

**A REPORT ON THE
MITCHELL RIVER CATCHMENT**

**A PROPOSAL FOR PROCLAMATION
PREPARED FOR CONSIDERATION BY THE
LAND CONSERVATION COUNCIL**

By

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SOIL CONSERVATION AUTHORITY

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Introduction

There have been several studies of the water resources of the Mitchell River catchment. In 1974 and again in 1979 the State Rivers and Water Supply Commission (SR&WSC) investigated development of the Mitchell River waters with a view to increasing the security and extent of irrigation development on the Mitchell River flats, and for other purposes.

The Soil Conservation Authority (SCA) is currently involved in a study of the land draining to the Gippsland Lakes, and land capability investigations are also being carried out to facilitate land use planning in the region. Parts of the Mitchell River catchment are involved in both these studies.

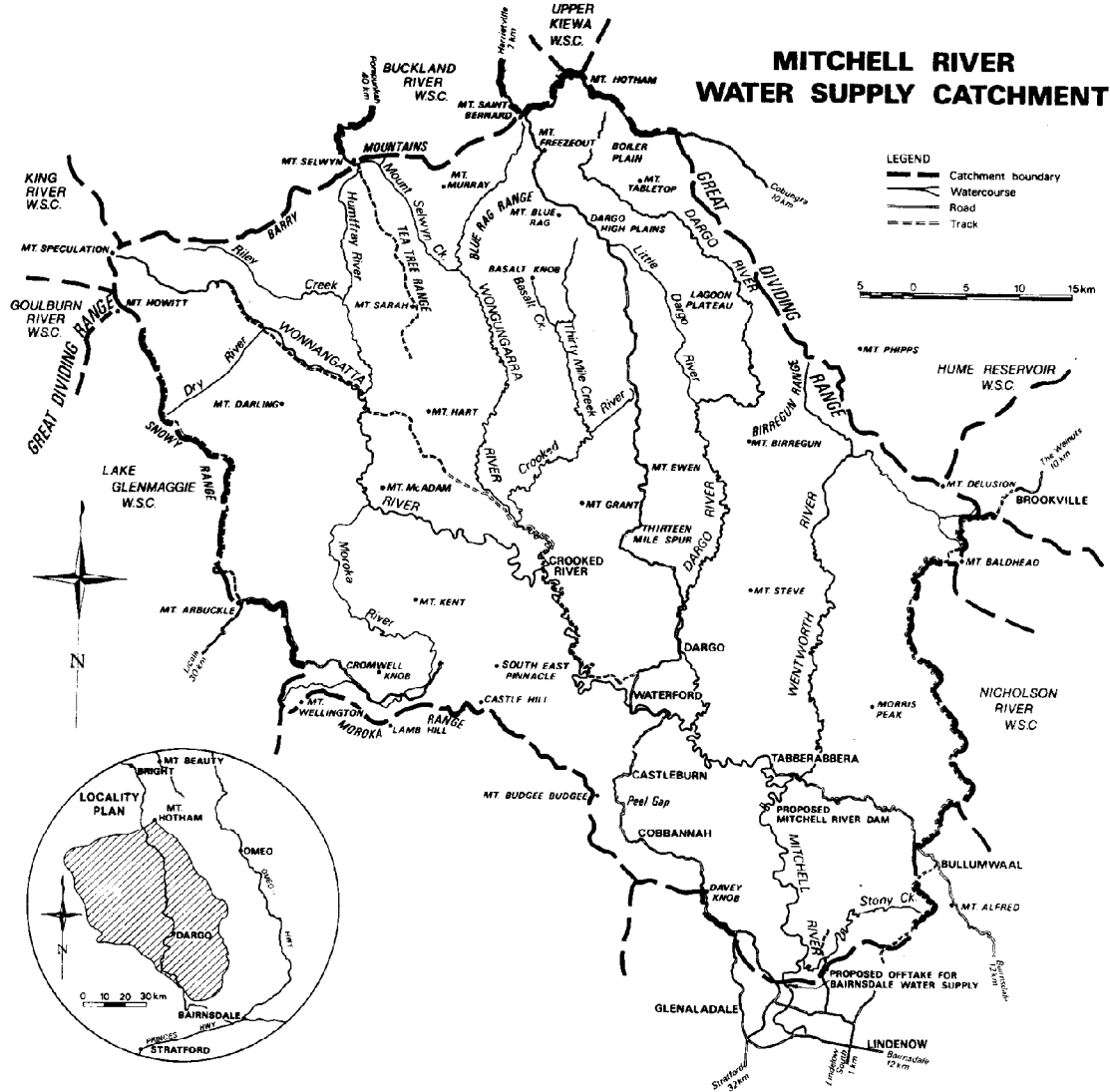
Plans for water resource development on the Mitchell River, contained in the SR&WSC 1979 report, are being implemented with the construction of the 15,0000 megalitre Mitchell River dam south of Tabberabbera. In addition, the Bairnsdale Waterworks Trust is planning the construction of a pump and offtake station which will be situated upstream of Glenaladale bridge. Both projects are due to be completed by 1983, subject to the provision of adequate funds.

The Land Conservation Council (LCC) has published Final Recommendations for land in the Alpine Area (1979) and makes particular reference to the need for proclamation of catchments with land above 1220 m elevation. Approximately 25 per cent of the land in the Mitchell River Catchment is in this category. The council has commenced an investigation of public land in the Gippsland Lakes Hinterland Area (southern section of the catchment) and a descriptive resources report is being prepared.

Proclamation of the Mitchell River catchment will enable the SCA to co-ordinate future land use decision for the protection of the catchment and its water resources.

This report is an inventory of the current state of the catchment and presented for consideration by the Land Conservation Council. The report recommends proclamation of the catchment under Section 5(1) (b) of the *Land Conservation Act 1970*.

Figure 1 - Mitchell River Water Supply Catchment



Chapter 1 - Catchment Description

1.1 General

The Mitchell River catchment supplies about 30% of the total inflow to the Gippsland Lakes System. The region is largely forested, rising from undulating hills in the south to mountains and alpine plains in the north. The Great Dividing Range marks the northern and north-eastern boundaries of the catchment. The Moroka and Snowy Ranges determine the western limits of the catchment and in the east, the boundary follows the Mount Baldhead-Bullumwaal Road.

Proclaimed catchments surrounding the Mitchell River are: the Nicholson, Hume Reservoir, Upper Kiewa, King, Buckland, Upper Goulburn and Lake Glenmaggie.

Major tributaries of the Mitchell River are the Wonnangatta, Wongungarra, Dargo and Wentworth Rivers. The catchment to the proposed Bairnsdale Waterworks Trust's offtake, has an area of 3900 sq km. Total population for the catchment is about 300, the largest settlement being Dargo with a population of 150.

The catchment includes four shires - Avon, Bairnsdale, Bright and Maffra (Refer Figure 3), and part of three counties - Dargo, Wonnangatta and Tanjil (Refer Parish List Appendix A).

1.2 Climate

Precipitation over the entire catchment amounts to 4.4 million megalitres per annum however, about 75 per cent is lost through evapotranspiration processes. Thus the annual flow of the Mitchell River is about 1.0 million megalitres. Areas above 1000 m elevation receive between 1400 mm and 2000 mm of precipitation, most occurring as snow from June to October. Rain-shadow effects cover part of the catchment, with areas around Dargo receiving only 400 - 600 mm of precipitation in an average year. Evaporation ranges from 800 mm per annum in the lower reaches of the catchment to 620 mm per annum in highlands area. Because of the broad range in altitude (40 m - 1800 m), temperature varies considerably. Temperatures at Bairnsdale range from an average maximum of 18.5°C in January to an average minimum of 8°C in July. In comparison, Mount Hotham has an average of 16°C in January and an average minimum temperature of -4°C in July.

1.3 Physiography

The Mitchell River catchment is composed of four broad landform categories: low mountains with foothills, mountainous tracts, tablelands and basins.

Foothills and low mountains represent 25 per cent of the catchment area and extend north to Peel Gap. Typically, slopes vary between 14 and 35 per cent and the drainage pattern is dendritic throughout.

Mountainous tracts extend over more than one third of the catchment and around the north, east and western boundaries they are the predominant landform. Slopes in excess of 50 per cent are common, with the difference in relief between valley floor and ridgetop often exceeding 500 m.

The Bennison Tablelands and Dargo High Plains occupy a small, but nevertheless hydrologically important proportion of land in the area under consideration. These gently sloping landforms tend to be preserved because of the resistant nature of the Older volcanic parent material. However, the plateaux tend to be undercut by erosive forces acting on the underlying Ordovician sandstone and siltstones, thus allowing scarps to form on the plateau fringe.

Flat to undulating landforms or basins have formed over about 15 per cent of the catchment and are situated in the areas of Dargo, Castleburn and northwest of Waterford. The basin formed at the junction of the Wongungarra and Wonnangatta rivers is of Quaternary origin, having been produced by alluvial deposition.

1.4 Geology

The greater part of the Mitchell River catchment is composed of Ordovician age siltstone, shale and sandstone. Some smaller sections, for example the Wild Horse-Tabberabbera formations, are geologically complex.

In the area of Dargo and Castleburn, granodiorite and diorite of Devonian origin has been eroded and dissected to form a landscape of rolling hills with occasional granite outcrops. At higher altitudes remnants of the Older volcanics of the Oligocene epoch form the Dargo High Plains.

In the southern section of the catchment, Carboniferous sedimentary material composed of siltstone, sandstone and conglomerate is apparent. Some high level terraces around Glenaladale originate from gravels and sands deposited during the Pliocene era.

The western edge of the catchment is characterised by extremely complicated geological patterns of development. In the Moroka River area, basalt flows and Carboniferous felspathic sandstone and conglomerate are intercalated in an Upper Devonian-Lower Carboniferous sequence.

Quartzose and felspathic sandstone materials of Carboniferous origin are also present in the north-west portion of the catchment along the Snowy Range. This complicated series of geological formations had led to the development of a correspondingly broad series of soil type associations.

1.5 Soils

As the catchment has many differing climatic regimes and geological characteristics, soil types vary considerably. However, several broad trends emerge.

On the alpine plains organic loams, peats and humified peats are the predominant soil types. In areas where basalt from the parent materials, soils have higher fertility, compared with soils of sedimentary origin.

Friable brown gradational soils, with loamy texture, have developed on moist mountain slopes. Soil depth varies with aspect and situation. On crests and north facing slopes, red and stony red gradational soils are evident. Dispersion is slight in the surface horizons, but increases with depth in the soil profile.

Alluvial plains and terraces at lower elevations are characterised by grey-brown loams with silt and sand over coarse sand and gravel nearer stream courses. These soils are subject to streambank erosion along permanent watercourses.

In areas where granite or granodiorite form the parent material, gradational soils composed of coarse sands, of varying depth, have developed. These occur mainly on steeper slopes around Dargo and Castleburn. Where terrain is undulating and more gentle, red and yellow duplex soils have developed, the yellow colour is associated with poor drainage. There is a high potential for sheet erosion among these soil types.

South of Tabberabbera sandy loams have been derived from sandstone parent material of Devonian origin. Dispersion and slaking effects are moderate to low in intensity. Depth of the soil profile ranges from 0.2 m on crests to 1 m or greater on lower slopes and in drainage lines. Moderate sheet erosion may occur on exposed sites.

At the southern extremity of the catchment cappings of Tertiary sand and sandy loam have developed overlying the Carboniferous sediments. Generally they are well drained because of their coarse texture and high position in the landscape.

1.6 Vegetation

The variability in the composition of vegetation is influenced by changes which occur in geology, soil and climate within any area of the Mitchell River catchment.

At the highest elevations alpine high plains vegetation consists mainly of heath, herbfield and grassland. Some prominent associated species include *Clemisia asteliifolia* (Silver daisy), *Danthonia nudiflora* (alpine wallaby grass) and *Epacris petrophila* (snow heath). Commonly occurring shrubs include *Acacia alpina* (alpine wattle) and *Callistemon sieberi* (alpine bottlebrush). Although these communities cover less than 10 per cent of the catchment, they provide summer grazing for cattle and are also important in the prevention of erosion.

Sub-alpine and alpine forest occupies approximately 20 per cent of the catchment. *Eucalyptus pauciflora* (snow gum), *E. dalrympleana* (mountain gum), *E. rubida* (candlebark) and *E. stellulata* (black sallee) form the dominant upper stratum. Closer to the ground *Oxylobium alpestre* (alpine oxycobium) and other high altitude shrub species abound.

The major woodland and open forest species of the higher rainfall areas are *E. camphora* (mountain swamp gum), *E. nitens* (shining gum), *E. dives* (broadleaf peppermint), *E. viminalis* (manna gum), with *E. delegatensis* (alpine ash) and *E. regnans* (mountain ash) in some sheltered situations. This forest type covers about 40 per cent of the catchment and is of substantial importance in both hardwood and water production.

The lowest rainfall areas around Dargo and Glenaladale produce a wide variety of dry sclerophyll forest species. Commonly occurring species include *E. bridgesiana* (apple box), *E. macrorhyncha* (red stringybark), *E. polyanthemos* (red box), *E. melliodora* (yellow box) and *Acacia dealbata* (silver wattle). In cleared areas (10 per cent of the catchment) major species, specifically related to agricultural production, include *Trifolium spp.* (clovers), *Dactylis glomerata* (cocksfoot), *Lolium perenne* (perennial ryegrass), *Phalaris tuberosa* (phalaris).

Chapter 2 - Water Resources

21 *Water Resources Development*

The most recent development within the catchment has been the commencement of construction of the access road for the Mitchell River dam. The dam will provide for increased irrigation of the Mitchell River flats, from the current 3,000 ha to a maximum of about 4,300 ha. Recreational facilities at the dam site are yet to be determined but could probably provide for day visitors, campers, swimming, fishing and boating with power boats up to 10 HP.

The current development (Stage I) will store 15,000 megalitres, and will contain approximately 34 days mean river flow. As a consequence it is anticipated that the spillway will be operating for most of the year. The total surface area of full storage level will be about 360 ha. The State Rivers and Water Supply Commission will acquire some freehold land adjoining the proposed full supply level. The area to be inundated is predominantly cleared grazing land, with shoreline slopes being gentle in most situations.

The major uses of the water resources will be domestic supply for both Bairnsdale and Paynesville, irrigation, light industry processes, and stock and domestic farm supplies. It is also intended to manage the storage to allow for the maintenance of minimum flows for river freshening. Water for irrigation on the Mitchell River flats will be drawn by private diverters from sites downstream of the proposed offtake. Above the offtake and dam site 2 diverters draw up to 94 megalitres per annum from the Dargo River while a further 5 diverters draw up to 298 megalitres from the Wonnangatta River.

The proposed Bairnsdale Waterworks Trust offtake pump is to be sited in a deep rock pool approximately 2 km upstream from Glenaladale bridge. A 600 mm diameter pipeline will carry water approximately 22 km to a storage basin near Bairnsdale. Water is expected to be available from the new offtake site by 1983.

22 *Water Quality*

Water quality upstream of the proposed Bairnsdale water supply offtake may be classified as good, and is within the World Health Organisation limits set for drinking water standards. Bacteriological testing indicates very low levels of *Escherichia coli* at this site. Provision has been made for chlorination of the supply if necessary.

Figure 2 - Mitchell River WSC - Shire Boundaries & Land Above 1220 M.

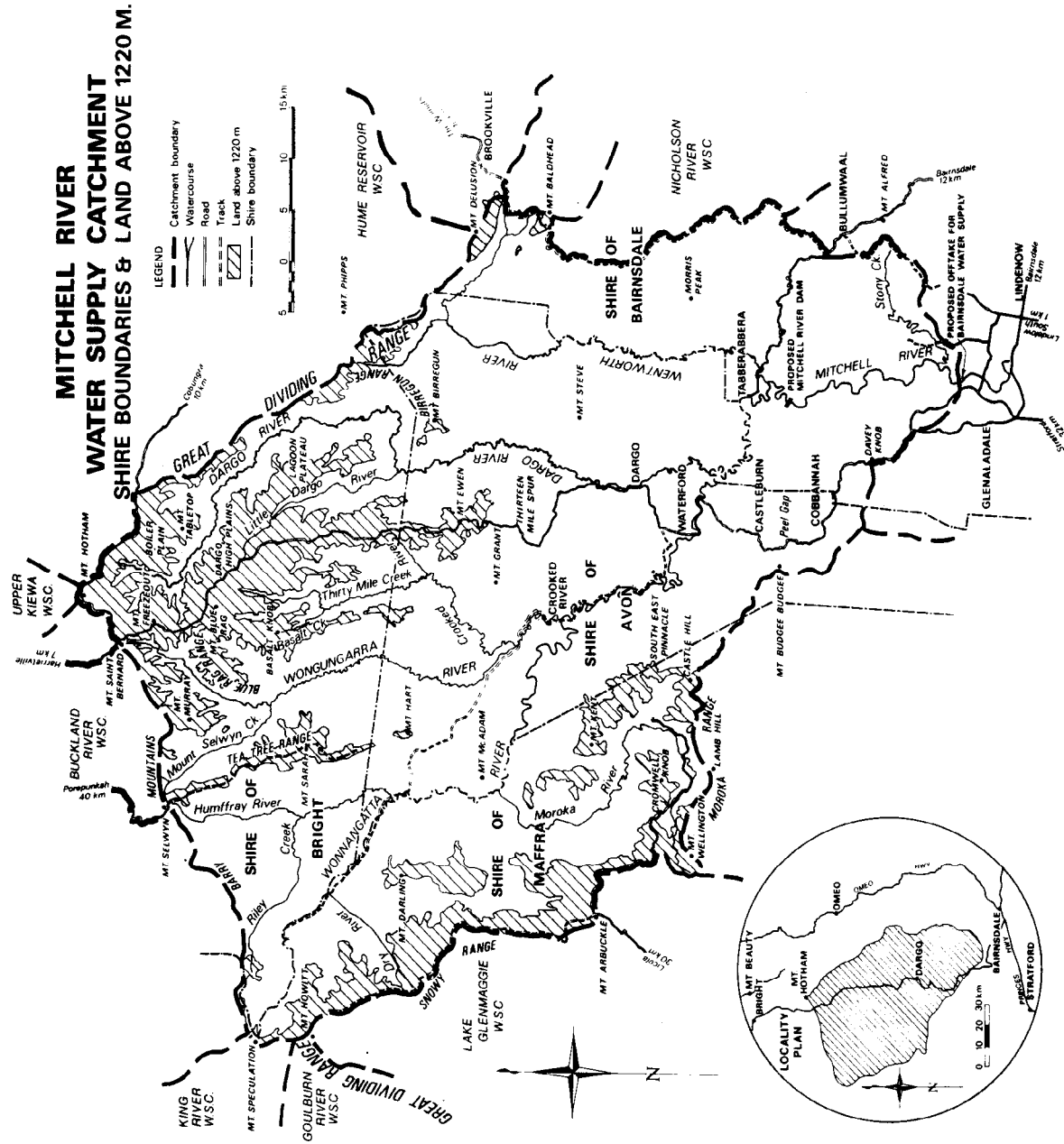


Figure 2

Chapter 3 - Land Tenure and Land Use

3.1.1 Freehold Land

Freehold land tenure on the high plains within the catchment is limited to small areas on the Dargo High Plains and on the Bennison Tablelands near Guys Hut. There are also some small freehold properties located near Mount St Bernard and Mt Higginbotham, both of which are within the Mount Hotham Alpine Resort. Approximately 11,000 ha of privately owned land in the catchment is located at Dargo and along the Wonnangatta River valley. A further 9,000 ha is located at Tabberabbera, Castleburn and Glenaladale.

3.1.2 Public Land

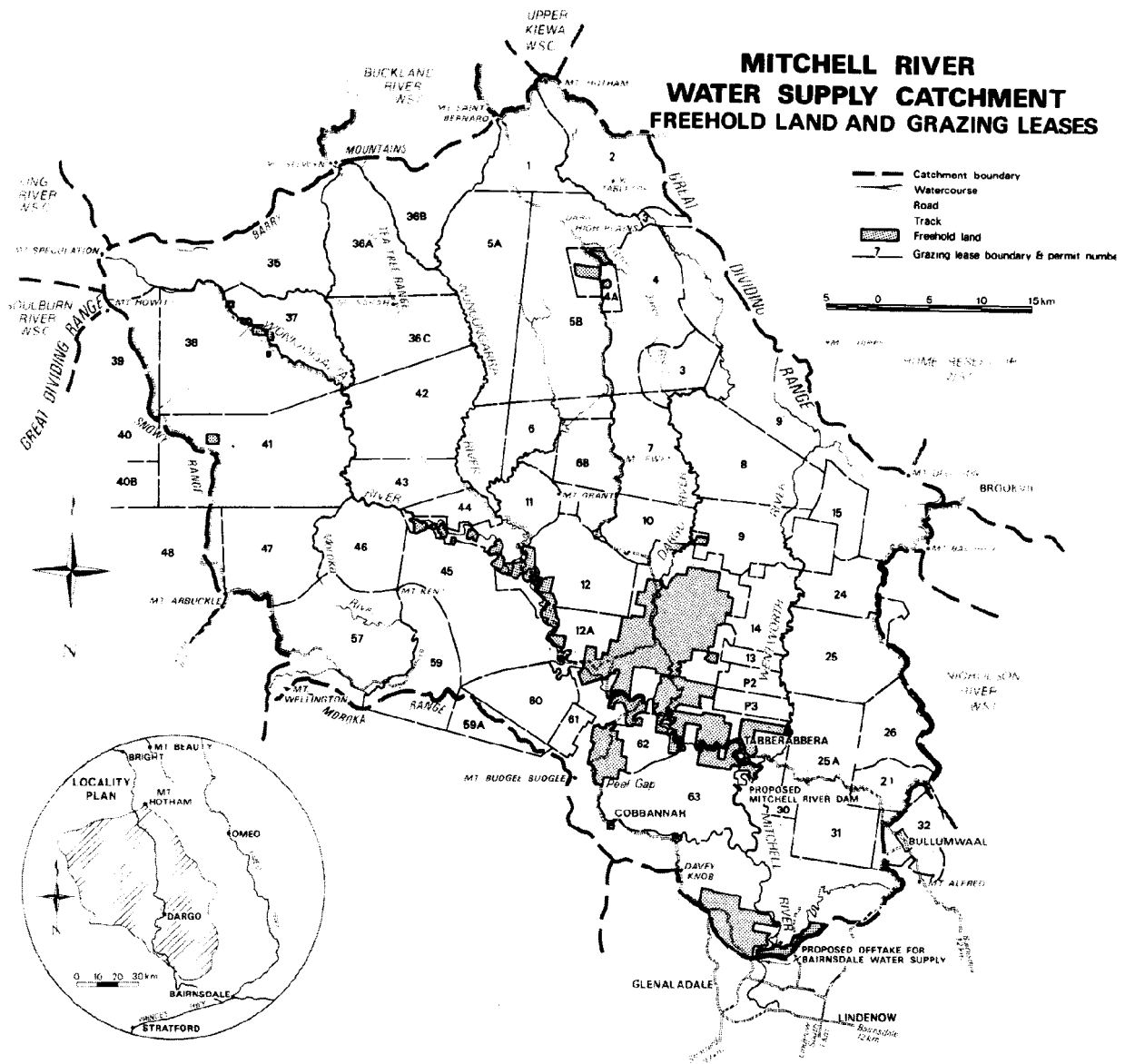
The major part (90 per cent) of the Mitchell River catchment is public land. The present status is predominantly unreserved Crown Land. Management of the area is primarily the concern of the Forests Commission and Department of Crown Lands and Survey. In areas above the 1220 m contour the Soil Conservation Authority exercises supervisory control of all grazing and earthworks.

Sections of Reserved Forest are located south of Bullumwaal (approximately 8,500 ha) and east of Mt Tabletop (approximately 5,900 ha). Other areas of public land in the catchment include the southern part of the Mount Hotham Alpine Reserve (2,930 ha). The reserve is currently administered by a committee of management comprising members from several government and private organisations. Physical management of the land in the reserve is the responsibility of the Department of Crown Lands and Survey. Glenaladale National Park (approximately 200 ha) is at the southern tip of the catchment and is managed by the National Parks Service. Recommendations for public land in the Alpine Area have been accepted by the Government with some modifications. These recommendations are summarised in Appendix B.

3.2 Land Use

Forestry operations are widely distributed, but occur mainly above 800 m elevation. Commercially important species include *Eucalyptus delegatensis* (alpine ash), *E. obliqua* (mess mate), *E. cupullocarpa* (mountain grey gum), *E. nitens* (shining gum) and *E. regnas* (mountain ash). Current forest operations are being conducted at the following locations: Basalt knob, Mt Ewen, Mt Kent, Riley River, Frosty Creek (near Mt Blue Rag) and areas of the Barry and Tea Tree Range. Logging operations are being carried out by contractors under the supervision of the Forests Commission. Timber is also taken for paper pulp manufacture by APM at Maryville. The Government has agreed on the recommendations of the LCC to designate some areas within the catchment for "once only" logging. These areas which are within National or State parks, will allow for the maintenance of timber production in the short term (Refer Appendix B).

Figure 3 - Mitchell River WSC - Freehold Land and Grazing Leases



Cattle grazing enterprises rely mainly on the supply of summer feed from extensive-sub alpine grassland and open forest situations. Permits issued by the Department of Crown Lands and Survey and the Forests Commission of Victoria, enable unrestricted range grazing throughout the summer months from December to April. During autumn, cattle are removed from the high plains area to lower more sheltered areas around Dargo and the Mitchell River flats.

Gullying and severe sheet erosion on parts of the freehold land around Dargo was initiated by heavy rabbit infestations prior to the introduction of myxomatosis; overgrazing of some areas by stock has allowed erosion to continue. Steep northerly aspects of forested hillsides are also particularly susceptible to sheet erosion.

Mining and extractive industries have also played an important role in the development of the region. Initially gold mining operations led to rapid growth of Dargo and surrounding districts. The gold-fields at Crooked River, Cobbannah and along the Wonnangatta River still have the potential for further development if the demand for precious metals continues to increase. Gravel extraction for roadworks is the major extractive industry currently operating in the catchment. Most gravel comes from private land, but some roadside (Crown Land) gravel extraction does take place.

Recreational activities within the catchment take many forms. The alpine areas, particularly around Mt Hotham, provide for both down-hill and cross-country skiing during the winter months. During the summer and autumn months many hikers use sections of the alpine walking track. Other areas popular with hikers are those around Mount Wellington, Mount Kent, Mount Howitt and along the Wonnangatta and Moroka Rivers. Forest tracks are also utilised by 4 WD vehicles and trail bike riders.

There are well-used picnic sites in open forest land adjacent to Cobbannah Creek, and picnic facilities and walking tracks are also provided at Glenaladale National Park. Canoeing is popular on the Dargo and Wonnangatta Rivers and the Mitchell River between Tabberabbera and Glenaladale Bridge. Gold fossicking has also become popular along several major and minor watercourses.

In the north of the catchment, the Mount Hotham Alpine Resort accommodates about 1800 persons. Plans are being considered to increase resort accommodation capacity to 3,500 persons. The proposed major accommodation developments do not encroach into the Mitchell River catchment, however, construction has commenced on an effluent disposal plant which will discharge waste to the catchment. Provided adequate monitoring is undertaken the system should not present a hazard to the water supply.

3.3 Development and Planning

Responsibility for statutory planning within the catchment rests within the local government authorities. The Shires of Bairnsdale and Bright both operate blanket Interim Development Orders (IDO).

A new IDO for this Shire of Avon is currently being prepared for exhibition. That portion of the catchment within the Shire of Maffra is delineated in the planning ordinance as a Forest Conservation Zone. Draft schemes for both the Avon and Bairnsdale Shires include stream protection zones which cover all freehold land surrounding the storage and associated watercourses. Restrictions are placed on clearing and subdivision. The planning scheme also proposes restricted activities in a 100 m buffer strip around the storage basin of the Mitchell River Dam.

Chapter 4 - Hazards to the Water Supply

4.1 Roads

As in most catchments which are predominantly forested, roading can be a prime cause of deterioration in water quality.

Many road batters in the catchment remain unstabilised and are therefore a continual source of sediment and stream turbidity. Improvement to drainage is also required on tracks and forest roads in the catchment.

4.2 Grazing

While sheep grazing on the high plains has been prohibited for some time, the judicious control of cattle numbers will assist further in the maintenance of both the yield and quality of water.

The importance of alpine ground and herb cover, in maintaining constant stream flow cannot be over-emphasised. Sudden peakflows result in both streambed and streambank erosion, together with flooding in lower reaches of the Mitchell River valley. The value of natural vegetation in regulating runoff is therefore an important factor because, not only does this promote infiltration, it also allows for sustained flow throughout the year.

Contamination of the water supply by stock does not appear to be a major problem. However, constraints on intensive animal enterprises such as piggeries may be required in the future. The SCA will recommend the provision of a stream buffer to regulate activities near the proposed offtake site for the Bairnsdale water supply, to facilitate the protection of water destined for domestic supply.

4.3 Forest Operations

Some forest operations currently being carried out are contributing to stream sediment load, particularly in the upper reaches of the catchment. It is estimated that the sedimentation rate of the 15,000 megalitre storage will be 0.22 per cent per annum (i.e. 400 years storage life). Attention to roadworks standards and recognition of stream buffer zones during forest operations will ensure that the sedimentation is not significantly increased.

4.3 Other Hazards

The physiography of the catchment is such that there is a shortage of land suitable for residential development. In Dargo for example, alluvial flats have been developed, for housing and there is potential for stream contamination from effluent disposal systems. This is however, the only township in the catchment and no pressures are evident for expansion.

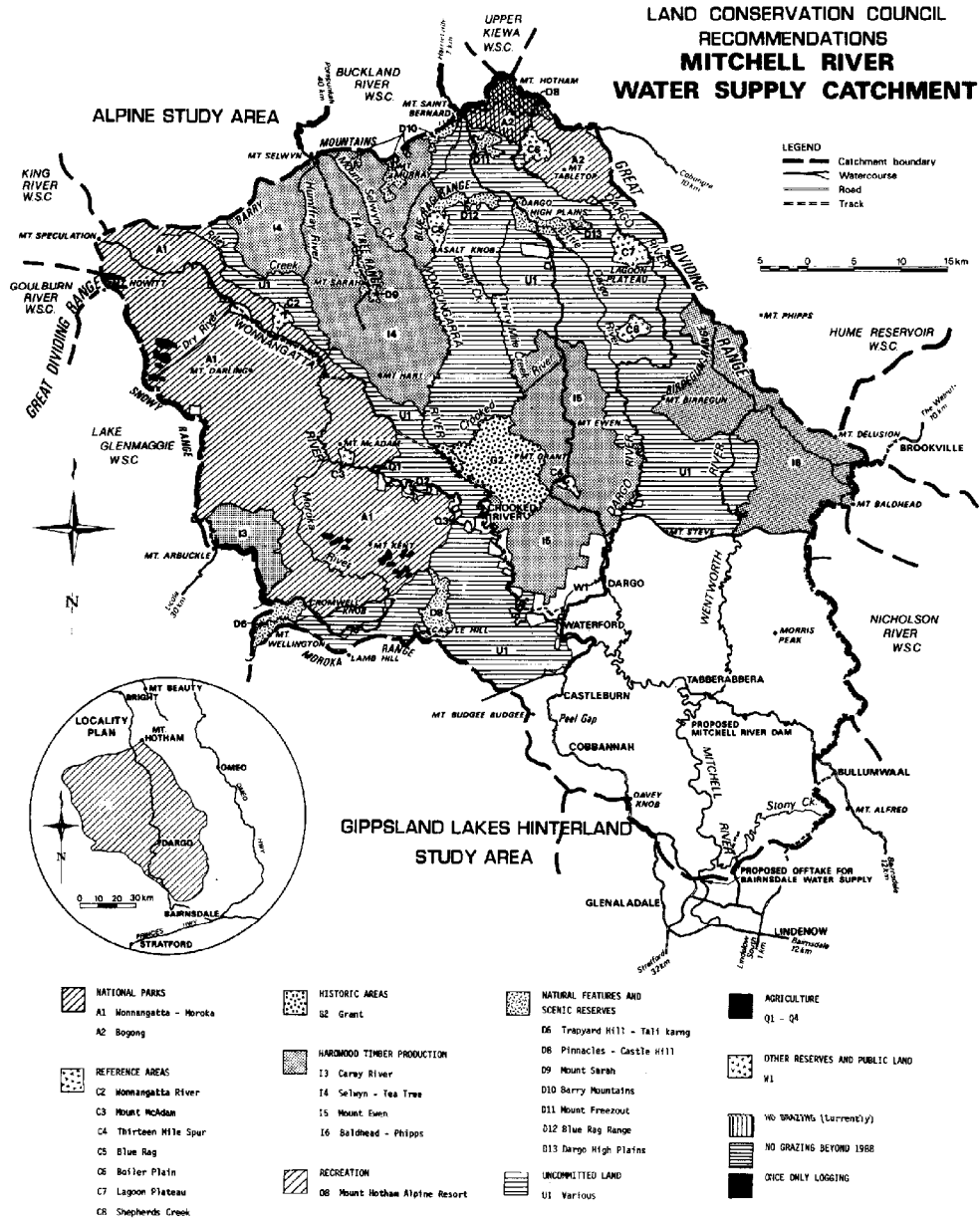
Effluent disposal will be an important consideration at the dam site if it is developed as a recreation area. A potential hazard posed by the water storage is shoreline erosion caused by wave action, while soil disturbance of a more transitory nature is expected during dam construction. The SCA will advise on measures to be taken to minimise off-site effects of land disturbance on water quality during the construction phase of the dam. On present estimates dam construction will be completed in 1983/84, subject to the availability of adequate funds.

The upsurge in exploration for gold has meant the re-introduction of educator dredges in some area. The regulation of their use in the catchment may be warranted in the future.

The catchment as a whole, is capable of providing water of high quality, primarily because most of the area is forested. At the current intensity of land use there appears to be little conflict between forestry,

agriculture, recreation and the demand for high water quality from the Mitchell River catchment. However, continued surveillance of current activities and future developments will be required to maintain the present high standard of catchment yield and water quality.

Figure 4 - Mitchell River WSC - Land Conservation Council Recommendations



Land Conservation Council Recommendations

The Mitchell River catchment extends over two LCC Study Areas: Alpine and Gippsland Lakes Hinterland. The relevant recommendations for the Alpine area are summarised as follows (see Appendix B):

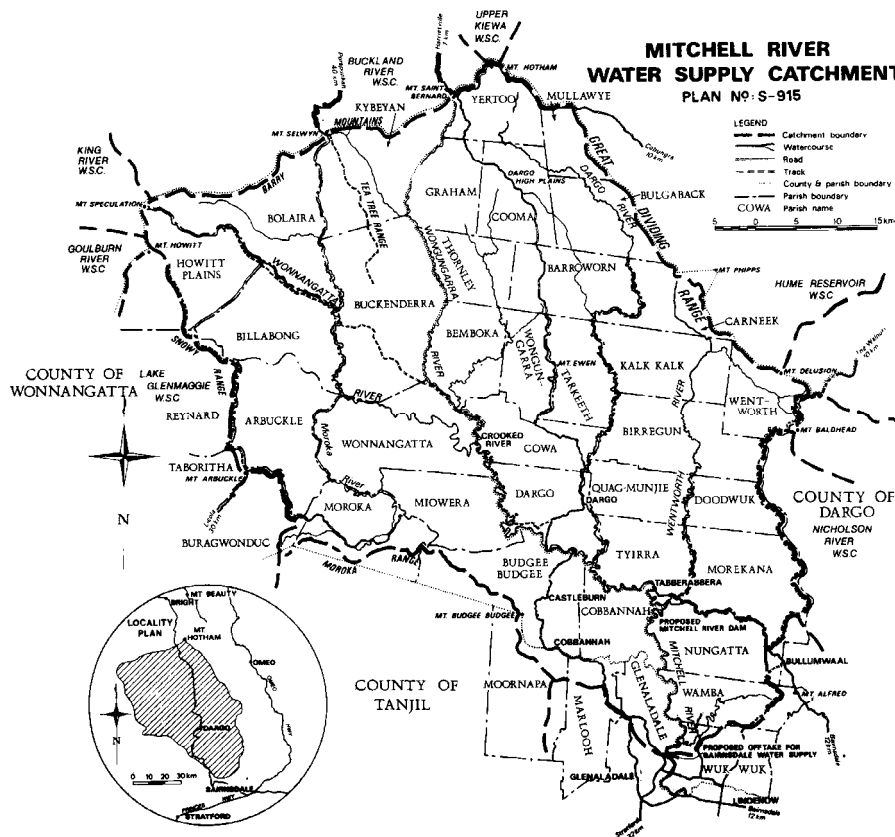
Recreation will be catered for with the provision of several areas for National Parks (A 1,2), Alpine resorts (08) and areas containing unique natural (D8-13) or historical features (G2). Reference areas are also provided (C2-8).

Several areas are designated suitable for forestry (I4-6) and agriculture (Q1-4). Large tracts of land will remain uncommitted (U1) while some reserves and Public land (W1) will continue under their present land use.

Recommendations

1. That the Authority approves this report and forwards it to the Land Conservation Council for consideration;
2. That the Land Conservation Council recommends to the Governor-in-Council that the Mitchell River catchment, as shown on plan S-915 be proclaimed under section 5(1)(b) of the *Land Conservation Act 1970* and section 22(1) of the *Soil Conservation and Land Utilization Act 1958*.

Figure 5 - Mitchell River WSC - Plan No.: S-915



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| LCC | | Report on the Gippsland Lakes Hinterland. Land Conservation Council. Ministry for Conservation of Victoria, Melbourne. |
| SCA | | Land Capability Study in the Tanjil and Mitchell River Catchments, Shires of Narracan, Traralgon and Morwell. |
| SCA | | A Study of the Land in the Catchments of the Gippsland Lakes. |

Appendix A - Country and Parish List

County Dargo

Parish	Barroworn	Morehana (part)
	Bemboka	Mullawye
	Birregun	Nugatta (part)
	Bulgaback	Quag-munj ie
	Carneek (part)	Tarketh
	Cooma	Thornley
	Cowa	Tyrirra
	Dargo	Wamba (part)
	Doodwuk	Wentworth
	Graham	Wangungarra
	Kalk Kalk	Wuk Wuk (part)

County Wonnangatta

Parish	Billabong	Kybeyan (part)
	Bolaira	Miowera
	Budgee Budgee	Moroka
	Buragwonduc (part)	Reynard (part)
	Buckenderra	Tamboritha (part)
	Cobbannah	Wonnangatta
	Howitt Plains (part)	

County Tanjil

Parish	Glenaladale (part)	Moornapa (part)
	Marlooh (part)	

Appendix B - LCC Alpine Recommendations

The areas designated National Park (A1, 2) are to be used for catchment protection and conservation of natural ecosystems. Grazing will be permitted, subject to special conditions set out in the Recommendations. Allowance will be made for recreation and education activities. Forest operations will be conducted in "once only" logging areas.