(*f*) timber production be phased out by no later than 3 years after the acceptance of this recommendation

(*g*) hunting and use of firearms not be permitted

(*h*) apiculture be permitted

and that it be reserved under section 4 of the *Crown Land (Reserves) Act*, 1978 and be included in a schedule to the *National Parks Act* 1975 with management plans prepared by the National Parks Service.

Notes:
1. Council is aware of the presence of wild pigs and brumbies in the Barmah Forest. Adequate control of such animals, and indeed all vermin and noxious weeds, is essential, both inside and outside the park. The destruction and suppression of vermin and noxious weeds within the park will be the responsibility of the Land Protection Service (Lands Division in the interim structure).

2. The local Aboriginal community should be involved in the preparation of management plans for the area and the opportunities for employing Aboriginal people should be investigated.

3. It will be necessary for the herdsman currently employed to manage stock grazing to ensure, as far as possible, that cattle do not stray into the park.

Warby Range State Park

This park straddles the Warby Range, which extends from Mount Killawarra in the north to Mount Glenrowan in the south, and includes the existing Warby Range State Park.

The granite hills comprising the range rise some 180 metres above the surrounding plain and include a series of rocky prominences, steep escarpments, and eroded plateaux generally increasing in elevation from north to south. Major prominences occur at Mount Killawarra (300 m), Mount Warby (480 m), and Mount Glenrowan (514 m).

Together with the outwash slopes, these hills support a mosaic of open forests and woodlands of Blakely's red gum, red stringybark, and a variety of box species including red box, grey box, and white box. Some areas also contain stands of white cypress pine. Blakely's red gum and red stringybark are regenerating on areas of former farmland purchased by the Crown and now incorporated within the existing State Park.

Significant plants within the park include the northern sandalwood (*Santalum lanceolatum*), western silver wattle (*Acacia decora*), and spur-wing wattle (*A. triptera*), all of which are rare in Victoria and are at the southern limit of their range. The latter two species have their Victorian distribution confined to the Warby Range. The park is also renowned for its springtime wildflower displays.

Among the diverse native animals present, the arboreal mammals are well-represented and include the sugar glider and feathertail glider. The Warby Range is also considered a stronghold for the rare squirrel glider. The rocky outcrops throughout the park support a varied reptilian fauna including carpet snakes and several unique reptiles, such as Burton's snake lizard (until recently, recorded only in the mallee), and the uncommon rainbow skink and black rock skink.

The many habitats found here are also important for a number of significant birds including the uncommon barking owl, turquoise parrot, white-bellied cuckoo-shrike, and black-eared cuckoo.

The park is a popular destination for various recreational activities including pleasure driving, bushwalking, cross-country running, horse-riding, orienteering, picnicking, and nature study. It contains a number of vantage points that afford excellent views of the Eastern Highlands, the Ovens River Valley, and the riverine plains to the north. Several picnic areas have been developed and walking and vehicular tracks lead to various features of interest. Local school groups also use the area for orienteering and environmental education.

The park is close to the Hume Highway and the large population and tourist centres of Wangaratta, Benalla and Yarrawonga. The area is also of value for apiary as it provides a diverse flora and is an important over-wintering site for bee hives.

Recommendation

A3 Warby Range State Park

That the area of 6 640 ha shown on the map be used to:

(*a*) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments

(*b*) conserve and protect natural ecosystems

(*c*) supply water and protect the catchment of the Glenrowan Waterworks Trust

that

(*d*) the Gas and Fuel Corporation operate and have access to a communications installation on Mount Glenrowan

(*e*) the use of the Warby Range fire tower continue for fire detection purposes

(*f*) honey production be permitted

and that the area be reserved under section 4 of the *Crown Land (Reserves) Act* 1978 and be included in a schedule to the *National Parks Act* 1975 with management plans prepared by the National Parks Service.

Note:
Quantities of wood products could be available from time to time as a result of park management activities.

REGIONAL PARKS

The River Murray, which has been called 'Victoria's northern coastline', attracts great numbers of visitors each year. It forms a natural focal point for a wide range of riverine and water-based recreational activities, and is readily acessible from a number of urban centres — Kerang, Echuca, Cobram, Tocumwal, and Yarrawonga — and the intensively developed irrigation farming areas in the region. It is also a popular destination for people living in Melbourne.

The public land abutting the river consists of picturesque river red gum forests and woodlands, wetland areas, billabongs, floodways, and pockets of box forest and has significant scenic recreation and nature conservation values.

Its recreational use on the Victorian side is extremely high and it has been estimated that the area between Rutherglen and Koondrook caters for some 108,000 visitor days and 195,000 camper days annually. Similar recreational usage would be expected on the adjacent New South Wales side of the river. As well, tourism is being actively promoted as a growth industry locally. Echuca's annual River Festival and the opening of the Port of Echuca serve as examples of this growth and it is expected that the level of recreational use along the river will continue to increase.

In order to cater for the present and anticipated increase in demand for recreation on public land abutting the River Murray, Council proposes the establishment of a system of regional parks. These parks vary in size, but each is located close to an urban centre and major tourist routes. They are intended to cater primarily for recreational use in a relatively natural riverine environment. Although physically separated, they should be regarded as a network designed to provide a wide range of recreational opportunities. The management approach for these parks and the recommended River Murray Reserve along the river should also be co-ordinated.

The primary management aim of the parks should be directed towards providing opportunities for a range of river-environment and river-based recreation activities for large numbers of people while maintaining and protecting the scenic and conservation values of the land.

A number of licensed pump sites, pump-line sites, and regulators associated with water management and use occur within the parks and the use of these facilities should be permitted to continue. Current legal access should also continue.

Public land adjacent to the Goulburn River and Lake Victoria within the City of Shepparton is intensively developed for informal recreation. The area of reserved forest adjoining Lake Victoria and still within the city boundary also has potential for recreational development.

Although the Council has no power under the *Land Conservation Act* 1970 to make recommendations on public land within a city, it believes that these areas should be considered as part of the State-wide regional park network established by the Council.

Recommendations

A 4—A 9 That the areas shown on the map and described below be used to:

(*a*) provide opportunities for informal recreation (including camping) in a riverine environment for large numbers of people

(*b*) conserve and protect ecosystems to the extent that is consistent with (*a*) above

and that

(*c*) apiculture be permitted.

(*d*) use of existing and licensed pump and pump-line sites be permitted to continue.

Echuca Regional Park (520 ha)

This park is located upstream of Echuca, which is a major population and tourist centre. It is also in close proximity to the intensively developed irrigation farming areas in the Tongala Irrigation District.

It's forests consist of river red gum open forest III and open forest II, grey box open forest — woodland II, and pockets of black box. The area is also considered valuable habitat for the rare squirrel glider and consideration should be given to this when management plans are prepared.

Among its main features, the park includes the frontage to the River Murray at its confluence with the Goulburn River and also a number of billabongs and floodways. These and other areas throughout the park provide opportunities for picnicking, walking, nature study, fishing, boating, camping, and pleasure driving.

Council is aware that areas of public land within the City of Echuca abut the Murray River. Although the Council has no power under the *Land Conservation Act* 1970 to make recommendations for this land, it believes that these areas should be considered as part of the State-wide regional park network established by the Council.

Recommendation

A4 Echuca Regional Park

That the area of 520 ha shown on the map be used in accordance with the general recommendations outlined above

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

Barmah Regional Park (580 ha)

This park includes frontage to the Murray River between Top Island and Tongalong Island in the Barmah Forest.

The dominant vegetation consists of river red gum open forest III with a grassy understorey. Numerous camp sites, located along the river throughout the park, receive intensive use during the summer months. The park provides opportunities for fishing, boating, swimming, walking, picnicking, nature study, and pleasure driving.

Recommendation

A5 Barmah Regional Park

(*a*) That the area of 580 ha shown on the map be used in accordance with the general recommendations outlined above

that

(*b*) use of this area be co-ordinated with the adjoining Barmah State Park

(*c*) grazing be permitted

(*d*) timber products be available from time to time as a result of developing and managing the park for recreation

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the National Parks Service.

Note:
Grazing is a permitted use in this park as the Council considers it would be impractical to exclude it from this area and at the same time permit it in the adjoining State Forest.

Tocumwal Regional Park (310 ha)

This park consists of two separate areas; one south of Tocumwal, the other including Carters and Labbert's Beaches. It is close to a major tourist road, the Newell Highway.

Its forests consist predominantly of river red gum open forest III, and its main features include the frontage to the Murray River and a number of sandy beaches known as Apex, Mulberry, Pebbly, Finley, Carters, and Labberts. All of these beaches, in particular Carters, are extremely popular camping areas and these and other areas throughout the park provide opportunities for picnicking, walking, nature study, fishing, and camping.

Recommendation

A6 Tocumwal Regional Park

That the area of 310 ha shown on the map be used in accordance with the general recommendations outlined above

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

Cobram Regional Park (570 ha)

This park adjoins the township of Cobram and is readily accessible from the Murray Valley Highway, a major tourist route. The park is also close to the intensively developed irrigated orchard and farming areas around Cobram, which are a noted tourist attraction.

Its forests are predominantly river red gum open forest III, and it also contains several billabongs and floodways. The Public Recreation and Camping Reserve, managed by the Cobram Shire, the Scout Association of Australia's camp site south-east of Cobram, and the Cobram Shire's tourist development of Horse-shoe Lagoon are all included within it. Other features include a number of sandy beaches that are extremely popular for recreation — Dead River, Big Tom's, Little Tom's, Thompsons, Scouts, Scotts, and Horse-shoe Lagoon beaches.

The park provides opportunities for a host of recreational activities including fishing, boating, swimming, camping, picnicking, walking, nature study, and pleasure driving.

Recommendation

A7 Cobram Regional Park

That the area of 570 ha shown on the map be used in accordance with the general recommendations outlined above

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

Yarrawonga Regional Park (390 ha)

This park is downstream of the Yarrawonga Weir and the existing caravan park operated by the Shire of Yarrawonga.

It has a vegetation of river red gum open forest II surrounding several billabongs and floodways. Features include the Yarrawonga common, a very popular area for camping, and the sandy beaches along the river, such as Green Bank, Chinaman's Bend, Forges No. 1 and No. 2, Little Bruces, and Zinettis No. 1 and No. 2 Beaches. These and other areas throughout the park provide opportunities for picnicking, walking, nature study, fishing, boating, camping, and some pleasure driving.

Council notes that the Shire of Yarrawonga has been licensed to occupy some 6 ha of the park for its caravan park extension and this use should continue.

Recommendation

A8 Yarrawonga Regional Park

That the area of 390 ha shown on the map be used in accordance with the general recommendations outlined above

that

(*a*) use of about 6 ha of the area for a caravan park be permitted

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with the management plans prepared by the State Forests and Lands Service.

Lower Ovens Regional Park (1300 ha)

Located at the confluence of the Ovens and Murray Rivers, the park consists of numerous river anabranches, islands, and billabongs created by the impoundment of water behind Yarrawonga Weir. River red gum forests dominate the area. The Murray Valley Highway provides ready access to the park, which is extremely popular with campers. The many waterways and billabongs are popular with fishermen, and they also provide valuable habitat for many species of water birds.

The park provides opportunities for picnicking, boating, nature study, fishing, camping, and swimming.

The Council notes that facilities for camping such as marked sites have already been developed in the area.

Recommendation

A9 Lower Ovens Regional Park

That the area of 1300 ha shown on the map be used in accordance with the general recommendations outlined above

and that it be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

B. REFERENCE AREAS

Reference areas are tracts of public land containing viable samples of one or more land types that are relatively undisturbed and that are reserved in perpetuity. Those concerned with studying land for particular comparative purposes may then refer to such areas, especially when attempting to solve problems arising from the use of land. Reference areas include typical examples of land types that have been modified elsewhere for productive uses such as agriculture, mining, or intensive timber production. The course and effects of human alteration and utilization can be measured against these relatively stable natural areas.

In common with references and standards used in other fields, these areas must not be tampered with, and natural processes should be allowed to continue undisturbed. Reference areas should be sufficiently large to be viable and should be surrounded by a buffer, the width of which would vary according to the activity occurring on the adjacent land. The role of the buffer is to protect the area from damaging or potentially damaging activities nearby. It will also protect important values in the surrounding land from potentially damaging natural processes occurring within the reference area.

Access should be restricted, and experimental manipulation should not be permitted. Setting aside such areas will enable continued study of natural features and processes: for example, fauna, hydrology and nutrient cycling. These studies are important in increasing our knowledge of the ecological laws and processes on which man's survival may ultimately depend.

The preservation of some species in the long term requires the setting aside of areas free from human interference (in the form of productive or recreational use of the land). These areas preserve a valuable pool of genetic material. Man often uses wild species to genetically strengthen inbred races of domestic plants and animals — and the future use of gene pools will probably expand far beyond this.

The *Reference Areas Act* 1978 provides for reference areas to be proclaimed by the Governor-in-Council, and for the Minister to issue directives for the protection, control, and management. An advisory committee, established under the *Act*, will assist the Minister.

The selection of the reference areas listed here is based on current knowledge of the land types in the study area, and additional areas may be needed as better information on ecology and land use problems becomes available.

However, the long history of utilization in the Murray Valley Area has meant the choice of reference areas that are undisturbed and can be adequately buffered is extremely limited.

Recommendations

B1—B3 That the areas listed below and shown on the map:

(*a*) be used to 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

(*b*) be surrounded by a buffer, and that delineation of the buffer be by joint arrangement between the advisory committee and the land manager of both the area itself and of the land adjacent to the reference area

and that

(*c*) 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 in the reference areas listed below cease when these recommendations are adopted.

Note:
Reference areas constitute the only public land from which apiary sites are excluded. The Council believes that no beekeepers are affected by these recommendations.

B1 Top Island (160 ha)

Quaternary alluvial; floodplain with floodways subject to frequent flooding from the Murray River; approximate average rainfall 400 mm; elevation approximately 100 m; open forest III river red gum with understoreys of moira grass, warrego summer grass, and common spike-rush in association and mosaic with swamp wallaby and warrego summer grasses; tall closed grasslands giant rush; grasslands dominated by moira grass.

Management plans are to be prepared by the National Parks Service.

B2 Top End (120 ha)

Quaternary alluvial; floodplain; subject to flooding from the Murray River; approximate average rainfall 400 m; elevation approximately 100 m; open forest III river red gum with understoreys of terete culm-sedge, warrego summer grass and terete culm-sedge in association and mosaic with warrego summer grass and swamp wallaby grass; open forest — woodland II grey box.

Management plans are to be prepared by the National Parks Service.

B3 Warby Range (170 ha)

Upper Devonian granite; plateau steep slopes and gullies; approximate average annual rainfall 600 mm; elevation 220 m–340 m; woodland I Blakely's red gum, open forest—woodland I white cypress pine, and open forest—woodland II of mixed box species (long-leaf box, red box, yellow box, white box) and red stringybark.

Management plans are to be prepared by the National Parks Service.

C. WILDLIFE

Wildlife conservation — a land use in its own right — cannot always be separated from other land uses such as timber production, forest grazing, water production, and recreation. These types of use often require large areas of land, much of which can be managed to retain its value as wildlife habitat. In the long term, wildlife conservation depends upon conservation of habitat covering areas that are sufficiently large and diverse to support genetically viable populations of species.

Animal habitats are generally described in terms of vegetation communities, although other characteristics — such as vegetation structure, ground cover, water depth, salinity, rock outcrops, and hollow trees — are also important. In the study area, animal habitats range from the swamps and river red gum forests of the flood plains to box woodlands on the drier hills. Much of the study area is cleared for dryland and irrigated farmland and these areas too provide important habitat for a number of species of wildlife.

The Vegetation and Primary Production maps of the study area illustrate the diversity of habitats and that much of the public land is concentrated in the riverine regions.

The distribution of an animal species depends on its behavioural and physical requirements for food, shelter, and breeding sites. Many species can utilize a range of habitats and consequently are widely distributed thoughout the area. Some occupy their environmental range as residents. Others, such as certain bird species, are not year-round residents but migrate in and out of the area at regular intervals. Other birds visit the area infrequently in nomadic movements, while yet other species move between high and low altitudes with the seasons. It is obvious therefore that the conservation of fauna presents many difficulties, even for those relatively few species whose life history and behaviour is understood.

Council considers that the Fisheries and Wildlife Division has an important role in the management of the entire area and, by working in close co-operation with the land managers in the formulation of management plans, should ensure that provision is made for the conservation of wildlife. This is especially important for animals that are closely restricted to a particular habitat for feeding and breeding. The squirrel glider, apparently restricted to open forests and woodlands of river red gum and box species, is one such species. The major Victorian strongholds of this animal are in the forests of the Goulburn River, at Killawarra, and the Warby Range.

The activities of man in modifying the natural environment have resulted in changes in the distribution and abundance of many species and some species have become extinct, as documented by the National Museum of Victoria in its 'Report on the Mammalian Fauna of the Murray Valley, Victoria' prepared for the Council. These changes have depended upon the nature and severity of the modification, the particular habitat requirements of the species, and its adaptability to change.

The precise effects on many species, however, are well documented. Council has recommended elsewhere in this report that principles relating to the conservation of fauna be adopted for land uses that could significantly affect wildlife values. The Council considers that further research into the ecological requirements of species is necessary to determine the effects of various land management practices, particularly those where management is oriented towards more competitive uses such as timber production, forest grazing, and intensive recreation. The results of such research may mean the modification of management practices in some areas if wildlife values are to be adequately considered.

The many wetlands of the study area, especially those associated with the Murray River and its tributaries, provide specialized habitat for a large group of birds, fish and crustaceans, and some mammals. They also form important elements of the scenery of the region. A number

of them have been modified by irrigation and drainage works, particularly in the western part of the study area. The use of these wetlands as part of the irrigation system can be beneficial in managing some fish and wildlife resources by retaining water for longer periods. However, irrigation has raised water tables, resulting in the loss of native vegetation in many instances. Drainage works remove excess water and in some cases these works have resulted in the drainage of wetlands, thereby limiting their value as wildlife habitat. In other cases drainage into wetlands has increased the salinity of the water.

The Council realizes that a balance must be achieved between the management requirements for irrigation and drainage and the management that would be optimal for the enhancement of wildlife values. The Fisheries and Wildlife Division and the bodies responsible for water management throughout public land in the study area should, however, in consultation with interested community groups, continue to investigate ways in which the wildlife values and recreational opportunities associated with wetlands can be improved.

Government should give serious consideration to the development of policies and the passage of legislation to ensure adequate allocation of water to the environment to ensure firstly an impovement in the conservation value of the presently degraded wetlands and secondly a maintenance of such values in areas that have survived the significant changes in land use practices since European settlement.

Although some forms of land use are compatible with fish and wildlife conservation, it is necessary to set some areas aside specifically for their conservation, and for developing wildlife conservation techniques.

These areas may be selected for conservation of species that the community harvests. They may contain the habitat of endangered species or they may have specialised breeding grounds or a high species diversity, or be of educational, recreational, or scientific interest. They may also be selected because of their ecological significance for (or regional representation of) a species or faunal association, or for their value as a stop-over for migratory or nomadic species.

Many of the public land lakes and swamps have been cleared — at least partially — of trees, and the majority are grazed. Grazing may need to be excluded from some of these areas for a period to permit regeneration of the native tree species.

In all wildlife reserves the responsibility for the supression of fires remains with the Forests Commission and fire-prevention measures will be carried out where necessary.

Recommendations

C1—C29 That the areas indicated on the map and described below be used:

(*a*) primarily to conserve the habitat of native animals, particularly water birds

and

(*b*) for public recreation and education where this does not conflict with the primary aim

that

(*c*) grazing be permitted at the discretion of the land manager

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the Fisheries and Wildlife Service.

C1 Woolshed Swamp (461 ha)

Intermittent shallow fresh-water swamp fringed by river red gum and yellow box, Parish of Wychitella.

Notes:

1. The stone extraction area in the south-east is excluded from this reserve (see recommendation R5).

2. Council is aware that, in the future, Woolshed Swamp may be required to provide additional off-channel storage capability for the Wimmera-Mallee Irrigation System.

C2 Lake Lyndger (332 ha)

Shallow fresh-water swamp fringed by river red gum and black box, Parish of Boort.

C3 Cemetery Forest (150 ha)

Wetland of tangled lignum with scattered black box comprising the Timber Reserve and Water Supply Reserve south of Allotments 24 and 23, Parish of Kerang. Some revegetation works are required.

C4 Tragowel Swamp (350 ha)

Grassy, fresh-water wetland with scattered black box, Parish of Tragowel. An ibis breeding area. Some revegetation works are required.

C5 Two Mile Swamp (146 ha)

Black box, fresh-water wetland fringed by river red gum, Parish of Tragowel.

C6 Westblades Swamp (73 ha)

Intermittent wetland on the Barr Creek, being Allotment 29B, section F, Parish of Murrabit West.

This area contains only improved pasture and lies in a region with little natural vegetation. Revegetation works would enhance wildlife values.

C7 McDonald Swamp (366 ha)

Wetland containing rushes, reeds, and numerous dead river red gum, surrounded by grassland, Parish of Gannawarra. Some revegetation works are required.

C8 Red Gum Swamp (157 ha)

Wetland containing saltbush, lignum, and numerous dead river red gum trees, Parish of Gannawarra. An ibis breeding area. Some revegetation works are required.

C9 Johnson Swamp (467 ha)

Open fresh-water wetland surrounded by rushes and reeds, and lignum, Parish of Macorna. Some revegetation works are required.

C10 Hird Swamp (350 ha)

Wetlands of rushes and reeds surrounded by lignum, saltbush, and some black box, Parish of Macorna. An ibis breeding area. Some revegetation works are required.

C11 Rowland Reserve (122 ha)

Heathy wetland of saltbush with some black box and dead trees, being the Water Supply Purposes Reserve west of allotment 42, section B, Parish of Macorna. Some revegetation works are required.

C12 Flannery Reserve (53 ha)

Wetland of lignum with some black box and dead trees, being the Timber and Water Reserve — allotment 48, section B, Parish of Macorna. Some revegetation works are required.

C13 Swamp (48 ha)

Open fresh-water wetlands with black box and tangled lignum surrounded by grassland, being the Water Reserve west of allotment 27, section 5, Parish of Turrumberry North. Some revegetation works are required.

C14 Baillieu Lagoon (168 ha)

Open fresh-water billabong containing dead trees surrounded by rushes and reeds, with river red gum, callitris, grey box, and black box in the hinterland, located adjacent to the Murray River in the north of the Parish of Turrumberry North. Some revegetation works are required.

Note:
Legal access to private property adjacent to this area should be permitted.

C15 Murphy Swamp (61 ha)

Fresh-water wetland comprising rushes, reeds, and grassland, being the Water Supply Reserve west of allotment 8, section 2, Parish of Turrumberry North. Some revegetation works are required.

C16 Gemmill Swamp (173 ha)

Semi-permanent fresh-water wetland comprising rushes and reeds with a river red gum forest and some yellow box to the north, Parish of Mooroopna. A wide range of bird species have been identified in this area, and several rare species breed here.

C17 Reedy Swamp (224 ha)

Open fresh-water swamp, receiving water from both the Goulburn River and irrigation drainage, surrounded by reed beds, river red gum, and some grey box, Parish of Shepparton.

C18 Black Swamp (Nine Mile Creek) (34 ha)

Shallow, permanent fresh-water wetland in a natural floodway containing rushes and reeds and with a number of dead trees, being the Water Reserve south of allotment 23, Parish of Drumanure. An important ibis breeding area. Some revegetation works are required.

C19 Gum Swamp (16 ha)

Portion of a shallow fresh-water wetland with river red gum, being Crown land south of allotment 18A, section D, Parish of Karramomus.

C20 McBurney Swamp (33 ha)

Shallow fresh-water swamp with river red gum, being allotment 92A, Parish of Tamleugh. An ibis breeding area.

C21 Lehmann Swamp (65 ha)

Shallow fresh-water swamp with river red gum, being allotment 32A, Parish of Tamleugh. Both the squirrel glider and feather-tail glider have been observed in this area.

C22 Shire Dam Swamp (25 ha)

Shallow fresh-water swamp with river red gum and grey box, being the Water Supply Reserve, allotment 20A, Parish of Tamleugh.

C23 Jubilee Swamp (147 ha)

Shallow fresh-water wetland with river red gum in the Parishes of Wills and Upotipotpon.

C24 Morphett Swamp (22 ha)

Fresh-water wetland with river red gum, Parish of Upotipotpon. An important ibis breeding area.

C25 Moodie Swamp (198 ha)

Intermittent fresh-water wetland fringed by river red gum and grey box, comprising allotment 13B of section A, and allotments 31, 31A, 31B, and 31C of section B, Parish of Waggarandall. Brolga have been sighted in this area.

C26 Tungamah Swamp (146 ha)

Intermittent fresh-water wetlands with river red gum and fringed by grey box comprising the 'Swamp' and 'Lagoon', section A, Parish of Tharanbegga.

Note:
The two wetlands are linked by a strip of public land that has been cleared of native vegetation; this should be revegetated with endemic tree species.

C27 Rowan Swamp (430 ha)

Intermittent shallow open water with grassy wetlands surrounded by red gum woodlands with grey box and yellow box to the west. This area includes land in the Parishes of Karrabumet and Bungeet. Brolga have been sighted here. Some revegetation works are required in this portion of this area.

C28 Dowdle Swamp (291 ha)

Modified fresh-water wetland comprising river red gum (in places replacing box species where levee works have raised the flood level resulting in the death of these trees) fring-

ed by grey box and yellow box, in the Parishes of Yarrawonga, Pelleubla, Bundalong, and Boomahnoomoonah. An important ibis breeding area. Some revegetation works are required.

C29 Black Swamp (Black Dog Creek) (126 ha)

Fresh-water wetland with river red gum, being the Timber Reserve and allotment 71C, Parish of Boorhaman.

WILDLIFE MANAGEMENT CO-OPERATIVE AREAS

Some areas have high values for wildlife conservation as well as capabilities for other uses. Where land tenure and management are orientated towards the other uses, special consideration will need to be given to the protection of the wildlife values. This will require some modification of the aims of management and can be achieved by co-operation between the responsible authorities and the Fisheries and Wildlife Division.

In order to provide for the best use and management of such areas that are important also for wildlife, it is proposed that they be declared wildlife management co-operative areas under the provisions of the *Wildlife Act* 1975. A management plan for each area will be necessary in order to ensure that the wildlife values are adequately protected. The plan would maintain the jurisdiction of the respective government departments and agencies over the area and the activities that take place within it.

Recommendations

C30—C32 That the areas described below and indicated on the map be used for the conservation of wildlife, water management, provision of forest products, grazing, apiculture, and recreational activities

that

in order to protect the wildlife values associated with each area, the Fisheries and Wildlife Division prepare a management plan in consultation with the appropriate government departments with responsibility for various activities associated with the area, and then submit the plan to them for agreement

and that these areas be declared Wildlife Co-Operative Areas under the *Wildlife Act* 1975.

C30 Kanyapella Basin (2,581 ha)

This is a flood drainage basin receiving a high proportion of its water from irrigated pastures. The area contains predominantly river red gum forest surrounded by grassland. A system of earthworks has been constructed to allow the pondage and movement of water for waterfowl management purposes and to provide, artificially, as much diverse habitat as possible without threatening the future survival of trees by prolonged flooding. Some revegetation works are required in portion of this area.

C31 Loch Garry (687 ha)

The area comprises part of the Loch Garry State Forest and is contiguous with other State Forest areas along this portion of the Goulburn River. It is a semi-permanent billabong on the flood plain of the Goulburn River, surrounded by a forest of river red

gum, yellow box, and grey box, and bounded by a levee bank constructed to protect adjacent farmlands from floodwaters. The wetlands and surrounding forest provide valuable habitat for a large number of animal species, and provide forest grazing and recreation, while the regrowth forests have the potential to produce a range of timber products; the whole area is used as pondage to regulate floodwaters.

C32 Big Reedy Lagoon (285 ha)

Big Reedy Lagoon is a large intermittent lagoon carrying rushes, reeds, and moira grass fringed by river red gum open forest III. The lagoon and adjacent river red gum forests provide valuable feeding and breeding habitat for large numbers of water bird species.

D. WATER USE AND REGULATION

WATER PRODUCTION

The study area lies within the Murray–Darling drainage system and contains the lower reaches of five major drainage basins — the Ovens, Broken, Goulburn, Campaspe, and Loddon. In comparison with the rest of the State it does not produce a significant quantity of surface water, although the amount is considered enough for domestic use and dryland farming in most years. By contrast, however, the Murray Valley area utilizes a substantial amount of the State's irrigation water.

The area also has a significant groundwater resource, which is used for irrigation, stock, and domesic purposes.

Catchment management and use.

None of the catchments in the Murray Valley area is used solely for water production. The catchments are subject to a variety of land uses, including recreational activities, timber production, and agriculture on open farmlands.

Land use planning

Only one proclaimed catchment exists in the study area — the Glenrowan Service Reservoir Catchment.

No land use determinations have been made for any catchment there, nor are any currently being prepared by the Soil Conservation Authority.

The Council maintains that the Authority should investigate all domestic water supply catchments within the study area and, where appropriate, these will be recommended for proclamation by this Council, in order to ensure a uniform procedure for land use planning within these areas.

A. Catchment land

Recognizing that the prime water-producing areas of the State coincide with the principal mountain and forested areas, and that these areas together with inland water bodies form major attractions for recreation, the Council believes that, in many areas, catchments can be managed for a range of uses consistent with the provision of adequate protection of the water resources. Recreational use of storages where it is permitted, must be carefully controlled to ensure adequate protection of water quality, and responsibility for this must remain with the water supply authority.

The Council realizes that the optimum combination of land uses for catchments will vary from one land type to another; a particular use that may not impair the quantity, distribution, or quality of water yield in one instance may have a profound effect in another. Changes in land use, which could detrimentally affect the quality, quantity, or distribution of water supplied from a catchment, should only be made following full consideration of the benefits and disadvantages associated with the various land use options. These considerations should take account of the interests of the groups likely to be affected by any changes as well as broader regional and State-wide issues.

Where there is a multiplicity of uses in a catchment supplying water used for power generation or for domestic, industrial, or irrigation purposes, the catchment should be proclaimed under section 5(1) of the *Land Conservation Act* 1970 and section 22(1) of the *Soil Conservation and Land Utilization Act* 1958.

After proclamation, and following consultation with the Land Conservation Council, the Soil Conservation Authority may make a land use determination for a catchment. This specifies the most suitable uses of all land in the catchment, and includes delineation of protective strips around storages and along major watercourses.

Council believes that in most situations it is not necessary for a water supply authority to control and manage all land in its water catchment. Authorities with management responsibilities within a proclaimed catchment should be conscious of the implications of management decisions on water production and should consult, co-operate, and reach agreement with the water supply authority and the Soil Conservation Authority regarding the type, location, and timing of management activities.

B. Buffer zone

The water supply authority should control and manage a buffer zone (defined in the land use determination) around storages and diversion works. This buffer zone is separate from the protective strips along watercourses, which, although important for water supply protection, would not by themselves form a manageable unit.

In addition the water supply authority should control and manage the storages and the areas on which capital works are situated, together with any other areas that may be needed for efficient management.

Each catchment and water supply system has individual characteristics and the determination of the buffer zone will need to take account of these differences. In determining the extent of the buffer zone, consideration should be given to factors such as ground slope, soil type, vegetative cover, adjoining land use, type of facilities available for treating the water, end-use of water, detention time in the storage, and the need to control public use of the storage and its immediate surrounds. The buffer zone should be large enough to reduce entry of most pollutants into the storage by way of filtration of overland flow, absorption through the soil, and assimilation in watercourses. The desirability of the buffer zone being a practical management unit should also be taken into account.

In some instances it may not be practical for the water supply authority to manage all, or part, of the buffer zone. In such cases agreement should be reached between the adjacent land manager and the water supply authority at the time of a land use determination. The agreement may include leaving the management of the buffer zone with the adjacent land manager on the basis that it would be managed with the prime object of protecting the water quality.

Water quality, yield, and regulation

It is possible to improve the quality of water by partial or complete treatment — at a cost. It must, however, be recognized that the higher the original quality of the water, the cheaper and more efficient is the treatment and, in most cases, the more acceptable the end product.

In many catchments it is already difficult to maintain existing water quality. This problem is likely to become even greater as pressures to allow various forms of land development and use of natural resources increase. Even with properly planned and controlled land use in

catchments it is probable that many water supply authorities will consider it necessary to at least disinfect water supplied from their storages. Indeed, many authorities already employ such treatment. Council recognizes that a number of water supply systems need some form of treatment now and that the others will need to consider some form of treatment in the future. In order to provide for this requirement Council believes it is important for the government to establish long-term policies to maintain water supply of a satisfactory quality.

It is also vital to safeguard the quantity and timing of yield. Catchments must be protected from loss of infiltration capacity, damage to other hydrologic properties, soil erosion, and contamination from chemical or biological sources.

Proper management of land uses within catchments is extremely important and recognition must be given to the need for high levels of protection, particularly in the ecologically sensitive areas. Values such as water yield, quality, and flow regime must be of major concern when implementing recommendations for public land within catchments. The Council recognizes the need for research to provide additional information that can be used in formulating management guidelines.

Additional water needs

Future water needs for domestic, stock, and irrigation purposes may require the construction of additional water storages. In the planning for these, the possible effects of the storages and their water releases on the ecosystems in the vicinity (in particular the effects on fish and wildlife habitat downstream) should be determined and taken into account.

The Council appreciates that it will probably be necessary to develop additional facilities associated with such schemes, but cannot make specific provision for those developments until definite proposals are made. Their environmental effects should be assessed before proceeding. In most cases an Environment Effects Statement is now required as part of the planning of any new major storage.

Recommendations

D1 That for the Glenrowan Service Reservoir shown on the map (this location being within a catchment for which no land use determination has been made), the present tenure and management of public land continue for the time being

and that, once a land use determination has been made, the following areas:

(i) the storage area

(ii) diversion works

(iii) associated facilities

(iv) the buffer zones around diversion works and storages, as defined in the land use determination

(v) any other allotments considered necessary

be used for

(*a*) water supply purposes

(*b*) other activities permitted by the water supply authority after consultation with the Soil Conservation Authority and the Environment Protection Authority

and that the area be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 for water supply purposes, and be managed by Glenrowan Water Board.

Notes:

1. The primary object of management of the buffer zone must be to protect water quality. Subject to this principle, the water supply authority may permit other secondary uses in the buffer zone. In such cases the principles of management must be agreed upon by that authority and any other authorities concerned.

2. In some instances it may not be practical for the water supply authority to manage all or part of the buffer zone. In such cases agreement should be reached between the adjacent land manager and the water supply authority at the time of land use determination. The agreement may include leaving the management of the buffer zone with prime object of protecting the water quality.

3. The Council considers that fossicking and prospecting under a Miner's Right should not be permitted on land under the control of water supply authorities, around storages and facilities, etc.

D2—D50 That in the case of the off-river storages and water supply installations, shown on the map and listed below, or channels (not individually listed), these and their associated reserves remain under existing tenure and control.

Notes:

1. Several hundred water installations located on public land are scattered throughout the study area. These occupy small areas and carry water towers and the like. They are not shown on the map and Council proposes that their existing tenure and control should continue.

2. The Council considers that fossicking under a Miner's Right should not be permitted on land reserved for water supply purposes, around storages and facilities, etc., or adjacent to water distribution channels.

D2 Pump and storage, Gordon Water Board (see note)

D3 Kerang Weir, State Rivers and Water Supply Commission

D4 Koondrook Weir, State Rivers and Water Supply Commission

D5 Pump on Gunbower Creek, Shire of Cohuna

D6 Cohuna Weir, State Rivers and Water Supply Commission

D7 Pump on Gunbower Creek, Shire of Cohuna.

D8 Gunbower Weir, State Rivers and Water Supply Commission

D9 Turrumberry Weir, State Rivers and Water Supply Commission on behalf of the River Murray Commission

D10 Campaspe Weir, State Rivers and Water Supply Commission

D11 Pump on Campaspe River, Rochester Water Board

D12 Pump and storage, Deakin Water Board

D13 Pump and storage, Town of Kyabram (see note)

D14 Pump and storage, Deakin Water Board

D15 Pump on Murray River, Shire of Nathalia (see note)

D16 Kennedy's Weir, State Rivers and Water Supply Commission

D17 Shiers Weir, State Rivers and Water Supply Commission

D18 Hardings Weir, State Rivers and Water Supply Commission

D19 Lucke's Weir, State Rivers and Water Supply Commission

D20 Pump, Shire of Nathalia

D21 Bulls Weir, State Rivers and Water Supply Commission

D22 Chinamans Weir, State Rivers and Water Supply Commission

D23 Pump and Weir on Broken Creek, Shire of Nathalia

D24 Pump and storage, Rodney Water Board (see note)

D25 Pump and storage, Rodney Water Board (see note)

D26 Pump on Goulburn River, Mooroopna Water Board

D27 Pump on Goulburn, Mooroopna Water Board

D28 Pump on Broken Creek, Shire of Numurkah

D29 Pump, Shire of Numurkah

D30 Borehole pump and storage, Shire of Numurkah

D31 Katandra Weir, State Rivers and Water Supply Commission

D32 Pump and storage, Shire of Cobram

D33 Pump, Tungamah Shire Water Board (see note)

D34 Pump and storage, Shepparton Water Board

D35 Gowangardie Weir, Shepparton Water Board

D36 Casey's Weir, State Rivers and Water Supply Commission

D37 Pump and weir on Broken Creek, Goorambat Water Board

D38 Bailey's Weir, State Rivers and Water Supply Commission

D39 Pump and weir on Back Creek, Devenish Water Board

D40 Pump, Tungamah Shire Water Board (see note)

D41 Waggarandall Weir, State Rivers and Water Supply Commission

D42 Reilly's Weir, Tungamah Water Board

D43 Ryans Weir, Tungamah Water Board

D44 Pump on Boosey Creek, Tungamah Shire Water Board (see note)

D45 Yarrawonga Weir, State Rivers and Water Supply Commission on behalf of the River Murray Commission

D46 Pump on Murray River (Lake Mulwala) Shire of Yarrawonga (see note)

D47 Pump on Murray River, Rutherglen Water Board

D48 Storage basin, Rutherglen Water Board

D49 Dam on Diddah Diddah Creek, Springhurst Water Board (see note)

D50 Rices Weir, State Rivers and Water Supply Commission

Note:
With the government's restructuring of the urban water sector either these new Authorities or the relevant municipal bodies will assume responsibility for administering the water supplies to the respective towns on 1 July, 1984.

Drainage

The State Rivers and Water Supply Commission currently controls a number of locations in the Murray Valley area for drainage and floodway-protection purposes. These areas are integral parts of the Commisison's regional irrigation drainage and flood-protection works and Council believes that these uses should continue and that they should remain under existing tenure and control.

Recommendations

D51 — D54 That the areas described below and shown on the map be used to facilitate regional drainage and flood protection.

D51 Kerang Evaporation Basin

A natural basin used to dispose of drainage water from the Kerang experimental area, known locally as Dry Lake.

D52 Beattie Depression Floodway

Note: Council believes that where practicable a tree planting program should be commenced on this area to enhance its landscape value.

D53 Kanyapella Flood Protection Area — Warrigal Creek

D54 Ardmona Depression, being allotment 67B, the eastern portion of allotment 30A, and the Water and Camping Reserve east of allotment 30A, Parish of Mooroopna. Used by the Water Commission as a flood-retarding basin.

Irrigation storages

The storages listed below are important elements of the Goulburn — Murray irrigation system. Some are also important because they supply domestic water to townships, either directly or via Water Commission irrigation channels emanating from the storages. Waranga Basin supplies Rushworth; Lake Mulwala supplies Yarrawonga. The townships of Boort, Girgarrie, Tongala, Katamatite, Kyabram, Merrigum, Barmah, Picola, Nathalia, Rochester, Tatura, Katandra West, St. James, and Tungamah are also supplied via a distribution system of irrigation channels.

Flood mitigation is an additional but important role of these storages. They also have significant values for fish and wildlife conservation, and accordingly, in managing them, the land manager should consult with the Fisheries and Wildlife Division.

Council also recognizes that these storages — especially Lake Mokoan and Waranga Basin — are major attractions for water-based recreation involving such activities as fishing, duck-hunting, sail-boating, rowing, and swimming.

Council believes that native tree planting programs should be initiated, where appropriate, on the foreshore land surrounding these storages to enhance their nature conservation and recreation values.

Currently the public is allowed free pedestrian access around the storages' foreshore land, some of which is held under grazing licences by adjoining landholders. However, camping is not allowed on this foreshore land except at a number of specified sites or at specified times such as the first two weeks of the duck season. This does not cater for those people who prefer more informal camping at sites with few facilities, if any. To meet this demand, Council considers that the land manager should allow informal camping at selected locations around the storages where it does not conflict with conservation or water supply values.

Recommendations

D55—D59 That the areas listed below and shown on the map be used for

(a) storage and distribution of water for irrigation and domestic purposes and flood mitigation

(b) nature conservation and recreation to the extent consistent with (a) above

that

(c) native tree planting programs be initiated to enhance nature conservation and recreation values

(d) occupancies, licensed pump stations, and grazing continue at the discretion of the land manager consistent with (a) above and that no further exclusive occupancies be permitted on public land surrounding these storages and that these areas be reserved under section 4 of the *Crown Land (Reserves) Act* 1978 for water supply purposes.

D55 Kow Swamp (2,275 ha)

Notes:

1. Bank erosion is a significant problem around this storage. The State Rivers and Water Supply Commission is currently undertaking a work program to remedy this situation.

2. Kow Swamp is currently a wildlife Sanctuary.

D56 Green Lake (278 ha)

Note:
Reference is made to the southern portion of Green Lake in the Final Recommendations for the North Central area (Recommendation D53).

D57 Waranga Basin (870 ha)

Notes:
1. Reference is made to the western portion of the Waranga Basin in the Final Recommendations for the North Central Area (Recommendation D50).

2. Management of the storage should take account of the basin's fisheries values.

3. Uses on and adjacent to the storage should be such that they do not adversely affect the domestic water supply that is drawn from this storage.

D58 Lake Mokoan (8,500 ha)

D59 Lake Mulwala (1,360 ha)

Notes:
1. The present use and management of two areas abutting Lake Mulwala known as the Yarrawonga Foreshore Area and Lake Mulwala Recreation Area should continue.

2. Uses on and adjacent to the storage should be such that they do not adversely affect the domestic water supply that is drawn from this storage.

RIVER MURRAY REGULATION AND FOREST MANAGEMENT

Red gum forests along the River Murray and its major tributaries are a major source of durable species timber, provide a unique range of habitat for native flora and fauna, and form significant flood pondage areas. They are also used for a range of activities including grazing, apiculture, sand extraction, and a variety of recreational pursuits including camping, fishing, swimming, boating, and pleasure driving. In addition, the riverine forests comprise the major blocks of public land and are a major landscape feature. The Council believes that these forest values must be protected and that it is therefore essential to maintain the forest ecosystem. This depends upon an effective winter — spring flooding regime and the absence of summer flooding. Some damage to the forest has already occurred due to river regulation and this will increase unless preventative measures are taken in the near future.

Forest flooding requirements

The average annual rainfall of 250 — 450 mm in the Murray Valley is insufficient to sustain the vitality of the red gum forests. These depend heavily on additional water supplies from natural flooding in later winter and spring followed by low river levels in summer and autumn, which allow flood-waters to drain away.

The red gum forests have evolved under a pattern of flooding characterized by:

* a regular winter — spring flooding of sufficient duration in the majority of years to stimulate regeneration and growth of trees and associated plant communities, to provide suitable wildlife habitat (particularly for water birds), and to recharge the subsoil to ensure adequate soil moisture over summer and autumn

* a late spring — early summer recession of flood-waters, which facilitates seedling establishment and provides favourable feeding and breeding habitat for many water birds that nest in spring or continue to nest through summer in low-lying areas

This regime is necessary to sustain tree growth on flood-plains in low-rainfall regions. Here, growth occurs early in the growing season, when water is readily available, and ceases towards the end of summer, when moisture is depleted. Peak dissemination of tree seed also occurs in spring. Furthermore, most water birds require floods of between 2½ to 3 months' duration for breeding purposes. They need this period to ensure that they can successfully complete the cycle of courtship through to the rearing of fledgelings. Floods of a lesser duration usually result in failure and abandonment of nests or fledgelings and the subsequent death of fledgelings by starvation or predation.

Any changes in river management affecting the natural pattern of forest flooding have the potential to greatly affect the vitality and long-term conservation of the red gum ecosystem.

Effects of river regulation on forest flooding

Intensive development of irrigation schemes in the Murray Basin, particularly since construction of Hume Dam in 1934, has required a substantial increase in summer stream flow. Long-term records at Tocumwal show that stream flow for the months of December to May inclusive amounted to about 20% of the annual average for the period 1895-1933; since then, the release of stored water has increased this to about 30% for the period 1934-1983.

High river levels in summer and autumn, compounded in some years by the rejection of water by irrigators due to unexpected rainfall in irrigation areas, have increased the volume of water entering Barmah Forest via floodways. The increased flow, together with periods of natural flooding, has led to some low-lying areas of forest being more or less constantly inundated. These conditions have inhibited the establishment of regeneration on affected areas, killed some mature red gum stands, and caused deterioration of other stands over hundreds of hectares. Unseasonal flooding has also been deterimental to other forest activities, including tourism (camping, sightseeing), fishing, apiculture and grazing.

Flow-carrying capacity of the River Murray between Tocumwal and Echuca, especially downstream of the Edward River offtake — known as the Barmah 'choke' — places an important constraint on river regulation of the Murray. In recognition of this constraint, regulators were constructed on major effluent channels between 1939 and 1959 to exclude water from the Barmah Forest during the irrigation season.

Water is naturally excluded from floodways along the river banks bordering the flood-plain forests until stream flow exceeds about 6,000 ML a day at Tocumwal, and may be excluded at the discretion of irrigation authorities until the daily flow exceeds about 11,000 ML. At this stage water is declared surplus and effluent regulators are usually opened to prevent over-topping of the natural banks along the flood-plain and to minimize bank erosion. When sustained flows exceed 18,000 ML a day, control by regulators is lost in both Victoria and New South Wales. Consequently, banks bordering the flood-plain are over-topped and forests areas function as natural flood-control reservoirs.

For several years some summer flows have exceeded 11,000 ML per day, but the regulators have been kept closed to avoid substantial losses of water for irrigation projects downstream. This situation, coupled with the cancellation of planned diversions of water due to local summer rain, has caused unseasonal flooding in some low-lying areas of forest via unregulated floodways.

Progressively increased regulation has also reduced the frequency, duration, and extent of forest flooding in winter — spring. Examination of stream-flow data and intensive investigations into forest flooding over the period 1961 to 1966 have indicated that an averge daily flow of

some 24,500 ML maintained at Tocumwal for about 30 days results in about 85% of the Barmah Forest being inundated. This is referred to below as an 'effective' flood. It does not necessarily guarantee the required depth and duration of flooding to satisfy all the requirements of the red gum ecosystem. Provided subsequent flows exceed 18,000 ML a day for a similar period before flood-waters drain and/or evaporate away, however, it does meet the essential criteria for sustaining tree production and growth and for water bird habitat. Flows of the magnitude identified above (approximately 1.2 million ML over a 2-month period during winter — spring) are necessary to maintain river levels high enough to allow gravity flow into the forest via effluent creeks and overbank flows. An 'effective' watering of the Barmah — Millewa red gum forests as described above, however, only requires a consumptive use of about 100,000 ML. The remaining flow returns to the river system and may be available for use further downstream in some circumstances. In dry years much of the required flow would need to be provided through the release of stored water for irrigation during the following irrigation season. The winter — spring flooding problem is therefore one of meeting the necessary forest watering requirement without significantly reducing irrigation supplies.

Based on the flooding criterion established above, the forest was effectively watered in 40 out of 48 years between 1886 and 1933 (before Hume Reservoir affected the natural flow). Since that time, the forest has been effectively watered in only 30 out of 50 years. Stream-flow profiles illustrating estimated natural flows between 1934 and 1983 show that, in the absence of regulation by Hume Reservoir, an effective watering would have occurred on nine additional occasions — namely, 1937, 1941, 1958, 1962, 1963, 1965, 1968, 1976 and 1980.

It is expected that construction of Dartmouth Dam with the greatly increased storage capacity this provides, will further reduce winter — spring flows of the order required for effective flooding of the riverain red gum forests, even in the more easily flooded reach of the river between Tocumwal and Echuca, in all but years of well-above-average rainfall in the catchments. Sustained dry periods will have a marked effect on regeneration and growth and on water-bird habitat and also favour a build up of defoliating insects, particularly the gum-leaf skeletonizer.

Possible Management Measures

River Murray Commission

In June 1980, the River Murray Commission (RMC) prepared a Review Report setting out proposed measures for overcoming the interrelated problems of forest and water management along the River Murray between Tocumwal and Echuca.

These can be grouped under two main headings — non-structural and structural measures.

Non-structural measures (involving modification of operating procedures for Murray storages):

— maintenance of higher storage in Lake Victoria

— review of the rules governing the rate of rise and fall of the River Murray below Hume Dam

(Both of these would reduce the incidence of unseasonal summer flooding.)

Structural measures (involving modification to existing works or the construction of new works):

— improvement of the capacity of the river channel between Tocumwal and Echuca by selected desnagging and restoration of natural levees to carry a regulated flow of 11,000 ML a day

— provision of a bypass around the limited channel capacity section to route part of the flows required downstream. This could include the use of Mulwala Canal and a number of creeks which return to the Murray further downstream

— construction of additional storages, en-route or off-river, or enlargement of the capacity of existing storages

— for forest-watering — enlargement of the diversion capacity of existing regulators, construction of a removable river weir, or installation of a pumping scheme to lift water from the river into the forest runners

(The first two of these measures would assist in reducing the incidence of unseasonal summer flooding; the third and fourth would assist in providing for a more adequate winter — spring watering of the river red gum forest.)

In particular, preference was given to four principal proposals on which work has already commenced. Progress on implementing these proposals is set out in a Public Information Statement by the River Murray Commission, dated October 1983, and is summarized below.

Replacement of regulators

A continuing program of progressive replacement of the offtake regulators within the Barmah — Millewa forest has been in progress since 1977. These prevent the flow of water into the forest areas during periods of high flow of the Murray in summer. To date, the Gulf regulators have been replaced and also those at Boals Creek, Big Woodcutter Creek, Sapling Creek, Paddock Creek, and Little Woodcutters Creek. It is proposed to replace the regulators at Island Creek in 1984/85 and Sandspit Creek in 1985/86.

Mulwala Canal bypass

The River Murray Commission has concluded satisfactory arrangements with the Water Resources Commission of New South Wales, the owner of Mulwala Canal, for the use of the canal to transfer flows from Yarrawonga to the Edward River and back to the Murray. This will assist in reducing the frequency and intensity of summer flooding of the Barmah — Millewa forests. These works commenced in 1983 and are to be carried out progressively over the next 3 years.

River channel works

A program has been established to provide for the removal of selected snags that obstruct the flow in the most restricted channel section through the forest area. Work has already been completed over a distance of about 14 km downstream of Picnic Point.

Restoration of levees

The object of restoring critical low sections of the natural levee system is to avoid local breakouts and improve the hydraulic capacity of the river channel. The strategy is essentially one of restoration of the natural conditions and is not aimed at any artificial increase in carrying capacity. These works have been deferred because of a shortage of funds in 1983/84.

The River Murray Commission is aware that, in addition to the present combination of proposals, it may need to introduce other alternatives to obtain the best long-term solutions. For this reason, it is giving further consideration to the following:

— the construction of an off-river storage by development of the Benanee Lakes Group, which adjoins the Euston Weir Pool

— modification of the operating policies for the release of water for irrigation and water supply to reduce the incidence of summer flooding and improve winter — spring flooding without any significant reduction in irrigation supplies

— the construction of a new off-river storage at Lake Kilnyana near Mulwala, N.S.W., and the construction of a removable river weir in the River Murray to raise water levels to enable existing forest regulators to achieve diversions to the forest

Studies on the feasibility of these proposals will be undertaken as funds permit.

Victorian State Working Group

A Victorian State Working Group was formed in 1979 and comprises officers from the State Rivers and Water Supply Commission and the Forests Division. To date, the Working Group has concentrated on examining alternative measures for restoring winter — spring flooding of the Barmah Forest.

Specific structural measures being investigated include a removable river weir, a pumping scheme, and distributory works within the forest. To date, engineering and economic aspects of these alternatives have been examined and comprise:

* computer simulation studies to determine the availability of water supplies to New South Wales, Victoria, and South Austalia as a result of deliberate forest-watering policies

* topographic surveys to analyse the characteristics of water movement and to evaluate distribution works throughout the forests

* economic evaluation of annual benefits from the forest under 'pre-Hume' conditions

The Council endorses the work being done by this Group as it believes that a solution to the winter — spring flooding problem is urgently required in order to maintain the viability of the red gum forest ecosystem.

A progress report prepared by the Parliamentary Public Works Committee on Water Allocations in Northern Victoria Inquiry stated that the Dartmouth Reservoir will increase the Victorian water allocation by 600,000 ML. Of this, 270,000 ML had previously been allocated to irrigators, leaving a total of 330,000 ML. The Committee recommended that 45,450 ML be allocated for expansion in urban water supply requirements up to the year 2000 and an interim allocation of 25,000 ML be available for use by the Fisheries and Wildlife Division to maintain waterbird habitat in a number of wetlands. It also recommended a further interim allocation of 65,000 ML for irrigation by private diversion.

The Committee further recommended that the remaining 195,000 ML available to Victoria should not be allocated until studies in progress concerning dilution flows and forest watering are completed. The Committee's work has now been taken over by the Joint Parliamentary Select Committee on Salinity, and it is expected that decisions on further River Murray water allocations will be made by the end of 1984. In addition, a review of policies and procedures with respect to the allocation, supply, use, and pricing policies for irrigation water is being undertaken as part of the State Water Plan.

Council supports the Committee's recommendations, but considers that a least a proportion of the remaining unallocated water be set aside specifically for forest-watering during the winter — spring period. This measure, in association with other engineering works described above, could lead to an improvement in forest-watering without any significant reduction in irrigation supplies.

Recommendations

D60 That the government, through its representative on the River Murray Commission, stress the importance of protecting the red gum forest ecosystem from unseasonal summer and autumn flooding and that the measures designated to alleviate this problem be implemented as a matter of urgency.

D61 That steps be taken to provide for adequate winter — spring watering of the River Murray forests and various engineering and management solutions be pursued in order to achieve this

and that

D62 water from Victoria's share of the River Murray resource be allocated specifically for winter — spring forest-watering, including portion of the currently unallocated water from the Dartmouth Reservoir.

ASPECTS OF SALINITY AND PUBLIC LAND USE IN THE MURRAY VALLEY

Land salinization is a serious problem in the Murray Valley area and is expected to worsen in the future unless suitable control measures are taken. Its occurrence stems, essentially, from the rise of saline groundwater to within a metre or so of the natural surface. This rise follows either extensive land clearning (in the case of dryland salting) or the introduction of large-scale irrigation (in the case of salting in irrigation areas).

The accumulation of toxic levels of salt in the soil that results from high groundwater levels threatens both dryland and irrigated farming areas. Land salinization is insidious, as the first sign is often an indication of a much larger problem affecting the property or district.

While dryland salting has caused scattered tree deaths on farms and roadsides in many areas, damage to forested public land is rare. On the other hand, in the irrigation areas west of the Campaspe River, raised water tables, salting, and inundation by drainage waters have severely affected both forested public land and farm trees. Tree deaths have also occurred along roadsides and watercourses, particularly where streams form part of the distribution or drainage network in irrigation districts.

Dryland Salting

Dryland salting has reduced agricultural production, initiated soil erosion (such as sheet and gully erosion), and increased the salinity of water in dams and rivers. It is not as extensive and has not caused as serious a decline in production as salting in the irrigation districts, but recent years have seen substantial increases in the areas affected. It has been estimated that dryland salting has affected some 1,800 ha in the Murray Valley area.

This salting often occurs where the northern slopes of the Great Dividing Range meet the riverine plain. Little public land remains here, and so the problem is confined mainly to freehold land. Significant areas of dryland salting occur around Boort, Rochester, and Caniambo.

Causes

Increased volumes of water percolating through the ground dissolve salts from the soils and rocks, adding to the salinity and raising the level of saline groundwater. When the groundwater approaches the surface it will discharge — either by capillary action and evaporation,

thereby concentrating salts in the surface soil, or (if the water table reaches the surface) by the formation of a saline spring or seep. Increases in rainfall, changes to vegetation cover in catchments, or land use changes can all increase the volume of discharge from seeps.

It is believed that the removal of native trees and shrubs from the catchment is the main cause of dryland salting in the Murray Valley area. Their removal allows greater volumes of water to percolate into the groundwater — water that these deep-rooting species would have intercepted and/or transpired under natural conditions. Differences in agricultural practice also affect the amount of percolation and the amount of salt leaching that takes place.

Effects

Salting reduces productivity, with badly salted areas becoming unproductive. It can also result in an erosion hazard that may in turn affect otherwise-productive land.

In addition, where dryland salting occurs, the salinity of water in the drainage system usually increases. This results in higher levels of salt in the natural rivers and streams and can render water in farm dams unsuitable for domestic, stock, or irrigation purposes.

Dryland salting also spoils the landscape by causing the death of trees and shrubs on farms and along roadsides and watercourses.

Furthermore, the destruction of native vegetation along roads and streams can have a significant effect, as such areas often contain the only remnants of a region's native plant associations. They also provide habitat for some native animals, and can have special significance as pathways permitting dispersal and migration of species, particularly birds.

Prevention and restoration

Dryland salting is a complex problem and — depending on its location and severity — can require different solutions.

On affected land, salt-tolerant plant species can be grown to encourage transpiration and the surface soil mulched to reduce evaporation.

The actual cause of the problem, however, lies in the upper part of the catchment (the 'recharge area'). Land management must be changed so that the uptake of water by plants can be increased, thereby reducing the quantity of water infiltrating to the groundwater.

Although the clearing of native forests for agriculture is widely recognized as a major cause of salting problems in Victoria, the number of trees remaining on private land in rural areas continues to be reduced both by clearing and by tree decline caused by a number of factors, including salinization. The restriction of further clearing of native vegetation in catchments where salting is or could become a problem must therefore be considered as a first step in any salinity control program.

The Council believes land-owners in 'recharge areas' should be encouraged to replant parts of their farmlands with plants that have deep-roots and utilize relatively large amounts of water. In many cases land-owners would require financial assistance and technical advice. Introduction of tree-growing assistance schemes has helped to substantially expand tree-planting activities in recharge areas throughout the State, and Council believes that the scheme should be expanded by increasing funding and manpower to encourage extensive tree-planting by land-owners in recharge areas as and when these are identified.

In some areas, marginal farmlands may possibly provide a better financial return when used for agroforestry rather than for grazing or cropping alone, while at the same time alleviating

the problems of dryland salting. Substantial research into agroforestry is required, however, and the Council believes that the government should provide encouragement and assistance for this.

In addition to its landscape and nature conservation values, roadside vegetation within the study area probably contributes to the lowering of the water-table levels, particularly in predominantly agricultural areas. The Council therefore believes that where possible native trees should be retained or replanted on road reserves, especially in salt-prone areas.

Recommendations

D63 That the government encourage research into and development of farm management practices such as tree-growing assistance schemes, agroforestry, and the use of deep-rooting plants that use relatively large quantities of water in order to alleviate the effects of dryland salting, thereby improving the condition of public land.

D64 That, where possible, native trees be retained or replanted on road reserves, especially in recharge areas and catchments where dryland salting is occurring.

Salinization under irrigation

Irrigation areas in the Murray Valley include some of the most productive lands in Australia. They support a wide range of agricultural and horticultural pursuits. Salinity problems in these areas did not arise recently. For example, on the plains around Kerang it became apparent even in the earliest days of settlement that the salt content of the soils in and near low-lying areas affected plant growth.

Again, earlier this century — before the construction of major storages secured summer flows in the Murray River — very high salinities, particularly in the lower reaches, were associated with low flows in drought years, such as occurred in 1914/15.

Although the western parts of the study area contained highly saline groundwater and subsoils before irrigation, the present-day salinity problem has largely resulted from decisions taken in earlier generations to develop them for irrigated agriculture and to then clear the native vegetation.

The irrigation systems in use at the present time have changed the hydrologic equilibrium by raising water tables and bringing salt, which was formerly safely at depth in the sub-soils, into the root zone.

Degradation of surface water quality has also occurred because of run-off from salinized lands following rainfall, and as a result of direct seepage from raised groundwater mounds. This degradation can significantly affect the quality of the River Murray waters and this in turn has affected some areas of public land. For instance, the effect is particularly marked where water from Barr Creek, which drains a substantial part of the Kerang irrigation district, reaches the Murray. These problems are, however, generally confined to the irrigation districts west of the Campaspe River.

The salinity problem

The general spread of high water tables and of salinity threatens both the productivity of the irrigation areas and the prosperous rural communities they support.

The major problem is the accumulation of salt in the root zone of plants. This can reduce productivity and in many instances leads to the death of all existing vegetation. Increased salinity

of the topsoil may also lead to higher salt loads in drainage waters. As the Murray River forms the natural main drainage system for the irrigation lands here, these increased salt loads may cause higher salinities in the river and thus a reduction in water quality unless suitable control measures are undertaken.

Salt-affected land is most obvious in the Kerang region. Two-thirds of the region overlies moderately to highly saline groundwater. As a result, saline areas are extensive, and it is estimated that annual agricultural production is about 25% lower than its potential. Reclamation by subsurface drainage has so far proved uneconomic, mainly because of the high cost of safe disposal of the effluent. However, improved irrigation and land management practices are assisting in the maintenance of the production.

Saline land is less evident around Shepparton because of a lower water table and lower concentrations of salts in subsoils and groundwaters. High water tables do, however, underlie 175,000 ha and some localized lower-lying areas are acutely salt-affected. Groundwater pumping schemes have been introduced to protect orchards in this area. Many pumps have been installed by farmers in the district and the water these pump is used for irrigation, although it may need to be diluted with water from the irrigation channels prior to use. Improved irrigation and land management practices are also assisting in groundwater and salinity control in the Shepparton region.

In badly salinized farmlands such as those in the Kerang, Cohuna, and Pyramid Hill districts (that is, the Lower Loddon River catchment), general tree death and decline is obvious throughout most of the area. The rate of decline appears to be increasing as more irrigation areas become affected by shallow water tables and salinity.

Parts of the native forest areas adjoining the Murray River irrigation districts, including State forests, roadside reserves, and other public lands, have been affected by waterlogging and/or salinity arising from the surrounding irrigation areas. The worst-affected, to date, are the black box forests and swamps and red gum forests along stream frontages in the Kerang and Cohuna districts.

Re-establishment of tree species may not be possible in some salt-affected areas, due to shallow groundwater and high salinity. Where the re-establishment of forest cover in these badly salted forests is feasible the cost can be high because of the need for intensive site preparation and careful tree maintenance after planting. The Council believes, however, that funds spent on large-scale re-establishment works can be justified on the basis of the commercial, social, and ecological requirements of these areas.

Solutions

A complete solution to the irrigation salinity problem would be to lower the water tables to a safe level and provide for the effective disposal of unusable salinized drainage water. However, such a complete solution may not be practical or even practicable in some regions. In some areas the shallow aquifer system is at best very poorly developed, making groundwater pumping impractical. At the same time the general quality of the shallow groundwater is saline and therefore the requirement of an effective disposal site for the saline groundwater is of importance. Suitable sites may be exceedingly difficult to locate.

Partial solutions to the irrigation salinity problem include improvements to farm management, such as efficient water use and local subsurface drainage, although the latter partial solution is only of a temporary nature and in the long term could further exacerbate the salinity problem. Subsurface disposal is in fact additional groundwater recharge, which will add to the pressure levels of the deep aquifers. Such additions will accelerate the upward-directed vertical flow gradient and hence the upward movement of saline groundwater.

The current strategy is to maintain the viability of existing farms, while at the same time preventing a further deterioration in the quality of the Murray River waters.

Under this strategy a number of works and procedures have been approved and implemented. Both the Victorian and Commonwealth governments provide funding for these on a dollar-for-dollar basis. Commonwealth funding is provided under the National Water Resources Program.

Further works and procedures for the control of irrigation salinity are currently being examined by the Joint Select Committee on Salinity.

Recommendation

D65 That the techniques developed to control salting be applied to salt-affected public land where appropriate.

E. RIVER MURRAY RESERVE

Public land in the immediate vicinity of the River Murray on both the Victorian and New South Wales sides has significant scenic, recreation, historical, and conservation values.

In association with the river, these lands provide a significant natural attraction for people wishing to engage in river-based recreation in an essentially natural environment, and provide an outstanding scenic landscape. A wide range of recreational activities is pursued on and adjacent to the river. Camping in secluded spots or adjacent to the many sandy beaches found along the Yarrawonga — Ulupna Island reach of the river is very popular, as too is fishing, walking, nature study or in many cases just relaxing by the river. Swimming, house-boating, canoeing, rafting, and water-skiing are all very popular pastimes. The enjoyment derived from various activities depends in large measure on the maintenance and protection of the 'riverine corridor': that is, the river itself and the treescape environment adjacent to it. Along the river the many sites of historical significance include old sawmill sites, punt landings, and localities associated with the riverboat era. Many archaeological sites of significance — such as Aboriginal fish weirs, middens, and canoe trees — also occur, and others will undoubtedly be identified.

The river red gum forests, along with the many billabongs and floodways, provide suitable feeding and breeding habitat for many species of native birds, animals, and fish in addition to numerous and impressive river red gums, which epitomize the Australian riverine landscape.

Management and use of public land adjoining the Murray can affect:

* the degree of streambank erosion
* the flood mitigation capabilities of the land
* the maintenance of the riverine landscape
* water quality
* conservation and protection of flora and fauna
* preservation of historical and archaeological sites
* the recreational opportunities that the river and adjoining forest offer

To conserve and protect the many values and uses of this land and to maintain a treescape corridor along the river, Council proposes the establishment of the River Murray Reserve.

In the Gunbower Forest, this reserve includes all the public land between the Murray and the 'River Track'. A strip of vegetation on the landward side of River Track should be managed as a buffer to protect the scenic values along this major access route. Elsewhere. the reserve includes the existing 60-metre-wide Public Purposes Reserve and, in some locations, additional areas of reserved and unreserved Crown land considered necessary to maintain the treescape corridor along the river.

In a number of cases the frontage reserve and other areas of public land are licensed to adjoining land-owners for grazing purposes. Where this situation arises, Council believes that recreational use should be restricted to non-damaging activities, such as walking, nature observation, fishing, or just relaxing — while potentially damaging activities such as camping, lighting fires, hunting, or using motorized recreational vehicles should be prohibited.

New South Wales land adjoining the River

The land in New South Wales abutting the River Murray has characteristics, values, and uses similar to those of the proposed River Murray Reserve and it would be desirable if this land could be managed in a manner compatible with the management of the River Murray Reserve.

Under section 26(d) of the New South Wales *Water Act*, removal of trees within 20 m of the bank of the Murray River (or indeed any other stream) requires the approval of the Catchment Areas Protection Board. Removals are restricted to:

* trees that threaten to fall naturally into the stream
* trees that endanger persons or property
* selected trees, the removal of which will benefit the general stand vigour

Prompt and careful removal of heads or other parts of trees that fall into the river as a result of any felling is strictly enforced.

Beyond the 20-m strip along the Murray River, the New South Wales Forestry Commission has classified an additional area of land of variable width, but generally about 60 m wide, as 'special emphasis visual resource protection', in order to protect the visual appearance of the forest adjacent to the river. As the primary aim of management in this area is to protect the visual landscape, no tree removals that would affect the visual qualities of the designated area are permitted. In practice, therefore, very few trees are removed from this strip of forest.

Management of the River Murray Reserve should be directed towards enhancing the scenic, recreation, and nature conservation values, protecting historical and archaeological features and providing opportunities for a diversity of recreation activities in an essentially natural riverine environment. It will be necessary to co-ordinate the management of this reserve with that of the regional parks proposed for various locations along the river.

A number of licensed pump sites, pumpline sites, and regulators associated with water management and use occur within the reserve and the use of these facilities would continue. However, Council believes that more stringent guidelines should be applied to the overall appearance of these structures, particularly at pump sites so that the impact of these sites on the scenic riverine environment is minimized.

The Council considers that the authorities responsible for the re-issue of these licences should place certain conditions on the appearance of the sites in order to avoid the proliferation of unsightly structures along the river.

The boundary of the reserve is shown on a series of maps included in this report.

Recommendation

E1 That the areas indicated on the map be used to:

(*a*) protect the natural and scenic values

(*b*) conserve native flora and fauna

(*c*) allow flood mitigation and streambank protection

(*d*) provide opportunities for informal recreation

that

(*e*) limited extraction of timber products be permitted only from those areas indicated on the map and where this is consistent with (a) and (b) above (The areas shown on the map do not include the existing 60-metre Public Purposes Reserve)

(*f*) honey production be permitted

(*g*) duck-hunting be permitted

(*h*) grazing be permitted at the discretion of the land manager where this is compatible with zone management goals

(*i*) recreation activities be restricted where the proposed reserve abuts freehold land and is subject to a water frontage licence that allows the holder to graze stock (non-damaging activities such as walking, nature observation, fishing, or just relaxing would be permitted — while potentially damaging activities such as camping, lighting fires, duck-hunting, or using motorized recreation vehicles should be prohibited); licensees may be required to provide stiles in any fences erected across their licence area if requested to do so by the land manager

(*j*) operations for the maintenance of bank stability and public safety continue to be permitted

(*k*) current legal access continue to be provided

and that the reserve be zoned in order to provide for the range of uses outlined above and be reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

TIMBER PRODUCTION

Hardwood forests in the Murray Valley area have played a significant part in the development of the region. Since the earliest days of European settlement the river red gum forests have been and will continue to be a major source of durable timber products. Prior to the 1860s timber production mainly supplied local consumption, but from about 1865, with the development of river transport and expansion of the State railway system, production greatly increased. Sawn sleepers and heavy construction timbers were the main items produced; paddle-steamers consumed substantial quantities of firewood; and during the 1870s and 1880s, at the height of the river transport era, many sawmills were established to meet the demand. As a result, the red gum forests were heavily cut over during this period. Since the turn of the century, timber production has been controlled. An upturn in sawmilling occurred in the 1940s, largely to meet the demands imposed by World War II. This continued into the early 1960s and also resulted in heavy cutting of the area's forests. In more recent times a relatively stable pattern of utilization has been established, with timber production more closely allied to long-term levels of supply.

Timber products supplied from the study area include sawlogs, poles, piles, sleepers, bridge timbers, fencing materials, landscape material, firewood, and charcoal.

In addition to red gum, other durable species including box, ironbark, and white cypress pine also occur in the study area and have been heavily utilized in the past. The main products being cut from these forests are sleepers and fencing materials.

The study area contains 10 sawmills, although the two located at Benalla and Violet Town draw supplies entirely from outside the area. The rest are located at Koondrook, Cohuna, Echuca (two), Barmah, Picola, Mooroopna, and Rutherglen, some of which cut logs from both New South Wales and Victorian forests.

In 1982, 174 people were employed full-time in procuring or processing forest produce while a further 67 were employed part-time. Some 40 people were employed in sawmills located within the study area that obtained supplies from elsewhere.

Timber production from this area should be considered in conjunction with that from the adjoining New South Wales forests as these are also keyed to supply the same market — that is, Melbourne for sawn products and sleepers for the State's railway system. Some 46,000 cubic metres of red gum sawlogs are produced in the region each year, of which approximately one-third comes from State forest in the Murray Valley area.

Railway sleepers from the local durable-species are in constant demand. Red gum is the only timber used at present, although other species may be used in the future if trees of sufficient size are available. Virtually the sole market is V/Line and production is regulated by the allocation of fixed quotas to 34 licensed cutters. Some 176,000 sleepers are produced in the region each year, of which the Murray Valley area supplies about 67,000 or about 38% of regional production.

Impact of proposed recommendations

Council recognizes the importance of timber production based on the Murray Valley area, but also recognizes the need to set aside areas of particular conservation significance; as a result, some stands of productive timber are included in parks and other reserves where timber-harvesting is not proposed, the largest area being within the Barmah State Park. In order to cause minimal disruption to the timber industry, the Council has recommended that timber-harvesting in this State Park be phased out within 3 years following acceptance of the Council's recommendations.

These proposed recommendations would remove timber production from some areas of public land. On a regional basis however, timber production would continue on some 95% of the productive area or, if the study area alone is considered, on about 88% of the productive area.

F. STATE FOREST

At present the larger areas of forested public land in the State that have not been incorporated into national parks or set aside in various reserves have, in the past, been designated by the Council either as areas for timber production (hardwood and softwood) or as uncommitted land. Timber production areas are or become reserved forest, while uncommitted land is termed 'unoccupied; or 'unreserved' Crown land. About 4.5 million ha or two-thirds of the public land so far investigated has been recommended for timber production or as uncommitted land. These two classes of land constitute State forest as currently defined under the *Forests Act* 1958.

A New Concept

Council has had great difficulty in finding an appropriate descriptive term for land in these two categories that is not defined in existing legislation. Following considerable deliberation the Council has decided to refer to this land as 'State forest', as it believes this term best describes public land in timber production areas and uncommitted land, even though it contains a range of vegetation types from tall mountain forests through to woodlands, mallee scrub, heathlands, and swamplands. However, in the section below entitled 'an alternative concept for State forest', the name is used only in a descriptive sense rather than as a term defined in the *Forests Act*.

Council has examined the basis for the separation of public land into timber production areas and uncommitted land and is aware of administrative and management difficulties that arise as a result. The 'alternative concept' places emphasis on reserving and managing these two classes of land as a single unit. This concept was first proposed in the Council's final recommendations for the Alpine area — Special Investigation published in November, 1983.

Current management of State forest

The Forests Commission is responsible for vegetation management and the prevention and suppression of fire in State forest. It also has responsibility for the issue of licenses to occupy reserved forest for activities such as grazing, stone extraction, and apiculture. In uncommitted land, the Lands Division deals with these matters.

This division of responsibilities, has in the past led to differences in fees for essentially the same type of licence within State forest. In some cases considerable inconvenience to the public has resulted where two or even three licences have to be obtained to occupy an area simply because the land overlaps the boundary between reserved forest (occupations controlled by the Forests Commission) and uncommitted land (occupations controlled by the Lands Division).

The *Forests Act* 1958 charges the Forests Commission with the responsibility of preparing and putting into operation working plans for areas of 'State forest' as defined in the *Act*. These plans set out the criteria for control, maintenance, improvement, protection from destruction or damage by fire or otherwise and removal of forest produce in and from 'State forest'. However, formal working plans for only relatively small areas have been submitted for approval over the years, although operational plans are prepared for the various forest districts.

While these plans cover the various uses associated with reserved forest, occupations in uncommitted land are handled by the Lands Division and are not included in plans prepared by the Forests Commission. Similarly, the *Land Act* 1958 includes provisions requiring the preparation of management plans for uncommitted land, and the Lands Division has prepared and is preparing statements, including management objectives, for uncommitted land subject to occupation of various kinds. However, no management plans currently exist for many areas of State forest.

As with all government departments, funding constraints have been imposed on the Forests Commission. As a result, uncommitted land has received lower priority for the expenditure of funds to provide for timber supplies in the long term than areas of similar productivity in reserved forest. There is also a reluctance to expend scarce resources on the management of land that is not specifically reserved for any purpose and thus is not as securely held as other areas within the public land estate.

Existing land use categories — timber production and uncommitted land

State forest comprises a mosaic of forests of varying productivity, and the separation of land into timber production areas and uncommitted land has tended to reinforce the belief that the State's commercially productive hardwood forest is entirely located within hardwood production areas and that timber production is the sole object of management. In fact, a significant volume of commercial timber is extracted, in conformity with Council's recommendations, from uncommitted land; at the same time, hardwood production areas are managed for a range of uses as well as for wood production.

Although many of the outstanding natural features and values occurring on public land are included in parks and reserves, timber production areas and uncommitted land contain areas with significant water production, landscape, historical, or conservation values. Many rare plants are found in State forest and, considering it occupies about two-thirds of all public land, it is of utmost significance as faunal habitat. The term 'hardwood production' implies quite erroneously that such areas have few values other than for timber production, while the term 'uncommitted land' belies the significance of this land for many different uses including timber production.

An alternative concept for State forest

The Council believes that, in the future, a unified and co-ordinated approach should be taken to the management of State forest and that it should be set aside and managed as a unit rather than administered as two classes of land of different tenure — namely reserved forest and uncommitted land. However, it will be necessary to recognize the different management requirements of areas with particular attributes within State forest.

Council has defined the areas of State forest in this study area and, in line with the concept of unified and co-ordinated management, believes it would be appropriate for all State forest to be adminstered under one *Act* and be securely reserved under a single land tenure incorporating provisions similar to those currently applying to reserved forest. The consolidation of responsibility for issuing all licensed occupations in State forest is an essential aspect of adopting a unified and integrated management approach. This would overcome the problems associated with the dual system of licensing that currently exists.

Following the delineation by Council of State forest and the designation of areas that have significance and need special protection or are required for particular purposes such as softwood production, management plans should be prepared. These plans should reflect the diverse values and differing capabilities of the land to support various community uses and needs. They would be developed in the light of a State-wide policy for the management of forested public land not included in parks or other specified reserves, and would take account of water production, recreation, timber production, floral, faunal, and fire-protection values.

Each management plan should also provide for the protection of significant areas designated by the Council as well as incorporating the Council's established principles relating to timber harvesting and the provision of other resources required by the community. It should also take account of existing statutory requirements such as land use determinations and specialist ad-

vice available from other agencies such as the Fisheries and Wildlife Division. Provision should be made for a regular review of management plans for State forest. Where appropriate, the Council would continue to recommend areas of special significance to be permanently reserved for a particular purpose.

Many areas of State forest have no particularly significant features; nevertheless, although they do not currently support resources to meet known or predicted demands they may well be required to meet as yet unspecified demands in the future. Much of this type of land has a relatively high erosion hazard and management will need to be directed towards the maintenance of the forest cover so that land options for the future are preserved.

In summary then, the Council believes a broad management strategy for State forests must be developed to provide for the carefully planned utilization of natural resources as well as the protection of other important values. Management carried out in accordance with formal plans and the secure reservation of these lands under one form of land tenure should also provide a sound basis for the commercial utilization of resources and the long-term maintenance and, where possible, enhancement of the diverse natural values and attributes of the forest estate.

Land use and management principles

State forest throughout the Murray Valley area has a multiplicity of uses. It is important for the conservation of plants and animals, timber production and flood mitigation and provides many opportunities for outdoor recreation. The forests also provide honey, forage, road-making materials, and other forest produce to satisfy various community needs.

Management of State forest should take into account these various values and should ensure that they can be maintained and that the range of forest products can continue to be supplied in the future. The Council believes that the broad management goals applying to State forest in the Murray Valley area should include the need to:

* protect forests and their associated vegetation and fauna from damage by wildfire and from injury by biological or other agents
* conserve landscape values, wildlife habitats, and floral, historical, and other natural values
* provide a continuing supply of hardwood timber on a sustained-yield basis
* provide opportunities and facilities for public recreation and education
* maintain flood mitigation capabilities
* provide for apiculture, forest grazing, extraction of road-making materials, defence training, etc. where appropriate

In relation to these goals the Council has referred below to a number of principles that should be incorporated into management plans for State forest.

Water

Much of the State forest is situated along the Murray River and its major tributaries, the Ovens and Goulburn Rivers, and it is particularly important in mitigating the effects of flooding and regulating the flow of water in the Murray system. Some damage to these forests has already occurred due to river regulation, particularly in the Barmah Forest, and this will increase unless preventative measures continue to be taken in the near future. The maintenance and protection of the red gum forest ecosystem depend in turn on an effective winter-spring flooding regime and the absence of summer flooding. A more detailed discussion of Murray River regulation and associated forest management problems is included in Chapter D, Water Use and Regulation.

State forest also plays a role in reducing the effects of salinity. Maintenance of native tree cover helps to lower water levels in salt-prone areas.

Timber production

The durable-species forests of the Murray Valley area currently provide about one-third of the total production of sawlogs and sleepers from the Murray Valley region, which includes New South Wales forests adjoining the study area. Timber production from this region is keyed to the Melbourne market for sawn products and V/Line for sleepers.

Red gum is the major species harvested from the area, and it is used to produce piles, poles, sleepers, bridge timbers, fencing material, landscaping material, and firewood. Other species utilized include ironbark, box species, and white cypress pine, which provide mainly sleepers and fencing materials.

The timber industry provides direct employment for about 170 full-time and approximately 70 part-time workers and makes an important contribution to the economy and social fabric of several towns in the Murray Valley area.

Nature conservation

State forest comprises a substantial proportion of the public land here and therefore has major significance for the conservation of native plants and animals. As only 9% of the study area remains as public land, it is important that conservation values are maintained and where possible, enhanced. Much of the public land lies adjacent to the major streams and is therefore important for the protection of aquatic environments. It also provides wildlife corridors linking faunal habitats. The Council is aware that a number of uncommon or rare plants and animals occur within State forest. Where known, these are specifically referred to in the recommendations below along with broad guidelines for management to protect these species. As new information becomes available on the specific habitat requirements of other native plants and animals, it should be incorporated into management plans for State forest.

It may be necessary to exclude grazing from some areas, at least temporarily, in order to protect particular species or habitats. The areas of State forest contain a mosaic of wetlands and billabongs that are particularly important feeding and breeding localities for waterfowl and these should be protected to ensure their continued viability as wildlife habitat.

Recreation

Outdoor recreation is an important use of much of the State forest throughout the area. It caters for a wide range of recreational pursuits such as camping, boating, fishing, picnicking, pleasure driving, hunting, horse-riding, nature study, and bushwalking. The forests along the Murray, Goulburn, and Ovens Rivers are used for recreation by locals as well as people from Melbourne. The Killawarra Forest is used for picnicking, pleasure driving, walking, nature study, and orienteering. The extensive road network throughout State forest is of particular value for motorized recreation, and many of the other outdoor activities depend on motor vehicles. Council maintains that this road network should continue to be available for public use.

Aboriginal People and the Barmah Forest

The government recently announced plans for the establishment of an educational and interpretive centre in the Barmah Forest. The centre would provide information and education about the significance of the forest to the Aboriginal people as well as providing information about the ecological significance of the forest and the diverse ways in which it is currently being used by the community.

Local Aboriginal groups see the centre as a stimulus to ongoing research into the Aboriginal associations with the forest and believe that it should be a meeting place for community activities. Accommodation for both Aboriginal and non-Aboriginal groups would be associated with the centre and its operation should provide employment opportunities for Aborigines.

The Yorta Yorta Aborigines have particularly strong emotional and cultural ties with the Barmah Forest and the Council believes their participation in all stages of the project's development should be actively sought and encouraged. The Council also believes that local Aboriginal communities should be involved in the preparation of management plans for the whole of the forest.

Recommendations

F1 That the areas shown on Map A be used to:

(*a*) produce hardwood timber

(*b*) conserve native plants and animals, and provide opportunities for the development of wildlife conservation techniques

(*c*) provide opportunities for open-space recreation (including hunting) and education

(*d*) provide for flood mitigation

(*e*) produce honey, forage, gravel, sand, and other forest produce such as charcoal

(*f*) protect the values in the areas described in the following two sections (Nature conservation and Historic sites) by the implementation of management prescriptions

and that they become State forest with management plans prepared by the State Forests and Lands Service.

Note:
Council is aware of the presence of wild pigs and brumbies in the Barmah Forest. The adequate control of such animals, and indeed all vermin and noxious weeds is essential. The destruction and suppression of vermin and noxious weeds throughout the forest will be the responsibility of the Land Protection Service.

Nature conservation

A number of rare or restricted plants and animals occur throughout State forest and these should be protected in accordance with Recommendation F1(*f*) above. In areas where protection of wildlife and wildlife habitat is a major consideration, management prescriptions should be prepared in consultation with the Fisheries and Wildlife Division.

* The squirrel glider (*Petaurus norfolcensis*) is a rare arboreal possum confined to the eastern and south-eastern parts of Australia. It appears that the mature river red gum and box woodlands adjacent to the Goulburn River and in parts of the Barmah Forest as well as the box-ironbark communities in the Killawarra Forest support significant populations of this animal. Little is known about its habitat requirements, although it appears that both overstorey and understorey vegetation are sources of food. It is therefore important to maintain the structure and diversity of the areas of State forest where these gliders are known to occur. Squirrel gliders also rely on the availability of tree hollows for nesting.

* Several native birds including the turquoise parrot (*Neophema pulchella*), grey-crowned babbler (*Pomatostomus temporalis*), and the bush think-knee (*Burhinus magnirostris*) are either uncommon or rare species that rely heavily on the maintenance of a diverse native understorey as a source of food and shelter. The remaining woodlands in the study area are important for the conservation of these species and every effort should be made to maintain or re-establish the diversity of the understorey in these areas, particularly in the Killawarra Forest.

* The numerous lakes, billabongs, and swamps situated throughout the areas of State forest are of major importance for water birds. Wetlands in the Gunbower and Barmah Forests were recently accepted for listing by the 'Ramsar' Convention as 'Wetlands of International Importance especially as Waterfowl Habitat'. Management will need to ensure that the value of these areas for wildlife habitat is maintained.

* That portion of the Barmah State Forest in the vicinity of Goose Swamp and Trickeys Gate contains the most extensive ecotone between red gum and black box occurring in the forest. Three rare species occur in this ecotone; *Helipterum strictum, Menkea crassa*, and *Swainsona microcalyx* var. *adenophylla*. The area also contains a number of species that are uncommon in the forest, including *Salsola kali, Sclerolaena muricata, S. divaricata, Maireana declavans, M. enchylaenoides, Atriplex suberecta, A. semibaccata, Rhagodia nutans, R. hastata, Sporobolus mitchellii*, and *Lilea scilloides*. The Goose Swamp area also contains examples of mature red gum woodlands. Further investigation is required to accurately define the areas containing these plants, but when this is completed the areas should be fenced to exclude grazing.

* Many rare or uncommon plants including graceful swamp wallaby grass (*Amphibromus gracilis*), water bush (*Myoporum montanum*), warty pepper-cress (*Lepidum papillosum*), and dense mint bush (*Prostanthera decussata*) occur in areas of State forest and these should be protected by management prescriptions.

Historic sites

The following features of historical interest should be protected in accordance with Recommendation F1(*f*) above.

Numerous sites located in the Barmah Forest have an association with the early riverboat days, timber harvesting, fishing, grazing, and Aboriginal occupation. For example, the Fish Basket was an area used by professional fishermen to store their catch prior to sending it to Melbourne, while Tram Island was so named because of a wooden tramway, used to transport timber, that crossed the area. An old well that supplied water to the steam-powered tram is located on the island. These and other sites of historical interest should be protected by management prescriptions.

G. FLORA RESERVES AND FLORA AND FAUNA RESERVES

Throughout the Murray Valley area, a number of areas contain examples of native vegetation with considerable floristic importance and also provide valuable habitat for populations of native fauna.

Council has recognized the special conservation significance of these areas and has accordingly recommended their reservation as flora reserves and flora and fauna reserves.

In all such reserves, suppression of fires remains the responsibility of the Forests Commission. Appropriate fire-prevention measures such as maintenance of fire access tracks and protective burning will be carried out where necessary.

The control of vermin and noxious weeds within flora reserves, and flora and fauna reserves will remain the responsibility of the Lands Division.

FLORA RESERVES

These reserves are significant because they contain examples of native vegetation with considerable floristic value in a natural or relatively natural state. They are set aside primarily to conserve species that may be rare or endangered, and other plant associations that are of particular conservation significance.

Recommendations

G1—G9 That the areas indicated on the map and described below be used to:

(*a*) conserve particular species or associations of native plants

that

(*b*) honey production be permitted

(*c*) passive recreation such as nature study and picnicking be permitted

(*d*) grazing be phased out

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the Services indicated in the schedule below.

G1 21 ha, being the Water Conservation Reserve east of Allotment 20B, section G, Parish of Boort, to be used to preserve the scrub communities of dumosa mallee and blue mallee, with yellow gum woodland.

Management plans to be prepared by the State Forests and Lands Service.

G2 42 ha, being the Water Supply Reserve adjacent to Allotment 22, section F, Parish of Boort, to be used to preserve the scrub community of dumosa mallee and yellow gum woodland.

Note:
This reserve contains a large dam that provides suitable habitat for water birds.

Management plans to be prepared by the State Forests and Lands Service.

G3 26 ha, being the Preservation of Species of Native Plants Reserve comprising allotments 3 and 4, section 15, Township of Terrick Terrick and allotments 39L and 39M, Parish of Terrick Terrick West, to be used to preserve a relatively undisturbed remnant of the northern plains native grassland flora.

Management plans to be prepared by the National Parks Service.

G4 43 ha, being the Water Reserve east of allotment 28, section 5, Parish of Turrumberry North, to be used to preserve a relatively undisturbed grassland relic of spear and wallaby grasses and marshes carrying rushes and sedges.

Management plans to be prepared by the State Forests and Lands Service.

G5 10 ha, being the existing conservation of an area of natural beauty reserve, known as Doherty's Pine Reserve, allotment 51A, section F, Parish of Rochester West, to be used to preserve the grey box—white cypress pine association.

Management plans to be prepared by the State Forests and Lands Service.

G6 2 ha, being allotment 52F, Parish of Gowangardie, to be used to preserve the disjunct occurrence of green mallee and its association with red box.

Management plans to be prepared by the State Forests and Lands Service.

G7 5 ha, being unreserved Crown land and road reserve west of allotment 38C, Parish of Upotipotpon, to be used to preserve the disjunct occurrence of green mallee and its association with grey, white and red box.

Note:
The Nalinga—Violet Town road bisects this reserve.

Management plans to be prepared by the State Forests and Lands Service.

G8 236 ha, known as Mount Meg, to be used to preserve the open forests—woodlands of Blakely's red gum, red stringybark, and white cypress pine and associated open heath—tussock grassland understorey.

Management plans to be prepared by the National Parks Service.

G9 215 ha of reserved forest along the Ovens River to preserve the open forest III of river red gum with a shrub understorey of river bottlebrush, silver wattle, and swamp paperbark (*Melaleuca* spp. aff. *ericifolia*). The occurrence of this melaleuca here is unique in the area and of conservation significance, as swamp paperbark is usually found in Gippsland.

Management plans to be prepared by the State Forests and Lands Service.

FLORA AND FAUNA RESERVES

Such reserves are significant because they provide valuable habitat for populations of native fauna and contain examples of native vegetation with considerable floristic value in a natural or relatively natural state.

Recommendations

G10—G11 That the areas indicated on the map and described below to be used to

(*a*) conserve native plants and animals

that

(*b*) honey production be permitted

(*c*) passive recreation such as nature study and picnicking be permitted

(*d*) grazing be phased out

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the National Parks Service.

G10 Mt. Hope — 106 ha, to be used to preserve a granitic outcrop and its associated vegetation and reptilean fauna.

The vegetation is typically treeless and varies from an open wattle scrub (*Acacia deanei* ssp. *paucijuga*) to open heath of rock correa, wedge-leaf hopbush, and less frequently snowy mint-bush. Flat sedge and slender panic (*Paspalidium constrictum*) — both rare or uncommon plants in Victoria — have been recorded here. Although not supporting significant mammal or bird populations, the reserve provides habitat for a number of species of reptiles including Cunningham's skink, large striped skink, and Bougainvilles skink. The isolated colony of eastern spiny-tailed geckos found here extends the species' known Victorian distribution and habitat type.

Note:
The land manager authority will need to make special provisions to ensure that recreational use of this reserve does not conflict with floral and faunal values.

G11 Boweya — 300 ha, to be used to preserve open forests of red ironbark, grey box, and red stringybark and associated eucalypt species and the associated mammal and bird fauna.

The understorey here is rich and varied, with some 50 native plants being recorded including bent-leaf wattle and twiggy bush-pea. During spring the area provides a spectacular display of wildflowers. Some 92 species of birds are known to inhabit the area, including such uncommon species as the pied butcherbird, swift parrot, crested bellbird, turquoise parrot, and grey-crowned babblers. The rare squirrel glider and tuan are also recorded here.

H. BUSHLAND RESERVES

Throughout the predominantly agricultural regions of the study area, a number of parcels of public land carry remnants of native vegetation. This vegetation, particularly the ground flora, has often been modified from the original by grazing and invasion of weeds. The native tree species remain, however, and these areas provide landscape diversity, particularly where more intensive agriculture is resulting in a gradual reduction in the numbers of trees on freehold land.

Council recommends that many of these small remnants of the native vegetation should become bushland reserves. Their major uses are to maintain the distinctive Australian character of the countryside and to provide diversity in the landscape. When accessible, they may also provide some opportunities for passive recreation in relatively natural surroundings, but it is not intended that they be developed for recreation. In many instances the only access is via an unused road covered by an unused-road licence, which should continue subject to the approval of the Lands Division in the Department of Conservation Forests and Lands. These bushland reserves are generally too small to have major significance for fauna conservation, although some may be important for migratory birds.

Management should aim at the maintenance of the native flora, particularly the tree species. Limited gravel extraction, low-intensity grazing, and the cutting of small amounts of firewood and an occasional post and pole are not necessarily incompatible with this primary aim, provided they are carefully planned and controlled and do not spoil the appearance of the reserves, particularly as viewed from roads, railway lines, and lookout points. These uses may not be appropriate to all reserves. In some instances the land manager may have to exclude them, at least temporarily, in order to permit regeneration of tree species.

In all bushland reserves the suppression of fires remains the responsibility of the Forest Commission. Appropriate fire-prevention measures will be carried out where necessary.

The control of vermin and noxious weeds within bushland reserves will remain the responsibility of the Lands Division in the Department of Conservation, Forests and Lands.

Recommendations

H1—H127 That the areas indicated on the map and described below be used to:

(*a*) maintain the local character and quality of the landscape

that

(*b*) passive recreation such as picnicking and walking be permitted

(*c*) honey production be permitted

(*d*) grazing be permitted subject to the approval of the land manager

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Land Service.

Notes:

1. Some reserves include relics of gold-mining activities that may, in some cases, constitute a hazard to public safety. The land manager should comply with the public safety requirements of the Department of Minerals and Energy with regard to the mining relics.

2. A number of dams, located within the bushland reserves, are used for fire-protection, stock water, or Shire purposes and these uses should continue.

H1 16 ha, being Allotment 22, section 3, Parish of Marmal.

H2 2 ha, being Allotment 14A, section 3, Parish of Marmal.

H3 6 ha, being Water Trust Reserve south of Allotment 19, section E, Parish of Murrabit.

H4 6 ha, being the Recreation Reserve north of Allotment 17, section 4, Parish of Gunbower.

H5 9 ha, being the Public Purposes Reserve north of Allotment 4A, section 5, Parish of Gunbower.

H6 20 ha, being north and east of Allotments 3 and 4, section 5, Township of Pyramid Hill, Parish of Terrick Terrick West.

H7 2 ha, being Allotment 1C, section A, Parish of Mologa.

H8 11 ha, comprising the Water Reserve, Cricket Reserve, and Recreation Reserve north of Allotment 34, Parish of Milloo.

H9 19 ha, being the Water Reserve north-east of Allotment 24, section 11, Parish of Turrumberry.

H10 7 ha, being east of Allotment 7, section 2, Parish of Turrumberry North.

H11 2 ha, being the school reserve adjacent to Allotment 170, Parish of Wharparilla.

H12 28 ha, comprising the State School and Water Supply Reserves, south of Allotments 141A and 142A, Parish of Echuca South.

H13 8 ha, being Allotment 14A, section A, Parish of Moira.

Note:
Portion of this area requires revegetation with tree species native to the area.

H14 1 ha, being adjacent to Allotment 1, section B, Parish of Moira.

H15 2 ha, being Allotment 1C, section B, Parish of Moira.

H16 4 ha, being Allotment 15A, section 4, Parish of Narioka.

H17 3 ha, being the Water Reserve adjacent to Allotment 14, section A, Parish of Picola.

H18 4 ha, being the Recreation Reserve adjoining Allotment 25, Parish of Yielima.

H19 9 ha, comprising the Recreation Reserve and Water Reserve east of Allotment 17, section B, Parish of Yalca.

H20 10 ha, being Allotment 20A, section F, Parish of Barwo.

H21 5 ha, being the Departmental Reserve east of Allotment 50B, Parish of Kotupna.

H22 7 ha, being the Water Reserve adjacent to Allotment 21, section E, Parish of Barwo.

H23 3 ha, being the Water Reserve, Allotment 70M, Parish of Kotupna.

H24 24 ha, being north of Allotments 18 and 19, section D, Parish of Kaarimba.

H25 14 ha, west of Allotment 28A, section B, Parish of Kaarimba.

H26 19 ha, being the Water Reserve, Allotment 5A of section C, Parish of Mundoona.

H27 33 ha, being the Wunghnu Common, Township of Wunghnu, Parish of Drumanure.

H28 4 ha, being the Water Reserve, Allotment 7, section A, Parish of Katunga.

H29 4 ha, being the Water Reserve adjoining Allotment 52, section B, Parish of Strathmerton.

H30 5 ha, being the Water Reserve adjoining Allotment 53A, section B, Parish of Strathmerton.

H31 24 ha, being the Camping and Water Reserve, Allotment 62A, section B, Parish of Strathmerton.

H32 9 ha, being the Water Supply Reserve south of Allotment 10, section F, Parish of Naringaningalook.

H33 1 ha, being Allotment 20A, section F, Parish of Naringaningalook.

H34 2 ha, being the Water Conservation Reserve, Allotment 12C, section A, Parish of Yabba Yabba.

H35 6 ha, being the Water Reserve, Allotment 16B, section A, Parish of Yabba Yabba.

H36 1 ha, being the Water Conservation Reserve north of Allotment 17, section A, Parish of Yabba Yabba.

H37 16 ha, being the Water Reserve, Allotment 15D, section B, Parish of Youanmite.

H38 8 ha, being the Water Reserve south of Allotment 4, section B, Parish of Youanmite.

H39 9 ha, being the Water Reserve Allotment 5C, Parish of Yabba Yabba.

H40 17 ha, comprising the Water Conservation Reserve and public land west, north, and east of the Katamatite Railway Station, north of Allotments 32, 31, 1 of 13, and 1 of 14, Township of Katamatite, Parish of Katamatite.

H41 3 ha, being Allotment 27, Parish of Youanmite.

H42 17 ha, being the Public Purposes Reserve, Allotment 5C, Parish of Boosey.

H43 23 ha, north of Allotment 184A, Parish of Boosey.

Note:
Portion of this area requires revegetation with tree species native to the area.

H44 20 ha, being Water Reserve west of Allotments 26 and 27, Parish of Waggarandall.

H45 19 ha, comprising the Water Reserve, Allotment 30A, section A, Parish of St. James, and the Gravel Reserve, Allotment 1B, section C, Parish of Waggarandall.

H46 20 ha, being adjacent to Allotment 29, section A, Parish of Tharanbegga.

H47 14 ha, being the Public Purposes Reserve north of Allotment 15, section A, Parish of Tharanbegga.

H48 4 ha, being the Water Reserve west of Allotment 24, section A, Parish of Shepparton.

H49 6 ha comprising Allotments 1A and 1B, section B, Parish of Congupna.

H50 7 ha, being the Water Reserve, Allotment 15E, Parish of Congupna.

H51 19 ha, being the Public Recreation and Hall Reserve, Allotment 41A, Parish of Katandra.

H52 3 ha, being the Water Reserve, Allotment 220L, Parish of Dookie.

H53 33 ha, comprising the Water Reserve, Allotment 43B, and the State School Reserve adjoining Allotment 43B, Parish of Yabba Yabba.

H54 25 ha, being the Water Reserve, Allotment 41J, Parish of Pine Lodge.

H55 2 ha, being Allotment 3C, Parish of Pine Lodge.

H56 9 ha, being the Water Reserve east of Allotment 80A, Parish of Currawa.

H57 13 ha, being the Water Reserve, Allotment 81, Parish of Currawa.

H58 2 ha, being Allotment 41A, Parish of Stewarton.

H59 4 ha, being the Water Reserve north of Allotment 58B, Parish of Arcadia.

H60 8 ha, being the Water Reserve south of Allotment 24B, Parish of Arcadia.

H61 49 ha, being the Water Supply Reserve, Allotment 6D, Parish of Caniambo.

H62 20 ha, being the 110 Section Reserve comprising Allotments 28C, 43A and 43B, Parish of Gowangardie.

Note:
Portion of this area requires revegetation with tree species native to the area.

H63 11 ha, being the Water Reserve, Allotment 13H, Parish of Gowangardie.

H64 13 ha, being the Water Reserve north of Allotment 18C, Parish of Gowangardie.

H65 7 ha, being portion of the Water Supply Reserve, Allotment 75A, Parish of Upotipotpon.

Note:
See Recommendation O5.

H66 31 ha, being the Water Reserve, Allotment 123A, Parish of Molka.

H67 2 ha, being the State School Reserve south of Allotment 83C, Parish of Molka.

H68 5 ha, adjoining Allotment 81B, Parish of Molka.

H69 19 ha, being the Water Supply Reserve adjoining Allotments 32 and 31B and south of Allotment 33C, Parish of Branjee.

Note:
Portion of this area requires revegetation with tree species native to the area.

H70 10 ha, being the Water Reserve north-east of Allotment 62, Parish of Miepoll.

H71 15 ha, being the Water Reserve south-west of Allotment 35A, Parish of Miepoll.

Note:
Portion of this area requires revegetation with tree species native to the area.

H72 9 ha, being the Gravel Reserve south of Allotment 34A, Parish of Karramomus.

H73 1 ha, being the State School Reserve, Allotment 72B, Parish of Tamleugh.

H74 1 ha, being Allotment 2C, Parish of Tamleugh.

H75 20 ha, comprising Allotments 35A, 4J, and 4G, Parish of Tamleugh.

H76 2 ha, being Allotment 68C, Parish of Gowangardie.

H77 9 ha, adjoining Allotment 32, Parish of Wills.

H78 12 ha, being the public purposes reserve, Allotment 37F, Parish of Wills.

H79 14 ha, being the camping and watering reserve south of Allotment 27A, Parish of Warrenbayne.

H80 10 ha, being the Recreation Reserve, Allotment 23B, Parish of Upotipotpon.

Note:
The eastern portion of this reserve contains pockets of native understorey flora that should be protected.

H81 4 ha, being Allotment 41D, Parish of Goomalibee.

H82 2 ha, being Allotment 39C, Parish of Goomalibee.

H83 6 ha, being the Water Reserve, Allotment 26D, Parish of Goomalibee.

H84 7 ha, being the Water Reserve, Allotment 64A, Parish of Goorambat.

H85 31 ha, being the Water Supply Reserve, Township of Wilby, Parish of Pelluebla.

H86 2 ha, being the Natural Interest Reserve, Allotment 21G, Parish of Karrabumet.

H87 6 ha, being portion of the Water Reserve, Allotment 10E, Parish of Mokoan.

Note:
The Shire of Benalla operates a tip in the remaining portion of Allotment 10E. (See Recommendation S3).

H88 10 ha, being the western and southern portion of the Public Purposes Reserve (Supply of Gravel), Township of Thoona, Parish of Mokoan.

H89 2 ha, being the Gravel Reserve, Allotment 33F, Parish of Bungeet.

H90 4 ha, being Allotment 18A, Parish of Mokoan.

H91 3 ha, being adjacent to Allotment 17, Parish of Mokoan.

H92 2 ha, being the Quarry Reserve, Allotment 2E, Parish of Mokoan.

H93 15 ha, being Allotment 63B, Parish of Bungeet.

H94 3 ha, being north of Allotment 81C, Parish of Goorambat.

H95 55 ha, being Allotment 87B, Parish of Mokoan.

H96 3 ha, being west of Allotment 84d, Parish of Goorambat.

H97 46 ha, being Allotment 82B, Parish of Mokoan.

H98 2 ha, being the Public Purposes Reserve south of Allotment 21, Parish of Winton.

H99 88 ha, being Allotment 52A, Parish of Mokoan.

H100 3 ha, being adjacent to Allotment 26D, Parish of Mokoan.

H101 1 ha, being the State School Reserve, Allotment 1A, Parish of Boweya.

H102 4 ha, being north of Allotment 15B, Parish of Boweya.

Note:
This reserve has from time to time supplied limited quantities of road-making materials. This level of use could continue in the future if alternative resources are unavailable.

H103 21 ha, being the Water Reserve, Allotment 4D, Parish of Killawarra.

H104 12 ha, being adjacent to Allotment 66, Parish of Killawarra.

H105 2 ha, being the Stone Reserve, Allotment 64A, Parish of Peechelba.

H106 3 ha, being adjacent to Allotment 41B, Parish of Killawara.

Note:
Portion of this area requires revegetation with tree species native to the area.

H107 1.4 ha, being the southern portion of Allotment 39C, Parish of Killawarra.

Note:
Legal access should be provided through portion of Allotment 39C to Allotment 39B, Parish of Killawarra.

H108 1 ha, being adjacent to Allotment 36B, Parish of Killawarra.

H109 4 ha, being the Water Reserve, Allotment 92B, Parish of Taminick.

H110 1 ha, being the Water Reserve, Allotment 32C, section 31, Parish of Wangaratta South.

H111 16 ha, being the Water Supply and Camping Reserve, Allotment 227A, Parish of Carraragarmungee.

H112 2 ha, being Allotment 132A, Parish of Bontherambo.

H113 2 ha, being the State School Reserve, Allotment 2A, section I, Parish of Brimin.

H114 3 ha, being west of Allotment 2a, section L, Parish of Norong.

H115 5 ha, being Allotment 7, section 3, Parish of Carlyle.

Note:
The abandoned and unreclaimed gravel pit occurring in this reserve is to be rehabilitated.

H116 7 ha, being the Gravel Reserve, Allotment 18H and adjacent Crown land, section 1, Parish of Lilliput.

H117 12 ha being Allotment 11, section L, Parish of Lilliput.

H118 4 ha, being the Gravel Reserve, Allotment 25, section L, Parish of Lilliput.

H119 3 ha, being the Water Reserve, Allotments 42A and 69A, Parish of Bontherambo.

H120 6 ha, comprising the Water and Camping Reserve, Allotment 6E and Allotment 6F, section 29, Parish of Carlyle.

Note:
Reserve contains a number of mine shafts of historical interest.

H121 6 ha, being Allotment 50A, section 41, Parish of Carlyle.

H122 4 ha, being the Gravel Reserve, south of Allotment 317, Parish of Chiltern West.

H123 7 ha, being Allotment 17A, section A, Parish of Chiltern West.

Note:
Reserve contains a number of mining tailings of historical interest.

H124 2 ha, being the Water Reserve, Allotment 221H, Parish of Chiltern West.

H125 3 ha, being south-west of Allotment 248C, Parish of Chiltern West.

H126 1 ha, being the Water Supply Reserve, Allotment 283S, Parish of Chiltern West.

H127 15 ha, being the eastern part of the Public Purposes Reserve south of Allotment 2, section B1, Parish of Gooramadda.

I. HISTORIC RESERVES

Sites of historical importance associated with pre-European occupation — and European exploration, agricultural, and timber activities, settlement, and the exploitation of stone and gold — are found on both private and public land throughout the Murray Valley area.

There is considerable interest in the community about the State's history. This interest is likely to increase, particularly as more becomes known about historical relics located on public land. Council considers that sites of historical interest should be managed to promote public awareness of the history of the area and that they should be protected as far as possible from progressive deterioration due to exposure to the weather and from damage by the public.

Historic Reserves are small areas that contain important relics, but generally have only one historical theme represented. Their size will generally preclude the development of recreational facilities, although some aids to interpretation could be provided.

Within the study area, many sites of historical importance have been included in parks, or other reserves. Three sites associated with the early history of the area, however, are included in historic reserves.

Recommendations

I1—I3 That the areas described below be used to:

(*a*) protect specific sites that carry or contain the relics of equipment, construction works, and artefacts associated with the history of the locality

(*b*) provide opportunities for recreation and education associated with the history of the locality (development of recreational facilities would be minimal)

that

(*c*) use of these areas be such as to ensure the safety of visitors (in matters of public safety nothing in these recommendations affects the powers of Inspectors under the *Mines Act* 1958 and the *Extractive Industries Act* 1966; it is understood that in exercising these powers the land manager would be consulted)

(*d*) exploration for and extraction of 'gold' and 'minerals'—including fossicking and prospecting under a Miner's Right—be permitted in accordance with Recommendations R1—R3

(*e*) honey production be permitted

(*f*) grazing be permitted at the discretion of the land manager

and that the areas be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the National Parks Service.

I1 Woolshed Swamp Sheepwash — 13 ha, being the Water Reserve, adjacent to Woolshed Swamp, Parish of Wychitella.

This reserve contains the site of one of the few remaining communal sheepwash structures in Australia. It was the practice in early pastoral days to thoroughly wash all sheep prior to shearing.

During the 1850s many thousands of sheep were washed here prior to being shorn at a woolshed located some 130 m west of the sheepwash.

I2 Boxwood—52 ha, comprising the Lime and Wood Reserve, Allotments 169 and 169D, Parish of Dookie.

A large block on hilly terrain composed of Cambrian sedimentary rocks and supporting an open woodland of grey and red box, the reserve contains relics of a limestone mine that was worked in the 1930s. The workings occur on a spur in the southern part of the block and consist of a number of long narrow open cuts along a 4 m-wide calcite vein. An exploration shaft and adit are also present. Mining relics at the site consist of foundations for the crushing plant and remnants of a kiln used to calcine the crushed lime. The reserve is commonly visited by school groups for historical and geological education purposes.

I3 Chiltern Valley Extended mine — 10 ha, being north and west of Allotment 40, section U1, Parish of Chiltern West.

This reserve, well forested with river red gum and grey box, is adjacent to Black Dog Creek. It is the site of Chiltern Valley Extended mine and a number of mining relics are still present. These consist of concrete machinery footings (for crushing equipment) and brick foundations of old buildings. A large quartz wash dump still remains and contains some large blocks of ferruginized quartz conglomerate. Very few areas near Rutherglen still carry significant dumps and foundation remnants from a deep lead mine on a well-forested block of public land.

J. SCENIC RESERVES

These are set aside to preserve scenic features and lookouts of particular significance.

Aims of management of these areas should be to maintain the character and quality of the landscape and to maintain native vegetation.

Recommendations

J1—J2 That the areas shown on the map and described below be used to preserve scenic features

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

J1 2 ha, being the Public Recreation Reserve, Allotment 81D, Parish of Murchison North.

Note:
A number of small gravel-extraction pits in the reserve should be rehabilitated.

J2 Mt. Ochtertyre, 26 ha, comprising Allotments 16, and 16A, section C, Parish of Gooramadda.

Note:
Grazing may be permitted at the discretion of the land manager.

K. RIVERS AND STREAMS

PUBLIC LAND WATER FRONTAGES

Along a number of rivers and streams in the study area, a strip of public land has been reserved between the water and adjacent public land or alienated land. No public land strip adjoins land alienated before 1881, and some properties in the study area have titles that extend to the banks or even incorporate the bed and banks of a stream. Thus some streams and rivers have either no public land water frontage or a discontinuous one. The recommendations that follow do not apply to privately owned frontage.

The locations of public land water frontages are shown on parish plans, which are available to the public from the Central Plan Office in the Department of Conservation, Forests and Lands. These frontages may have a surveyed boundary of short irregular lines or be of specified width (varying in particular instances from 20 m to 60 m) along each bank. In some cases this land has been reserved for public purposes under the *Land Act* 1958 and in others it is unreserved. The land usually comes under the control of the Lands Division in the Department of Conservation, Forests and Lands while in all cases the State Rivers and Water Supply Commission controls the water.

Each of these authorities may delegate some of its responsibility to local bodies. The Lands Division may form committees of management for public purposes, while river improvement or drainage trusts under the guidance of the State Rivers and Water Supply Commission may be formed in certain areas. The Forests Commission controls forest produce on public land water frontages, except where a committee of management has been formed. Public land frontages alongside artificial water storages and aqueducts are often controlled by the water supply authority that controls the water.

Adjoining occupiers often hold public land water frontages under licence for grazing purposes. Special conditions may apply to the licenses — for example, to permit cultivation. The licence system has advantages in that licence-holders are required to control noxious weeds and vermin on the frontage. This control would be extremely difficult and expensive to achieve in any other way. When a frontage is held under licence, boundary fences are normally extended to the water's edge, and legal public use is limited to through travel. The licensee often discourages public access because of an understandable fear of damage, intentional or otherwise, to his property. Vandalism and littering are problems in many areas open to the public, and firm action by authorities with management responsibilities is often required. Control is obtained through the normal exercise of fire, litter, firearms, and other regulations, although it is evident that more effective policing is required, particularly at weekends. Education of the public to understand the rural environment is perhaps the best solution in the long run.

These licensed river frontages are, however, public land; they are often valuable for low-intensity forms of recreation such as walking, fishing and observing nature, and provide access to extensive lengths of streams and lake shores. As mentioned above, members of the public are legally entitled to walk though a licensed frontage. Licences for previously unlicensed public water frontages, now being issued by the Lands Division require the licensee to erect a stile or gate in any fence erected across the frontage, where appropriate to facilitate public access.

This condition has not been applied to the majority of existing licences and Council believes that in some situations, for example along popular fishing streams, the provision of stiles would facilitate pedestrian access along public land water frontages and would reduce damage to fences and avoid gates being left open.

Public land frontages that are unlicensed have no restriction on public access, although use of vehicles is controlled by the *Land Conservation (Vehicle Control) Act* 1973. They are, however,

normally fenced off from adjacent freehold land. The landholder has no obligation to provide access through freehold land to the frontage, and nothing in these recommendations suggests that this situation should change.

The maintenance of a vegetation cover along stream banks is important in preventing soil erosion and in preserving the local landscape. Public land water frontages are sometimes valuable for nature conservation as well, as they may provide corridors for movement of nomadic and migratory species, or support native plants and animals that are no longer found in surrounding areas. In too many cases, however, the provisions of the relevant *Acts* have not been enforced effectively, and such public land water frontages have been progressively cleared of native vegetation.

Public land water frontage reserves

Water frontage reserves are defined for the purpose of these recommendations as being all existing water frontages and other reserves or unreserved public land adjoining streams except for those areas, not currently reserved as a water frontage, that have been set aside elsewhere in these recommendations whether as part of a large reserve (such as a State park or State forest) or for some special purpose (such as a flora, recreation or streamside reserve).

Recommendation

K1 That the public land water frontages:

(*a*) be used to

(i) protect adjoining land from erosion by the maintenance of adequate vegetation cover and to provide for flood mitigation

(ii) maintain the character and quality of the local landscape

(iii) conserve native flora and fauna

(iv) provide opportunities for low-intensity recreation

(v) allow access to water and for grazing of stock by adjoining landholders under licence where appropriate

that

(*b*) (i) where a licence has been issued for a public land water frontage as in (*a*) (v) above, restricted recreation use by the public be permitted (non-damaging activities such as walking, nature observation, fishing, or just relaxing should be allowed, while potentially damaging activities such as camping, lighting fires, or using motor or motorized recreation vehicles should be prohibited)

(ii) licensees be required to provide stiles in any fences erected across their licence area if requested to do so by the land manager.

(iii) cultivation not be permitted, except with the approval of the Department of Conservation, Forests and Lands, and that, in proclaimed water supply catchments, the Soil Conservation Authority be consulted to ensure that approval to cultivate is in accordance with land-use determinations affecting the water frontage made under the *Soil Conservation and Land Utilization Act* 1958.

(iv) in particular cases, licensees be required to fence off and exclude stock temporarily from some parts of the licence area where, in the opinion of the land manager, special measures are necessary to protect water supplies, to rehabilitate areas that are eroding or salt-affected, or to permit regeneration of native plants that have particular value for nature conservation

that

(*c*) the State Forests and Lands Service be consulted prior to the proclamation of roads, the construction of roadways, or the creation of buildings on public land water frontages

and that

(*d*) (i) public land water frontages be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978

(ii) where an area currently reserved as a water frontage is adjacent to or within a national, State park, regional park or other reserve, management plans be prepared by the Service responsible for preparing plans for adjoining or surrounding land.

(iii) where it is not within or adjacent to a reserve or park as described in (*d*) (ii) above, management plans be prepared by the State Forests and Lands Service or a committee of management where one is appointed.

Note:
Public land water frontage reserves cannot be accurately defined at the scale used on Map A (1:250 000). However, some of the larger reserves have been shown on the map. The appropriate Parish plan should be referred to in order to determine the precise boundaries of these reserves.

STREAMSIDE RESERVES

In many instances, small blocks of public land adjoin streams but are not included in the public land water frontage.

These blocks have, where appropriate, been designated streamside reserves. Some are currently reserved under section 4 of the *Crown Land (Reserves) Act* 1978; others are unreserved crown land, although they may be licensed for grazing. Vegetation on these areas varies from open woodlands to grassland. Every effort should be made to conserve native trees on these reserves, where they exist, and to encourage regeneration or restoration where the vegetation has been depleted or destroyed.

Blocks of public land such as this have values for nature conservation and recreation. They allow public access to the river or stream, especially where access along the public land water frontage is difficult. The land manager may provide facilities for activities such as camping on streamside reserves in areas where conflict with nature conservation values are minimal.

It is intended that public land water frontages adjacent to or within a streamside reserve be managed by the authority responsible for that reserve.

Streamside reserves are separate and distinct from the public land water frontages described earlier in these recommendations.

Recommendations

K2—K30 That the areas shown on the map and described below be used to:

(*a*) provide passive recreation such as picnicking, walking and angling

(*b*) provide opportunities for camping at the discretion of the land manager if this use does not conflict with the maintenance of the water quality of the adjacent stream

(*c*) conserve flora and fauna

(*d*) maintain the quality and character of the local landscape

(*e*) provide grazing, at the discretion of the land manager, if this use does not conflict with the maintenance of the water quality of the adjacent stream or with (*a*), (*b*) and (*c*) above.

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

K2 12 ha, on the Bullock Creek comprising the Water Reserve north-west of Allotment 13A, Parish of Mincha, and the Water Supply Reserve south of Allotments 49A and 49B, Parish of Mincha West.

K3 20 ha, being the Water Reserve, Allotment 11, section B, Parish of Rochester West.

Note:
Portion of the area requires revegetation with tree species native to the area.

K4 10 ha, being the Water Reserve, Allotment 18, Parish of Bonn.

K5 150 ha, on the Goulburn River at Yambuna Bridge, being north and east of Allotments 1, 2, and 3, section 8, Parish of Wyuna.

K6 175 ha, on the Goulburn River at McCoys Bridge, being north of Allotments 66, 67, 68, 70 and 71, Parish of Wyuna.

K7 6 ha, on Deep Creek adjacent to Murray Valley Highway, being west of Allotment 61C, Parish of Kotupna.

K8 24 ha on Skeleton Creek adjacent to the Murray Valley Highway, being north of Allotments 60A and 60, Parish of Kotupna.

K9 22 ha, on the Broken Creek adjacent to the Murray Valley Highway, being the Public Purposes Reserve north of Allotment 4, section E, Parish of Barwo.

K10 31 ha, on the Broken Creek, comprising the Water Reserve, Public Purposes Reserve, and Crown land, Township of Waaia, Parish of Waaia.

K11 3 ha, on the Broken Creek, being the Plantation Reserve, Allotment 29A, section A, Parish of Baulkamaugh.

K12 476 ha, on the Nine Mile Creek, comprising various areas of reserved and unreserved Crown land in the Parishes of Drumanure and Dunbulbalane.

This area contains significant forests and woodlands of river red gum and grey box with native grasses which provide scenic diversity in an intensively irrigated farming area. The area also has value as water-bird habitat.

Note:
The Scout Association of Australia may continue to use their site adjacent to Allotment 21, section B, Parish of Drumanure.

K13 72 ha, on the Boosey Creek, comprising the Water Reserve Allotment 187A, Parish of Boosey, and the Water Reserve adjacent to Allotment 27B, Parish of Youarang.

K14 27 ha, on Black Dog Creek and adjacent to the Norong—Boorhaman Road, being north of Allotments 5 and 6B, section Q, and north of Allotments 14A and 13 section R, Parish of Norong.

K15 3 ha, being the Water Reserve adjacent to the Howlong—Albury road and a lagoon system, Allotment 2A, section B1, Parish of Gooramadda.

K16 16 ha, comprising the Water Reserve east Allotment 1, section A1, and Crown land adjacent to Allotments 3, 2, and 11, section A1, Parish of Gooramadda.

K17 90 ha, on the Goulburn River, being west of Allotments 45, 46, 47, 48, 236, and 205, Parish of Murchison, north and east of Allotments 59, 60, 67, and 68, Parish of Arcadia.

K18 10 ha, on the Broken River, being the Water Reserve, Allotment 7B, Parish of Kialla.

K19 25 ha, on Seven Creeks, adjacent to the Miepoll—Violet Town Road, east of Allotments 23, 24, 27, 28, 31, 32, 35, 36, 37, 39, 41, and 44, Parish of Miepoll.

K20 20 ha on the Broken River, comprising Crown and north of Allotment 35, Parish of Gowangardie, and part of the Timber Reserve south-west of Allotment 1, Parish of Pine Lodge.

K21 12 ha, comprising Crown land adjacent to the Broken River, north of Allotments 6A, B, C, D, and E, Parish of Gowangardie.

K22 10 ha on the Broken River, being Allotment 76, Parish of Upotipotpon.

K23 2 ha, being the public recreation reserve, Allotment 77B, Parish of Goomalibee.

K24 5 ha, on the Broken River accessed from the Midland Highway, being Crown land south-west of Allotment 46, Parish of Goorambat.

K25 8 ha, on the Broken River approximately 1 km west of the Midland Highway, being the Public Purposes Reserve south of Allotment 8, section Q, Parish of Benalla.

K26 5 ha on the west bank of the Broken River, being unreserved Crown land west of Allotment 8, Parish of Benalla.

K27 3 ha, on Back Creek, comprising the Road Material Reserve and Water Reserve, Township of Lake Rowan, Parish of Karrabumet.

K28 5 ha on the Black Dog Creek adjacent to the Rutherglen—Springhurst Road, comprising the Public Purposes Reserve, Allotment 19, section T, and Crown land north of Allotment 9, section T, Parish of Lilliput.

K29 16 ha, being frontage to Rocky Water-holes Creek, north and east of Allotment E, section 11, Parish of Chiltern West.

K30 4 ha, being the Watering Purposes Reserve adjacent to Black Dog Creek, south of Allotment 6, section B, Parish of Chiltern West.

RIVER IMPROVEMENT

River Improvement Trusts are constituted under the *River Improvement Act* 1958 for sections of the Ovens River, Broken River, Black Dog Creek and Bullock Creek.

Improvement works in rivers are designed to maintain the carrying capacity (for water supply or drainage purposes), to protect adjoining land from flooding and erosion, to maintain the security of structures such as bridges on the flood plain, and to prevent siltation of the lower reaches by control of upstream erosion.

The works carried out include:

* erosion-preventing works on the banks — for example, planting of trees, the use of various materials for bank protection and the felling of trees that may be undermined (to prevent loss of bank material)
* clearance of waterways, by removal of snags within the bed of the channel, to maintain or improve discharge capacity.

Such work is often made necessary by the changes that man has made to land use in the river catchments and on the flood plain. The following changes have generally reduced the value of the rivers for nature conservation:

* Clearing of vegetation has increased run-off and reduced time of concentration of storm flows. The situation is sometimes aggravated by overgrazing and unwise cultivation in the catchment and along the river banks, accelerating soil erosion and transport of sediment to the stream. Increases in urban development — with disposal of storm water directly to streams — have also altered flow regimes.
* Regulation of stream flow by water storages and use of streams to transport water for irrigation and domestic use also change the natural flow regime.
* The construction of barriers such as road embankments and bridges, through which the river must pass, has often resulted in substantial modification of the bed and banks. Present legislation requires that all proposed replacement or new structures across waterways, flood plains, and depressions are referred to the State Rivers and Water Supply Commission and to the River Improvement Trust, where one is involved, for approval.

River improvement authorities, in attempting to cope with the consequences of these changes, carry out works that sometimes adversely affect landscape and nature conservation values, but sometimes ultimately enhance these values.

Removal of snags from the centres of wide streams damages fish habitat, but the tethering of these snags against the banks may provide alternative fish habitat, as well as protecting the banks from erosion, Realigning and regrading of eroding beds and banks often removes holes and back waters of value as fish habitat and for angling and swimming in a particular location. On the other hand, these operations, in preventing erosion, reduce transportation of silt.

River improvement works are sometimes aesthetically displeasing, particularly during construction and in the early stages after completion, but their ultimate aim is to prevent erosion and to allow re-establishment of vegetative cover along the stream banks.

River improvement trusts are required to act within the District as defined under the *River Improvement Act* 1958. Where such Districts encompass only the stream environs, or part only of the stream, they may be able to treat only the symptoms of problems, as the causes may lie in the catchments beyond the area of their responsibility. Works that they carry out are often limited by lack of funds. There is thus little opportunity in the design and implementation of works for consideration of their likely impact on areas outside the Trust's districts. However, the Standing Consultative Committee on River Improvement, an advisory committee formed by the State Rivers and Water Supply Commission, in examining a Trusts's works program, has regard for the effects of such works on the upstream and downstream regime.

The flow regimes of some rivers must of course be modified and flood plains used for agriculture, but it is appropriate to look at the principles of the natural system in seeking solutions to the problems that thus arise rather than to move further from those principles. The Council believes that the following principles should apply in determining the need for and design of river improvement works.

* Where problems in river management arise, the whole catchment should be considered in seeking a solution.
* Where flood control in a catchment is necessary, planning strategies should include consideration of ways of reducing run-off from the catchment.
* Total flood control is seldom practicable. In the case of minor flooding it may often be more appropriate to take action to minimize the consequences of flooding rather than attempt to prevent it.
* An adequate vegetation cover should be maintained along stream frontages to stabilize the banks and to reduce the velocity of flood-waters as they leave and re-enter the stream course.
* Structures such as road embankments and bridges on flood plains are a variation of the natural situation, and consideration should be given in their design to their effect on the flood pattern (see note 3).
* Works carried out within the bed and banks of a stream to change the alignment, gradient, or cross-section should be kept to the minimum necessary.
* Consideration should be given in the design of works to maintaining or enhancing landscape values and the value of the stream for recreation and as a habitat for wildlife.

Recommendation

K31 That the assessment of the need for, and the planning and implementation of, any works involving changes to the beds and banks of streams be based on the principles set out above.

Notes:

1. The State Rivers and Water Supply Commission has formed a Standing Consultative Committee to advise the Commission on river works. This committee comprises representatives from the following:

   State Rivers and Water Supply Commission
   Ministry of Water Resources and Water Supply
   Conservation Council of Victoria
   Soil Conservation Authority
   Fisheries and Wildlife Division
   Forests Commission
   Lands Division
   Association of Victorian River Improvement Trusts

The Committee is convened by a representative of the State Rivers and Water Supply Commission.

2. The State Rivers and Water Supply Commission, with the assistance of the Standing Consultative Committee, has prepared a document, 'Guidelines for River Management, 1979', that expands on the principles set out above. These guidelines require plans for all works (other than those of a minor nature), together with an assessment of their environmental consequences, to be submitted to all relevant agencies for consideration prior to the commencement of works. The aim of the guidelines is to ensure that an optimum balance is achieved between structural improvements on the one hand, and the maintenance or enhancement of the stream's landscape values and its value as a habitat for wildlife and for recreation on the other.

3. Information relating to the works that may be undertaken on flood plains is included in the report 'Flood Plain Management in Victoria', produced by the Victorian Water Resources Council.

L. ROADSIDE CONSERVATION AND HIGHWAY PARKS

ROADSIDE CONSERVATION

The primary purpose of road reserves is obviously to provide for communication, transport, and access. However, vegetation along the road verges can have particularly high conservation, recreation, and landscape values, especially in agricultural districts where most of the native vegetation has been cleared. Geological features exposed in roadside cuttings are a useful adjunct to more detailed work involved in mapping the geology of an area and are often used as an educational resource.

Nature conservation

Vegetation on roads is important for nature conservation because it often contains the only remnants of the region's native plant associations. Such remnants are valuable for preserving species with restricted distribution and genetically interesting variants of widespread species. They are often useful in land studies, as they may permit the original pattern of the vegetation to be pieced together. They also provide habitat for some native animals, and have special significance as pathways permitting birds to move through the countryside on annual migration, or in search of food or nesting sites. While some roads retain wide strips of native vegetation, many are mostly cleared or otherwise greatly altered. Valuable remnants of native vegetation growing on the verges of some roads should be protected where possible. Of particular note is the vegetation along roadsides on the agricultural northern plains, where the loss of mature trees is becoming an increasing problem. On these open plains roads and road reserves contain the great majority of trees in the landscape.

Accumulation of fuel along roadsides is a fire hazard of concern to fire-control authorities and it must often be reduced by burning off during cool weather. This burning off sometimes conflicts with scenic and conservation values and the Council believes that such burning should be restricted to strategically important areas and kept to the minimum consistent with efficient fire protection.

Recreation and landscape

In rural districts, vegetation along roads is often a major component of the landscape, breaking the monotony of cleared paddocks and accentuating the contours of the land. It provides a pleasant, variable road environment for motorists, and shady areas for rest and relaxation. The Council believes that as much roadside vegetation as possible should be retained when roads are being upgraded. If a major upgrading is being planned, feasibly of purchasing a strip of private land should be considered in order to preserve good stands of roadside vegetation.

Management

Responsibility for the management of roadside vegetation is vested in various authorities, depending on the status of the road. The most important roads of the State (State highways, tourist and forest roads, and freeways) declared under the *Country Roads Act* 1958 are completely under the control of the Road Construction Authority (9000 km). Main roads (14 500 km) are also declared, but are controlled jointly by the Road Construction Authority and local municipal councils. Vegetation on unclassified roads (about 98 000 km of mostly minor roads) is under the care and management of municipal councils, although it is owned by the Crown. The Forests Commission has the control of vegetation on unclassified roads that pass through or adjoin State forests. (Note: these figures are for all Victoria.)

Back roads

With increasing population and use of cars, a tendency has developed for through-roads in the study area to be continually upgraded. Tree-lined back roads with gravel surfaces on narrow winding alignments are becoming increasingly uncommon. Yet for many people such roads best fulfil their need for contact with rural environments. The Council believes that a conscious effort must be made to maintain the character of these roads, particularly when upgrading or realigning is being considered.

Recommendations

L1 That road reserves throughout the study area continue to be used for communication, transport, access, surveys and utilities.

Landscape, recreation, and conservation values can best be protected by observing the following guidelines. The Council recognizes that many of these are already being implemented by the bodies responsible for the construction and maintenance of roads.

* When improvements to a road are being carried out, trees and shrubs on the road reserve should be disturbed to the minimum extent consistent with the safe and efficient design and use of the road.

* Major works to realign minor roads carrying trees and shrubs should not be undertaken unless clearly warranted by the nature and volume of the traffic carried, and the managers of adjacent public land should be consulted regarding such works.

* Where re-alignment of a road results in a section of the old road being cut off, wherever possible that section should not be sold but used as a recreation and rest area or incorporated into an adjacent appropriate reserve.

* 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 Forests Commission 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.

* Road-making materials should not be taken from road reserves unless no suitable alternative sources are available. Any such removal should be done so as to ensure a minimum disturbance of the native vegetation, and the disturbed area should be rehabilitated, where possible, with vegetation native to the area.

* Burning off, slashing, or clearing of roadside vegetation should be kept to a minimum consistent with providing adequate fire protection.

* Weeds and vermin on roads should be controlled by means that do not conflict with the uses given above.

* The various road management authorities, when planning to upgrade roads that have heavy recreational use, should give due consideration to recreational requirements, and give priority along such roads (when funds are available) to the development of roadside recreational facilities.

* On soils of moderate to high erosion hazard, road management authorities should ensure that pre-planning, design, construction, and funding of roads cater adequately for erosion prevention and control. Advice should be sought from the Soil Conservation Authority.

L2–L5 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.

A number of important sites along road reserves should be protected, and these are listed below.

Sites of habitat and/or botanical significance

L2 Boort—Lake Marmal Road

Impressive and significant stands of yellow gum and some mallee.

L3 Murray Valley Highway

Impressive and significant stands and individuals of yellow box with some white cypress pine.

L4 Road Reserve, adjacent to the Thoona—Boughyard Creek road; the rare western silver wattle is found here.

L5 Road Reserve south of Allotments 3, 4, 5, 7 and 8, section 15, Parish of Carlyle, Significant and impressive stands of yellow box.

L6 That the following guidelines be applied to unused roads:

(1) The clearing of native trees and shrubs other than noxious weeds should continue to be clearly prohibited in the conditions of unused-road licences.

(2) A condition permitting public use of licensed unused roads should be written into unused-road licences where necessary to provide practical access to public land.

(3) Unused roads or easements should not be alienated if there is any likelihood that they will have value for future traffic, nature conservation, recreation, or other public use.

Highway Parks

Along some of the roads, the reserve carries picnic areas and wayside stops, but along major tourist routes there is an additional need for areas sufficiently large to allow travellers to be isolated from the road environment and to allow dispersion of picnickers. These areas should have scenic qualities, perhaps incorporating a stream, and be sufficiently stable to withstand intensive use. They would be used by travellers for relaxation and picnicking and should be adequately developed with picnic and rest facilities (fireplaces, tables, etc.).

Recommendations

L7–L8 That the areas listed below and shown on the map be used:

(*a*) for picnicking and to provide relaxation for the travelling public

(*b*) to maintain the local character and quality of the landscape.

that

(*c*) facilities in keeping with the nature of the reserve be provided

and that they be permanently reserved under section 4 of the *Crown Lands (Reserves) Act* 1978 with management plans prepared by the State Forests and Lands Service.

L7 20 ha, being the Water Reserve, Allotment 12, section A, Parish of Ballendella. This reserve lies between the Northern Highway and the Campaspe River.

Note:
Portion of this area requires revegetation with tree species native to the area.

L8 42 ha, comprising the Water Reserve, Allotment 19A, and Water Reserve west of Allotment 19A, Parish of Goorambat. This area, known locally as Casey's Weir, lies between the Midland Highway and the Broken River.

Roadside Picnic Area

Smaller less-developed picnic areas should supplement the system of highway parks and major reserves. Unlike highway parks, these would not be sufficiently large, nor developed to the high standards necessary, to cater for large numbers of people. They should be in attractive locations off the road reserve, and some picnic facilities should be provided.

Recommendation

L9 That the land manager establish picnic areas in suitable locations adjacent to road reserves, one such location being: 2 ha, adjacent to the Loddon Valley Highway south of Allotment 112, Parish of Tragowel.

M. EDUCATION AREAS

Environmental education is a fundamental step in the conservation of natural resources; it has become an important part of school curricula, and forms the basis of courses for tertiary and adult students.

Environmental education is indispensably linked with field studies. It is concerned with studying and appreciating all sorts of environments — natural ones undisturbed by man's activities, natural ones manipulated to produce particular products such as hardwood timber, or drastically altered ones such as are found in urban and agricultural areas. One of its basic requirements is access to land.

Council, realizing that public land provides excellent opportunities for studies of a wide range of environments, has recommended that almost all public land (including parks, wildlife reserves, and State Forest) be available for educational uses. Council believes that in most situations educational studies can take place without conflicting with the primary use for which an area is set aside. Indeed in some cases it is the manipulation of the land for the primary use that makes the area of value for environmental education. Council believes, however, that it is necessary for some relatively undisturbed land to be set aside specifically for educational uses, as unless this is consciously done, such environments will tend to be changed by other uses. In these areas education would be the primary use and other uses would only be permitted when not in conflict with the educational use. Activities permitted in education areas that may not be appropriate elsewhere would include long-term studies, collection of biological material, biomass studies, and the establishment of growth plots. They may also provide opportunities to demonstrate techniques of erosion control and the restoration of native vegetation and stream conditions to a more natural state.

In selecting land for education areas, the Council has sought to provide areas:

* giving examples of major land types
* with maximum diversity of vegetation types, soils, etc., and with natural boundaries
* located with consideration of ready access by users
* located so as to minimize the danger that wildfires present to users
* located in proximity to other land types and to a variety of other land uses
* large enough to prevent over-use and to allow for zoning to protect areas of special value
* selected so as to minimize erosion and pollution hazard

No one organization should have the exclusive right to use a particular education area, as it is important that students have the opportunity to visit a number of education areas in various land types throughout the State rather than visiting the one site several times. Minimum facilities such as toilets and shelters would be required at each education area, and it would be desirable to have accommodation either on the area or at some nearby locality. Whether or not accommodation facilities are located on the education area will depend on its proximity to other areas of educational value in the region and also on the availability and location of existing accommodation. In forested areas accommodation and other permanent facilities should only be provided where adequate safeguards against fire can be made.

The Council believes that management plans for education areas should be prepared by the Service within the Department of Conservation, Forests and Lands with planning responsibilities

for the adjacent or surrounding public land. Planning and implementing the education aspects together with co-ordinating the use of areas should be done in consultation with user groups in the education system and with community bodies with an interest in environmental education.

Recommendations

M1–M2 That the areas of public land listed below and shown on the map be used to provide opportunities for students of all ages to:

(*a*) 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

(*b*) compare the ecosystems within education areas with other nearby natural and modified systems

(*c*) observe and practise methods of environmental analysis, and the field techniques of the natural sciences

(*d*) conduct simple long-term experiments aimed at giving an understanding of the changes occurring in an area with time

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978, with management plans prepared by the State Forests and Lands Service.

M1 Spence Bridge (230 ha)

Quaternary alluvium; flood-plain; open forest II river red gum (frequently flooded), open forest—woodland II black box (infrequently flooded), lagoon and floodways; elevation 80 m; approximate rainfall 374 mm.

Notes:

1. The area occupied by the Scout Association of Australia is excluded from this reserve.

2. Alternative supplies of sand can be made available from within the forest.

M2 Wallaby Hill (310 ha)

Ordovician sediments; undulating to steep; open forest II red ironbark, red stringybark, and Blakely's red gum, open forest—woodland II grey box and red ironbark—grey box associations; elevation 180—243 m; approximate rainfall 600 mm.

N. LAKE RESERVES

Of the numerous lakes in the study area, the majority are located in depressions on the Murray and Loddon River flood-plains and form a complex system of wetlands of various depths and salinities. Most of these wetlands remain in public ownership, although many are surrounded by farmland and have been cleared — at least partially — of trees, and the majority are grazed.

Some of the public land lakes are reserved for 'public purposes', but others are simply unreserved Crown land. The Council considers that, while 'public purposes' reservations have in the past served to protect particular lakes, the value of the system as a whole has not been recognized.

Both capability and current use of the individual lakes vary widely. Scenic quality varies from picturesque to barren and unattractive, and the extent to which the lakes provide opportunities for other uses such as recreation (mainly boating and angling), wildlife conservation (particularly waterfowl), water supply, and drainage also varies. The ephemeral nature of many lakes also leads to a variation of uses and values with time on individual lakes. In some cases, a lake may dry up completely and remain until the next wet season as either a bare salt pan or a fertile plain that can be used for agriculture. The natural water levels in some lakes are manipulated — either by deliberate drainage or by pumping for irrigation.

Form of reservation

In preparing its recommendations, Council has considered the various competing uses for and the capabilities of each lake separately as well as considering the system as a whole. Those lakes with high wildlife values and where wildlife conservation is the prime use have been recommended as wildlife reserves (see Chapter C).

Some of the lakes have been recommended as lake reserves; this establishes a secure form of tenure and gives the managing authority flexibility to introduce those controls necessary to protect the values both of specific lakes (where no one value may predominate) and of the system as a whole, while providing for existing legal uses to continue. The land manager will be able to set up local committees of management and can frame and enforce regulations that are specific to a particular lake. This will ensure that proposals for use can be evaluated in relation to the capabilities of the particular lake and to the impact on the system as a whole.

Recommendations

N1–N3 That the lakes described in the schedule below and shown on the map be used, according to their particular capabilities, for:

(*a*) recreation

(*b*) wildlife conservation

(*c*) scientific study

(*d*) water supply

(*e*) drainage (including flood storage)

that

(*f*) current legal use for low-intensity grazing be permitted under the control of the managing authority (such control may involve exclusion of grazing, at least temporarily, from some reserves)

and that they be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978, with management plans prepared by the State Forests and Lands Service.

N1 Lake Marmal and adjacent Crown land (160 ha), Parish of Terrappee.

N2 Lake Boort (including Little Lake Boort and Big Lake Boort) and surrounds (486 ha), Parish of Boort.

Note:
The area includes the existing Park, Garden and Recreation Reserve and the reserve for Native Flora and Fauna and Public Recreation that abut the lake, and the use of these reserves for those purposes is to continue.

N3 Lake Moodemere (262 ha)

Comprising the Public Purposes Reserve, Parishes of Norong and Carlyle, and the Recreation Reserve, Parishes of Norong and Carlyle.

Note:
A management plan for this reserve should be prepared in consultation with the Fisheries and Wildlife Division and power-boating should be confined to the deeper section of the lake in the vicinity of the current recreation facilities.

O. RECREATION

The term recreation includes the multitude of different activities that people undertake during their leisure time. In fact, the distinguishing characteristic of recreation is not the activity itself so much as the attitude with which it is undertaken — activities undertaken with little or no feeling of compulsion are almost certainly recreation.

Outdoor recreation is of particular interest to Council, as the public land of the study area provides important opportunities for it. Throughout, these recommendations refer to the countless forms of outdoor recreation in a number of ways:

* Formal recreational activities include all organized sports and other group activities, while activities such as picnicking, fishing and hiking are grouped as informal.
* Passive recreation covers situations where the individual obtains his recreation through enjoying the sights, sounds and atmosphere of the surrounding environment while expending little physical effort. Examples are picnicking, nature observation, and strolling.
* Active recreation covers situations where the individual must expend considerable physical effort to obtain some mastery of physical forces in order to satisfy his particular recreational needs. Examples are playing organized sport, bushwalking, and water-skiing.
* Open-space recreation includes all recreational activities that require spacious outdoor surroundings, whether the activities be active or passive, formal or informal.
* Intensive recreation involves large numbers of people per unit area. For example, the camping areas at Barmah Lakes and at Yarrawonga would be considered to be intensively used.

In view of the predicted increase in demand for outdoor recreation and the high capability of some public land to meet this demand, the Council, in making its recommendations, has suggested that the majority of public land should be available for recreational uses of some sort. Accordingly, it has set aside a variety of reserves that will provide for a wide range of opportunities. Council could not, however, make recommendations covering in detail all the forms of recreation currently pursued on public land. These include activities such as swimming, bushwalking, orienteering, canoeing, fishing, hunting, fossicking, picnicking, horse-riding, boating, trail-bike riding, and pleasure driving. Council believes that activities such as these can be accommodated, without detriment to other values, somewhere on public land. Consequently, Council points out that outdoor recreation in general is an acceptable primary or secondary use of much public land (except reference areas and some water storages and their buffers) and has left the details of recreational use to the land manager.

The various recreation activities differ in their requirements for types of land, size of area, and site location. They also differ in their impact on the land and on other activities (including other forms of recreation). Generally, any one activity pursued at a low level of intensity poses little threat to the environment and seldom conflicts with other activities. With increasing intensity, conflicts and problems can arise. There is always the problem of recreation damaging the environment it seeks to use.

Council therefore believes that the land manager should aim at controlling the levels and patterns of recreational use according to the capability of the area to sustain such use without irreversible damage or significant conflict with the primary purposes of the area, while at the same time avoiding unnecessary restrictions on usage. Special care will be required in the location and management of areas zoned for intensive recreation, to prevent environmental damage. Thus, more stringent restrictions can be expected in areas where the vegetation and soils are sensitive to damage (such as those occurring on sandy soils), and where the natural environment or special natural features are being preserved.

Three particular forms of recreation that may require consideration by the land manager, whether now or in the future, are further discussed below.

Motorized Recreation

Much outdoor recreation depends on motor vehicles. These may be conventional cars, four-wheel-drive vehicles, or motor-cycles.

They may be used for touring and sightseeing, as a means of obtaining access to a particular area where other forms of recreation will be undertaken, or — when they are driven in competitive rallies or in adverse but challenging road conditions — as a source of recreation in themselves.

Most visitors to the area use conventional two-wheel-drive vehicles and keep to the major through routes. Others use four-wheel-drive vehicles or motor-cycles to gain access to the more isolated areas via the secondary system of roads that supplement the major ones. This system was constructed mainly for timber harvesting, forest management, and fire protection. The roads are frequently rough and sometimes steep and have not been designed to cope with increasing use by recreation vehicles.

Consequently, even legal use of roads can pose maintenance problems for the land manager. Authorities responsible for their construction and maintenance on public land may close roads temporarily or permanently when traffic exceeds their physical capacity, for safety reasons, or when use by vehicles is in unacceptable conflict with the area's primary uses. Erosion hazard areas may be proclaimed according to the provisions of the *Land Conservation (Vehicle Control) Act* 1972 and regulations, enabling strict control to be enforced.

If the increased recreational use of roads is to be catered for, adequate funding should be provided for road maintenance, otherwise deterioration leading to erosion is inevitable.

A number of four-wheel-drive clubs have acknowledged the need for restrictions on motorized recreation in certain areas and during some periods of the year, and generally support the use of existing legislation to control undesirable activities. Clubs also recognize the need to inform and educate participants in motorized recreation of the environmental consequences of improper use of four-wheel-drive vehicles. Authorities with management responsibilities should continue to promote responsible attitudes to the use of four-wheel-drive vehicles and trail-bikes.

A significant and growing proportion of the population is becoming involved in recreational touring, which depends on the use of roads on public land. Drivers of motor vehicles, including motor-cycles, who leave the roads on public land contravene the provisions of the above *Act*. (Limited exceptions are given in the *Act*).

The demand exists for the provision of some areas of public land to accommodate and relocate the off-road activities of motor vehicles, particularly trail-bikes. Such areas could, for example, take the form of defined trails in some State forests or could include disused quarries or parts of some recreation reserves close to urban centres. Where possible, the alternative use of suitable private land should be considered. Areas chosen, whether public land or freehold, would have to be in situations where damage to soil and vegetation would be minimal, and where noise would not cause undue disturbance to other people using, or living in, nearby areas. Council points out that there is a serious and growing problem of damage to soils and vegetation by spectators attracted to these activities.

Hunting

The Murray Valley area offers good opportunities for the hunting of a range of game species.

Game birds

The numerous lakes and wetlands throughout the study area comprise some of the more popular duck-shooting areas in the State. Many licensed hunters visit the study area's wetlands each year during the 3-month Victorian duck-hunting season. Japanese snipe are also hunted in swampy and open country within the study area.

The proposed recommendations do not allow hunting in the State and Regional Parks nor in proposed flora and flora and fauna reserves. The Council is aware that the Barmah State Park contains some wetlands which, depending on the season, can offer opportunities for duck-hunting. The Council is also aware that duck-hunting opportunities in other wetland areas could be important and it has drawn the government's attention to the desirability of continuing to investigate ways of achieving this (see Wildlife Chapter).

Youth Camps

Currently the study area contains few permanent youth camp sites. Demand is likely to increase, however, for sites for use by scouts, schools, church groups, and the like. Users have generally preferred sites situated in pleasant bushland, close to a permanent stream, readily accessible by road, and in areas where the safety of the camp and its occupants can be ensured during periods of high fire danger. Such sites are relatively scarce and their use for youth camps is in direct competition with their use for less-restrictive public activities, such as picnicking and general camping.

Camps on public land vary greatly — in the purpose for which they are constructed, in their standards of maintenance, and in the degree to which they are used. Some are designed to provide full accommodation, with campers living in huts that have electricity and hot water provided; others have only minimal facilities, with campers living in tents. Some have considerable amounts of money and volunteers' time and effort put into their construction and maintenance; others have been built and are maintained at very low standards. Some are used for much of the year, with the owner organization allowing use by other groups. Others are used only occasionally and exclusively by one group.

User groups have an increasing tendency to acquire freehold land for their actual camp site, while using adjacent public land for their outdoor activities, and Council believes that this trend should be encouraged. While recognizing that a variety of types of camps may be needed, Council believes that any camps permitted on public land should be properly located, constructed, and maintained. For efficient management of camps, it may be necessary for a single organization to be given limited tenure over a minimum area at any individual camp site, under the control of the land manager. Council believes, however, that these camps should still be used as fully as possible consistent with avoiding damage to the environment.

The greater use of existing camps on public land is desirable in order to avoid proliferation of camp sites, and there is a need for co-ordination of information regarding the availability of those camps that could be used by groups who do not have tenure of their own.

It is likely that some existing camps may need to be phased out or relocated where these conflict with the primary use of the surrounding land, or if they are in particularly hazardous areas from the point of view of pollution, erosion, or wildfire.

Recommendations

Recreation

O1 That public land continue to be available for a wide range of recreational uses where these can be accommodated without detriment to other values and that authorities with

management responsibilities aim at controlling the types, levels and patterns of recreational use according to the capability of particular areas to sustain such use without irreversible change or significant conflict with the primary purpose of the area.

Motorized recreation

O2 That vehicular use of roads within the meaning of the Land Conservation (Vehicle Control) Regulations continue to be permitted on public land except where closure is necessary because of erodible soils, seasonal conditions, excessive maintenance, or conflict with the primary use of the area.

O3 That the authorities with management responsibilities endeavour to provide some areas for off-road vehicular use within land under their control.

Recreation reserves

O4—O8 That the areas described below and shown on the map be used for organized sports (football, horse-racing, golf, etc.) and informal recreation (picnicking, camping, etc.) as permitted by the land manager

that native trees be conserved where possible

and that these areas be permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978, with management plans prepared by the State Forests and Lands Service.

O4 Existing recreational reserves.

Note:
The existing Recreation Reserve, Township of Pyramid Hill, encompasses Pyramid Hill. The significant geological, scenic, and floristic values of this area should be protected.

O5 0.4 ha, being the south-eastern portion of the Water Supply Reserve, Allotment 75A, Parish of Upotipotpon.

O6 8 ha, being Allotment 1A, section 20, Parish of Wangaratta South. Recreational use of the area would include bow-hunting.

O7 0.6 ha, being the northern portion of Allotment 39C, Parish of Killawarra.

Note:
Legal access should be provided through portion of Allotment 39C to Allotment 39B, Parish of Killawarra.

O8 35 ha in the Parish of Barmah, incorporating the Barmah Lakes Camping Area.

Note:
This area should be managed in conjunction with the adjoining Barmah State Park.

P. MILITARY TRAINING

Council believes that military training is a legitimate use of public land, but is aware of the possibility of conflicts arising with some forms of recreation. It is Council's view that military training should not occur in reference areas or wilderness areas, and only under special circumstances in parks and other areas of recreation and conservation significance:

Recommendation

P1 That, where military training is conducted on public land:

(*a*) the types of activities, and their timing and location, be subject to agreement between the defence department, the land manager, and the other relevant government bodies such as the Land Protection Service in the Department of Conservation, Forests and Lands.

(*b*) the training activities be carried out under conditions specified by the land manager and other relevant authorities, to minimize any detrimental effects

(*c*) the Forests Commission be consulted (for fire-protection purposes) with respect to training activities in protected public land

(*d*) it be excluded from reference areas, and, except under special circumstances, from parks and other areas of recreation and conservation significance.

Q. AGRICULTURE

The Council recommends that, at this stage, no additional large areas of public land be developed for agriculture and that only small areas of public land be made available (see Recommendations Q5—Q10).

Recommendations

Q1—Q4 That the areas of land listed below, and shown on Map A, be used for agricultural research and education purposes, and that they remain or become (as the case may be) permanently reserved under section 4 of the *Crown Land (Reserves) Act* 1978 for this purpose.

Q1 Animal and Irrigated Pastures Research Institute, Kyabram (250 ha).

Q2 Irrigation Research Institute, Tatura (42 ha).

Q3 Dookie Campus of the Victorian College of Agriculture and Horticulture (V.C.A.H.) (2,448 ha).

The V.C.A.H. is the only substantial area of public land remaining in this part of the study area.

Much of the land surrounding V.C.A.H. has been cleared and given over to agricultural pursuits. The removal of vegetation has led to a loss of habitat and landscape diversity and in some areas has resulted in the land becoming susceptible to sheet and gully erosion and dryland salting. Council understands that it is proposed to replant some of the cleared slopes around Mount Major within the Dookie Campus with native trees in order to enhance its visual amenity and to demonstrate the species and techniques that could be used in the revegetation of surrounding farmlands to alleviate the problems of erosion and salting. The Council supports this proposal. A similar revegetation scheme known as 'Project Treecover' is underway at Caniambo.

The campus encompasses a 150-ha timber reserve, that provides local landscape character; and Mount Major, a popular scenic lookout, provides views of the Eastern Highlands and the surrounding plains.

Council, in addition to the above recommendation, recommends that

(*a*) the 150-ha timber reserve located south-west of the college buildings be retained to maintain the local character and quality of the landscape

(*b*) the public continue to have access via the formed road to the scenic lookout on the summit of Mount Major

Q4 Rutherglen Research Institute (800 ha).

Land recommended for alienation

It is proposed that the land described below and shown on Map A be made available for agriculture in accordance with the provisions of the *Land Act* 1958.

Q5 2 ha, being the Water Reserve west of Allotment 12B, Parish of Terrappee.

Q6 48 ha, being Allotment 19, Parish of Milloo.

Q7 7 ha, being Allotment 24A, section 4, Parish of Turrumberry North.

Q8 44.5 ha east of Allotment 18, section D, Parish of Patho.

Q9 20 ha, being portion of Allotment 30A, Parish of Mooroopna.

Q10 0.35 ha, being Reserved Forest, south-east of Allotment 9, Parish of Pine Lodge.

Grazing on public land

Forest grazing and grazing on public land water frontages occurs throughout the study area. Grazing is carried out under licence or by agistment. The availability of this public land is not of great significance in the economy of the grazing industry in the region. It is, however, of considerable importance to many individual licensees and agisters, for whom grazing on public land often forms an integral part of their farming enterprise.

The practice is well-established and has been carried out in the region since European settlement. During the 1840s, Edmund Curr (a squatter) regularly drove sheep from winter runs in southern Victoria to the luxuriant summer pastures of Moira grass that developed in the Barmah Forest following the winter-spring flooding. Since those days, forest grazing has gradually come under government control but has continued as an important adjunct to the local farming community, as it allows extra stock to be carried over the dry summer and autumn.

During its investigation of the Murray Valley area the Council commissioned a study of grazing on the larger blocks of public land in order to determine its economic significance to both the graziers and the regional economy. The consultants were also asked to develop grazing management options that would provide for the re-establishment and maintenance of the natural forest environment. The areas studied were:

* Barmah forest (including the Yielima grazing area or 'Top End')
* Gunbower Forest
* Terrick Terrick Forest
* Killawarra Forest

Information supplied by the consultants provided an important input into the formulation of Council's recommendations regarding grazing in these areas. Reference to each of the areas included in the study is made below.

Council believes that the intensity, location, and timing of grazing on public land should be consistent with the aim of maintaining an adequate vegetative cover, thereby minimizing both soil erosion and the loss of sensitive species by grazing, either directly or indirectly, through a change in soil fertility. The Council also believes that some areas of public land should be managed primarily for the maintenance and enhancement of the ecosystems they support. In these areas, grazing by domestic stock is an inappropriate use and the land manager should take all practicable steps to exclude them.

Barmah Forest

The Barmah Forest is divided with regard to grazing into two distinct areas — namely, the Barmah grazing area and the Yielima grazing area. The two are separated by a boundary fence and the agistment arrangements are administered separately.

Barmah grazing area

Grazing in this area is by agistment and some 28 landholders have stock within the forest. Grazing rights in the Barmah grazing area are restricted to landholders living in Nathalia Shire.

Cattle numbers over the past 20 or so years have ranged from 3,000 to 4,000 for some years during the early seventies but have been less than 2,000 for the past 7 years. The number of agisters has also decreased over the past 7 years from 56 in 1977 to 28 in 1983.

Landholders agisting cattle in the forest are involved mainly in mixed farming and dairy farming, and it has been estimated that the contribution to gross farm margins from forest grazing is around 12% for mixed farms and 9% for dairy farms.

Yielima grazing area

Grazing in this area is also by agistment and rights to graze in the forest are restricted to landowners north of the Murray Valley Highway who do not have a water right. The number of agisters has declined from 11 in the 1970s to 4 in 1983/84.

Although the number of cattle agisted prior to 1976 was relatively stable, the total grazed in winter has decreased from around 150 in 1976/77 to about 50 in 1982/83, while summer numbers for the same period have declined from about 400 to about 100.

It has been estimated that the contribution to gross farm margins from grazing in Yielima is around 10%.

The significance of grazing

As indicated above, grazing in the Barmah and Yielima portions of the Barmah Forest has declined in recent years. This decline probably reflects the current economic position of the beef industry and the general trend towards larger holdings and fewer farms in the area.

It may also reflect the restrictive entry conditions that apply and the feeling expressed by the graziers that agistment fees are relatively high, taking into account management problems such as loss of cattle through illegal shooting, theft, and the failure to muster all stock.

The consultants have estimated that removal of grazing from the entire area of these forests would result in a reduction in net income per farm from this activity, and for some farm enterprises this could mean the difference between viability and non-viability unless other opportunities for generating farm income are developed. On a regional basis the cessation of grazing would have a minimal impact.

The consultants have also stated that the available evidence suggests that changes have occurred to the structure and composition of the grey box—yellow box woodlands and the black box woodlands as a result of grazing pressure by domestic stock, feral animals, and native animals. In the case of the rushland communities changes have occurred as a result of grazing by domestic stock and the effects of water regulation. The concentration of grazing on the box ridges during the winter months when the red gum understorey is either dormant or submerged has assisted the invasion of alien species, and grazing by stock, feral, and native animals has probably reduced the cover and diversity of understorey vegetation on these areas. The species composition of the rushlands may also have changed from common reed and cumbungi to giant rush partly as a result of the introduction of domestic stock, as the first two species are palatable to stock and occur in areas that are frequently grazed.

However, grazing by domestic stock in both the Barmah and Yielima grazing areas does not appear, of itself, to have had significant observable effects on the structure and composition of the grassland and red gum communities, with the possible exception of the red gum community type dominated by introduced species.

The Council believes that there is a need to protect representative examples of the land types and their associated vegetation communities in the Barmah Forest and therefore proposes that some areas be removed from grazing. In two areas, encompassing Top Island and Barmah Lakes in the western portion of the Forest, it is recommended that grazing be discontinued as these contain good examples of the land system components that are frequently flooded. It is also proposed to exclude portion of the Top End from grazing as this is representative of the less frequently flooded components of the red gum ecosystem. The Council has indicated, however, that in portion of the Top End between Tullah Creek, the Rookery, and the boundary of freehold land, grazing could be considered as one of the management options for reducing the fire hazard.

It will be difficult to completely fence out some areas because of the flood-prone nature of the forest and the high cost of fence maintenance. It will therefore be necessary to continue to employ a herdsman to ensure that cattle do not stray into areas that are to be protected.

A number of small areas located within the existing Barmah Muster Paddock contain several rare plants, including *Helipterum strictum, Menkea crassa,* and *Swainsona microcalyx* var. *adenophylla.* These plants are usually found in a transitional zone between the black box woodlands and the red gum forests bordering Goose Swamp and Broken Creek. Further work is required to define these areas accurately, but when this is completed Council believes that the areas should be fenced to exclude grazing.

Recommendations

Q11 That the Barmah and Yielima grazing areas continue to be available for grazing by cattle with the exception of those areas shown on Map A, where grazing is to be phased out within 3 years of the date of acceptance of Council's recommendations.

Note :
Consideration could be given to the use of grazing as one of the options for reducing the fire hazard in that portion of the Top End south of Tullah Creek, the Rookery, and the boundary of freehold land.

Q12 That the area available for grazing in State Forest be administered as a single unit.

Q13 That, when delineated, the areas containing rare plants in the vicinity of Goose Swamp be fenced to exclude grazing.

Q14 That the structure and rate of agistment charges be competitive with market-determined agistment rates.

Q15 That the land manager monitor the effects of grazing on both native overstorey and understorey species occurring in the forest and ensure that stocking rates are adjusted to properly reflect the management aims for the forest.

Gunbower Forest

Grazing in the greater proportion of the Gunbower Forest is carried out under agistment, while the remainder is divided into individually licensed areas. These cover a total area of about

7,300 ha with 21 licensees. The number of cattle on grazing licences in the forest during winter is about 300, with a further 300—400 yearlings grazed at various times throughout the year. The remaining 11,300 ha of the Gunbower Forest is grazed under agistment. At the present time the six agisters, all involved in dairy farming, mainly use the forest to graze dry dairy stock over the winter months. The number of agisters has declined steadily from 17 in 1974 to 6 in 1983 and the number of cattle has decreased at a corresponding rate. The decrease in the number of agisters using the forest is probably due to the current economic position of the beef industry and to the relatively high costs and management problems associated with agistment in the forest.

It has been estimated that the contribution made to gross farm margins from grazing the Gunbower Forest is between 11% and 20% in the case of licensees and 10% and 16% for agisters. In terms of the regional economy the contributions derived from grazing public land would be minimal.

The available evidence suggests that changes have occurred to the structure and composition of the black box and grey box woodlands as a result of grazing pressure by domestic stock, feral animals, and native animals. In the case of the rushland communities, changes have occurred as a result of grazing by domestic stock and the effects of water regulation. Grazing has probably been a major cause of the shift in species composition from common reed and cumbungi to giant rush, as the first two species are palatable to stock and occur in areas that are frequently grazed.

However, grazing by domestick stock in the Gunbower Forest does not appear, of itself, to have had significant observable effects on the structure and composition of the grassland and river red gum communities.

The Council has proposed that grazing under licence or by agistment continue over most of the Gunbower Forest, except for that part of the forest recommended as an education area and for portion of the Pig Swamp, which has not been available for grazing for a number of years.

Recommendations

Q16 That the Gunbower Forest continue to be available for grazing by cattle with the exception of the areas listed below and shown on the attached map:

* Spences Bridge Education Area
  — grazing is to cease upon acceptance of the recommendation

* portion of Pig Swamp
  — already removed from grazing.

Q17 That the land manager monitor the effects of grazing on both overstorey and understorey species occurring in the forest and ensure that stocking rates are adjusted to ensure that conservation management goals can be attained.

Q18 That the current methods of grazing by agistment and area licence continue.

Terrick Terrick Forest

Grazing in this forest is by agistment over 28-day periods and four agisters currently utilize the area. The number of cattle in winter ranges up to about 350 while in summer the number is about 100. Each agister is involved in a mixed farming enterprise, generally consisting of

wheat, oats, sheep, and beef. It has been estimated that the contribution to the gross margin of each farm made by forest grazing is between 1% and 2%. On a regional basis, the cessation of grazing would have little or no effect.

The Terrick Terrick Forest is the largest consolidated occurrence of white cypress pine woodland remaining in Victoria. However, the area formerly consisted of a mosaic of vegetation communities with some pure stands of white cypress pine, some pure box woodlands, and a mixture of both. This original woodland structure has been altered by selective cutting of the box species to favour the establishment of white cypress pine, which is used for fencing and other timber products.

Protection from grazing by domestic stock is considered necessary for the regeneration of white cypress pine and other native understorey species, and current management already excludes grazing from areas of the forest on a rotational basis to ensure that regeneration can take place. Managed grazing is also used as a method of fuel reduction in the forest, but in order to achieve adequate regeneration of white cypress pine and the associated understorey species it may be necessary to develop other techniques to reduce the fire hazard. This should be given a high priority in developing a management plan for this forest. In formulating the following recommendations the Council considered the conservation significance of the area and the sensitivity of white cypress pine to fire.

Recommendations

Q19 That grazing be permitted only on such areas and at such times as the land manager considers necessary for management purposes.

Q20 That the intensity, timing, and location of grazing be consistent with the maintenance or re-establishment of the natural woodlands and associated understorey vegetation.

Q21 That the land manager monitor the effects of grazing on both overstorey and understorey species in the forest.

Killawarra Forest

Grazing in the Killawarra Forest is carried out by a single licensee who has grazed an average of 600 sheep in the forest since 1965. The licensee is involved in a mixed farming enterprise comprising beef, sheep, and cereal crops. The forest grazing aspect is, however, a separate enterprise in itself. It is estimated that the cessation of grazing would result in a reduction of about 10% of the property gross margin.

Available evidence suggests that grazing by domestic stock has reduced the distribution and abundance of the shrubby understory in the Killawarra Forest. The grass and herb component may have also been similarly affected. It is suggested that grazing in good years has no significant impact on native vegetation, but in dry years the ground cover can be substantially reduced.

The Killawarra Forest is a significant area of box-ironbark woodland and is known to support a number of uncommon plants, including the dense mint bush (*Prostanthera decussata*) and several notable animals such as the squirrel glider and turquoise parrot. The significance of the forest habitat for these animals lies in the maintenance of both overstorey and understorey composition in a relatively natural state.

Grazing is used as a method of fuel reduction in the forest. Heavy fuel accumulations are principally confined to the grey box woodlands, streamside communities, and volunteer

grasslands on the cleared areas of the forest. Other methods to reduce the fire hazard could be adopted here, however, such as the establishment of a fuel-reduction burning program in strategic areas of the forest.

The Council believes therefore that grazing should be substantially reduced in both intensity and frequency so that the native understorey vegetation can be re-established and maintained. Grazing should be confined to areas that have strategic importance for fire protection in the forest, and should be used in conjunction with other methods of reducing fuel accumulations. The Council is aware of the severe erosion hazard in this forest, which should be taken into account when planning fire-protection measures and other management activities.

Recommendations

Q22 That grazing be permitted only in those areas of the forest that have strategic importance for fire protection, in combination with other fire-protection measures such as fuel-reduction burning.

Q23 That the intensity and frequency of grazing be substantially reduced to a level consistent with the re-establishment and maintenance of the native overstorey and understorey vegetation.

Q24 That the land manager monitor the effects of grazing on both native overstorey and understorey species in the forest.

Fire protection

Council is aware of community concern regarding fire protection and that, in order to reduce the risk of major outbreaks, fire-protection measures must be undertaken.

Particular attention has been given to fire prevention and suppression in the organisation of the new Department of Conservation, Forest and Lands. Fire protection services for public land will be provided and co-ordinated by the Regional Management Division. The organizational arrangements to provide the services will be similar to those that have operated effectively in the Forests Commission. The Amalgamation provides the significant additional benefits of direct involvement of much larger forces of staff and employees in prevention and suppression and of better co-ordinated and more readily available support forces of manpower and equipment. All these elements collectively will enable more effective fire prevention and fire suppression programs to be achieved on public lands of the State.

River red gum, in particular young regeneration, is sensitive to damage by fire and even relatively cool burns can cause the death of some young trees. Mature trees may also suffer a degree of damage and this can reduce their value for timber production. Grazing is therefore the most frequently used method of reducing the fire hazard in areas of red gum forest where a major aim of management is the production of high-quality timber.

In areas of red gum forest where the primary aim of management is conservation of the natural ecosystem rather than timber production however, carefully planned and executed fuel-reduction burning in strategic areas (such as mature red gum stands) would provide an alternative fire-protection measure to grazing. In addition, the establishment of firebreaks adjacent to private land and along major tracks within the forests will assist in reducing the fire hazard.

Fuel-reduction burning used to reduce flammable fuels would need to be carried out in spring and autumn, depending upon the growing season and the nature of the fuel involved. The Council therefore believes that in those areas in the Barmah and Gunbower forests that would

no longer be available for grazing, the land manager should, where necessary, implement a strategic fuel-reduction program in order to reduce the fire hazard. Such a program may include fuel-reduction burning and the establishment of firebreaks in strategic areas. The Council has however, indicated that grazing could be considered as one of the options to reduce the fire hazard in a portion of the Top End abutting freehold land.

In two other areas, the Terrick Terrick Forest and the Killawarra Forest, the Council has drawn attention to the need to manage the land in order to re-establish and maintain native plant communities. The native white cypress pine woodlands occurring in the Terrick Terrick Forest are also particularly sensitive to damage by fire and therefore forest grazing is the current method used to reduce fuel accumulations in this area. The Council believes, however, that grazing management for fire protection in this forest should be co-ordinated with the need to re-establish and maintain the original vegetation community that existed prior to settlement. The Killawarra Forest contains tree species that are not so readily damaged by fire and here fuel-reduction burning in areas of strategic importance for fire protection could be one option to reduce the fire hazard. In general, however, fuel accumulation in box—ironbark forests such as the Killawarra is relatively low, particularly where native species dominate the understorey.

Apiculture

Honey production is an important industry in parts of the Murray Valley area. The Council considers that apiary sites should continue to be permitted on public land other than in reference areas.

R. MINERAL AND STONE PRODUCTION

The continued existence of our technological society will depend on the availability of minerals. The study area contains known deposits of 'gold' and 'minerals' as defined in the *Mines Act* 1958 and as subsequently gazetted (metallic minerals, coal, etc.). Nevertheless, knowledge of the location of our mineral resources is far from complete and new deposits of commercial significance will undoubtedly be found. Furthermore, currently uneconomic deposits of important minerals may become economically exploitable, and other minerals that are not used at present may become important.

Exploration for gold and minerals

The government has the responsibility to establish the existence and extent of the State's mineral resources. The government, in the main, meets this responsibility through the provisions in the *Mines Act* 1958 that provide the tenure under which private enterprise is encouraged at its own cost to locate new deposits of gold or minerals. When a new deposit is discovered in an area where mining is not a currently approved land use, it may be of such importance that a change of the land use is required in the State interest. The decision on whether such a change is in fact necessary can only be made against a background of the best available knowledge of the location and extent of the particular mineral deposit. It is important therefore that the reservation of conservation areas should not automatically exclude exploration for mineral or fossil fuel resources. Attention should be directed towards ensuring that other values and interests are protected, rather than preventing exploration activities.

The protection of other values — particularly those historical values around old mine sites — should never be enforced to the point that it places human life at risk. In relation to public safety, nothing in the recommendations affects the powers of Inspectors under the *Mines Act* 1958 and the *Extractive Industries Act* 1966.

Gold

Since 1977, sharp rises in the price of gold have resulted in a significant upturn in exploration activity. The interest of individual prospectors has also increased, as seen by the increased number of claims being registered. A number of attempts are being made to re-open previously uneconomic mines on existing leases.

The substantial rise in the gold price has also stimulated a renewed interest in general prospecting (fossicking), evidenced by the increased number of Miner's Rights issued.

This increased interest in prospecting and mining has not been confined to the large-scale operations being planned and undertaken by the corporate sector. Many individual miners and prospectors are operating in Victoria — some professionally (that is, they rely on these activities for their sole source of income), some on a part-time, semi-professional basis, but many as a form of recreation encouraged by the possibility of 'striking it rich'. In terms of the number of people involved, this latter group has experienced the most substantial growth, especially since the increased use of the metal detector.

Fossicking and prospecting

Fossicking and prospecting are often taken to mean one and the same thing. In mining terms a fossicker is a person who casually works over old mine workings and waste rock heaps in the hope of finding small amounts of gold and minerals. Unlike prospecting, the term 'fossicking'

has no basis in legislation under the *Mines Act* 1958. Fossicking is also accepted as a wider term that embraces not only the search for gold and minerals, but also for other items such as bottles or coins.

Prospecting is a systematic activity, defined in the *Mines Act* 1958 as 'all operations conducted for the purpose of discovering or establishing the presence or extent of mineralization or of a mineral'. It is necessary to hold either an exploration or search licence, or a Miner's Right, before prospecting may be undertaken. Most individual miners and prospectors operate under a Miner's Right, which does not permit prospecting on private land.

Under current legislation there is a small percentage of public land in the State where prospecting under a Miner's Right is not permitted. This includes areas used for various community purposes such as golf courses, cemeteries, and flora reserves.

Council considers fossicking and prospecting to be legitimate uses of public land and as such should not be unduly restricted or regulated. There are some areas, however, where these activities may not be permitted or may require limitation and these have been specifically nominated in the recommendations (see Chapter B — Reference Areas and the Water Production section in Chapter D).

In addition to these, there may be other limited areas of land surface that, because of their special public importance or inherent instability, warrant either permanent or temporary exclusion from fossicking and prospecting. These areas may include, for example:

* land that, if disturbed, may detrimentally affect water quality, especially where the water is used for domestic consumption
* important habitats for plant species or fauna
* important historic relics that could be damaged
* sites of high erosion hazard
* community assets such as recreation areas and water or sewerage installations
* important geological formations.

These limited areas of land surface have not been specified in the recommendations, but will be determined by the management authority and the Department of Minerals and Energy together. Fossicking and prospecting, where they involve minimal disturbance to soil or vegetation, will be permitted on public land other than these limited areas and those specifically nominated in the recommendations. Areas currently exempted or excepted under existing legislation should remain so, unless otherwise specified in these recommendations or unless the land manager and the Department of Minerals and Energy together determine that such exemptions or exceptions should no longer apply.

With the exception of the land referred to in the section on Water Production in chapter D (Recommendations D1—D59), the areas specifically excluded in these recommendations amount to less than 1% of the public land in the study area, and are recommended as reference areas. These are set aside to maintain natural ecosystems as a standard that may be used by those concerned with studying the land for particular comparative purposes. Within these areas all human interference, including fossicking and prospecting as well as all other forms of productive or recreational use, is prohibited.

Stone

Materials covered by the definition of 'stone' in the *Extractive Industries Act* 1966 (including rock, gravel, clay, sand, and soil) are widespread in the area. There is a strong community demand for new and better roads and buildings, and so for the materials necessary for their

construction. Most of these materials are provided from private land, but public land is also an important source.

The requirements of the shires with regard to their needs for 'stone' production have been determined by a process of consultation and investigation, involving the shires, the Department of Minerals and Energy and this Council.

Public land is a significant source of road-making material for some shires. Although resources remain on areas of public land, they are not unlimited and Council believes that shires should be investigating now the extent to which private land could be used as a source of 'stone'.

The Council is concerned by the complexity of legislation and procedures governing extraction of 'stone'. (For example, the Road Construction Authority and municipal councils are not bound by many provisions of the *Extractive Industries Act* 1966.)

A substantial number of unwise excavations have been made upon public land, and in many instances, particular with older excavation sites, the rehabilitation of excavated land is lagging.

There is need for:

* review of existing legislation and procedures to enable more rational use of the 'stone' resource of the State
* provision of adequate resources for the reclamation of old extraction sites on public land.

Poorly planned and located excavations can affect surrounding lands through noise, dust, unsightliness, and erosion and can diminish the value of the land. With care, however, these effects can be avoided or minimized.

Principles and guidelines

The terms 'exploration and extraction', referred to below, do not relate to the forms of these activities described above under fossicking and prospecting.

The Council believes that the following principles should apply.

1. Some areas of land surface — because of their inherent instability or special public significance (for example, community assets or areas with important scenic, archaeological, historical, recreation, or nature conservation values) — warrant permanent or temporary exclusion from exploration and/or extraction of 'gold' and 'minerals'. The Department of Minerals and Energy and the land manager should together determine these areas. An inter-departmental committee convened by the Department of Minerals and Energy is currently establishing the procedures to be followed by the Departments involved.

2. When tenure is issued for operations under the *Mines Act* 1958 on public land, the land manager should be consulted regarding the conditions to apply and the supervision should be in accordance with the agreed conditions as specified in the claim, licence, or lease and with the requirements of the *Act*.

3. Consultation should continue between the land manager, the Department of Minerals and Energy, the Soil Conservation Authority, and the other relevant authorities with respect to the procedures to be adopted for the exploration and extraction of 'stone' on public land. Any operations on public land should continue to be subject to the approval of the land manager.

In all cases, the procedures that are established should apply to municipal councils, the Road Construction Authority, and other public authorities as well as to commercial operators. To ensure this, the relevant *Acts* may have to be amended.

4. A system should be established that would ensure, before work commences, the availability of funds for progressive and final reclamation of any excavation or operation. Provision should also be made to enable the acceleration of the rehabilitation of all existing extraction areas on public land.

5. Royalties for materials extracted from public land, including site rental when appropriate, should be more closely related to the market value of the material. This would eliminate the temptation to use public land purely on the grounds of the nominal royalties often levied in the past.

6. The following guidelines should apply to all extraction from public land:

   (*a*) The Department of Minerals and Energy should not issue leases for mining of 'gold', 'minerals', or 'petroleum' unless satisfied with the program submitted by the applicant. In the case of Miner's Right claims, prior assessment is impractical and the Department should require the lodgement of a bond as surety for adequate rehabilitation. Wherever practical, the Department should seek the lodgement of mining plans that show the expected post-mining state of the land and should state operating conditions to achieve an appropriate standard of rehabilitation acceptable to the land manager.

   (*b*) No sites for the extraction of 'stone' should be opened in areas that the land manager, in consultation with the Department of Minerals and Energy, considers to be of greater value for other uses, including aesthetic or nature conservation values. The advice of the Department of Minerals and Energy should also be sought as to the desirability of proposed excavations, having regard to alternative sources of 'stone'.

   (*c*) Extraction of 'stone' should generally be concentrated on the fewest possible sites in an area, and any one site should be substantially worked out and where possible reclamation ensured before a new site is exploited. The type of excavation to be carried out should be that with the lowest environmental impact consistent with the effective use of the resource. In general, and where the nature of the resource permits, excavations for 'stone' should be deep and limited in area in preference to shallow excavations over a wide area. The extraction of granite sand occurring as shallow deposits in the weathered profile should be discouraged unless it has been established that no suitable alternatives are available. In the special circumstances where approval is given for this form of extraction, particular attention should be given to the prevention of soil erosion.

   (*d*) Where an application for the removal of 'stone' from a stream-bed is considered, the land manager should take particular care to ensure that the operations will not directly or indirectly cause erosion of the bed or banks, or undue pollution of the stream. In addition to the arrangements outlined above for 'stone', the land manager should also consult with the relevant water supply and conservation authorities, and should consider the scenic and recreation values of the area.

   Alternative sources with a lower environmental impact should be used where they are available. The environmental effect of extraction may be reduced if alluvial stone is obtained from properly managed quarries on the river terraces, rather than from the present stream-bed.

(e) All extraction sites should be fully reclaimed where possible. Reclamation should follow extraction progressively when possible, but otherwise should begin immediately extraction is completed. The requirements for reclamation should be included in the conditions of the lease or licence before any approval to extract is granted. The reclamation may include, for example, replacing topsoil, revegetating the site with plantation forest, allowing a quarry to fill with water and developing the site as a park, using a gravel pit for off-road vehicles, using a quarry for garbage disposal prior to reclamation, or restoring the site as closely as possible to its original topography and revegetating it with species native to the site.

In addition to the above, the approval of the Soil Conservation Authority should continue to be sought for the exploration or extraction operations for 'gold', 'minerals', 'petroleum', or 'stone', where the subject land is within a proclaimed water supply catchment.

Recommendations

R1 That fossicking and prospecting under Miner's Right, involving minimal disturbance of soil or vegetation, be permitted on public land other than:

(i) those areas specifically excluded in the recommendations (see the chapters on Reference Areas and Water Use and Regulation)

(ii) those areas that the land manager and the Department of Minerals and Energy together may determine (see the guidelines in the section on fossicking and prospecting)

(iii) the areas referred to in R2 below.

R2 That those 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 Minerals and Energy together determine that such exemption or exception should no longer apply.

R3 That public land in the study area (other than reference areas) continue to be available for exploration under licence and for extraction of 'gold', 'minerals' and 'petroleum', subject to Recommendation R2 and the principles and guidelines set out above.

Note:
This recommendation does not refer to exploration under a Miner's Right, which is covered by Recommendation R1.

R4 That public land in the study area (other than reference areas) continue to be available for exploration for 'stone' subject to the principles and guidelines set out above.

R5–R24 That the areas listed below and shown on the map be used for the extraction of 'stone' in accordance with the principles and guidelines outlined above and, if not already reserved for this purpose, be temporarily reserved under section 4 of the *Crown Land (Reserves) Act* 1978, with management plans prepared by the State Forests and Lands Service. (These areas are additional to sites on larger blocks of public land where gravel extraction is one of the recommended uses.)

Portions of some of these areas are currently used for extraction of stone under an Extractive Industries Lease and those portions would not be reserved under section 4 of the *Crown Land Reserves Act* 1978.

R5 21 ha, being the southern portion of Woolshed Swamp, west of Allotment 22, Parish of Wychitella.

R6 30 ha, being the Common (Gypsum Paddock) Drainage Reserve, north-east and east of Allotment 22C, Parish of Boort.

R7 22 ha, being the Stone and Gravel Reserve north of Allotment 1A, Parish of Terrick Terrick West.

R8 25 ha, being the Water Reserve, Allotment 35A, Parish of Terrick Terrick West.

R9 3 ha, being north-east of Allotment 79, Parish of Terrick Terrick West.

R10 6 ha, north of Allotment 91, Parish of Terrick Terrick West.

R11 19 ha, being the Quarry Reserve, Allotment 174B, Parish of Nanneella.

R12 5 ha, being the Gravel and Stone Reserve south of Allotment 19B, Parish of Balmattum.

R13 1 ha, being the Gravel Reserve south of Allotment 30C, Parish of Devenish.

R14 8 ha, being the Gravel Reserve east of Allotment 30D, Parish of Devenish.

R15 8 ha, being the Gravel and Stone Reserve, Allotment 8B, Parish of Tharanbegga.

Note:
The road cutting in this reserve should be protected for education purposes, as the interbedded Ordovician marine sediments display a variety of faults, folds, and other structural features.

R16 6 ha, comprising the Gravel and Quarry Reserve and the northern and eastern portion of the Public Purposes Reserve (Supply of Gravel), Township of Thoona, Parish of Mokoan. A screen of trees should be planted adjacent to the sealed road to the east of the reserve.

R17 10 ha, being the eastern portion of the Quarry Reserve north of Allotments 113A and 113B, Parish of Taminick.

Note:
This quarry was used to supply stone for the construction of Wangaratta Cathedral and it is likely to be re-opened to supply stone for additions to the cathedral. Any future extraction should be planned such that any impact on the values of the adjoining Warby Range State Park is minimized.

R18 15 ha, being the Gravel Reserve, Allotment 3A, section 23, Parish of Wangaratta South.

R19 8 ha, being the Gravel Reserve, Allotment 44C, Parish of Killawarra.

R20 2 ha, being Allotment 11D, Parish of Boorhaman.

R21 3 ha, being the Gravel Reserve, Allotment 19, section B, Parish of Norong. A screen of native trees should be retained adjacent to the road leading to Lake Moodemere.

R22 5 ha, being south of Allotment 6A, section L, Parish of Lilliput.

Council notes that this area has historical interest, being part of the Southern Consuls mine, and the machinery mountings should be preserved.

R23 49 ha, being west of Allotment 299F, Parish of Chiltern West.

R24 7 ha, being east of Allotment 18, section A, Parish of Chiltern West.

Note:
In relation to public safety, nothing in the recommendations affects the powers of Inspectors under the *Mines Act* 1958 and *Extractive Industries Act* 1966. It is understood that these powers would be exercised in consultation with the management authority.

S. UTILITIES AND SURVEY

Many utilities occupy land. They include roads, pipelines, power lines, power stations, hospitals, churches, cemeteries, public halls, shire offices and depots, garbage depots, sanitary depots, and sewage-treatment works. These recommendations do not specifically refer to many of the small areas used for the purposes listed above, as no change of use is proposed. It is intended that for such areas existing legal uses and tenure should continue.

In the absence of firm planning proposals, accompanied by the necessary detailed information, it is not possible for the Council to provide for future requirements of land for survey and utilities. The use of land for these purposes will be considered when the need arises.

Government agencies concerned with provision and installation of communications equipment, transmission lines, pumped storage sites, power stations, port facilities, pipelines, roads, etc. are requested to 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 would assist in achieving co-ordinated planning, and perhaps avoid the necessity for costly resurveys.

Recommendations

General utilities

S1 That existing easements continue to be used to provide access and services.

S2 That new power lines, pipelines, communications equipment, and other utilities be planned to minimize disturbance to public land and protect the values associated with this land, that they not be sited on public land without the agreement of the management authority, and that new pipelines and power lines follow existing easements if possible (this may require widening of some easements).

Garbage and sanitary depots

Council considers that sites on public land for the disposal of garbage and sanitary materials should be located so as to cause minimal conflict with conservation values.

Facilities on public land should be shared by municipalities wherever practicable to minimize the number of sites required. At the same time, it is appreciated that locating sites reasonably close to users minimizes transport costs and the illegal dumping of rubbish. Areas used on a temporary basis (such as garbage depots and sanitary depots) should be fully rehabilitated at the operator's expense.

Within areas used as garbage depots, disposal of waste should be confined to small sections of the site at any one time, and there should be tighter supervision to ensure that garbage is dumped only in the designated areas.

S3 That existing legal garbage depots (including those approved by the relevant authorities but not yet operating) continue to be available for garbage disposal.

S4 That areas used on a temporary basis (such as garbage depots and sanitary depots) be fully rehabilitated. This should apply to sites used illegally as well as those used legally. Where the user or users are known, rehabilitation should be at their expense.

S5 That, within areas reserved as garbage depots, disposal of waste be confined to small sections of the site at any one time, and that steps be taken to prevent the dumping of garbage other than in the designated areas.

S6 That existing licensed waste-disposal depots in State Forest continue to operate.

S7 That 7 ha west of Allotment 299F, Parish of Chiltern West, be used by the Shire of Rutherglen as an extension to the existing garbage depot.

Trigonometrical stations

The Council recognizes the necessity to reserve sites for new trigonometrical stations in the future.

S8 That the minimum area necessary for survey purposes be temporarily reserved around trigonometrical stations on public land where it would otherwise remain as unreserved Crown land; and, where other forms of public land tenure apply, that the appropriate department have the right to occupy a minimum area around the station and provide lines of sight.

Navigation aids and communications installations

S9 That the minimum area necessary for access to and maintenance of navigation aids and communications installations be temporarily reserved on public land where it would otherwise remain as unreserved Crown land; and, where other forms of public land tenure apply, that the government utility involved have the right to occupy a minimum area around the aid and provide lines of sight.

Social welfare

S10 That Dhurringile Prison (197 ha) continue to be permanently reserved for social welfare purposes.

Railway lines

S11 That, where isolated remnants of the original vegetation remain on land associated with railways, every effort be made to protect that vegetation consistent with management practices.

Other utility areas

S12 That existing legal use and tenure continue for areas that are at present reserved and used for utility purposes such as airports, public buildings, municipal depots, cemeteries, schools, etc.

T. TOWNSHIP LAND

Public land in townships is currently used for a wide range of purposes. The Council has not proposed any change of use for such public land where the present use is for schools, public halls, sports grounds, and the like. In some cases, however, Council has made a specific recommendation for township land to be set aside as a Bushland Reserve, as a Streamside Reserve, or to be used for water production; these recommendations are included in the appropriate sections. Other areas of public land in townships should remain as unreserved Crown land — to be used, if required, for township purposes in the future.

Recommendation

T1 That public land in townships, other than those areas that have been specifically reserved, should remain as unreserved Crown land to meet future requirements.

Note:
At the mapping scale used (1:250 000), it is generally not possible to define the boundaries of public land in townships accurately. Reference should be made to the appropriate township plan to determine the accurate boundaries and form of reservation for those townships where public land is not shown on the map or referred to in these recommendations.

U. OTHER RESERVES AND PUBLIC LAND

Some small areas of public land in the study area that are used for various purposes, such as water production, grazing, camping, public utilities, and so on, have not been specifically mentioned in these recommendations. Others (both reserved and unreserved) receive little active use at present, even though they may once have been reserved for some specific purpose.

The Council intends that existing legal uses and tenure of these small areas of public land should continue, and that those not currently used for any particular purpose be used in a way that will not preclude their commitment in the future to some specific public use.

Recommendation

U1 That, for small areas of public land not specifically mentioned in these recommendations, existing legal use and tenure continue

and that

where the land is not reserved for a specific purpose at present, such areas be used in a way that will not preclude their reservation in the future for as-yet-unknown public purposes.

Revegetation of areas

The deterioration of tree cover in some of the rural areas of the State is causing increasing and widespread concern. Clearing — to establish pasture and crop lands — has been the initial cause of this deterioration and continues in some areas. The gradual decline, and ultimate death, of the remaining trees, however, is emerging as the major problem.

Soil compaction by stock, excessive use for timber, attacks by insects, parasites, and other pathogens, exposure to winds, salting of the soil, erosion, and natural senescence among aging trees are all possible causes of the decline. The prevention of natural regeneration by grazing or other practices is exacerbating the problem.

Increasing soil salinity resulting in the degradation of grazing and crop country, loss of shelter for stock and for wildlife, and diminished aesthetic value are all consequences of this decline, which, although difficult to express in monetary terms, results in economic loss.

Throughout the study area, a large number of small parcels of public land carry little or no natural vegetation. In many cases they have been reserved for specific purposes, although not used for them, and have been continuously licensed to the adjoining landholders; over a period of time they have been cleared and integrated with the surrounding farmlands. In other cases the reserves can still be recognized by the native vegetation, but, for a number of reasons, the tree cover has declined.

A recent amendment to the *Forests Act* 1958 has introduced a tree-growing assistance scheme to encourage tree-planting and tree-fostering projects — where these are in the community interest. In addition a number of government departments, either individually or in co-operation, have established tree-growing areas or research projects in order to demonstrate the feasibility and the techniques involved in re-establishing tree cover on land affected by salting or drainage problems in the areas.

To complement these activities, in areas where tree decline and salting are becoming a problem and in areas where native trees are greatly reduced in number, Council recommends that

some of the small areas of public land be used as pilot schemes or nuclei for the re-establishment of tree species native to the area.

Following successful revegetation, some of these areas could serve as examples to the rural community of the effectiveness of such revegetation schemes.

Recommendations

U2—U51 That the areas listed below and shown on Map A be revegetated and reserved for the purposes indicated in the schedule below.

U2 150 ha, being the Timber Reserve, Allotments 44A and 44B, Parish of Kerang — State forest.

U3 14 ha, being the Reserve for Public Purposes west of Allotment 20A, section B, Parish of Kerang — Streamside Reserve.

U4 64 ha, being the Reserve for Timber and Water west of Allotment 1, section C, Parish of Kerang — State forest.

U5 25 ha, being Allotment 8B, section D, Parish of Murrabit — Bushland Reserve.

U6 12 ha, south of Allotment 6, section B, Parish of Murrabit — Bushland Reserve.

U7 45 ha, being the Water and Timber Reserve, Allotment 33B, section D, Parish of Murrabit — Bushland Reserve.

U8 10 ha, being the Public Purposes Reserve, Allotment 3A, Parish of Gannawarra — Bushland Reserve.

U9 59 ha, being Allotment 142, Parish of Tragowel — Bushland Reserve.

U10 3 ha, being north of Allotment 23A, section 7, Parish of Gunbower West — Bushland Reserve.

U11 17 ha, being west of Allotment 16A, section C, Parish of Loddon — Bushland Reserve.

U12 4 ha, being Allotment 73B, Parish of Mincha West — Bushland Reserve.

U13 2.5 ha, being the Recreation Reserve south-west of Allotment 37A, Parish of Mincha West — Bushland Reserve.

U14 2 ha, being Allotment 46B, Parish of Mincha West — Bushland Reserve.

U15 11 ha, being the Public Purposes Reserve west of Allotment 12, section 7, Parish of Turrumberry North — Bushland Reserve.

U16 26 ha, comprising the Water Reserve and Public Purposes Reserve (State School) west of Allotment 7, section 7, Parish of Turrumberry North — Streamside Reserve.

U17 79 ha, being the Water Reserve south of Allotment 10, section 6, Parish of Turrumberry North — Bushland Reserve.

U18 27 ha, being the Water Supply Reserve south of Allotment 10, section B, Parish of Loddon — Bushland Reserve.

U19 15 ha, being the Water Reserve east of Allotment 23A, section E, Parish of Yarrowalla — Bushland Reserve.

U20 2 ha, being the State School Reserve north-east of Allotment 25, section C, Parish of Yarrowalla — Bushland Reserve.

U21 47 ha, being the Water Supply Reserve, Allotment 12, section A, Parish of Mologa — Bushland Reserve.

U22 32 ha, comprising the Public Purposes Reserve, Recreation Reserve, and unreserved Crown land west of Allotment 9, section 3, Parish of Turrumberry North — Bushland Reserve.

U23 10 ha, being Allotment 78B, Parish of Wharparilla — State School Forest Plantation.

U24 33 ha, being the Water Supply Purposes Reserve east of Allotments 20A and 28A, Parish of Bamawm — Bushland Reserve.

U25 30 ha, being the 102nd Section Reserve, Allotment 81A, Parish of Millewa — Bushland Reserve.

U26 12 ha, being the Water Reserve west of Allotment 72, Parish of Millewa — Bushland Reserve.

U27 2 ha, being the Reserve north of Allotment 50C, Parish of Warragamba — Bushland Reserve.

U28 15 ha, being the 102nd Section Reserve south of Allotment 253A, section D, Parish of Diggorra — Bushland Reserve.

U29 2 ha, being the Water Reserve, Allotment 88A, Parish of Toolamba West — Bushland Reserve.

U30 4 ha, being adjacent to Allotment 9A, section F, Parish of Barwo — Bushland Reserve.

U31 40 ha, being the Racecourse and Recreation Reserve, Allotment 22C, section D, Parish of Kaarimba — Bushland Reserve.

U32 100 ha, being unreserved Crown land, Township of Tungamah, Parish of Tharanbegga — Bushland Reserve.

U33 4 ha, being Allotment 196F, Parish of Burramine — Bushland Reserve.

U34 1 ha, being the State School Reserve, Allotment 31D, Parish of Boweya — Bushland Reserve.

U35 2 ha, being Allotment 50A, Parish of Bontherambo — Bushland Reserve.

U36 9 ha, being Allotment 59C, Parish of Bontherambo — Bushland Reserve.

U37 3 ha, being Allotment 30, Parish of Bontherambo — Bushland Reserve.

U38 25 ha comprising the Gravel Reserve, Allotment 9A, Gravel Reserve, Allotment 1A, Allotment 2 and adjacent Crown land, section 12, Parish of Lilliput — Bushland Reserve.

U39 22 ha being the Water Supply Reserve, Allotment 8, section 15, Parish of Carlyle — Bushland Reserve.

U40 6 ha, being Allotment 30B, section 41, Parish of Carlyle — Bushland Reserve.

U41 9 ha, being Allotment 12B, section 43, Parish of Carlyle — Bushland Reserve.

U42 7ha, being Allotment 26A, section 43, Parish of Carlyle — Bushland Reserve.

U43 6 ha, being Allotment 70A, Parish of Pranjip — Bushland Reserve.

U44 5 ha, being the Water Supply Reserve north-east of Allotment 45A, Parish of Miepoll — Bushland Reserve.

U45 4 ha, being the State School Reserve, Allotment 31A, Parish of Caniambo — Bushland Reserve.

U46 20 ha, being Gravel Reserve west of Allotment 41C, Parish of Gowangardie — Bushland Reserve.

U47 8 ha, being the Limestone Reserve, Allotment 270A, Parish of Dookie — Bushland Reserve.

U48 8 ha, being Allotment 13E, Parish of Gowangardie — Bushland Reserve.

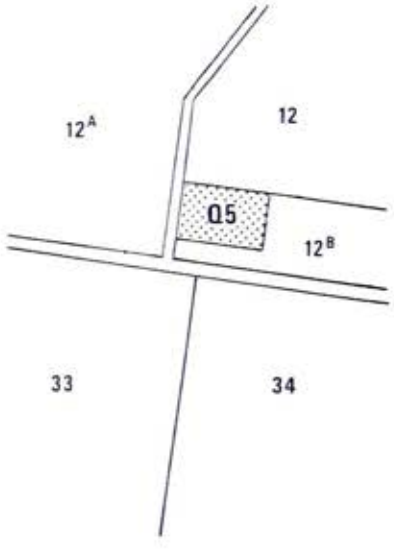
U49 2 ha, being Allotment 8A, Parish of Stewarton — Bushland Reserve.

U50 3 ha, being the Gravel Reserve, Allotment 20D, Parish of Goomalibee — Bushland Reserve.

U51 8 ha, being the Water Reserve adjacent to Allotment 60, Parish of Glenrowan — Bushland Reserve.

AGRICULTURE Q5
TERRAPPEE

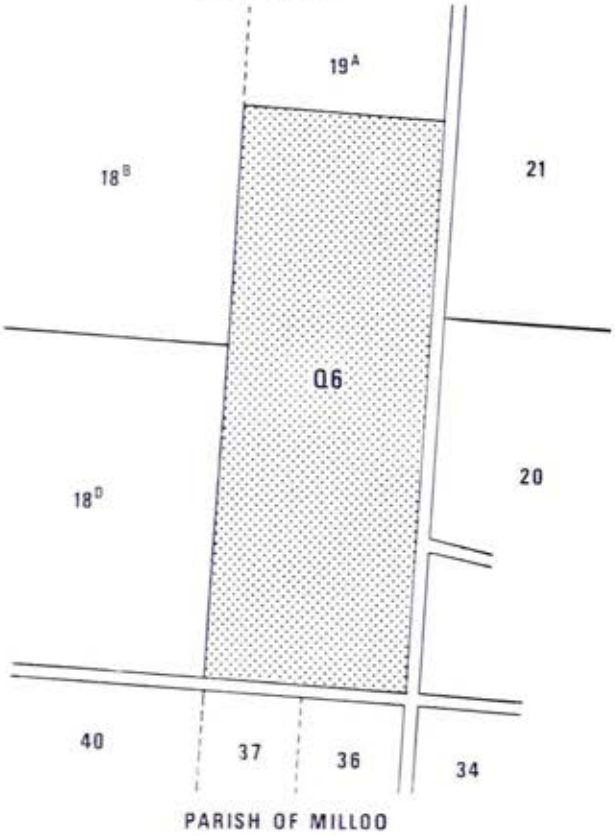
MAP 1



PARISH OF TERRAPPEE

AGRICULTURE Q6
MILLOO

MAP 2



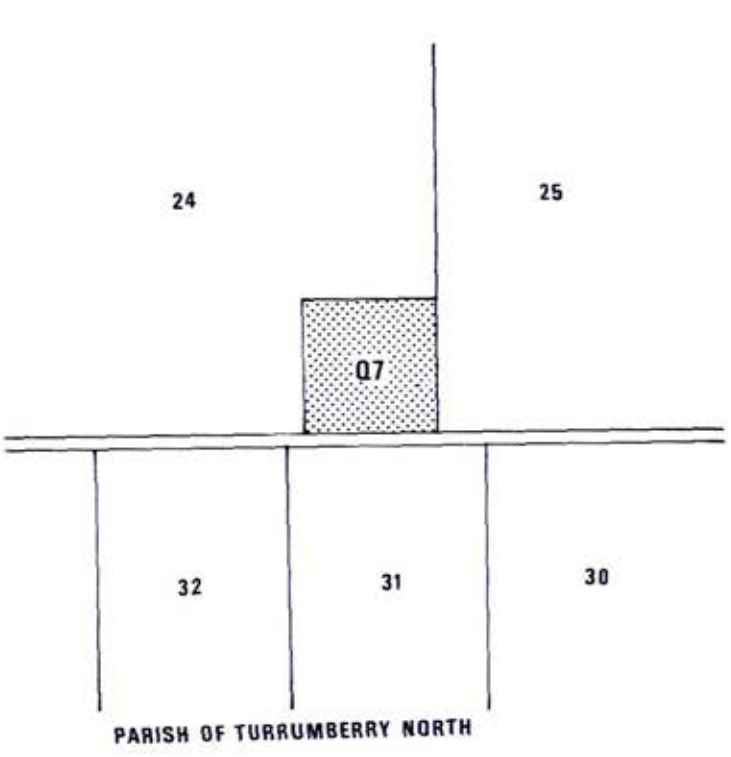
PARISH OF MILLOO

PUBLIC LAND RECOMMENDED FOR ALIENATION

SCALE 1 : 15,840

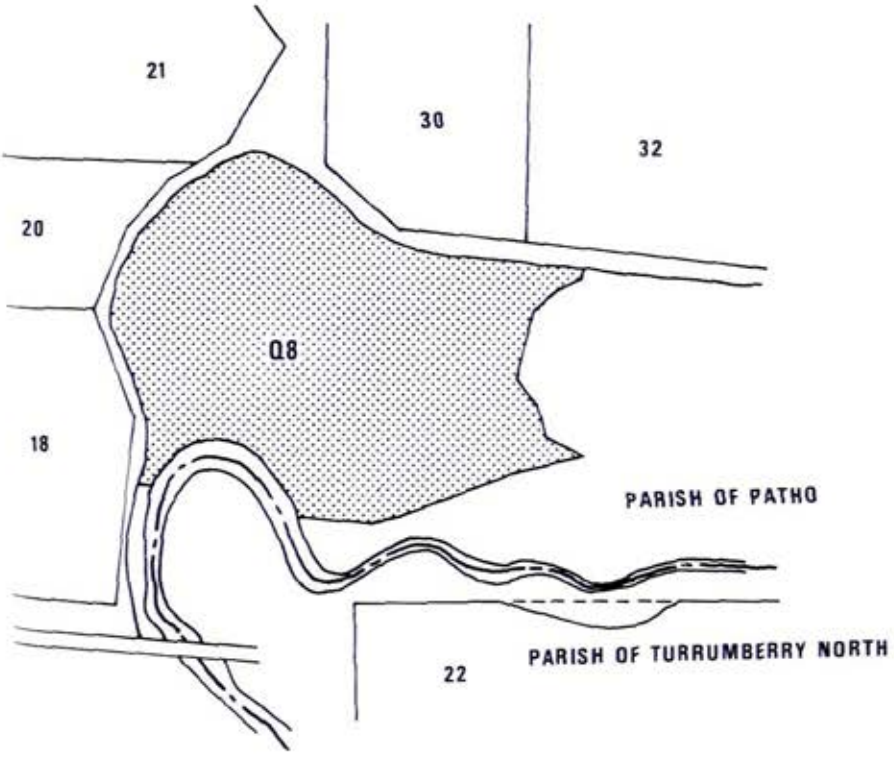
AGRICULTURE Q7
TURRUMBERRY NORTH

MAP 3



AGRICULTURE Q8
PATHO

MAP 4

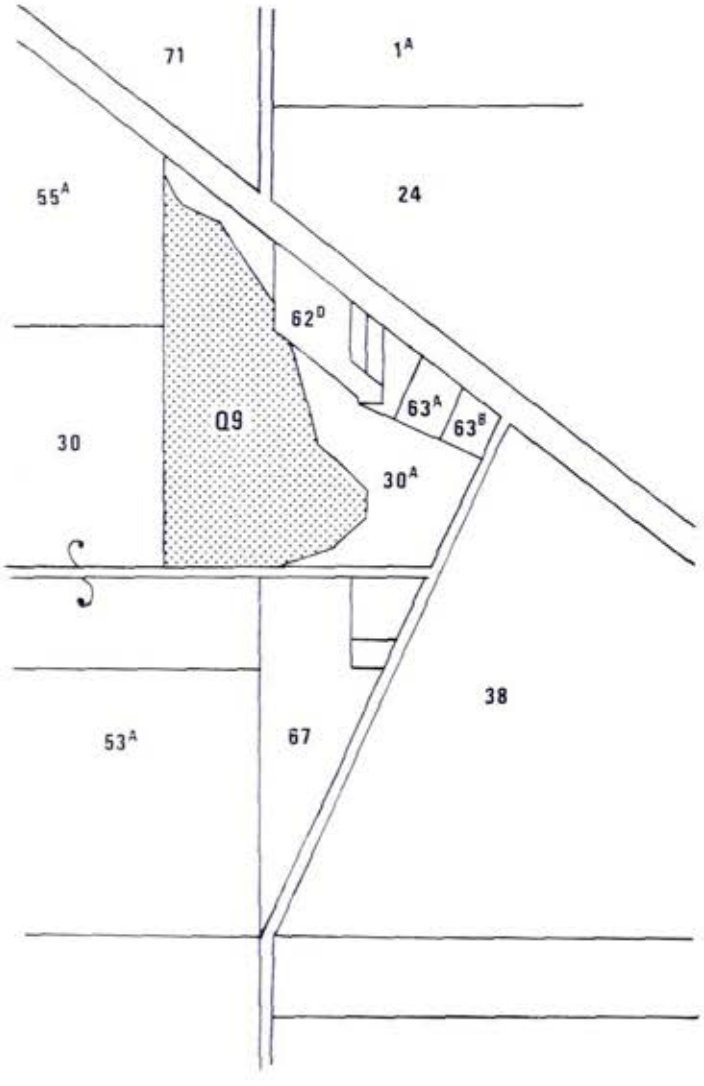


PUBLIC LAND RECOMMENDED FOR ALIENATION

SCALE 1 : 15,840

AGRICULTURE Q9
MOOROOPNA

MAP 5

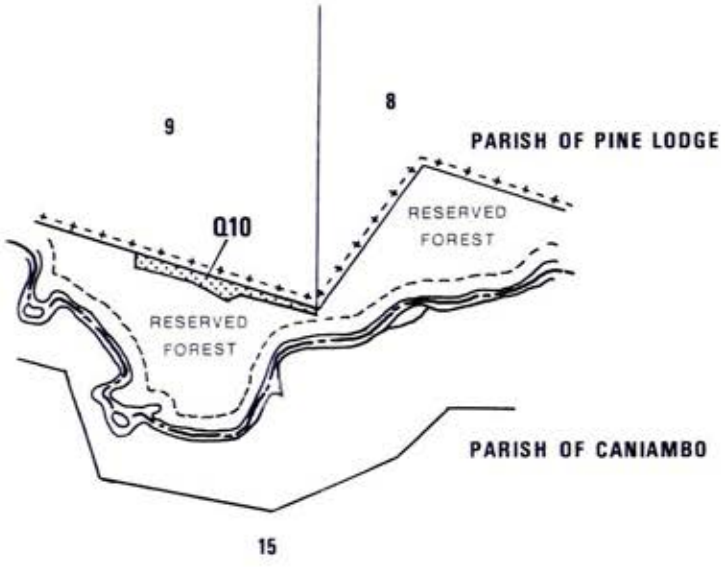


PUBLIC LAND RECOMMENDED FOR ALIENATION

SCALE 1 : 15,840

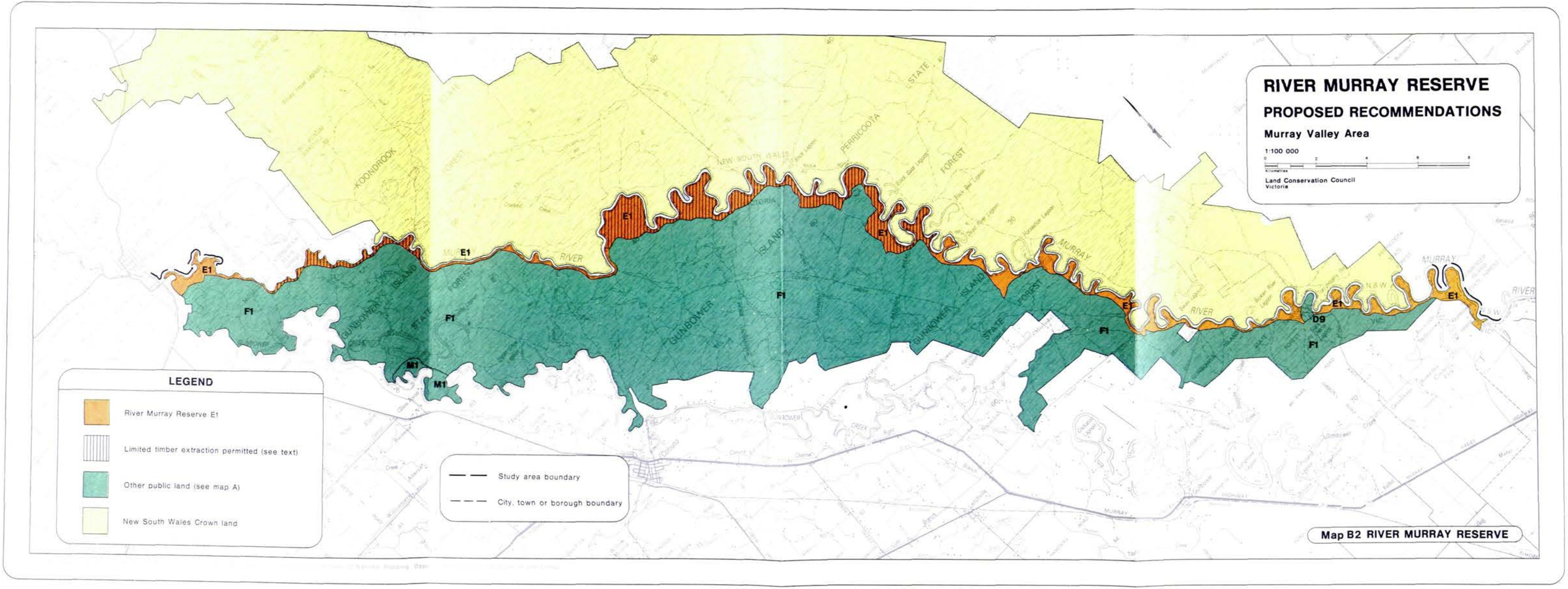
AGRICULTURE Q10
PINE LODGE

MAP 6

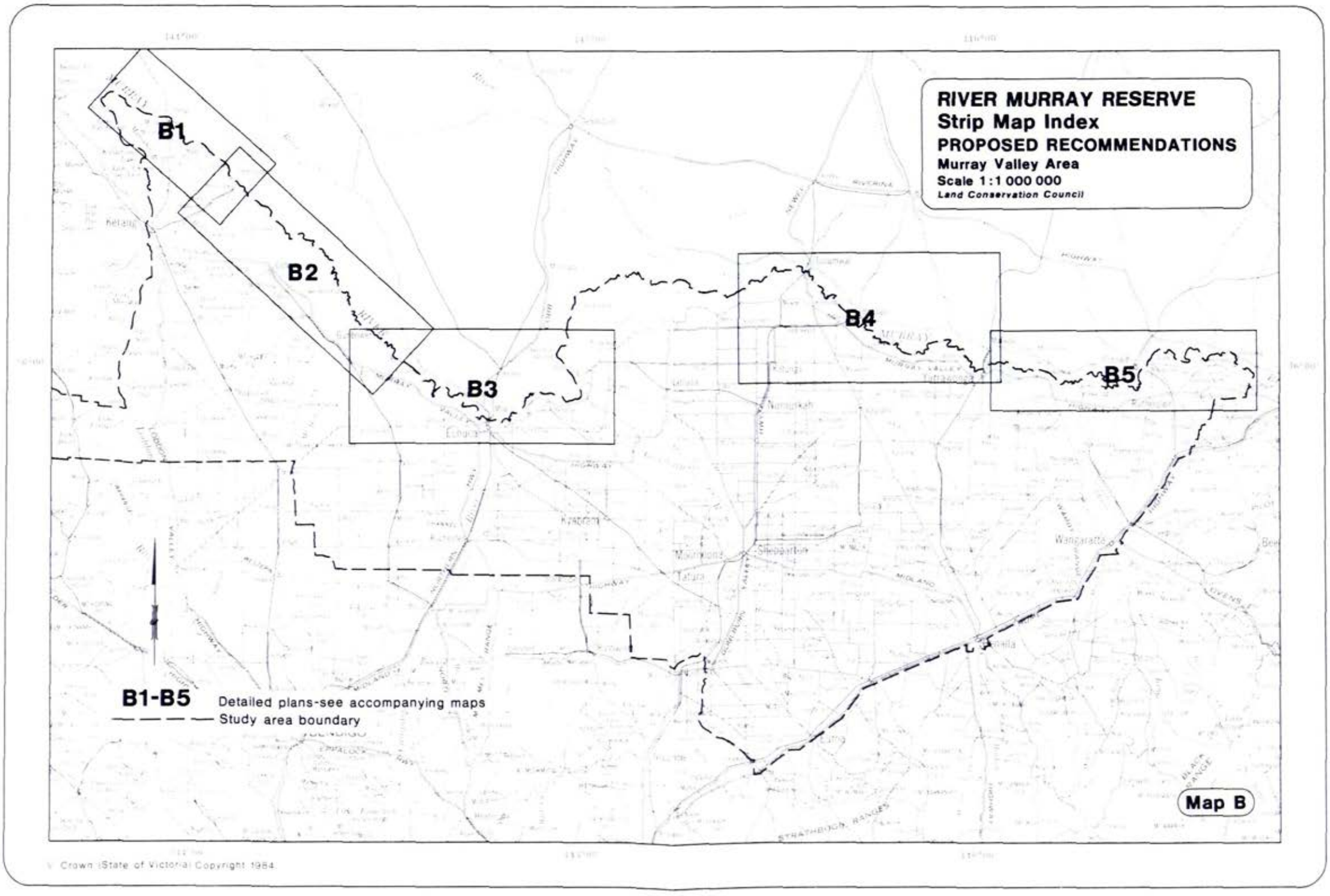


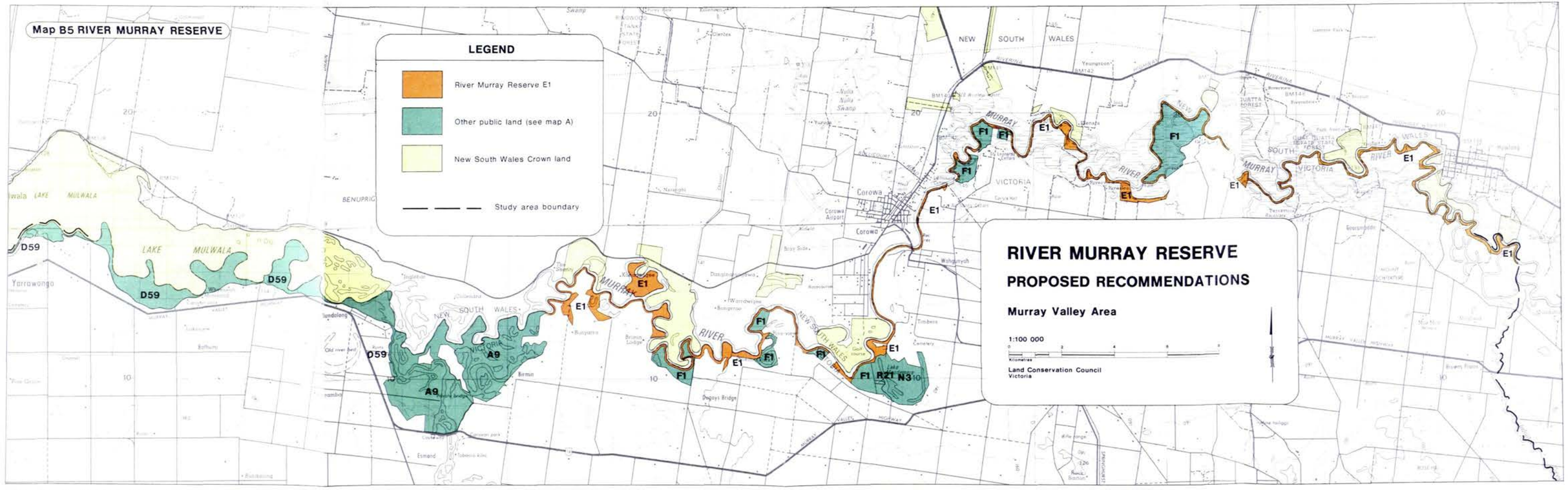
PUBLIC LAND RECOMMENDED FOR ALIENATION

SCALE 1 : 15,840

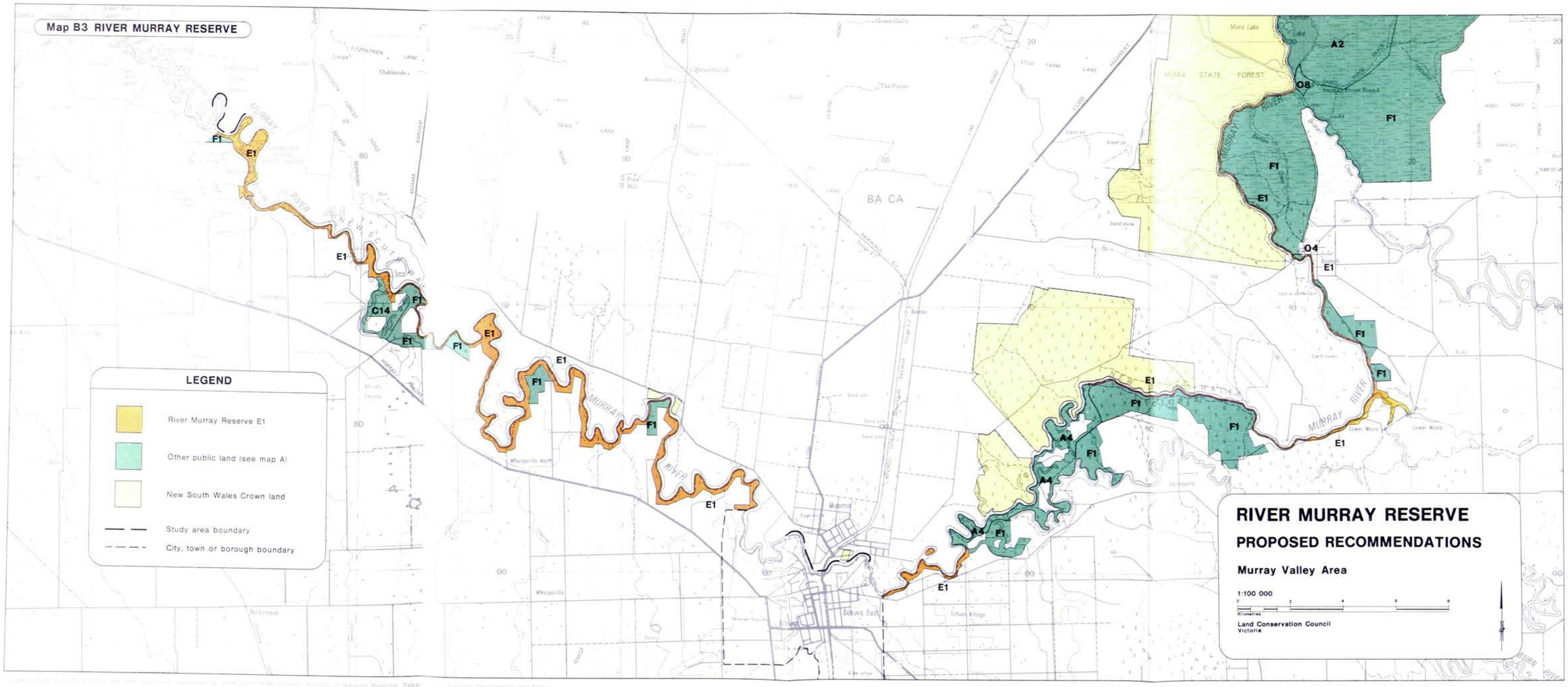

RIVER MURRAY RESERVE
PROPOSED RECOMMENDATIONS
Murray Valley Area
1:100 000
0 2 4 6 8
Kilometres
Land Conservation Council
Victoria
LEGEND
River Murray Reserve E1
Limited timber extraction permitted (see text)
Other public land (see map A)
New South Wales Crown land
Study area boundary
City, town or borough boundary
E1
F1
M1
D9
KOONDROOK
PERRICOOTA
STATE FOREST
GUNBOWER ISLAND
GUNBOWER
MURRAY RIVER
NEW SOUTH WALES
VICTORIA
Map B2 RIVER MURRAY RESERVE


RIVER MURRAY RESERVE
PROPOSED RECOMMENDATIONS
Murray Valley Area
1:100 000
Kilometres
Land Conservation Council
Victoria
LEGEND
River Murray Reserve E1
Other public land (see map A)
New South Wales Crown land
Study area boundary
A2
A6
F1
E1
A7
A8
H42
C32
D4
D45
D59
Map B4 RIVER MURRAY RESERVE

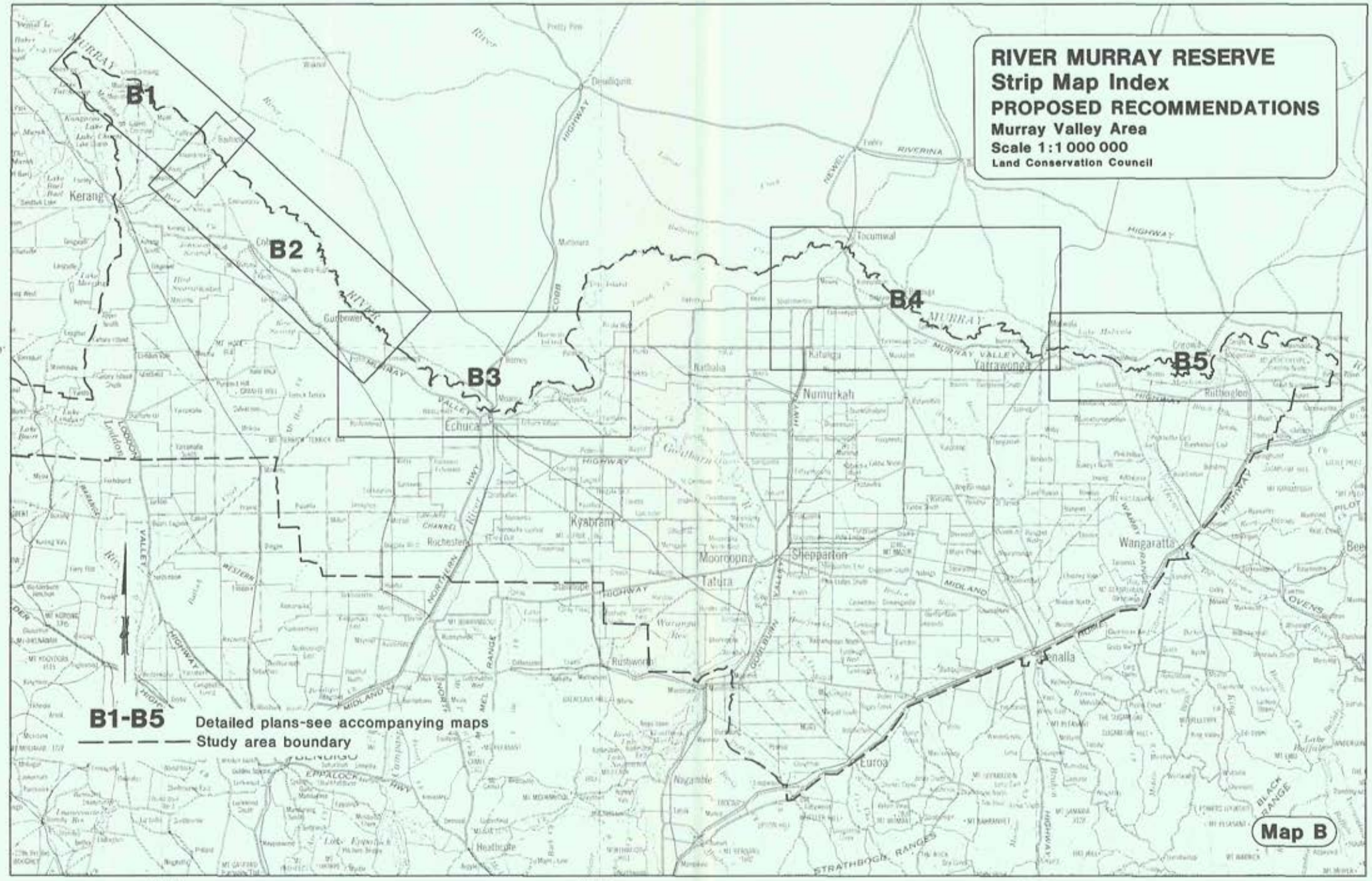




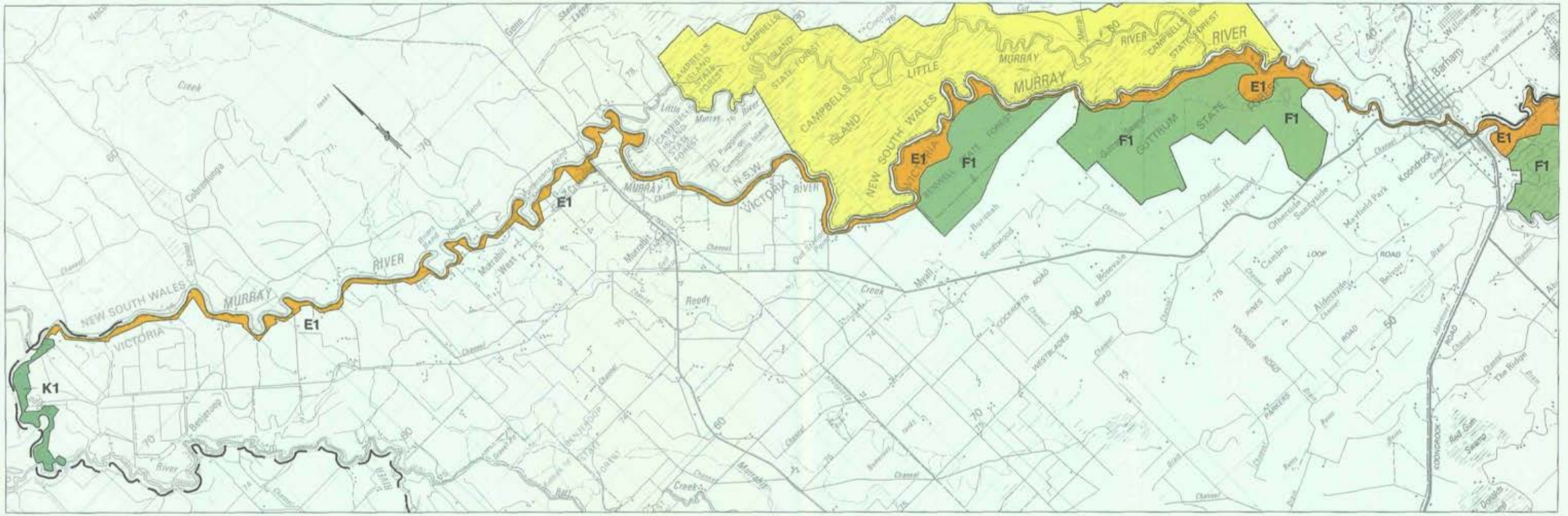
Map B3 RIVER MURRAY RESERVE



RIVER MURRAY RESERVE
Strip Map Index
PROPOSED RECOMMENDATIONS
Murray Valley Area
Scale 1:1 000 000
Land Conservation Council



Map B1 RIVER MURRAY RESERVE



RIVER MURRAY RESERVE

PROPOSED RECOMMENDATIONS

Murray Valley Area

1:100 000

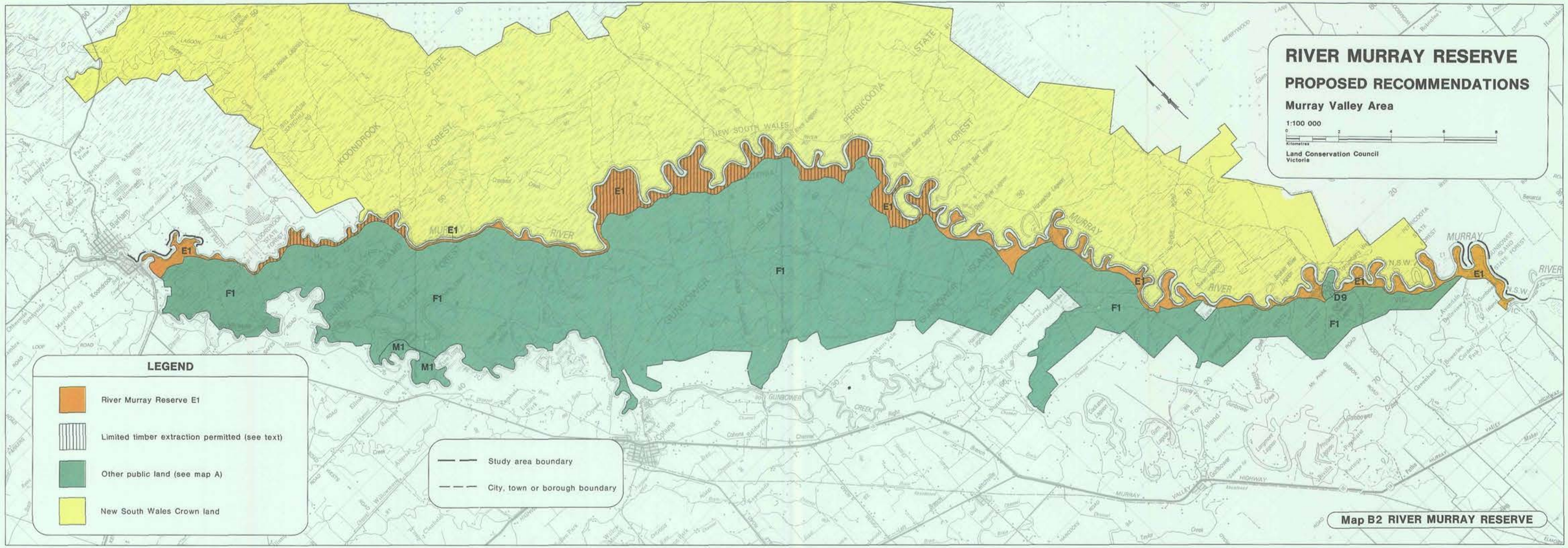
0 2 4 6 8

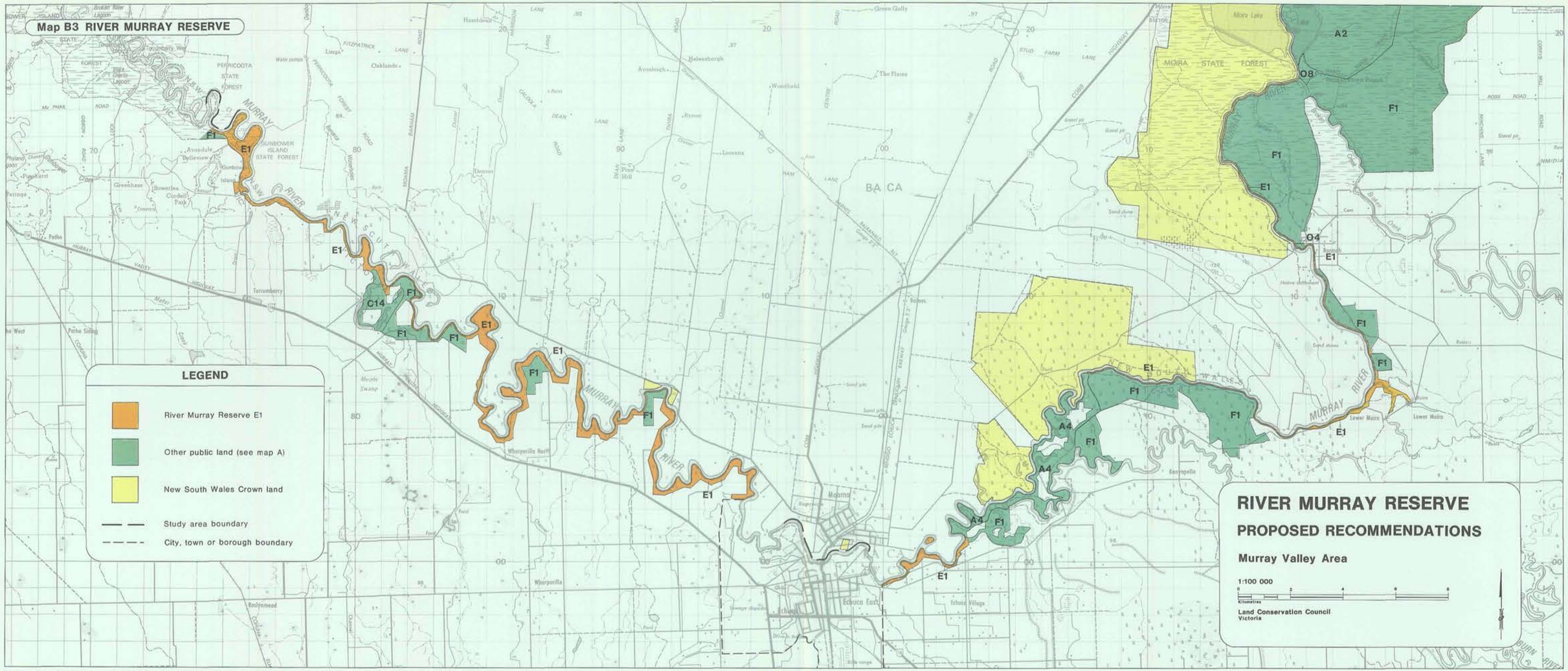
Kilometres

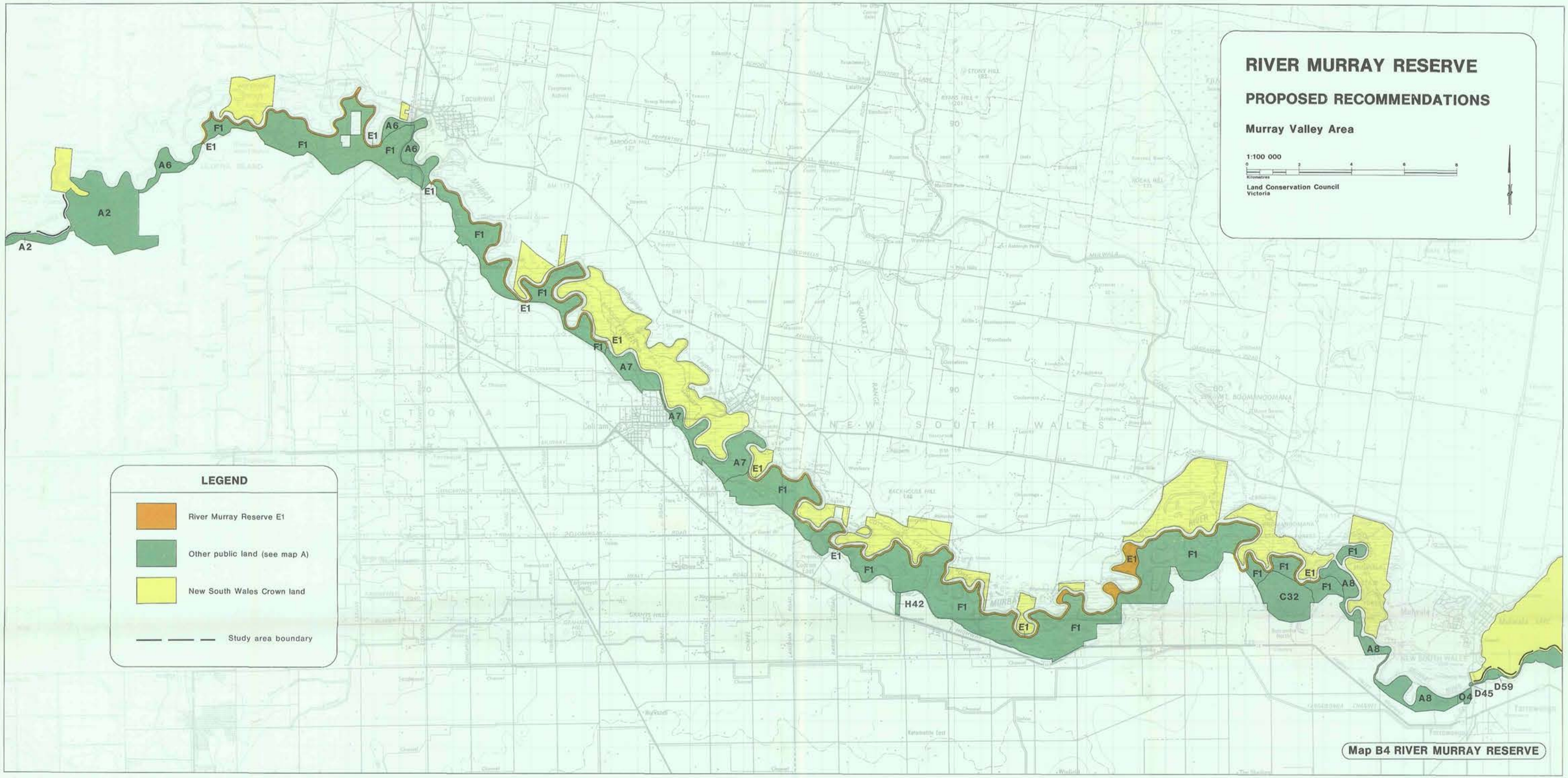
Land Conservation Council
Victoria

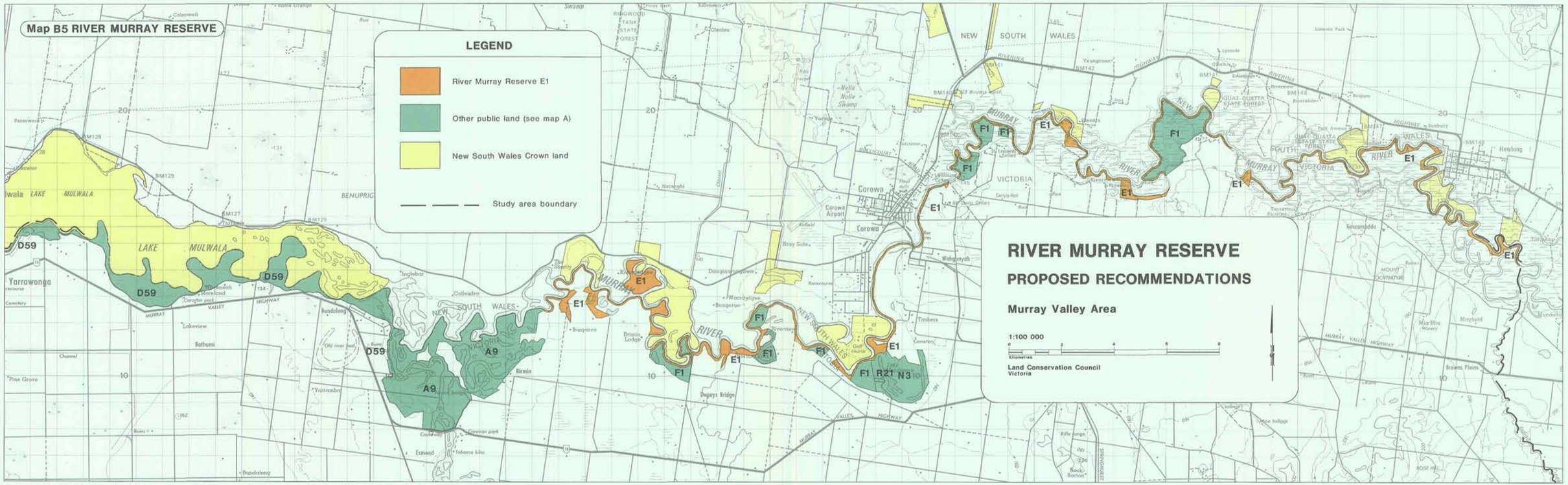
LEGEND

- River Murray Reserve E1
- Other public land (see map A)
- New South Wales Crown land
- Study area boundary
- City, town or borough boundary

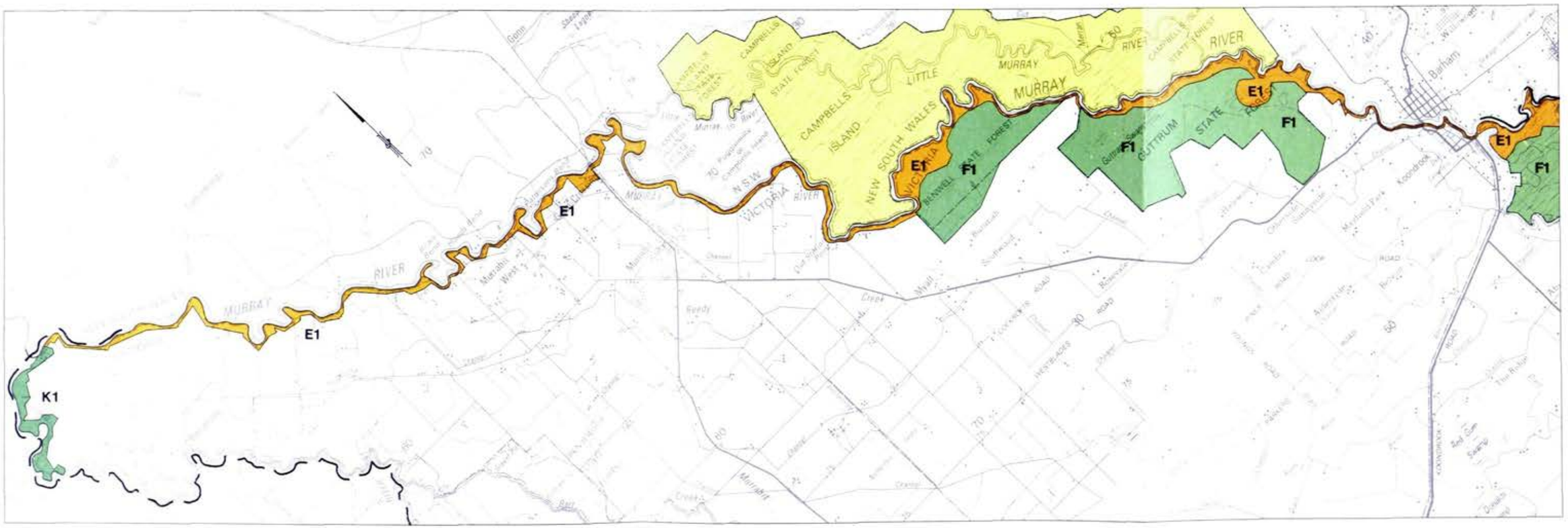





RIVER MURRAY RESERVE
PROPOSED RECOMMENDATIONS
Murray Valley Area
1:100 000
0 2 4 6 8
Kilometres
Land Conservation Council
Victoria
LEGEND
River Murray Reserve E1
Other public land (see map A)
New South Wales Crown land
Study area boundary
A2
A6
F1
E1
A7
H42
C32
A8
D59
D45
O4
Tocumwal
Deniliquin
VICTORIA
NEW SOUTH WALES
Map B4 RIVER MURRAY RESERVE



Map B1 RIVER MURRAY RESERVE



RIVER MURRAY RESERVE

PROPOSED RECOMMENDATIONS

Murray Valley Area

1:100 000

0 2 4 6 8

Kilometres

Land Conservation Council
Victoria

LEGEND

- River Murray Reserve E1
- Other public land (see map A)
- New South Wales Crown land
- Study area boundary
- City, town or borough boundary