

6

PRIMARY PRODUCTION

LAND SETTLEMENT AND IRRIGATION

Land utilisation

The climatic conditions of Victoria (for details see pages 49 to 68), especially the varying incidence of rain, have resulted in the development of a wide range of farming practices, but at the same time have been largely responsible for restricting the number of enterprises on individual farms. Farming is generally carried out on a single enterprise basis, a major exception being the association of cereal growing and sheep grazing in the main wheat areas. Other exceptions occur on a less extensive scale with other forms of production.

Most farms in the State are owner operated and, with the exception of the larger holdings, the routine work on the farm is carried out by the farmer and his family, but at times of peak labour requirement, such as during shearing or harvest, additional labour is employed.

Considerable areas in the State are retained as forest reserves and for water catchments (see page 280).

The pattern of land use is more or less clearly defined in each of the statistical districts (see map on page 307). Thus the Mallee and the northern part of the Wimmera District are used almost exclusively for cereal production and sheep raising. The more intensive carrying of livestock in these districts has been made possible by a channel system of domestic and stock water supply originating in the mountainous areas of the Grampians to the south. The agriculture of the Northern District is based largely on irrigation and ranges from dairying to fruit production. The non-irrigated parts of the district are used for cereal and sheep production. In the Western, Central, North-Central, North-Eastern, and Gippsland Districts, the rainfall is heavier and more reliable; consequently, there is more diversity in land utilisation. In these districts, sheep grazing and dairying are the most important industries. Cultivation is generally limited. Some wheat is grown in the North-Eastern and Western Districts and there is some production of potatoes, vegetables, and other intensive cultivation crops on the more fertile soils in the higher rainfall parts.

Mallee District

This district is situated in the far north-west of the State and has a total area of 10.8 million acres. However, there are extensive areas in the north and west which, because of water shortage and the liability to severe soil

erosion, have not been settled, and the total area occupied is 7.7 million acres.

The soils of the district being light in texture are easily and cheaply cultivated and the main farming enterprise is cereal cropping, associated with wool and prime lamb production. Wheat is the principal crop grown in addition to oats for grain, hay and grazing, and barley. Yields from cereal crops vary widely according to seasonal conditions. The following table gives the areas sown and average yields per acre for the season 1969-70:

MALLEE DISTRICT—CEREAL CROPS, SEASON 1969-70

Crop	Area	Average yield per acre
	acres	
Wheat	1,476,177	22.38 bushels
Oats—grain	123,498	19.11 bushels
hay	22,070	1.37 tons
grazing	28,758	..
Barley	189,164	20.21 bushels

In the past, lack of suitable pasture species was a major problem in pasture development, and the grazing was provided largely by native pastures, green cereal crops, and crop stubbles. The discovery and introduction into crop rotations of suitable medics has resulted in marked benefit to both crop production and grazing. The use of medics is now widespread in the district and has greatly improved the conditions for production of early prime lambs mainly for the Melbourne market. Dry land lucerne has also contributed to the vastly improved grazing afforded by the pastures.

In 1969-70 the district carried 2.2 million sheep and produced 22.0 million lb of wool in addition to the early lambs.

Irrigation areas located close to the Murray River, which marks the northern boundary of the State, produce most of the State's dried vine fruits and considerable quantities of citrus fruits.

Wimmera District

The Wimmera occupies the central western part of the State and has an area of 7.4 million acres, of which 6.2 million acres are occupied. Average annual rainfall in the north is about 16 inches per year, increasing in the south to 20 inches. The Grampians in the south of the district have a higher rainfall. This area is unsuited to agricultural production and is retained by the Crown as a watershed area and forest reserve.

There are wide variations in soil type, but the district includes substantial areas of fertile self-mulching clay loams, which are among the most productive wheat-growing soils in Australia. South and east of the Grampians the soils are podzols and in the south-west there is a large area of light-textured grey soils.

Wheat farming in association with fine-wool growing or prime lamb production is the main farm enterprise over the north and central Wimmera. Both climate and soils are suited to cereal cropping and yields obtained are high. In recent years the development of suitable strains of medics and

clovers has resulted in the inclusion of a pasture phase in crop rotations.

The table below shows the areas of the cereal crops sown and average yields for the season 1969-70:

WIMMERA DISTRICT—CEREAL CROPS, SEASON 1969-70

Crop	Area	Average yield per acre
	acres	
Wheat	992,091	29.45 bushels
Oats—grain	261,702	26.89 bushels
hay	24,325	2.01 tons
grazing	21,998	..
Barley	120,142	22.89 bushels

In addition to mixed sheep and wheat farming, there are extensive areas, particularly in the south and west of the district where rainfall is higher and pasture establishment easier, which are used solely for grazing. About three quarters of the sheep carried in the area are Merinos, and, although a number of early fat lambs come from the wheat growing areas, emphasis here is more generally on fine-wool production and breeding. In 1969-70 the district carried about 5.2 million sheep and produced 57.3 million lb of wool. As is the case in the Mallee, dairying and beef cattle production are only of minor importance.

Northern District

This is an area of plains country extending from the Central Highlands in the south to the Murray River in the north. The total area of the district is 6.3 million acres, of which 5.6 million acres are occupied for agricultural purposes. The soils vary from typical light Mallee soils in the north-west to fertile red-brown earths in the east. Average annual rainfall is 14 inches in the north-west and increases to 25 inches over the foothills of the ranges, which are on the eastern boundary of the district. The district includes the major irrigation areas of the State, and because of this several different farming enterprises are carried out.

Wheat growing is an important industry and because of climatic and soil differences, yields vary widely across the area. As in the other wheat producing districts, oat crops are an important feature in rotations and for grazing. In the 1969-70 season the following areas of cereal crops were sown:

NORTHERN DISTRICT—CEREAL CROPS, SEASON 1969-70

Crop	Area	Average yield per acre
	acres	
Wheat	636,004	24.82 bushels
Oats—grain	197,087	25.02 bushels
hay	52,838	2.09 tons
grazing	19,755	..
Barley	77,635	23.83 bushels

In 1969-70 the district carried about 4.4 million sheep, largely on wheat farms, and emphasis is on prime lamb production rather than fine-wool growing. Extensive irrigation has made it possible to establish highly productive perennial pastures which are used mainly for dairy production, but, in addition, the irrigation areas fatten sheep and lambs from the non-irrigated area in Victoria and New South Wales. The milk produced is mostly used for butter, cheese, and other manufactured products, but small quantities are used for city wholemilk supply. In 1969-70 there were over 485,000 dairy cattle in the district.

Apart from dairying, irrigation has permitted the establishment of an important fruit growing industry. This area supplies fresh fruit to Victorian and interstate markets and also provides fruit, mainly apricots, pears, and peaches, for the important canneries operating in the district. Tomatoes are also produced on a large scale.

North-Central District

This district includes much of the Central Highlands area and the average annual rainfall is generally over 28 inches, but on the northern slopes it is as low as 22 inches. There is wide variation in topography and soils and much of the area is used for grazing sheep and beef cattle. However, the district is relatively small, containing only 2.9 million acres, of which 2.1 million acres are occupied and used for farming production.

Cereal cropping is unimportant, but potatoes in the volcanic hills east of Ballarat and pome fruits in the Harcourt area are the most important crops grown. Although dairy farms are scattered throughout the district, it is marginal for this form of production and emphasis is on sheep production associated with beef production. In 1969-70 the district carried about 2.7 million sheep and about 158,000 beef cattle.

North-Eastern District

The district has a total area of 7.2 million acres, but includes substantial areas of Crown lands, many of which are very steep and heavily timbered. The area occupied is 3.7 million acres. Annual average rainfall varies from 20 inches in the north-western corner of the district to well over 60 inches over the mountains. Almost all of the area used for rural production has a 20 to 30 inch rainfall.

Although cereal cropping is not general, there is an interesting development of ley farming based on subterranean clover pastures. However, areas concerned and production are small in relation to the State totals. The fertile river valleys are suited to speciality crop production, and in 1969-70, 10,600 acres of tobacco and small quantities of hops were grown in these areas. In 1969-70 the district carried 118,000 dairy cattle, mainly along the river valleys.

Prime lamb growing and crossbred wool production are the main sheep enterprises in the north-western and western parts of the district, but fine-wool growing is more common on the unimproved pastures along the Murray Valley and in the Omeo area. The district carries about 2 million sheep.

The North-Eastern District is an important beef cattle breeding and fattening area, and in 1969-70 over 404,000 head were carried. The cattle make good use of the rough pastures of the foothill country and the productive pastures of the flats make suitable fattening areas.

Western District

Most of the district falls in the 25–30 inches average annual rainfall belt, but an area north and east of the Otways is influenced by a rain shadow effect and the average annual rainfall is about 24 inches. In the Otway Ranges the average annual rainfall is as high as 70 inches. The soils of the district vary considerably in type and fertility. Basaltic soils cover the great bulk of the plains area. In the north the soils are similar to those of the southern Wimmera. The total area of the district is 8.8 million acres of which 6.8 million acres are occupied. There are substantial areas of forest reserve in the Otways, which are in the south-eastern part of the district.

The only cereal crop of importance grown is oats, which are used as a fodder crop, cut for hay, or harvested for grain which is also used very largely to feed stock. The more fertile soils produce both potatoes and onions, and about 60 per cent of the State's onion acreage is located on volcanic tuff soils near Colac and Warrnambool. However, emphasis is placed on animal production, and climatically the district is well suited to the development of improved pastures. It is the major wool producing area of the State, and in 1969–70 there were 12.0 million sheep in the district. In 1969–70 40 per cent of the total sheep population was Merino, and the fine-wool breeds—Merino, Polwarth, and Corriedale—made up 68 per cent of the total sheep population. There are relatively few crossbreds, and prime lamb production does not have the same importance as in other districts. The Western District is an important beef cattle breeding and fattening area and in 1969–70 carried 621,000 head. Many of the State's leading stud herds are located in the district and in addition, many sheep properties carry beef cattle.

Dairying is an important industry and there is widespread distribution of dairy cattle. However, the main concentrations are in the following areas : Colac, Camperdown, Koroit, Allansford, and the Casterton–Coleraine region. A proportion of production is used as wholemilk for town supply, but a considerable proportion of the State's processed milk products and butter is produced in the district, which in 1969–70 carried 460,000 dairy cattle.

Central District

Average annual rainfall varies from 24 inches within the rain shadow area, north of Geelong, to more than 35 inches over the ranges north and east of Melbourne. Topographically there is variation from plains country on the western side of Port Phillip Bay to the steep hill country north and east of Melbourne. There is also a wide variation in soil type and fertility. The total area of the district is 4.1 million acres and 2.7 million acres are occupied—the remainder being reserved as forest and watershed areas.

The climate is suited to the production of malting barley and in 1969–70 61,000 acres were grown—mainly on the plains to the west. Potatoes are grown in the Romsey–Ballarat area, on the Bellarine Peninsula, and the Koo Wee Rup Swamp.

Market gardening is important in the area extending from the south-eastern suburbs of Melbourne to the northern shores of Western Port, and also on the irrigation settlements near Werribee and Bacchus Marsh.

The district is the major producer of apples ; dessert types of pears and peaches and other stone fruits are also important. Orchards are located in

the eastern metropolitan area, on the Mornington Peninsula, and near Bacchus Marsh and Pakenham. Ninety per cent of the State's strawberry crop is grown in the Dandenong Ranges some 25 miles east of Melbourne.

In 1969-70 the district carried 2.6 million sheep and production is almost evenly divided between fine-wool growing and fat lamb production.

Beef cattle are grazed in conjunction with sheep over most of the area, but in the east they are run with dairy cows to produce vealers.

The major dairying area is in the east, and this forms part of the most important dairying area of the State. The area is a major supplier of wholemilk for city supply and for butter and cheese manufacture. In 1969-70 there were 269,000 dairy cattle in the district. Pig production is also important.

Gippsland District

The total area of this district is 8.7 million acres, but the northern and eastern parts are mountainous and are reserved by the Crown. The area occupied is 4.4 million acres and the bulk of settlement is south of a line between Dandenong and Bairnsdale. Average annual rainfall varies from just under 22 inches within the rain shadow near Maffra and Sale to 60 inches and above in the highlands. An intensive irrigation scheme has developed around Maffra with highly productive dairying. Average rainfall over most of the settled areas in the west is sufficient for the development of fertile perennial pastures. The soils range from poor sands to relatively fertile loams. The highly fertile alluvial soils of the river valleys are important sources of production.

With the exception of forage crops, cropping is not important in the area, although certain speciality crops, such as maize, beans, and potatoes, contribute substantially to the State's total production.

Gippsland is the main dairying district of the State and dairying is by far the most important rural industry in the district. The highly productive pastures of the 30 to 40 inches average annual rainfall areas are the basis of the industry. The district supplies the greater part of the whole-milk requirements for the Melbourne market and plays a major part in the production of butter, cheese, and other processed dairy products. In addition, the dairy herds contribute to veal and beef production. In 1969-70 the district carried about 560,000 dairy cattle. Pig raising is associated with dairy farming, and there are 61,000 pigs carried in the area.

In western and southern Gippsland sheep production is small and consists largely of fat lamb producing flocks run in conjunction with dairy cattle. In parts of the district east of Rosedale, fine-woolled sheep and beef cattle are valuable enterprises.

Alienation of land

The total area of the State is approximately 56,245,760 acres. On 30 June 1970 this comprised :

	acres
Lands alienated in fee-simple	33,213,059
Lands in process of alienation	429,831
Crown lands	22,602,870
Total	56,245,760

Crown lands comprise :

Land in occupation under—		
Perpetual leases		36,614
Grazing leases and licences		5,139,485
Other leases and licences		292,558
Reservations—		
Reserved forest		5,656,671
Forest and timber reserves (under Land Act)		150,187
Water catchment and drainage purposes		213,972
National parks (under National Parks Act)		506,537
Wildlife reserves (administered by Fisheries and Wildlife Department)		126,954
Water frontages, beds of streams and lakes (not included above)		843,950
Other reserves		288,810
Unoccupied and unreserved but including areas set aside for roads		9,347,132
Total		22,602,870

In the following table are shown the area of Crown lands sold absolutely and conditionally, and the area of lands alienated in fee-simple during the five years 1964 to 1968. A portion of the area conditionally sold reverts to the Crown each year in consequence of the non-fulfilment of conditions by the selectors. The lands alienated each year include areas selected in previous years.

VICTORIA—ALIENATION OF CROWN LANDS

Year	Area of Crown lands sold			Crown lands alienated in fee-simple	
	Absolutely, at auction, etc.	Conditionally to selectors	Total	Area	Purchase money
	acres	acres	acres	acres	\$
1964	3,896	23,055	26,951	76,587	406,554
1965	4,705	20,757	25,462	76,965	280,839
1966	27,135	12,508	39,643	53,136	420,313
1967	18,120	48,239	66,359	40,780	566,717
1968	17,880	27,191	45,071	57,014	509,413

Information regarding the Assurance Fund is found on page 679 of this book.

Government assistance to the farming industry, 1964

Land Conservation Council

The Land Conservation Council came into being on 15 February 1971 when an Act of Parliament to make better provision in relation to the conservation of public land was proclaimed. The Council comprises a chairman appointed by the Governor in Council and permanent heads (or their nominees) of the Soil Conservation Authority, the Department of Agriculture, the Forests Commission, the Lands Department, the State

Rivers and Water Supply Commission, the Mines Department, the Department of Fisheries and Wildlife, and the National Parks Authority, as well as a person with experience in the conservation techniques used in developing land for primary production, and two persons with special knowledge of and experience in some aspects of the conservation of natural resources, the latter three being appointed by the Governor in Council.

The functions of the Council are :

1. to carry out investigations and make recommendations to the Minister with respect to the use of public land in order to provide for the balanced use of land in Victoria (public land is defined as land which is not within a city, town, or borough, and is unalienated land of the Crown including land permanently or temporarily reserved under the Land Act and State Forest, land vested in any public authority other than a municipality or sewerage authority, or land vested in the Melbourne and Metropolitan Board of Works);
2. to make recommendations to the Governor in Council as to the constitution and definition of water supply catchment areas under the *Soil Conservation Land Utilisation Act 1958* ; and
3. to advise the Soil Conservation Authority concerning policy on the use of land (whether public land or any other land however vested) in any water supply catchment area.

In making any recommendation the Council must take into account the present and future needs of the people of Victoria in relation to :

1. the preservation of areas which are ecologically significant ;
2. the conservation of areas of natural interest, beauty, or of historical interest ;
3. the creation and preservation of areas of reserved forest ;
4. the creation and preservation of areas for national parks ;
5. the creation and preservation of areas for leisure and recreation, and in particular of areas close to cities and towns for bushland recreation reserves ;
6. the creation and preservation of resources for the conservation of fish and wildlife ;
7. the preservation of species of native plants ; and
8. land required by government departments and public authorities in order to carry out their functions.

To ensure that all opinions are heard and all facts considered before recommendations are made, the Act provides for publication in the *Government Gazette* and in the newspapers circulated throughout the State, as well as the newspapers circulated particularly in the vicinity of the area or district concerned, notification that an investigation for an area is proposed. Any person or body may make submissions to the Council about how any public land can be better used to meet the needs of the people of Victoria, and the Council is required to consider these submissions before making any recommendation concerning the use of public land to the Minister.

Because it is the most populated State in Australia in relation to area, Victoria illustrates the problem of how society demands land for various

purposes, some of which are compatible, and some conflicting or competitive. When there are, or it is anticipated that there will be, conflicting or competitive demands for land, decisions must be made and these should be based on proper criteria. The Council's function is to ensure that recommendations are made on the basis of significant scientific and other criteria.

Soil Conservation Authority, 1961-71; Land Utilisation Advisory Council, 1962, 1967, 1970; Destruction of vermin and noxious weeds, 1963; Soil, land use, and ecological surveys, 1966; Farm water supplies, 1968; Group conservation, 1969

Rural finance facilities

Australia's national policy for permanent land settlement has been based on the family unit farm. Financially this has seldom been easy because even in the early days settlers found it difficult to earn enough to maintain themselves while they were clearing and developing their blocks. The conditions of purchase were made very easy but considerable aggregation of holdings took place because settlers failed. Later, some of these large estates were re-purchased, subdivided, and the smaller farms made available to settlers under closer settlement schemes.

After each world war these schemes were expanded to enable ex-servicemen to acquire farms under generous terms of settlement. In addition, money was advanced to returned servicemen to enable them to buy their own "single unit" farms. Soldier settlers were also granted loans for the purchase of stock, plant, and equipment.

The State set up a Rural Finance Corporation with wide powers for assisting rural industry. This was later merged with the Soldier Settlement Commission into a Rural Finance and Settlement Commission.

The Commonwealth Bank has had a Rural Credits Department for many years. Its main function is to provide seasonal assistance in the marketing of products. Thus it cushions the effect of large interim payments at harvest time and provides credit for goods awaiting shipment or in transit. The Bank also administers the Farm Development Loan Fund, and assists in financing research. The Commonwealth Development Bank is interested in making loans available for the improvement of approved properties.

The trading banks have many farmer clients who require finance mostly on a relatively short-term seasonal basis. Numerous pastoral finance companies act as agents for farmers and frequently provide credit for the purchase of properties or for their improvement or for the purchase of livestock. The State Savings Bank also makes limited financial advances to farmers.

Rural Finance and Settlement Commission

The Rural Finance and Settlement Commission was established by legislation passed in 1961, which began to merge the former Soldier Settlement Commission and the Rural Finance Corporation. The new Commission carried out the functions of the previous authorities temporarily in two separate branches, namely, those of Settlement and Finance, respectively, until further legislation passed in 1963 completed the merger by removing this division and co-ordinating the functions previously performed by the two separate authorities.

Rural Finance Act

The Rural Finance Corporation was established in April 1950. Its functions, which have since been taken over by the Commission, include the making of advances through loans at low rates of interest to existing or proposed country industries, both primary and secondary. The Commission is also empowered to advance moneys to, or for the benefit of, any farmer for carrying into effect a composition or scheme of arrangement between him and his creditors. The Commission is also empowered under the Act to carry out special lending as agent of the Treasurer. Under these agency provisions, the Commission administers relief lending to members of the rural community in times of adversity such as bushfires, floods, and drought. (See also page 286.)

VICTORIA—RURAL FINANCE ACT: REVENUE, EXPENDITURE, ETC.
(\$'000)

Particulars	1965-66	1966-67	1967-68	1968-69	1969-70
Revenue					
Interest	1,346	1,447	1,559	1,689	1,849
Other	34	30	42	23	38
Total revenue	1,380	1,477	1,601	1,712	1,887
Expenditure					
Administration	169	185	247	230	278
Interest	1,021	1,108	1,169	1,295	1,309
Sinking fund	56	59	61	66	68
Other	61	49	92	8	16
Total expenditure	1,307	1,402	1,569	1,599	1,671
Net surplus	73	75	32	113	216
Loans and advances outstanding at 30 June	24,113	25,123	27,641	27,330	29,099
Loan indebtedness to State Government at 30 June	22,128	22,881	24,451	27,527	26,395
Government agency advances made	260	252	3,144	3,447	823
Part III advances made	3,559	4,236	5,289	2,699	5,637
Government agency advances outstanding	1,215	1,353	4,291	6,412	6,203

General settlement

Before the end of the Second World War, the Commonwealth Government and various State Governments made arrangements for the settlement of discharged soldiers on the land as part of a general scheme of rehabilitation of ex-members of the services. In 1945 the Victorian Government completed an agreement with the Commonwealth Government. The State Parliament ratified the agreement and also passed legislation constituting the former Soldier Settlement Commission. Soldier settlement in all States has now reached the stage where no further allocations of blocks are proposed.

Under the Victorian legislation, soldier settlement was carried out under two separate schemes. First, there was the general settlement scheme where the Commission acquired freehold land or Crown land for subdivision and development into holdings for application by ex-servicemen. Such holdings were allocated on a competitive basis, having regard to the merits of all applicants. The number of ex-servicemen settled under this scheme totalled 3,293. Second, there was the single unit farm scheme, where ex-servicemen were granted loans up to a maximum of \$18,000 to assist them in the

purchase of existing farms of their own choosing. Under this scheme 2,878 ex-servicemen were granted loans amounting to \$23,917,338.

The Soldier Settlement Act enabled the Commission to make advances to general settlers and single unit farm settlers to assist them in the purchase of stock, plant, equipment, and shares in co-operatives. For this purpose \$12,586,333 has been advanced to settlers and at 30 June 1970, \$12,512,018 has been repaid and \$31,944 has been written off, leaving an outstanding balance of \$24,371. In addition to its functions under the Soldier Settlement Act, the Commission, on behalf of the Commonwealth Government, administered that portion of the Commonwealth *Re-establishment and Employment Act* 1945, which related to agricultural loans and allowances.

The following tables set out the particulars of rural rehabilitation of ex-servicemen in Victoria as at 30 June 1970 :

**VICTORIA—LAND ACQUIRED AND COST OF
DEVELOPMENT, 1945 TO 1970**

Particulars	Land acquired and total expenditure to 30 June 1970	
	acres	\$'000
Freehold land	1,193,171 }	39,448
Crown land	51,536 }	53,877
Development and improvement of holdings	..	
	Total realisations to 30 June 1970	
	acres	\$'000
Sales of land not required for soldier settlement	65,046	(a)3,303

(a) Sale price of land not required for settlement.

VICTORIA—ADVANCES TO EX-SERVICEMEN, 1945 TO 1970

Act	Total advances to 30 June 1970		Advances outstanding at 30 June 1970	
	number	\$'000	number	\$'000
Soldier Settlement Act—				
Advances for settlers' lease liability(a)	3,033	57,406	1,949	34,072
Advances to assist in acquiring and developing single unit farms	2,878	23,917	1,069	7,198
Advances for improvements, stock, implements, etc.	n.a.	12,568	35	24
Advances for shares in co-operatives	327	250	..	..
Commonwealth Re-establishment and Employment Act—				
Advances to assist rehabilitation in farming industry	2,970	3,594	57	7

(a) The total number of settlers allocated holdings is 3,293 which includes 243 holdings re-allocated and 17 holdings disposed of.

n.a. : Not available.

Other land settlement

The *Land Settlement Act* 1959 extended the functions of the then

Soldier Settlement Commission in that, under such Act, the Commission was given authority to administer a new land settlement scheme to cater for those men wishing to become farm owners—many of whom were too young to have been ex-servicemen and thus eligible for soldier settlement. The scheme generally is based on the same principles as the scheme for soldier settlement—the main differences being the interest rates payable and the basis of determining the capital liability of the settler for the farm. There is no provision in the Act for advances to buy single unit farms. The Commission is given authority to purchase privately owned land or set apart suitable Crown land for development and subdivision.

Any male British subject over the age of 21 years is eligible to apply for land made available, but the actual allocation is made on a competitive basis, having regard to a number of factors laid down in the Act, including the applicant's experience in farming and prospects of success. A feature of the legislation is that the farms are either brought to, or within sight of, production before allocation. Further details about the general principles of this legislation will be found on pages 494–6 of the *Victorian Year Book* 1963.

Up to 30 June 1970 the land being developed for allocation under this scheme has been on five developmental projects. These are at Heytesbury near Cobden, Yanakie on Wilsons Promontory, the East Goulburn Project near Shepparton, Rochester irrigation project, and Palpara in the south-western corner of Victoria.

The Yanakie and East Goulburn schemes have now been completed and all farms allocated to settlers.

The demand for all holdings allotted to date has been exceedingly keen and the 573 farms allocated (381 dairy farms under rainfall conditions, 113 irrigation dairy farms, and 79 soft fruit orchard holdings) attracted more than 15,000 applications.

At 30 June 1970 the position of other land settlement in Victoria under the *Land Settlement Act* 1959 was as follows :

VICTORIA—OTHER LAND SETTLEMENT, 1959 TO 1970

Particulars	Land acquired and total expenditure to 30 June 1970		Balance outstanding at 30 June 1970	
	acres	\$'000	\$'000	
Land acquired—				
Freehold land purchased	24,425	2,068	9,570	
Crown land	126,880			
Development and improvement of holdings	..	26,564		
	Total realisations to 30 June 1970			
	acres	\$'000		
Sales of land not required for settlement	6,232	(a) 635	277	
	Total advances to 30 June 1970		Advances outstanding at 30 June 1970	
	number	\$'000	number	\$'000
Advances to settlers under the Land Settlement Act	n.a.	1,599	41	112
Liability of settlers granted purchase leases	469	14,956	467	14,164

(a) Sale price of land not required for settlement ; balance outstanding represents instalments not yet due where terms were given to purchasers.
n.a. : Not available.

Relief lending

In addition to its ordinary lending under the Rural Finance Act, the Commission is empowered to carry out special lending as agent of the Treasurer. Under these agency provisions it administers relief lending to the rural community in times of adversity such as bushfires, floods, and droughts. During the 1967-68 drought special funds were provided to Victoria by the Commonwealth for various drought relief measures including lending to drought affected farmers for carry-on and re-stocking purposes where the farmers had exhausted their capacity to borrow through normal sources of finance. Advances were made at an interest rate of 3 per cent per annum with a repayment term of up to seven years.

As a sequel to drought relief the Commission, at the request of the Government, initiated a scheme to provide finance to farmers and graziers to enable them to purchase oat silos and fill them if necessary; this was introduced as an encouragement to the man on the land to build up a fodder reserve against future adverse seasons. The number assisted was 803 involving \$720,344.

More frequently, the Commission has administered relief funds to vine and fruit growers, and other farmers in the Swan Hill-Mildura area, who suffered when hail and rain damage seriously reduced incomes. During the year assistance totalling \$353,280 was granted to 331 growers.

*Other rural finance facilities**State Savings Bank of Victoria*

State Savings Bank loans for rural purposes are available on the security of first mortgage over freehold property. Loans are repayable over periods varying between fourteen and a half and twenty-one years. Interest is charged at the rate ruling from time to time—in 1971 ranging from 6.75 to 8.25 per cent per annum depending on the amount of the loan and whether the property is worked by the applicant. The maximum loan must not exceed two thirds of the value of the property.

Particulars for the year ended 30 June 1970 may be found on page 660.

Reserve Bank of Australia—Rural Credits Department

The Rural Credits Department was established in 1925 as a department of the Commonwealth Bank of Australia, and is now part of the Reserve Bank of Australia. Its function is to provide finance to statutory marketing boards and similar authorities and to co-operative associations of primary producers. Advances are used by borrowers principally for making payments to growers for their primary produce pending its sale and to finance marketing expenses which in some cases include processing and packing of the commodity.

Finance for the marketing of wheat, and to a lesser extent, dairy products, has comprised the major portion of credit provided, but the Department's operations have also covered such commodities as barley, cotton, canning fruits, dried fruits, meat, eggs, and superphosphate.

Interest rates since 8 August 1969 have been 5 per cent per annum, if against the security of a Commonwealth or State Government guarantee; and 5.25 per cent per annum against other securities.

Grants have also been made by the Rural Credits Development Fund for research and extension work to assist the development of primary industries. The Fund is financed by one half of the annual net profits of the Rural Credits Department.

Farm Development Loan Fund

The Farm Development Loan Fund was established in 1966 to provide loans to primary producers, at preferential rates and conditions, for drought relief and farm development purposes. Loans are made by the trading banks from their Farm Development Loan Fund Accounts with the Reserve Bank, and are designed to supplement other loans available from the banking system.

Commonwealth Development Bank

A brief outline of the functions of the Commonwealth Development Bank, together with particulars of rural loans outstanding at 30 June 1970, may be found on pages 654-5. Rural loans are made for a variety of purposes, e.g., clearing, fencing, pasture improvement, farm water conservation, erection of essential farm buildings, and the basic stocking of properties. Other aspects of assistance granted include aid to successful applicants in government sponsored rural development schemes and land ballots. Special attention is also given to providing finance to applicants opening up new areas. Particulars of rural loans approved in Victoria during the year ended 30 June 1970 are given in the following table :

VICTORIA—COMMONWEALTH DEVELOPMENT BANK
OF AUSTRALIA : RURAL LOANS APPROVED, 1969-70
(\$'000)

Type of rural activity	Value of rural loans approved
Sheep	1,608
Dairying	1,305
Cattle	1,187
Wheat and other grain crops	77
Fruit	715
Poultry	552
Other	228
Total	5,672

The average loan approved for rural purposes during 1969-70 was \$12,862.

Advances by major trading banks

The extent of rural lending in Victoria by the Commonwealth Trading and other major trading banks is illustrated by the following table which shows bank advances to borrowers outstanding at the end of June for the five years 1966 to 1970 :

VICTORIA—COMMONWEALTH TRADING BANK AND PRIVATE
TRADING BANKS : BUSINESS ADVANCES OUTSTANDING TO
RURAL INDUSTRY BORROWERS
(\$m)

Industry of borrower	Amount outstanding at the end of June—				
	1966	1967	1968	1969	1970
Sheep grazing	49.2	61.5	76.4	82.2	81.0
Wheat growing	15.2	18.6	27.5	26.5	28.4
Dairy and pig raising	31.9	40.8	51.0	54.2	48.7
Other rural	22.9	29.8	38.1	44.7	50.9
Total	119.2	150.7	193.1	207.6	209.1

Advances to rural industry borrowers represented 21.5 per cent of trading banks' business advances outstanding at the end of June 1970, and 17.2 per cent of all advances outstanding. The maximum rate of interest on

bank overdrafts at 30 June 1970 was 8.25 per cent per annum but the average rate on rural loans would probably be below this level.

Advances of pastoral finance companies

The following table shows total rural advances outstanding to pastoral finance companies at the end of June for the five years 1966 to 1970 :

VICTORIA—RURAL ADVANCES (a)
OF PASTORAL FINANCE COMPANIES
(\$m)

At end of June—	Advances outstanding
1966	40.9
1967	50.2
1968	54.8
1969	65.9
1970	66.1

(a) Held by branches located in Victoria which is not necessarily the State of residence of the borrower.

Improvement purchase leases

Crown land can be made available for application under improvement purchase lease conditions and applications received are dealt with by a local land board.

The essential conditions of an improvement purchase lease are as follows :

1. That the lessee will make such land improvements within the first six years as are specified. "Land improvements" means the clearing, draining, or grading of land, the preparation of land for the sowing of crops and pasture, and soil improvement and maintenance.
2. That the lessee will commence to carry out the land improvements within one year and will complete one quarter within three years.
3. That the lessee will not sell, assign, or part with possession of the leasehold during the first six years.
4. That the lessee will not mortgage his interest in the leasehold during the first six years without first obtaining the consent of the Department.
5. That the lessee will reside in person on or within twenty-five miles of the leasehold during the first six years.

The purchase money is payable in twenty annual instalments and on satisfactory compliance with the conditions of the lease and on payment of the balance of purchase money and fees, a Crown grant will be issued at any time after the first six years except where the lease contains a soil erosion prevention condition. The period is then twelve years or such further period as is provided in the lease.

From the inception of improvement purchase leases in 1956 until 30 June 1970, 1,157 allotments comprising 350,786 acres of Crown land have been proclaimed available for settlement.

Water supply and land settlement

History

For practical purposes, the history of water supply in Victoria—outside the metropolitan area—can be taken up in the early 1880s when the miners who had left the goldfields to settle on the northern plains began to assess after a few exceptionally favourable years the true nature of the arid lands which they were pioneering. It was their agitation which led to the *Irrigation*

Act 1886 providing for elected local trusts to construct water supply works with government loan funds.

Between 1886 and 1900 about ninety Trusts were set up under this Act, but for a variety of reasons they all proved a failure. By 1900 the need for a State-wide approach to the water supply problem was apparent and in 1905 the Water Act was passed. This revolutionary Victorian Act, which has since provided the basis for practically all of the rest of Australia's water supply development, had three main features :

1. it abolished all but one of the Trusts (Mildura) and wrote off their debts ;
2. it set up the State Rivers and Water Supply Commission to develop and control water supply and conservation throughout the State, with the exception of the Melbourne metropolitan area ; and
3. it completed the nationalisation of water resources commenced in the 1886 Act and vested in the Crown the right to the use and control of the water in the State's rivers, streams, etc., thus avoiding the litigation which has clouded the history of water supply elsewhere.

Control of surface waters and other functions

One of the State Rivers and Water Supply Commission's main functions is to exercise the Crown's rights to the control and use of rural surface waters, and to act on any infringement of these rights. The Crown's interest is to see that limited resources are distributed fairly and productively between users. This is done by licences and permits for private diversions from streams, and by the apportionment of resources to authorities constituted under the Water Act.

The Commission also investigates water resources and plans works. It operates 390 gauging stations on streams and publishes the information obtained. Records of river flows date back to the 1860s. Investigation and planning require surveys, and there are thirty-five surveyors working from ten centres. Other Commission investigatory services are its Testing Laboratory and Water Research Section at Head Office and its Hydraulic Research Station at Werribee.

Ten year plan

The Premier announced a comprehensive programme of storage works in July 1963, the construction of which would be spread over the period 1964-1974. The estimated cost in 1964 was \$77m ; the equivalent in 1970 would have been \$110m. The original estimate included one quarter the share of Chowilla (\$11m on the 1964 base) and the second stage of Buffalo, estimated cost \$56.5m.

The projects included in the original programme were :

Devilbend Reservoir	Complete
Lake Bellfield	Complete
Buffalo Dam—first stage	Complete
Corop Lakes	Complete
Tarago Dam	Completed to about 20,000 acre feet. Enlargement to about 30,000 acre feet will be carried out in 1971-1972

Chowilla (one quarter share)	Deferred
Nillahcootie	Complete
Lake Merrimu	First stage complete
Lake Mokoan	Complete
Buffalo—second stage	Deferred. Dartmouth proposal will take priority

The original programme has been modified by the proposal to construct Dartmouth rather than Chowilla to provide additional supplies from the River Murray for Victoria, New South Wales, and South Australia. The construction of Dartmouth, if ratified by all Parliaments concerned, would make the inclusion of the second stage Buffalo project unnecessary for some years.

The Government has approved a further works programme which provides for the commencement of the following projects :

<i>Project</i>	<i>Estimated cost</i>
Lake Merrimu (second stage, i.e., inlet tunnel)	\$2.5m
Millewa Domestic and Stock Scheme—replacement of open channels by pipelines	\$2.5m
Lake Howitt Project (Mitchell River)	\$5.0m
Rosslynne Reservoir (Jacksons Creek)	\$3.0m
Dartmouth Dam (one quarter share River Murray Commission Project)	\$15.0m
South Otway Pipeline	\$3.0m
Bungal Dam (West Moorabool River)	\$4.8m

Construction of the Millewa scheme, the south Otway pipeline, and the Bungal Dam has already begun.

These works will provide additional security for existing rural developments and will allow the fast increasing urban demands in areas to the west of Melbourne to be met.

Commonwealth aid project

A storage on the King River (Lake William Hovell) received a Commonwealth Government grant of \$4m towards construction, which began in April 1969. The 10,000 acre feet storage was filled in May 1971.

The purpose of the dam is to provide assured supplies for irrigation, particularly of tobacco, in the King River Valley and will ultimately provide additional urban supply to the City of Wangaratta.

Groundwater Act

The Groundwater Act, which was passed in the autumn session of Parliament 1969 and proclaimed in September 1970, enables the Mines Department and the Commission to establish the administrative procedures necessary for the investigation, conservation, and utilisation of the groundwater resources of Victoria.

The Act gives the Mines Department authority to investigate the State's groundwater resources so that the State's total water resources and their proper use can be considered by the Government in the future.

Substantial progress has been made in the appointment of staff to administer the Act. The Groundwater Appeal Board has been appointed and will serve to protect the rights of the individual in the equitable distribution and use of groundwater resources.

Since the proclamation of the Act 1,182 applications for licences to extract groundwater for purposes other than domestic and stock use have been lodged with the Commission and over 3,000 bores from which water is extracted only for domestic and stock use have been registered.

A Groundwater Conservation Area has been declared in the Koo Wee Rup-Dalmore District. Over 200 bores are operated in the district for the irrigation of a total area of about 10,000 acres of pastures and miscellaneous cash crops and the volume of groundwater extracted annually exceeds the natural rate of replenishment of the aquifer. The groundwater level is falling steadily, leading to a deterioration in water quality in areas adjacent to the coast. Investigations are in progress to determine the safe volume which may be extracted annually.

Irrigation

Most irrigation is carried out in districts directly controlled by the Commission, although there is an increasingly large proportion of "private diverters", irrigators who are authorised to take water from streams, lakes, etc., but who do not come within the boundaries of an irrigation district. (See private irrigation below.)

A feature of the districts is the system of "water rights". Under this system a certain quantity of water is assigned to each district and allotted to the lands commanded and suitable for irrigation. The irrigators pay a fixed sum for this water each year, whether they use it or not, and also pay a general rate. The irrigators get this water right in all except the very driest years and they can also buy water in excess of the water right in most seasons. The water right system assures irrigators of a definite quantity of water each year, and the Commission can rely on fairly constant revenue to meet the cost of district operation. Water usage varies according to seasonal conditions and the water right system provides a constant minimum income.

A feature of Victorian irrigation policy has been the development of closer settlement by intensive irrigation, that is, by allocating relatively large quantities of water per holding instead of limiting the allocation of water to a portion of each holding. This has meant that Victorian irrigation is predominantly devoted to dairying, fruit, and vegetables, rather than to sheep raising. The advantage of intensive irrigation is that much higher returns are available from a given quantity of water and, consequently, a much greater rural population is supported.

Private irrigation

Private irrigation by diversion of water from rivers, lakes, etc., has increased in recent years. From 1942-43 to 1969-70 the area watered privately increased from 23,462 acres to 201,149 acres, the latter being 14 per cent of the total area irrigated. The number of private diversions authorised during 1969-70 was 10,660 and the water delivered was used mainly to produce annual and perennial pastures and fodder, as well as potatoes, tobacco, hops, citrus, and cotton. About half the area privately

watered is supplied from streams regulated by storages, the other half being from streams wholly dependent on rainfall. Many private storage dams are being built, frequently at substantial cost, on individual properties to insure against low flows in the streams normally used.

Major storages devoted principally to irrigation are shown in the following table :

VICTORIA—MAJOR IRRIGATION STORAGES

River	Irrigation storages	Capacity	Principal system or district served
		acre ft	
Goulburn	Lake Eildon	2,750,000	Goulburn-Loddon
	Waranga Reservoir	333,400	" "
	Greens Lake	26,550	" "
	Goulburn Reservoir	20,700	" "
Campaspe	Lake Eppalock	252,860	" "
	Cairn-Curran Reservoir	120,600	" "
	Tullaroop Reservoir	60,000	Maryborough town supply; private diverters; and Goulburn-Loddon System
Broken	Lake Nillahcootie	32,260	Broken River Valley; private diverters
Murray	Lake Hume	(a) 1,240,000	Murray
	River Murray Weirs	(a) 111,575	"
	Kow Swamp	40,860	"
Macalister	Lake Glenmaggie	154,300	Macalister
	Lake Buffalo	19,500	Wangaratta town supply; private diverters; Ovens Valley
Werribee	Pykes Creek Reservoir	19,400	Bacchus Marsh District
	Melton Reservoir	13,900	Werribee District
	Lake Merrimu	15,000	Bacchus Marsh District
		(b) 5,210,905	

(a) Victoria's half share under the River Murray Agreement, subject to certain obligations to South Australia.

(b) In addition to the storages named, there is a system of natural lakes in the Kerang-Swan Hill Area forming part of the Torrumbarry System. The Coliban River storages are used for both irrigation and town supply around Bendigo and Castlemaine. A limited irrigation area is also supplied from the Wimmera-Mallee System.

Town supplies

The Commission operates major works for town water supplies outside the Melbourne metropolitan area—the Coliban System supplying Bendigo, Castlemaine, and other towns in that area; the Mornington Peninsula System supplying towns extending from Longwarry to portion of Dandenong, the bayside towns from Seaford to Portsea, the Western Port towns from Hastings to Flinders, and the township of Wonthaggi; the Bellarine Peninsula System supplying water to the towns extending from Portarlington to Anglesea; and the Otway System supplying water from the Otway Ranges to Camperdown, Cobden, Terang, and Warrnambool. The total towns supplied by the Commission are 148 and their total population is 248,220. (For other town supplies and sewerage see page 221.)

Millewa pipeline project

In the far north of Victoria, a major water pipeline scheme is under way in the dry and sandy Mallee country west of Mildura. It will

VICTORIA—AREA OF SYSTEMS AND LANDS IRRIGATED, AND WATER DELIVERED, 1969-70

System or District	Total area within constituted district	Area irrigated								Water deliveries
		Pastures		Lucerne and sorghum	Vineyards	Orchards	Market gardens	Others	Total	
		Native	Sown							
	acres	acres	acres	acres	acres	acres	acres	acres	acres	acre ft
River Murray System— Torrumbarry System (a) Murray Valley Area Pumped Supply Districts (b)	386,439	14,094	238,409	9,605	4,279	1,795	796	15,103	284,081	320,000
	301,691	306	106,408	6,914	61	6,637	337	1,308	121,971	227,609
	74,781	294	325	1,162	40,255	3,010	139	2,445	47,630	142,140
Total River Murray	762,911	14,694	345,142	17,681	44,595	11,442	1,272	18,856	453,682	689,749
Goulburn-Loddon System Macalister District Werribee-Bacchus Marsh Other northern systems Other southern systems Private diversions	1,327,070	26,708	520,348	33,418	359	20,636	4,395	36,492	642,356	898,919
	130,476	980	59,040	324	..	..	98	..	60,442	59,729
	16,231	..	5,833	775	..	624	3,902	276	11,410	17,284
	n.a.	521	13,287	1,185	1	2,857	415	111	18,377	38,482
	n.a.	5,231	148,964	16,221	2,592	4,198	1,457	139	1,596	387,539
	n.a.						15,384	8,559	201,149	
Grand total	(c) 2,236,688	48,134	1,092,614	69,604	47,547	39,757	26,923	64,433	1,389,012	2,091,702

Source : State Rivers and Water Supply Commission.

(a) Includes 15,225 acres irrigated by private diversion.

(b) Including First Mildura Irrigation Trust (18,559 acres irrigated), supervised by the Commission.

(c) Incomplete.

n.a.: Not available.

bring reticulated water under pressure to farms and townships in the 441,000 acre Millewa district, now served by open channels. Some \$2.5m will be spent on the work, being carried out by the State Rivers and Water Supply Commission and scheduled for completion in 1975; it is the largest rural pipeline reticulation scheme yet undertaken in Victoria.

The wheat and sheep farms of the Millewa region cover some of the hottest and driest land in the State. At present, evaporation and seepage take a heavy toll of the water delivered to farms and towns through 388 miles of Commission channels and 230 miles of landowners' channels. By preventing this loss, the new pipeline scheme will save up to 7,500 acre ft of water a year.

The pipeline scheme followed an inquiry by the State Development Committee in 1965. In addition to saving water, it will avoid an estimated expenditure of \$400,000 on urgently needed reconstruction work on the present system, now nearing the end of its useful life. Surveying began in October 1969, and stage one (the Werrimull main and the Bambill South storage) was completed in 1970. A further four stages will see the installation by 1975 of distribution pipes to all individual farms. The first reticulated supply—to the settlement of Yarrara—should be flowing by mid-1972.

Farmers in the Millewa area will benefit in many ways from the new pipeline scheme. Instead of the annual filling of farm dams with water to last a full year, they will now have reticulated water constantly on tap. The extra water (now lost through evaporation and seepage) will mean that livestock carrying capacity can be increased, while maintenance costs for the Commission and the landowner will be reduced to a minimum.

Water for the Millewa domestic and stock system is pumped from the River Murray at Lock No. 9, and carried by channel to Lake Cullulleraine, north of Werrimull. Under the present system, it is pumped from the Lake to four higher points, for distribution by gravity throughout the region. When the new scheme is completed, water from Lake Cullulleraine will be pumped to a reservoir at Bambill South, a few miles west of Werrimull. This earthen storage, completed in October 1970, holds 40 million gallons of water, and is filled through 12 miles of 12 inch diameter rising main from Werrimull. A special pipelaying machine was used in May 1970 to lay this main in only 13 days. From the Bambill South storage, water will be distributed through 336 miles of 10 inch diameter pipeline to 123 holdings and two townships in the Millewa area.

Lake William Hovell

Lake William Hovell dam, under construction by the State Rivers and Water Supply Commission, will safeguard irrigation along the King River in northern Victoria. The 10,000 acre ft reservoir will supply water to irrigators producing tobacco, hops, milk, and beef cattle from Whitfield to Wangaratta, and will allow the irrigated area to be substantially increased. Set in heavily timbered virgin bushland, the William Hovell dam is being built 45 miles south of Wangaratta, in a narrow gorge at Horseshoe Bend, some 13 miles upstream of Whitfield township. Construction was officially proposed in 1966 and work began some two and a half years later. It was completed towards the end of April 1971 and was full within 14 days.

The cost, estimated at \$4m, is to be met by a Commonwealth grant.

Steep, thickly timbered slopes surround Lake William Hovell, which is likely to become a popular boating and picnicking spot. The catchment area, with an average annual rainfall of 56 inches, covers 141 sq miles and is located entirely in rugged, mountainous country—all Crown land, and mostly forest reserve. The reservoir will have an initial capacity of 10,000 acre ft, with provision for future enlargement if necessary to 120,000 acre ft in order to provide extra water for areas beyond the King and Ovens river valleys. The water level of the present reservoir will be 1,340 ft above sea level, with a maximum water depth of 100 ft.

The King River rises on the northern slopes of the Great Dividing Range near Mount Howitt. It flows through forested mountain country north-westerly and then northerly, before passing into a wide valley of fertile flats which extend through Cheshunt and Whitfield to the confluence of the King and Ovens Rivers at Wangaratta.

The valley's products depend on irrigation water pumped from the river. Although natural stream flow is large, it is concentrated in the winter and spring months, when least needed for irrigation. In summer, low flows are frequent; on several occasions the flow has ceased altogether for two to three weeks, and, in severe droughts, has remained low for up to three months. During summer and autumn, therefore, irrigators have been subjected to grave financial risk because of the lack of an assured supply, but this problem should be overcome by the new dam. As an additional benefit, the regulated flow from the storage will also replenish groundwater available on the river flats.

The earth and rockfill embankment, located on a narrow spur forming the inner section of a horseshoe bend of the river, will be 105 ft high and 1,350 ft long. A 400 ft long, 15 ft diameter diversion tunnel, driven through the rocky spur for diversion of the river during construction, will be used for the outlet works in association with a 100 ft high outlet tower. A concrete spillway will lead excess or flood water back to the river through a concrete-lined chute.

Lake William Hovell can be operated to reduce the size of minor floods but its effect on larger floods, which occur every three or four years, is likely to be negligible.

Finance

Acting as a government authority, the Commission constructs its works with funds provided for the purpose by Parliament, amounting by 30 June 1970 to \$330m including contributions by the State of Victoria towards works carried out for the River Murray Commission. A further \$81m of government loan moneys has been provided for expenditure by local authorities under the supervision of the Commission. In recent years the rate of expenditure on construction of State works has been about \$13m annually, and the Commission also supervises the expenditure of about \$5.5m annually by local authorities.

The Commission administers, supplies water to, and collects revenue from nearly 120 separate districts, each of which is run financially as a

separate undertaking. Revenue from its ten irrigation districts exceeds \$5m ; from its urban districts about \$2.5m ; from its ten rural waterworks districts about \$1m ; and from its three flood protection districts about \$100,000 ; the total annual revenue, including other sources, is over \$10.4m.

Administration

The Commission is served by a decentralised organisation designed to carry out diverse functions all ultimately related to water. Central administrative, engineering, and clerical functions are carried out by a staff of 560 in the head office at Armadale. At the many country centres throughout the State there are 1,050 other officers and some 1,400 casual employees. Together they are engaged in planning, building, maintaining, and operating waterworks vital to the prosperity of rural Victoria.

Irrigation, 1962 ; Wimmera-Mallee region water supply, 1963 ; Flood protection, river improvement, and drainage, 1963 ; Underground water, 1964 ; Water supply in Victoria, 1964 ; Goulburn-Murray Irrigation District, 1965 ; Spray irrigation in agriculture and dairying, 1965 ; Private irrigation development, 1966 ; Water Research Foundation, 1966 ; River improvement, 1967 ; Rivers and streams fund, 1967 ; Dandenong Valley Authority, 1968 ; Water conservation, 1969 ; Water supply to Western Port 1971

River Murray Agreement and the River Murray Commission

1914 Agreement

The River Murray Agreement in its original form was concluded on 9 September 1914 between the Prime Minister of the Commonwealth of Australia and the Premiers of the three States of New South Wales, Victoria, and South Australia. The Agreement was subsequently ratified by the four Parliaments and came into force in the following year. It provided for the construction of works to regulate and use the waters of the river for irrigation, other water supply purposes and navigation, the allocation of water between the three States, and the formation of the River Murray Commission, a body charged with the duty of giving effect to the Agreement and the Acts of ratification.

Provision was made for construction of a system of storage on the Upper Murray at "Cumberoona or some other suitable site or sites". In the event the Cumberoona site was abandoned in favour of a location some six miles downstream, not far below the junction of the River Murray and the Mitta Mitta River ; an expanse of 56,000 acres, now known as Lake Hume. A second system of storage was authorised at Lake Victoria, an off-river site in New South Wales between Wentworth and the South Australian border.

Provision was also made for weirs and locks, for navigation and water supply purposes, in the course of the river from its mouth to Echuca, at one time a river port of commercial importance. Similar provision was made for weirs and locks in the course of the Murrumbidgee River from its confluence with the Murray to Hay, or, alternatively, at the discretion of the New South Wales Government, in the Darling River upstream from its confluence with the Murray at Wentworth, and involving equivalent expenditure. In the event, of the 26 weirs and locks then contemplated on

the Murray, those numbered 1 to 11 were built between Blanche Town (S.A.) and Mildura (Vic.), No. 15 at Euston (N.S.W.), and No. 26 near Torrumbarry (Vic.), not far downstream from Echuca. Arising from the progressive decline of river traffic from 1896 onward, structures numbered 12, 13, and 14 were not built, nor were those numbered 16 to 25 between Euston and Torrumbarry.

New South Wales elected for the development of the Murrumbidgee, but the only structures built between 1936 and 1940 were at Maude and Redbank. Locks were not provided at these two weirs because river traffic on the Murrumbidgee had then ceased.

The 1914 Agreement allocated the cost of works (then estimated at \$9,326,000) as \$2,000,000 to the Commonwealth and the balance equally between the three States (\$2,442,000 each), or in these proportions applied to actual costs. The responsibility for construction of specific works was allocated to the States with costs of maintenance to be borne by the State undertaking construction.

The water allocated to South Australia was a normal minimum of 1,254,000 acre ft per annum in specified monthly volumes, with the upper States sharing the regulated flow at Albury and reserving the flow of their tributaries below Albury for their own use, subject, of course, to satisfaction of South Australia's entitlement. These provisions remain unchanged.

The responsibility between the upper States for meeting South Australia's entitlement was in the proportions— $T + \frac{A}{2}$, where "T" denotes the mean annual *natural* flow of tributaries to the Murray below Albury from the particular State and "A" the mean *actual* flow at Albury. This was subsequently varied in 1948 to provide for equal sharing of the obligation. An original provision for filling Lake Victoria once per annum was dropped in 1963.

1923 Amendment

During 1923 a provision was inserted to give priority to works intended for irrigation as against those primarily for navigation; a somewhat belated recognition of declining river traffic. It was also agreed that the cost of works would be shared equally by the four Governments, a concession by the Commonwealth in favour of the States. At this time Weir and Lock No. 1 at Blanche Town had been completed and work on Hume dam, commenced in 1919, was actively proceeding.

1934 Amendment

This variation was generated in a period of economic depression, with public works expenditure severely restricted. At this time eleven more weirs and locks had been completed, or almost so, while Lake Hume, designed to impound 2,000,000 acre ft, was being filled for the first time. The Governments agreed to limit the capacity to 1,250,000 acre ft (thus postponing the cost of removing the town of Tallangatta), but with works provision to permit later extension to the designed capacity.

The number of weirs (or weirs with locks) was reduced from twenty-six to fourteen in the River Murray and limited to two on the Murrumbidgee.

The upstream limitation for weirs and locks at Echuca was removed in order to permit construction of a large weir at Yarrawonga, completed in 1939, to serve large areas subsequently developed for irrigation in both the upper States.

South Australia obtained agreement for the construction of the interesting Murray Mouth Barrages to link a series of islands in Lake Alexandrina, a short distance in-shore of the river mouth. The purpose of these structures, completed in 1940, is to prevent the ingress of sea water for a distance upstream of 170 miles to Weir and Lock No. 1 at Blanchetown.

The four Governments agreed to meet the cost of the re-scheduled works programme up to, but not exceeding \$24m, a considerable increase on the 1914 figure. Arrangements were also made for the cost of maintenance of works, wherever situated, and expenses for river gauging, to be shared equally by the three States.

Remedial action

In February 1939, following rapid drawn-down of Lake Hume because of dry conditions, a section of the main embankment subsided and the upstream protective concrete facing was destroyed over a length of about 1,200 ft. Work was commenced to stabilise the bank and to protect the exposed filling from wave action. By July 1942 some 600,000 cubic yards of stone had been placed, mostly from barges. This was successfully tested in April 1944 when the reservoir was again drawn down because of very severe drought conditions, only about 1 per cent of the capacity remaining at the lowest water level stage.

1948 Amendment

Provision was included in this amendment for Hume dam to be completed to impound 2 million acre ft, as previously intended, and for enlargement of the inlet channel to Lake Victoria from Weir and Lock No. 9 to a capacity of 6,000 acre ft per day. A degree of catchment management was introduced for lands in New South Wales and Victoria draining to Lake Hume, and the Commission was authorised to carry out investigations. At this time Victoria was interested in a weir adjacent to the off-take of the Marraboor (or Little Murray) effluent above Swan Hill. To facilitate this, provisions were inserted to permit the contracting Governments authorising the construction of mutually-agreed additional works by one or more of the contracting Governments, with sharing of capital and maintenance costs also by arrangement. In the event the Marraboor Weir proposal did not eventuate, the diversion required for the adjacent irrigation area being achieved by pumping.

Provision was made for a reserve of 750,000 acre ft to be kept in storages for use only in drought, and rules were introduced for sharing of the water available for use on these occasions in, for practical purposes, the proportion of five parts to each of the upper States and three parts to South Australia. The upper level of expenditure was raised to \$28m and, as mentioned earlier, it was agreed that the obligation for water passed to South Australia would be shared equally by New South Wales and Victoria.

Snowy Mountains Scheme

In 1949 legislation was enacted to authorise, under the defence power of the Commonwealth, construction of this very large hydro-electric project involving, among other things, the inland diversion of waters of the Snowy River at Jindabyne to the Swampy Plain River near Khancoban, thence to the River Murray at Bringenbrong. Provision was also made for the diversion of the smaller Tooma River, a tributary to the Murray below Bringenbrong, to the Tumut, which flows to the Murrumbidgee.

At the time it was envisaged that the net increment of water coming to the Murray, that is, the difference between the volumes received from the Snowy and those taken from the Tooma, would be shared between New South Wales (three quarters) and Victoria, with no water for South Australia. It was also envisaged that a balancing storage of some 250,000 acre ft would be provided between Lake Hume and Khancoban in order to regulate waters coming from the Snowy during the winter and spring for use during the following summer and autumn. All this had a significant bearing on subsequent events.

1954 Amendment

The post-war period up to this time had been one of much investigational activity. One of the significant conclusions was that the capacity of Lake Hume could be increased to $2\frac{1}{2}$ million acre ft at a relatively modest cost, and that half of the increment of capacity between 2 and $2\frac{1}{2}$ million acre ft (that is, 250,000 acre ft) could be regarded as the storage necessary to regulate diverted Snowy waters.

This was given legislative sanction by the Commonwealth and three State Governments. The upper level of estimated expenditure was raised to \$39.5m in four equal contributions, with the proviso that any amount coming available from the Snowy Authority would be disbursed in equal parts. At the same time provision was made for works between Tocumwal and Echuca to prevent the loss of regulated flow into the many channels which break out of this reach of the main stream into New South Wales and concentrate in the Edward River near Deniliquin. Arising from the increased storage capacity the drought reserve was raised to one million acre ft.

1958 Amendment

At this time the arrangements for diversion of the Tooma River away from the Murray were threatened by a writ out of the High Court by South Australia moving to restrain action. This difficulty was overcome by New South Wales and Victoria each accepting a debit against their shares of the flow at Albury equal to half the diverted quantities, with Victoria's half being replaced into the River Murray via the Murrumbidgee. Quite detailed machinery was also provided for the distribution of water to the three States during a declared period of restriction. These were tested during the 1965-66 dry period and the 1967-68 drought and proved satisfactory. These provisions embodied the important principle that "Murray water" included water received from the Snowy less the smaller volumes taken from the Murray by the Snowy Authority's Tooma diversion works.

In order to resolve doubts as to the validity of the defence powers of the Commonwealth to build the Snowy works, and for other reasons, an Agreement regarding these works was reached between the Commonwealth, New South Wales, and Victoria. This was subsequently ratified by the three Parliaments.

1963 Amendment

This embodied provision for the somewhat controversial Chowilla storage of about 4½ million acre ft between Renmark (S.A.) and Wentworth (N.S.W.), the cost estimate for all works being raised to \$72m, a figure which provided some \$28m for the Chowilla project. At the same time the Governments concluded the Menindie Lakes Agreement which made available the waters of these Darling River storages for the purposes of the River Murray Commission, with a reservation of 90,000 acre ft annually by New South Wales for use between the storage outlets to the Darling, the Ana Branch of the Darling, and the River Murray. This was for a seven year period ending 31 December 1969, but has been extended by mutual agreement.

Subsequent events

Preliminary work, including a detailed investigation, was put in hand at the Chowilla dam site; plans and specifications prepared; and tenders invited by the Government of South Australia as constructing authority through its Engineering and Water Supply Department. After consideration of tenders received it became evident that the project would cost an estimated \$68m. In addition, the previously assessed benefits were substantially reduced by an increased evaporation penalty arising from a larger storage area than previously envisaged. Further reduction arose as a result of experience during the 1965-66 dry period in controlling rising salinity levels. It was found necessary to allow a minimum flow of about 900 cu ft per second to pass downstream through the Mildura reach to the pool formed in the Murray by Weir and Lock No. 10 at Wentworth.

In May 1967 the River Murray Commission agreed to defer further work on the project for the time being and engaged the Snowy Mountains Authority in a consultative capacity to make an investigation of alternative sites in the catchment above Albury. This led to the development in 1968 of the Dartmouth Reservoir proposal on the Mitta Mitta River, a 3 million acre ft storage impounded by a dam nearly 600 ft high with an estimated cost of \$64m in 1971.

Formal agreement between the four Governments was signed late in February 1970. At the same time provision was made for South Australia's annual minimum entitlement to be increased by about 20 per cent to 1.5 million acre ft and for specified minimum flows at Weirs and Locks Nos. 15 and 26 in order to keep salinity within tolerable limits. Agreement was also reached to perpetuate the expired Menindie Lakes arrangement; but with provision for a New South Wales reservation slightly increased to 100,000 acre ft per annum. In return, Victoria agreed to cede 45,000 acre ft per annum of its tributary flow below Albury to New South Wales.

This agreement was ratified later in 1970 by the Parliaments of the Commonwealth, New South Wales, and Victoria and in August 1971 by the Parliament of South Australia.

Finally, the four Governments received during 1970 a comprehensive report dealing with the salinity problem in the River Murray, the salinity increasing in severity with progression downstream from Swan Hill to the pumps supplying Adelaide at Mannum. This report was prepared for the River Murray Commission by Gutteridge, Haskins and Davey, consulting engineers, in association with Hunting Technical Services, who provided the expert knowledge on agricultural aspects. This is an important milestone in the development of the river system, particularly for South Australia, the State which suffers most from the rising salinity levels.

Expenditure

The total capital expenditure in respect of construction of works was \$54,503,564 at 30 June 1970; the contribution by each Government being \$13,625,891. For the year ending June 1970 the costs of operation and maintenance of completed works and gauging stations (\$1,319,488) was met by contributions from each of the three States of \$403,000 and reduction of bank balance by \$110,488. Against this, each State received a credit of about \$9,000 from revenue coming from the sale of water for electricity generation at Hume dam and rentals of land. Administrative expenses were \$48,333, financed by contributions of \$10,500 by each of the four contracting Governments and reduction of bank balance by \$6,333.

AGRICULTURAL EDUCATION, RESEARCH, AND EXTENSION SERVICES

Tertiary agricultural education

Agricultural colleges

The legislation of 1884 which provided for the establishment of agricultural colleges set up a Council of Agricultural Education for their administration. Its revenue was derived from the rentals of endowment lands, sales of farm produce, and student fees, and it continued to administer the Colleges until 1944 when, with the passing of a new Agricultural Colleges Act, control was transferred to the Department of Agriculture in which a new Division of Agricultural Education was established. This move has provided adequate finance for maintenance and capital expenditure, the latter including a complete rehabilitation programme for both Dookie and Longerenong Agricultural Colleges in the period from 1959 to 1969.

The main purpose of the Colleges is to train agricultural technologists in the basic technical and scientific principles underlying all aspects of agriculture. Lectures on all topics are complementary with demonstrations, tours, laboratory work, and practical farm work, the latter being given on large farm areas attached to each College—6,048 acres at Dookie and 2,386 acres at Longerenong. Although the emphasis is placed on training technologists to assist in agricultural research and extension, intending farmers will gain a sound technical and scientific background to enable them to make use of modern agricultural and economic developments in operating their own properties.

In 1966 a revised syllabus was introduced at Dookie and Longerenong and after successful completion of the three year course, students gain a Diploma of Agricultural Science. The minimum entrance standard is a pass in five subjects including English and Chemistry at the Leaving or Leaving technical examination. In practice, however, it is found that most students have completed one year at Higher School Certificate level.

The development of post-secondary education in all technical fields which has taken place since 1967 has made it desirable that the agricultural colleges raise the entrance standard to the Higher School Certificate level, as has been done in other Australian States. The colleges would then offer an Associate Diploma in Agricultural Science, but it is anticipated that this will not be effected before 1973. A third agricultural college at Glenormiston, opened in 1971, provides a two year course in production and management for the future farmer.

Short intensive courses for farmers, farmers' sons, and others engaged in rural pursuits are provided at Dookie Agricultural College.

In 1967 the three year course for the Diploma of Horticultural Science was introduced at the Burnley Horticultural College, with the same pre-requisite entrance requirements as for the agricultural colleges. This replaced the Diploma of Horticulture course introduced in 1958. The new course is comprehensive, giving tuition and practical experience in fruit and vegetable production, ornamental horticulture, nursery management and landscape design, as well as training in the basic physical, biological, and applied sciences.

Part-time evening classes in horticultural, agricultural, and associated science subjects are also conducted at Burnley. The Agricultural Education Division also administers the government grant to the Victorian Young Farmers.

University of Melbourne School of Agriculture

The Faculty of Agriculture was established in 1905 by statute of the Council of the University and the first Professor of Agriculture, Dr Thomas Cherry, was appointed in 1911. However, it was not until 1921, following the passing of the *Agricultural Education Act 1920*, that provision was made for a building to house the school and for the appointment of permanent staff.

The purpose of the four year course is to give students a sound basic training in scientific principles as applied to agriculture. The first year is devoted to science subjects and is followed by a year in residence at the University Field Station at Mount Derrimut, Deer Park. This is a property of 800 acres, about 13 miles from the School, where students are introduced to the variety of farm operations involved in a mixed farming enterprise, while taking lectures and practical classes in various sciences applied to agriculture. They return to the University campus for more advanced training in the soil, plant, and animal sciences and economics in the third and fourth years of the course. In the final year the students have a restricted choice of subjects which allows a measure of specialisation while ensuring that all students receive a general training in all aspects of agricultural science.

Since the establishment of the Faculty of Agriculture 1,000 graduates have entered the profession. A quota of 70 is placed on the numbers in the first year of the B.Agr.Sc. course and the number of graduates averages about 55 per annum. There are some 30 students working for higher degrees (Ph.D. and M.Agr.Sc.) either at the University or at Mount Derrimut and ten postgraduate students attend the course for the Diploma in Agricultural Extension. Buildings and facilities are provided at Mt. Derrimut Field Station for training students and for research in the soil, plant, and animal sciences. This has been made possible by generous grants from primary industry funds and from the State and Commonwealth Governments.

Bureau of Agricultural Economics : activities in Victoria

The Bureau of Agricultural Economics was established in July 1945 to meet the need for a Commonwealth research body in the field of agricultural economics and rural policy. No administrative functions are vested in the Bureau; it is specifically a service institution charged with the duty of undertaking research and making the results available to all concerned, including Commonwealth and State departments, semi-government and private institutions, and individuals.

As a Commonwealth body, the Bureau is concerned with agricultural problems and policies primarily on a Commonwealth-wide basis. Its activities in the States are largely parts of wider Commonwealth studies and investigations. It does, however, carry out specific investigations requested by State authorities. In Victoria these have included a study of the water requirements in relation to irrigated dairy farms and prime lamb producing farms in the Tongala-Stanhope irrigation district, two examinations of the economic aspects of the processed tomato industry, an economic assessment of the mechanical harvesting of tobacco, and evaluation of projects being considered under the National Water Resources Programme including the King River and Mitchell River dams and the Millewa Stock Water Supply Scheme.

Generally, the activities of the Bureau in Victoria have taken the form of surveys of the structure of the various rural industries. Frequently these have been carried out in conjunction with the Victorian Department of Agriculture. The most important of these have included the following:

1. Dairy industry

(a) A study of the costs, incomes, and management problems of dairy farms in Victoria. This study, carried out in 1954, covered commercial butter producers in the main dairying districts.

(b) An economic survey of the dairy industry in 1964. This study involved both the wholemilk and the manufacturing sectors of dairy production in the main producing areas and covered the period 1961-62 to 1963-64.

2. Wheat industry

Five surveys of the economic structure of the wheat industry have been undertaken by the Bureau since its inception, the last survey being in respect of the three seasons ending 1966-67. Results of these investigations have

provided basic data for negotiations with the industry in the implementation of subsequent stabilisation schemes.

3. Sheep industry

(a) The economic structure of the Victorian sheep industry is being investigated as part of the Bureau's survey of the Australian sheep industry which has been carried out on a continuing basis since 1952-53 up to and including 1969-1970. The sample embraces properties carrying 200 sheep or more and for Victoria distinguishes properties in two zones: the wheat-sheep and high rainfall.

(b) A study of the profitability of different farm management practices in the Hamilton area of the Western District of Victoria, covering the six year period from 1957-58 to 1962-63.

(c) A study of the prime lamb industry in Victoria is to be undertaken by the Bureau as part of a wider study to obtain details of the economics of prime lamb production.

4. Dried vine fruit industry

(a) A survey of the Australian dried vine fruits industry was carried out in conjunction with the State Departments of Agriculture in New South Wales, Victoria, and South Australia. Areas covered in Victoria included the Robinvale, mid-Murray, and Sunraysia districts.

(b) Further surveys covering the same districts were carried out covering the three years ending 1962-63 and 1967-68 to provide basic information for the establishment of stabilisation schemes requested by the industry.

(c) A continuous study of a sample group of dried vine fruit specialists in Sunraysia was carried out over the three year period 1958-59 to 1960-61.

(d) A study of the economics of artificial rack drying in vine fruits.

Other investigations carried out by the Bureau which have included Victoria as an area of study have covered surveys of the following industries, some on more than one occasion: commercial egg production, wine grapes, beef cattle, canning fruits, berry fruits, citrus fruits, apples and pears, pigs, potatoes, and a study of water diversion by private pumping from the Lower Murray River.

Many of the other activities of the Bureau are of importance for Victoria; these include the publication of various commodity situation reports such as *The Wheat Situation*, *The Wool Outlook*, and *The Dairy Situation*, which review home and overseas developments affecting the outlook for these major commodities and the publication from time to time of special reports such as the *Statistical Handbook of the Sheep and Wool Industry* and *The Economics of Fattening Store Cattle by Dry-Lot Feeding*. The Bureau also carries out more general analyses which are of interest to Victoria as well as other States. These include examinations of the effects of economic policies, conditions, and developments (at home and abroad) on Australian rural industries, or trends in Australian farm production, cost, and incomes, and of the economics of rural development projects.

Further reference, 1966; Farm management, 1967; Agricultural extension services, 1968; Size distribution of rural holdings, 1969; Research and extension activities of the Department of Agriculture, 1970; Application of scientific research to agriculture, 1970; Research stations of the Department of Agriculture, 1971

FARMING

General

Collection of statistics

Before 1904 the statistics were collected by the municipal authorities who were required by statute to furnish information on such forms and in such manner as was required by the Governor in Council. During the period 1904 to 1966 police officers were required to collect agricultural, pastoral, and dairying statistics from land-holders in Victoria. Commencing with the 1966-67 Farm Census, the collection of these statistics has been carried out on a direct postal basis.

The Bureau made an intensive coverage check of its listings of land holdings used in the collection of agricultural and pastoral statistics in Victoria, and these were reconciled with lists of rateable land of one acre or more in extent, as recorded by municipalities for rating purposes. As a result, 6,975 holdings totalling 1,462,229 acres were added to the annual collection as from the 1967-68 season. This change in coverage should be kept in mind when comparing figures for 1967-68 with those for previous years.

The rural statistics contained in this part are mainly compiled from annual returns of agricultural, pastoral, and dairying production collected from some 70,000 rural holdings in Victoria at 31 March each year. Statistics from these schedules are compiled for each county and local government area.

Every holding of 1 acre and upwards used for the production of agricultural products or for the raising of livestock and the production of livestock products is required to supply full particulars of the area occupied, the rural population, the number of persons employed, the area and yield of each kind of crop cultivated, artificial fertiliser usage, numbers of certain items of farm machinery, the number and description of livestock, the quantity of wool clipped, and other relevant matters.

Data relating to area sown, production, yield per acre, and number of holdings growing crops are for the season ended 31 March, thus including crops which are sown and harvested, or harvested, during the twelve months ended 31 March.

In cases where harvesting of certain crops has not been completed by 31 March (potatoes, fruit, vines, etc.), supplementary collections are made later in the year.

Livestock numbers, farm machinery on rural holdings, and the number of persons working are reported at 31 March, while wage and salary payments relate to the twelve months ended 31 March.

Summary of Australian statistics

The following table, which summarises the principal farming activities

in Australia during the 1969-70 season, shows the position of farming in Victoria relative to other States :

AUSTRALIA—PRINCIPAL ITEMS OF FARM ACTIVITY, 1969-70

Particulars	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T. and A.C.T.	Australia
Rural holdings—								
Number	75,908	69,498	43,829	29,035	22,937	10,159	516	251,882
Area ('000 acres)	170,630	39,057	380,218	162,692	280,819	6,517	182,455	1,222,388
Principal crops—								
Wheat—								
Area ('000 acres)	8,623	3,298	1,504	3,210	6,788	15	3	23,440
Production ('000 bushels)	162,786	83,544	14,898	59,159	66,700	353	73	387,512
Oats—								
Area ('000 acres)	903	884	75	372	1,139	22	1	3,396
Production ('000 bushels)	19,238	25,927	950	6,665	15,463	455	25	68,723
Barley—								
Area ('000 acres)	542	487	417	1,384	900	30	..	3,759
Production ('000 bushels)	12,335	11,373	7,587	30,454	12,059	1,096	..	74,901
Hay—all types—								
Area ('000 acres)	748	1,200	180	384	500	172	7	3,192
Production ('000 tons)	1,406	2,466	373	608	508	365	11	5,737
Tobacco—								
Area (acres)	2,739	11,015	12,908	..	..	..	..	26,662
Production (dried leaf '000 lb)	3,061	15,516	18,975	..	..	..	..	37,552
Onions—								
Area (acres)	1,485	3,296	2,998	2,026	302	192	n.a.	10,299
Production (tons)	13,381	21,339	20,060	22,793	4,428	2,176	n.a.	84,177
Potatoes—								
Area (acres)	25,865	39,765	17,712	8,021	6,332	9,367	n.a.	107,062
Production (tons)	142,047	279,553	115,455	78,624	67,164	66,920	n.a.	749,763
Other vegetables—Area (acres)	48,568	52,999	56,881	11,408	7,755	22,623	399	200,633
Fruit—Area (acres)	95,325	70,883	53,048	44,802	24,131	21,157	109	309,455
Vineyards—Area (acres)	25,423	49,838	3,614	64,837	6,650	..	..	150,362
Grapes for table (tons)	8,568	11,057	5,695	1,294	3,135	..	..	29,749
Wine made ('000 gallons)	11,529	7,251	31	43,754	769	..	..	63,334
Currants (tons)	651	3,383	..	3,325	1,068	..	..	8,427
Sultanas and raisins (tons)	14,118	67,070	..	3,169	8	..	..	84,365
Livestock numbers, 31 March 1970—								
Sheep ('000)	72,284	33,156	16,446	19,747	33,634	4,560	252	180,079
Cattle ('000)	5,636	4,462	7,515	1,026	1,681	646	1,194	22,162
Pigs ('000)	708	495	480	351	250	111	4	2,398
Livestock slaughtered for human consumption—								
Sheep ('000)	5,850	8,177	2,249	2,270	3,164	608	8	22,324
Lambs ('000)	7,460	7,568	688	1,964	1,370	689	149	19,888
Cattle ('000)	1,289	1,256	1,405	203	382	145	97	4,777
Calves ('000)	256	453	275	46	20	33	..	1,083
Pigs ('000)	1,064	895	757	386	316	160	15	3,593
Wool production ('000 lb)	749,830	437,776	196,352	275,005	336,474	48,195	2,666	2,046,298
Wholemilk production—								
All purposes ('000 gallons)	310,104	897,326	189,708	106,160	57,751	103,213	939 (a)	1,665,297
Principal items of machinery on rural holdings—								
Tractors (number)	88,865	82,318	72,106	37,264	35,870	12,956	646	330,025
Shearing machines (stands)	73,189	43,152	17,438	30,080	26,385	4,839	304	195,387
Milking machines (units)	38,018	112,012	34,185	17,642	9,144	16,941	101	228,043
Gross value of production—								
Agriculture (\$'000)	479,500	319,699	315,530	186,766	155,938	41,824	1,443	1,500,700
Pastoral (\$'000)	467,894	385,025	301,577	148,939	176,387	38,532	23,278	1,541,632
Dairying (\$'000)	154,938	225,141	70,959	40,834	25,927	28,774	666	547,239
Poultry (\$'000)	83,220	48,460	25,042	10,952	13,874	5,566	596	187,710

(a) Includes estimates of production in the Northern Territory.

n.a. : Not available.

Land occupied in different districts, 1969-70

For the season 1969-70 the number of occupiers of rural holdings was 69,498, the area devoted to agriculture 7,119,906 acres, and the total area occupied 39,057,452 acres.

It should be noted that statistics in this part of the *Year Book* have been compiled for statistical districts, which are groups of counties, namely, land areas with immutable boundaries. A map defining the boundary of each statistical district appears opposite.

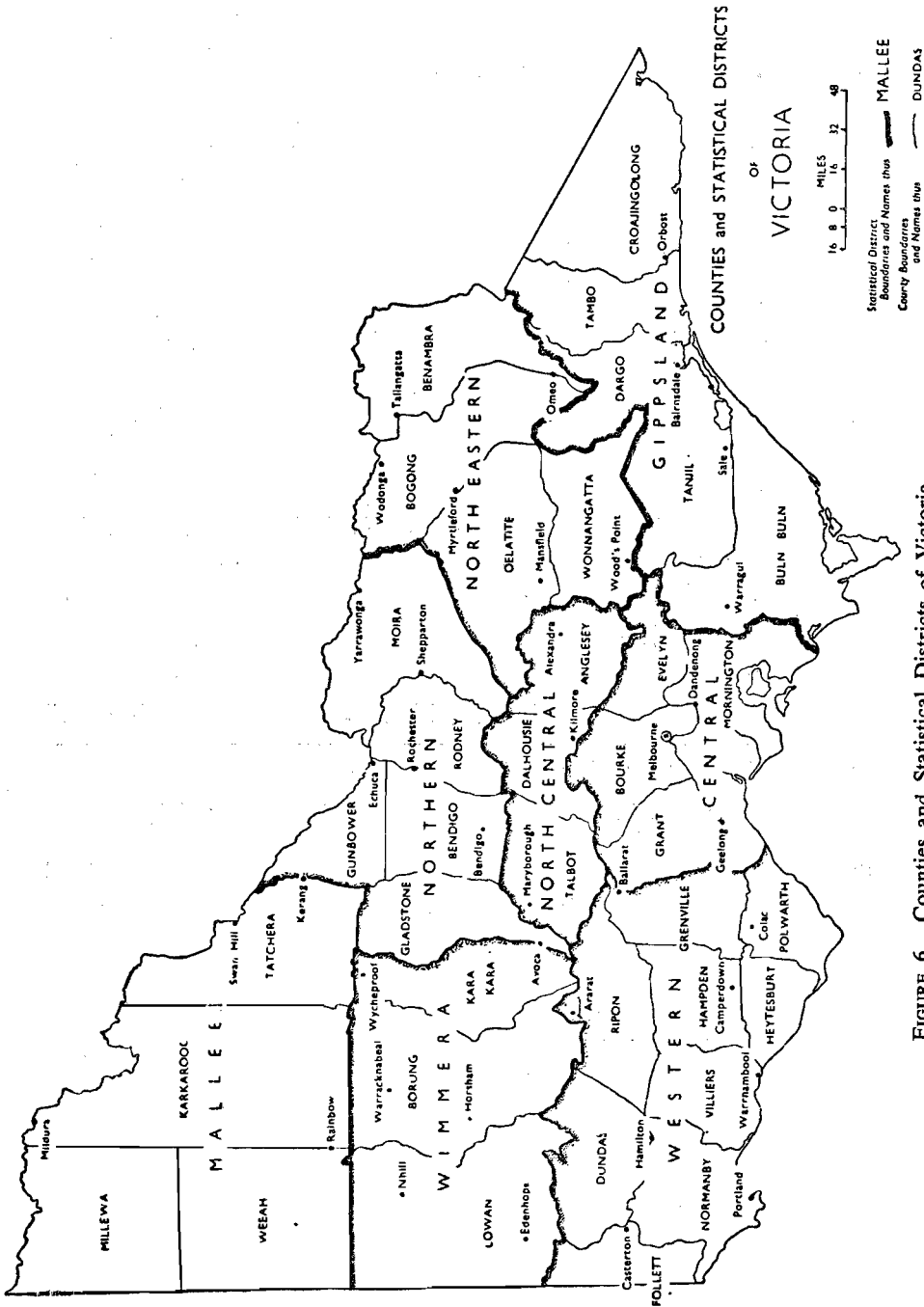


FIGURE 6. Counties and Statistical Districts of Victoria.

VICTORIA—LAND IN OCCUPATION IN EACH DISTRICT, SEASON 1969–70
(Areas of 1 acre and upwards)

Statistical District	Total area of Districts	Number of holdings	Area occupied				Total
			For agricultural purposes (a)	For pasture		Unproductive	
				Sown grasses, clover, or lucerne (b)	Natural grasses		
	'000 acres		'000 acres	'000 acres	'000 acres	'000 acres	'000 acres
Central	4,065	14,767	297	1,769	430	138	2,633
North-Central	2,930	4,373	121	1,280	614	82	2,097
Western	8,775	12,797	488	5,143	886	276	6,793
Wimmera	7,395	5,958	2,014	2,865	954	315	6,148
Mallee	10,784	5,973	2,734	2,269	2,123	553	7,679
Northern	6,337	11,507	1,250	3,009	1,240	130	5,629
North-Eastern	7,220	5,099	133	1,757	1,541	355	3,786
Gippsland	8,739	9,024	83	2,072	1,567	570	4,292
Total	56,246	69,498	7,120	20,163	9,355	2,419	39,057
PERCENTAGE OF ABOVE TO AREA OCCUPIED							
Central	..	..	11.28	67.16	16.32	5.24	100.00
North-Central	..	..	5.77	61.04	29.28	3.91	100.00
Western	..	..	7.19	75.71	13.04	4.06	100.00
Wimmera	..	..	32.76	46.60	15.52	5.12	100.00
Mallee	..	..	35.60	29.55	27.65	7.20	100.00
Northern	..	..	22.21	53.45	22.03	2.31	100.00
North-Eastern	..	..	3.51	46.41	40.70	9.38	100.00
Gippsland	..	..	1.93	48.28	36.51	13.28	100.00
Total	..	..	18.23	51.63	23.95	6.19	100.00
PERCENTAGE IN EACH DISTRICT OF TOTAL IN STATE							
Central	7.23	21.25	4.17	8.77	4.60	5.70	6.74
North-Central	5.21	6.29	1.70	6.35	6.56	3.39	5.37
Western	15.60	18.41	6.85	25.51	9.47	11.41	17.39
Wimmera	13.15	8.57	28.29	14.21	10.20	13.02	15.74
Mallee	19.17	8.59	38.40	11.25	22.69	22.86	19.66
Northern	11.26	16.56	17.56	14.92	13.26	5.38	14.41
North-Eastern	12.84	7.35	1.87	8.71	16.47	14.68	9.70
Gippsland	15.54	12.98	1.16	10.28	16.75	23.56	10.99
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

(a) Excludes area of clover and grasses cut for hay and seed.

(b) Includes oats and barley sown for grazing and lucerne fed off.

Classification of rural holdings by size and type of activity

Tabulations classifying rural holdings by principal characteristics have, in the past, been undertaken at irregular intervals. Since the Second World War they have been prepared for each of the years 1947–48, 1949–50, 1955–56, 1959–60, 1965–66, and 1968–69.

VICTORIA—HOLDINGS CLASSIFIED ACCORDING
TO SIZE OF HOLDING : NUMBER AND TOTAL
AREA OF HOLDINGS, 1965–66

Size of holding (acres)	Number of holdings	Total area of holdings
		acres
1– 99	21,340	805,121
100– 199	12,219	1,742,700
200– 299	6,693	1,623,245
300– 399	5,312	1,803,816
400– 499	3,297	1,470,439
500– 999	11,037	7,797,393
1,000–1,399	3,738	4,404,898
1,400–1,999	2,573	4,255,922
2,000–2,999	1,599	3,817,242
3,000–4,999	926	3,453,964
5,000 and over	465	6,668,863
Total	69,199	37,843,603

The following tables show some of the information, in summary form, from the 1965-66 and 1968-69 classification of rural holdings by size and type of activity :

VICTORIA—HOLDINGS CLASSIFIED ACCORDING TO TYPE OF ACTIVITY :
NUMBER AND TOTAL AREA OF HOLDINGS AND AREA USED
FOR VARIOUS PURPOSES, 1965-66

Type of activity	Number of holdings	Total area of holdings	Area used for—				
			Fruit	Crops (excluding fruit)	Fallow	Sown grasses and clovers	Balance of holding
		acres	acres	acres	acres	acres	acres
Sheep—Cereal grain	6,160	8,285,531	26	2,215,984	1,074,082	2,411,438	2,584,001
Sheep	13,093	13,039,405	536	483,573	122,617	6,871,486	5,561,193
Cereal grain	3,453	4,712,777	262	1,903,412	1,187,381	580,179	1,041,543
Beef cattle	3,111	3,497,707	193	38,122	16,082	929,783	2,513,527
Dairying	20,087	4,474,207	1,500	239,007	57,339	2,781,603	1,394,758
Vineyards	2,165	85,878	48,803	3,694	1,526	7,546	24,309
Fruit (other than vine)	2,131	144,005	64,244	3,891	2,845	27,125	45,900
Vegetables—							
Potatoes	923	140,138	228	37,444	5,225	56,408	40,833
Other and mixed	1,528	265,154	2,549	76,149	8,236	113,765	64,455
Poultry	1,008	53,321	683	5,798	2,915	18,674	25,251
Pigs	273	33,337	33	2,718	2,925	8,959	18,702
Tobacco	284	65,887	60	10,285	1,182	16,469	37,891
Other	353	27,370	504	5,006	2,075	6,158	13,627
Multi-purpose	2,193	1,525,082	2,368	227,300	68,613	668,373	558,428
Total classified holdings	56,762	36,349,799	121,989	5,252,383	2,553,043	14,497,966	13,924,418
Unclassified holdings—							
Sub-commercial	7,848	750,292	1,964	19,802	25,885	215,197	487,444
Unused, special, etc.	4,589	743,512	797	1,294	41,398	90,710	609,313
Total all holdings	69,199	37,843,603	124,750	5,273,479	2,620,326	14,803,873	15,021,175

VICTORIA—NUMBER OF HOLDINGS GROWING WHEAT, AND NUMBER OF HOLDINGS ON WHICH LIVESTOCK WERE DEPASTURED, CLASSIFIED ACCORDING TO SIZE OF HOLDING, 1968-69(a)

Size of holding (acres)	Number of holdings with—				
	Wheat	Sheep	Cattle for		Pigs
			Milk production	Beef production	
1- 99	196	2,858	6,373	6,728	1,758
100- 199	323	2,900	7,793	5,331	1,413
200- 299	403	2,611	3,955	3,718	834
300- 399	778	3,009	2,438	3,138	632
400- 499	683	2,315	1,321	2,122	358
500- 999	4,282	9,084	3,041	6,718	1,212
1,000-1,399	2,043	3,459	901	2,474	449
1,400-1,999	1,575	2,471	563	1,716	336
2,000-2,999	1,074	1,556	573	1,083	386
3,000-4,999	652	926		637	
5,000 and over	287	471		375	
Total	12,296	31,660	27,061	34,040	7,447

(a) Subject to revision.

NOTE. Individual holdings may appear in more than one category.

Superphosphate and fertiliser development

Approximately 90 per cent of the annual tonnage of fertilisers used in Victoria is superphosphate, all of which is manufactured locally.

James Cuming, who arrived in Victoria in 1862, established the superphosphate industry in Australia. The phosphatic material used in the manufacture of the early superphosphate consisted of bone char, ground bones, and guano, but subsequently rock phosphate was imported from Florida and Tennessee, U.S.A. However, since the First World War high grade deposits of rock phosphate from Nauru and Ocean and Christmas Islands have provided almost all of the rock phosphate used for superphosphate manufacture in Australia.

Since the 1920s there has been a growing consciousness of the need to topdress pastures with superphosphate for maximum productivity. In 1969-70, 874,936 tons of superphosphate were used in Victoria, of which 633,268 tons were used on pastures.

Fertiliser developments

Next to phosphorus, nitrogen is the most important nutrient in Victorian agriculture. For many years animal manures supplemented by nitrate of soda and sulphate of ammonia were the only nitrogenous fertilisers available. Production of animal manures is now insignificant, but urea, ammonium nitrate, calcium ammonium nitrate, urea-formaldehyde, and anhydrous ammonia are additions to the list of manufactured fertilisers.

Legislation

Since the Artificial Manures Act was introduced in 1897, the law has required fertilisers to be sold according to a guaranteed analysis. Under the *Fertilisers Act* 1958 manufacturers must register the brands, analyses, and prices of their product with the Department of Agriculture. A list of registrations is published annually in the *Government Gazette*.

In 1969-70 artificial fertilisers were used on 3,148,969 acres of wheat; 1,474,194 acres of other cereal crops; 81,163 acres of vegetables; 77,126 acres of orchards; 162,984 acres of other crops; and 10,408,338 acres of pastures. Superphosphate is the main fertiliser used on both crops and pastures and in 1969-70 amounted to 241,693 tons of single strength equivalent or 82.0 per cent of the total artificial fertiliser used on all crops and 633,243 tons or 89.0 per cent of that used on pastures.

VICTORIA—ARTIFICIAL FERTILISERS

Year	Crops			Pastures		
	No. of holdings	Area fertilised	Quantity used	No. of holdings	Area fertilised	Quantity used
		'000 acres	'000 tons		'000 acres	'000 tons
1965-66	30,582	4,664	255	40,637	11,730	800
1966-67	29,771	4,772	267	40,658	12,502	846
1967-68 (a)	30,253	4,961	289	39,636	11,359	780
1968-69 (a)	n.a.	5,654	316	34,994	9,233	638
1969-70 (a)	27,055	4,945	294	35,426	10,408	713

(a) Not strictly comparable with previous years due to changing coverage as mentioned on page 305.

Artificial fertilisers, 1970; Superphosphate, 1971

Aerial agriculture

The aerial agriculture industry in Victoria has grown rapidly and aircraft are now extensively used for topdressing and sometimes for seeding, crop spraying with weedicides and insecticides, and the control of rabbits by the dropping of poisoned carrot baits. A more recent phase of aerial development is the dropping of young fish into Victorian lakes and streams. A full description of aerial agriculture will be found on pages 494 and 764-5 of the *Victorian Year Book* 1966.

Before 1 January 1967 statistics on aerial agriculture were collected by the Department of Civil Aviation who developed the series in 1956. Since 1 January 1967 these statistics have been compiled from quarterly returns collected by the Bureau of Census and Statistics from operators of aircraft engaged in aerial topdressing, seeding, spraying, and allied activity such as rabbit and dingo baiting.

VICTORIA—AERIAL AGRICULTURE

Particulars	Unit	Year ended 31 March—				
		1966	1967	1968	1969	1970
Total area treated (a)	'000 acres	2,472	2,424	1,803	1,956	2,337
Topdressed or seeded	'000 acres	1,630	1,945	(b)	(b)	1,795
Sprayed or dusted (c)	'000 acres	702	(b)	266	(b)	542
Materials used—						
Superphosphate	tons	110,550	(b)	(b)	87,225	116,125
Seed	'000 lb	56	139	310	157	99
Aircraft utilisation (flying time)	hours	19,832	19,109	15,124	15,536	20,893

(a) Areas treated with more than one type of material on one operation are counted once only. Includes 139,910 acres baited for rabbit destruction in 1966, 45,000 acres in 1969, and 58,000 acres in 1970. Figures for 1967 and 1968 not available for publication.

(b) Not available for publication.

(c) Includes 58,000 acres baited for rabbit destruction, etc., in 1970.

Farm machinery

The numbers of the principal items of farm machinery on rural holdings at 31 March during each of the five years 1966 to 1970 are given in the following table:

VICTORIA—FARM MACHINERY ON RURAL HOLDINGS

Particulars	Number at 31 March—				
	1966	1967	1968 (a)	1969 (a)	1970 (a)
Milking machines—Units	105,004	108,664	109,137	112,618	112,012
Shearing machines—Stands	41,689	43,510	43,596	43,393	43,152
Tractors—Wheeled type	73,668	76,678	78,721	79,101	79,188
Crawler type	2,493	2,888	3,045	2,958	3,130
Rotary hoes	12,016	12,305	13,112	12,915	11,646
Fertiliser distributors and broadcasters	28,219	30,948	30,560	30,383	30,036
Grain drills—Combine	19,604	20,392	20,380	20,217	19,919
Other	9,586	9,574	9,187	9,002	8,641
Maize planters	762	747	750	909	877
Headers, strippers and harvesters	13,963	14,319	14,556	14,179	13,310
Pick-up balers	11,972	12,965	13,173	14,106	14,337
Forage harvesters	1,625	1,913	1,951	2,080	2,108

(a) Not strictly comparable with previous years; see page 305 for explanation.

NOTE. Details of items which have not been collected since 1955 are published in the *Victorian Year Book* 1954-1958, page 88.

Mechanisation of farming, 1962

Progress of cultivation

The first Statistical Register of Victoria published in 1854 shows that in 1836 there were 50 acres of land under cultivation in the Colony of Victoria. By 1840 this figure had increased to 3,210 acres. This progress continued until 1852 when 57,471 acres were under cultivation. With the discovery of gold in Victoria, agricultural progress received a temporary setback, the area of land cultivated declining to 34,816 acres in 1854. However, with the influx of population came a demand for agricultural products and, by the end of 1860, the area of land under cultivation amounted to 407,740 acres.

The following table shows the annual average area under cultivation in each decennium from 1856 to 1965 and the actual area for each of the five seasons 1966 to 1970 :

VICTORIA—ACREAGE CULTIVATED ANNUALLY

Period or year (ended March)	Annual average area in each decennium, 1856 to 1965, and actual area each year 1965 to 1970, under—		
	Crop (a)	Fallow	Total cultivation (a)
	acres	acres	acres
1856 to 1865	325,676	12,146	337,822
1866 to 1875	624,377	57,274	681,651
1876 to 1885	1,306,920	137,536	1,444,456
1886 to 1895	2,109,326	364,282	2,473,608
1896 to 1905	3,022,914	524,197	3,547,111
1906 to 1915	3,756,211	1,276,148	5,032,359
1916 to 1925	4,594,244	1,852,145	6,446,389
1926 to 1935	5,233,894	2,501,357	7,735,251
1936 to 1945	4,435,645	2,142,953	6,578,598
1946 to 1955	4,635,982	2,311,401	6,947,383
1956 to 1965	4,222,393	2,191,000	6,413,393
1965	5,019,479	2,484,423	7,503,902
1966	4,969,436	2,620,326	7,589,762
1967	5,143,495	2,751,499	7,894,994
1968	(b)5,202,729	(b)2,646,502	(b)7,849,231
1969	6,156,483	2,727,232	8,883,715
1970	5,374,775	1,745,131	7,119,906

(a) Until 1960 the area of crop included pasture cut for hay and seed. For the decennium 1956 to 1965 and 1961 onwards, area of pasture cut for hay and seed is excluded in the above table.

(b) Includes 135,574 acres under crop and 55,814 acres under fallow resulting from change in coverage referred to on page 305.

Crops and growers

The following table shows the area under, the yield from, and the gross value of each of the principal crops in Victoria for the season 1969-70 :

VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1969-70

Crop	Area	Yield	Gross value (a)
	acres		\$'000
Cereals for grain—			
Barley —			
2-row	460,905	10,787,122 bushels	10,491
6-row	25,719	585,517 bushels	570
Maize	1,145	71,930 bushels	111
Oats	883,651	25,927,064 bushels	10,495
Rye	11,560	57,000 bushels	58
Wheat	3,298,254	83,543,852 bushels	116,747

VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1969-70—*continued*

Crop	Area	Yield	Gross value (a)
	acres		\$'000
Hay—			
Barley and rye	10,292	18,479 tons	250
Lucerne	95,135	226,843 tons	5,143
Meadow	853,364	1,739,096 tons	26,943
Oaten	199,638	405,747 tons	5,632
Wheaten	41,528	70,388 tons	959
Green fodder	77,420	..	2,182
Grey and other field peas	21,128	410,109 bushels	631
Grass and clover seed	53,587	112,388 centals	1,610
Industrial crops—			
Broom millet	210	779 cwt fibre	21
Linseed	18,880	685 cwt seed	4
Hops	838	187,039 cwt	1,167
Mustard	657	15,355 cwt	1,445
Tobacco	11,015	4,932 cwt	67
		138,536 cwt	15,348
Vegetables—			
Onions	3,296	21,339 tons	1,469
Potatoes	39,765	279,553 tons	17,002
Other	52,999	261,113 tons	24,080
Stock fodder—			
Pumpkins and root crops	7,451	..	559
Vineyards—			
Grapes—			
Table	2,648	11,057 tons	2,245
Wine	7,044	34,943 tons	1,735
Drying	35,955	292,565 tons	..
		63,801 tons of sultanas	18,937
		3,269 tons of raisins	1,060
		3,383 tons of currants	1,225
Vines, unproductive	4,191	..	..
Orchards—			
Productive	57,189	..	43,444
Unproductive	13,694	..	..
All other crops	23,165	..	8,069
Total crops	6,312,323	..	319,699

(a) The gross value is based on the wholesale price realised in the principal markets. The places where primary products are absorbed locally or where they become raw materials for a secondary industry are presumed to be principal markets.

VICTORIA—NUMBER OF GROWERS OF CERTAIN CROPS, SEASON 1969-70

Crops grown	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Grain crops—									
Wheat	547	400	856	3,869	2,660	3,482	414	39	12,267
Oats	559	559	2,164	2,680	1,050	2,384	526	31	9,953
Barley	655	120	523	1,360	1,306	1,099	75	56	5,194
Maize	1	..	1	..	2	3	15	61	83
Green fodder—									
Maize	185	20	69	3	1	9	16	243	546
All other	757	308	1,027	52	77	455	290	587	3,553
Other—									
Potatoes	1,168	333	445	4	20	10	81	358	2,419
Onions	211	..	186	4	23	10	2	3	439
Other vegetables	1,293	22	313	31	326	392	24	183	2,584
Orchards	1,517	124	47	69	1,071	934	119	56	3,937
Vineyards	11	9	3	8	2,281	159	22	..	2,493
Grass and clover seed	27	85	189	41	47	108	174	7	678
Tobacco	..	..	..	..	..	23	352	..	375

The preceding table shows the numbers of growers of certain primary products, in each statistical district of the State, for the season 1969-70.

The information has no relation to the number of rural holdings in the State, as numbers of occupiers are engaged in the cultivation of more than one of the crops enumerated.

A summary of the area under cultivation and yield of crops in each statistical district of the State for the season 1969-70 is given in the following tables :

VICTORIA—AREA UNDER CULTIVATION, SEASON 1969-70
(acres)

Crop	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern	Gipps-land	
Grain crops—									
Wheat	34,153	32,589	71,336	992,091	1,476,177	636,004	52,528	3,376	3,298,254
Oats	28,848	30,866	213,363	261,702	123,498	197,087	26,909	1,378	883,651
Barley	64,007	3,969	24,712	120,142	189,164	77,635	3,179	3,816	486,624
Rye	347	271	190	216	10,077	234	101	124	11,560
Maize	(a)	626	(a)	4,300	364	103	73	600	21,140
Field peas	7,702	626	5,207	4,300	2,406	721	65	101	1,128
All hay	158,632	68,815	305,111	85,653	51,832	273,429	77,716	178,769	1,199,957
Green fodder	17,241	6,441	29,817	1,693	2,050	9,632	4,904	13,093	84,871
Grass and clover for seed	1,127	7,305	14,277	2,700	5,394	7,746	14,683	355	53,587
Tobacco	21,248	5,615	6,082	10	122	451	10,564	5,811	11,015
Potatoes	1,123	91	1,888	3	57	197	2	26	3,296
Onions	24,285	201	14,380	80	3,286	4,123	213	6,541	52,999
All other vegetables	79	141	810	46,296	902	1,409	1,789	481	49,838
Vines	21,158	1,995	452	2,111	8,563	34,334	1,789	481	70,883
Orchards	4,831	275	26,038	860	1,589	6,561	1,596	2,005	43,753
All other crops									
Total area under crop	384,781	159,059	712,994	1,472,371	1,920,875	1,249,388	196,379	216,476	(b)6,312,323
Land in fallow	34,690	13,378	43,659	585,931	839,237	192,354	11,501	24,382	1,745,132
Total area under cultivation	419,471	172,437	756,653	2,058,302	2,760,112	1,441,742	207,880	240,858	8,057,455

(a) Included in all other crops.

(b) The total area under crop includes 853,364 acres of grass and clover cut for hay and 30,597 acres of double-cropping.

VICTORIA—YIELD OF PRINCIPAL CROPS, SEASON 1969-70

Crop	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern	Gipps-land	
Grain crops—									
Wheat bush	884,868	834,893	2,413,437	20,220,335	33,038,274	15,786,038	1,296,649	69,358	83,543,852
Oats	836,944	1,008,216	9,100,931	7,039,761	2,360,749	4,930,992	627,899	21,572	25,927,064
Barley	1,920,799	120,842	757,154	2,749,674	3,822,282	1,849,881	70,335	81,672	11,372,639
Maize	(a)	(a)	(a)	22,600	8,080	3,760	37,450	71,930	
Field peas	174,957	18,108	118,995	65,544	20,007	9,498	912	2,088	410,109
All hay tons	339,431	131,771	623,882	139,837	76,778	535,871	164,645	448,738	2,460,953
Grass and clover for seed cents	1,152	17,753	26,456	4,111	6,056	13,819	42,676	365	112,388
Tobacco cwt	144,380	42,482	43,458	88	557	1,763	133,894	42,948	138,536
Potatoes tons	6,898	..	12,311	9	446	1,432	3,877	239	279,553
Onions	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	21,339
Wine made gallons	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	7,251,000
Dried vine fruit—									
Raisins ton	..	..	..	..	3,269	..	..	..	3,269
Sultanas ..	..	..	..	..	63,801	..	..	..	63,801
Currants ..	..	..	..	..	3,383	..	..	..	3,383

(a) Details for individual districts are not available for publication.

Principal crops

The cereals wheat, oats, and barley are the principal crops grown in Victoria and these, together with hay, represent about 90 per cent of the total area sown, although there is some variation from year to year. The growing of potatoes, grapes, and apples is also important.

In the following section some detailed descriptive and statistical information is given of all main crops grown in the State including those mentioned above.

Wheat

The acreage sown to wheat in recent years has been more than 3 million acres. This is about half the total area under crop in the State. Virtually all the wheat crop is used for grain production, only about 1 per cent being cut for hay. The average annual production for the five years ended 1969–70 was about 67 million bushels of which about 65 per cent was exported. Grain yields during these five years, which included a severe drought in 1967–68, averaged about 20 bushels (60 lb per bushel) per acre, but yields as high as 60 bushels per acre are harvested on individual farms in most seasons. The highest officially recorded yield is 78.8 bushels per acre for 50 acres grown near Murtoa in 1960. However, in the 1967–68 drought, wheat production fell to 29 million bushels and the average yield to 8.8 bushels per acre.

Record production occurred in the year following the drought when a crop of just under 4 million acres produced about 91 million bushels. Similar increases in several other States led to a considerable surplus over the requirements for export. The Wheat Marketing Act proclaimed on 9 December 1969 implemented in Victoria the Wheat Delivery Quota Scheme proposed by the Australian Wheat Growers' Federation and provided the administrative machinery decided upon by the Victorian Farmers' Union for the operation of the scheme. The scheme aims to allocate deliveries in accordance with market demand, availability, and storage capacity. In the 1969–70 season the quota for wheat grown in Victoria and in the adjacent regions which normally deliver to silos operated in the Victorian grain handling system was 65 million bushels or about 5 per cent below the average of receipts during the previous five seasons. Some of the production in excess of the quota was, however, received by the Grain Elevators Board where space was available as advance deliveries against the 1970–71 quota of 52 million bushels—a reduction of 20 per cent compared with the previous season. As a result of the lower requirements the area sown to wheat fell to less than 2 million acres in 1970–71.

The main wheat belt lies in the northern part of the State, in the Mallee, Wimmera, and Northern Districts, where about 94 per cent of the crop is grown. The average annual rainfall varies from about 12 inches in the north-west of the State to about 20–30 inches at the eastern and southern margins. About three quarters of the wheat crop is sown on bare fallowed land.

Superphosphate is applied at seeding to virtually all crops. Zinc sulphate is added in the Wimmera District, applications normally being made to each third or fourth wheat crop. Nitrogenous fertilisers are used in particular circumstances, namely, on light sandy soils and land infested with skeleton weed in the Mallee and on heavily cropped land in the

Wimmera and southern areas. Diseases are not normally a major problem, but heavy losses occur due to foot rot and cereal cyst nematode in some seasons. Stem rust rarely causes much loss. Ball smut is effectively controlled by pickling with fungicide powder which is done at the same time as the seed is graded. Weeds are controlled by fallow cultivation or by crop spraying. The crop is harvested from mid-November in the early districts to January under late conditions.

Wheat is grown in rotation with fallow, other cereal crops, and pastures. The use of subterranean clover and medic leys has greatly improved soil fertility, with resultant benefit to wheat yields and quality. Sheep grazed on these, and on native pastures, contribute materially to the State's wool and prime lamb production, especially to the production of early prime lambs.

Wheat is grown on three major soil types :

1. Mallee soils referred to as solonised brown soils ;
2. self-mulching grey soils of heavy texture and high fertility in the southern Wimmera ; and
3. red-brown earths of varying texture in the northern Wimmera and the Northern District.

Most wheat varieties grown in Victoria are of the soft white class. The environment generally does not favour the production of wheat of the harder types, but limited areas of the hard variety Emblem are sown in the eastern Mallee where wheat with protein content above the Victorian f.a.q. (fair average quality) is usually produced. Substantial improvement in wheat quality has been achieved by plant breeding during the past 30 years, and one of the leading soft wheats at present is in the medium to strong class. The adoption of clover and medic ley rotation systems has led to a substantial improvement in the protein content, and thus the bread making quality, of Victorian wheat.

Virtually the whole of the wheat crop is handled, stored, and transported in bulk. The crop is marketed through the Australian Wheat Board. The greater part of the crop is marketed as one grade known as f.a.q. (fair average quality). Small amounts of the semi-hard wheat grown in the eastern Mallee and low protein soft wheat suitable for biscuit flours are segregated for separate sale.

Grain Elevators Board

In 1934 an Act was passed to provide for the handling of wheat in bulk in Victoria. The Act gave the Government power to constitute a Board of three members to implement the provisions of the Act. As a result of submissions made by the Board to, and approved by, the Government, 226 country receiving elevators and a 30 million bushel capacity shipping terminal at Geelong and storage facilities for 4 million bushels at Portland have been constructed, the necessary finance being obtained from loans totalling \$30,818,000. Repayment of the principal and interest are guaranteed by the Victorian Government. In 1963 the Act was amended to provide for the handling of barley in bulk by the Grain Elevators Board.

The Grain Elevators Board first received and shipped Victorian wheat in bulk for the 1939-40 season and first received barley in bulk for the 1963-64 season.

The Board's Geelong Terminal is operated by push-button remote control with operational indicator lights appearing on a diagram panel of the whole

terminal. Grain can be received from rail trucks and can be shipped from the terminal at the same rate of 1,600 tons per hour, either direct from the terminal storage bins or by a combination of storage bins and rail receivals. The storage facilities at Portland are linked to the Portland Harbor Trust shipping terminal.

The Grain Elevators Board has under its control storage for 140 million bushels of wheat and barley. In comparison with the season 1969-70, when the quantity of 85,810,000 bushels of bulk wheat and 7,270,000 bushels of bulk barley were delivered to the Board, the receivals for the 1970-71 season were 32.7 million bushels of bulk wheat and 9.8 million bushels of bulk barley. Wheat quotas were introduced for the 1969-70 season, Victoria's quota being fixed at 65 million bushels and the balance of the receivals being over-quota wheat. The Victorian quota for 1970-71 was 52 million bushels.

The following statement shows the revenue and expenditure of the Grain Elevators Board in Victoria:

VICTORIA—GRAIN ELEVATORS BOARD: REVENUE, EXPENDITURE, ETC.
(\$'000)

Particulars	Year ended 31 October—				
	1966	1967	1968	1969	1970
REVENUE					
Grain handling charges	3,936	4,375	3,979	4,654	5,022
Interest on investments	373	437	482	552	584
Other	..	..	3	..	..
Total revenue	4,309	4,812	4,464	5,206	5,606
EXPENDITURE					
Operating and maintenance expenses	1,317	1,517	1,093	1,651	1,949
Administration expenses	414	457	342	458	505
Depreciation and renewals	504	544	571	573	600
Interest on loans	1,230	1,348	1,420	1,516	1,590
Sinking fund charges	231	255	269	288	292
Appropriations to reserves	493	788	762	720	669
Other	45	2	6	..	..
Total expenditure	4,234	4,911	4,463	5,206	5,605
Net surplus	75	—99	1	..	1
Fixed assets at 31 October	26,611	28,909	30,700	31,823	32,825
Loan indebtedness at 31 October—					
State Government	1,729	1,706	1,683	1,672	1,630
Public	22,202	23,723	24,899	26,572	26,734

Australian Wheat Board

History

After the outbreak of the Second World War, the Australian Wheat Board was established in September 1939 under national security legislation. When the war ended in 1945 the Board continued to operate until 1948 as an agent for the Commonwealth Government under "transitional legislation".

In 1948 agreement was reached between the Commonwealth and States for the first of the Wheat Industry Stabilisation Schemes. For constitutional

reasons, it was necessary for each State to pass legislation accepting the Australian Wheat Board as the central marketing authority, and to permit it to operate within the States. Before the outbreak of the war progress had been made in Federal-State Conferences towards a comprehensive stabilisation scheme. The war intervened and full control over the sale of Australian wheat was given to the Board under the exigencies of war-time conditions.

The marketing experience of the Board, and the desires of the growers were finally combined in the wheat stabilisation legislation of 1948 and renewed under successive five year schemes ever since. The Australian Wheat Board now functions under the present *Wheat Stabilisation Act* 1968. This Act authorises the Board to market all wheat harvested between 1 October 1968 and 30 September 1975 (seven seasons) but limits the application of the revised guaranteed price provisions to wheat harvested between 1 October 1968 and 30 September 1973 (five seasons). Negotiations between the growers and the Government will be held before September 1973 to review the guarantee provisions.

Constitution

The Board comprises fourteen members, two growers from each of the five mainland States together with the chairman, a finance member, a millers' representative, and an employees' representative.

Functions and operations

Under complementary Commonwealth and State legislation :

1. the Board is the sole authority for the marketing of wheat in Australia and for both wheat and flour for export ;
2. growers are required to deliver to the Board all wheat grown by them except that required as seed or feed on the farms where it is grown ; and
3. the Board becomes the owner of all wheat delivered to it.

The Board employs the various bulk handling authorities and wheat merchant-shippers are employed by the Board for the receipt of bagged wheat.

Total deliveries by wheat growers to the Victorian branch of the Australian Wheat Board during the 1969-70 season were 85,883,199 bushels including 5,150,000 bushels of southern New South Wales wheat delivered to storages at railway sidings operated by Victorian Railways in New South Wales and 1,812,000 bushels of southern New South Wales wheat delivered to storages in Victoria.

The Mallee experienced its best ever autumn conditions and all other areas received excellent autumn rains. Sowing in the Mallee was completed in June 1969 but dry conditions delayed the Wimmera until July. By September crop conditions were above average in all districts; however, a dry spell from mid-September to late October caused crops to suffer a check although estimates were still high. Whilst the dry conditions reduced yields, the lack of rain in this period possibly saved Mallee crops from greater losses as the development of rust was retarded sufficiently to allow the grains to finish to normal size. Mild temperatures towards harvesting time enabled these crops to yield better than anticipated.

The State yield per acre from the 1969-70 crop was 25.6 bushels. The f.a.q. standard was set at 65.5 lb per bushel.

Wheat standard

The fair average quality (f.a.q.) standard is determined each season by a State committee and is the basis for sales of each crop.

Samples of wheat from various districts are obtained each year and mixed to obtain a representative sample of the whole crop. The f.a.q. weight is then determined by use of the Schopper 1 litre scale chondrometer.

*Area of wheat for grain, production, gross value, f.a.q.,
and holdings growing 20 acres and over*

In the following table the area of wheat for grain, production, average yield, gross value of production of wheat, the f.a.q. standard determined in Victoria and the number of holdings growing wheat (20 acres or more) for each of the seasons 1965-66 to 1970-71 are shown :

VICTORIA—WHEAT FOR GRAIN

Season	Area	Production	Holdings growing wheat (20 acres and over)	Average yield per acre	Gross value	Weight of bushel of wheat, f.a.q.
	'000 acres	'000 bush	number	bush	\$'000	lb
1966-67	3,138	70,896	11,202	22.59	104,471	63½
1967-68	3,224	28,317	11,056	8.78	43,856	65
1968-69	3,984	(a) 90,728	11,686	22.77	122,008	65
1969-70	3,298	83,544	11,618	25.32	116,747	65½
1970-71	1,879	36,901	9,669	19.63	(b) 50,989	64½

(a) Record production.

(b) Subject to revision.

Wheat breeding

The objective of wheat breeding in Victoria is to produce new varieties which will give higher yields of better baking quality grain than existing varieties. Included in the yield objective is the reduction of losses due to drought and various diseases which include cereal cyst nematode (eelworm), stem rust, leaf rust, septoria, and eye spot lodging. The breeding work is a function of the Victorian Department of Agriculture, which undertakes plant breeding, field testing, and quality evaluation. In current breeding programmes, selections are being made from crosses between semi-dwarf and dwarf imported varieties of high yielding ability and Victorian varieties.

The wheat breeding activities of the Department are centred on the State Research Farm at Werribee and the Victorian Wheat Research Institute at Horsham where the hybridisation is carried out, the early generations raised, and the initial quality and disease testing done. This work is supplemented by regional selection centres in other wheat growing districts.

Field testing is undertaken in all districts at Departmental research stations and colleges and on farmers' properties. There are about thirty-five centres for varietal testing in Victoria. Disease testing is carried out at research stations in appropriate areas and at the Victorian Wheat Research Institute at Horsham and the Victorian Plant Research Institute at Burnley. After the early generation quality testing, which is done at the State

Research Farm, Werribee, and the Victorian Wheat Research Institute at Horsham, final evaluations, including test baking, are undertaken at the Department's cereal laboratories in Melbourne.

The wheat breeding work of the Department has been very successful. During the past fifty years over forty new varieties of wheat have been released for cultivation by farmers. The most widely grown of these have been Free Gallipoli (1923), Ghurka (1924), Rancee 4H (1930), Magnet (1939), Quadrant (1941), Insignia and Pinnacle (1946), Sherpa (1953), Olympic (1956), Emblem (1963), and Summit (1966). Almost 90 per cent of the wheat acreage in Victoria is sown to varieties bred by the Department, and for some years Insignia was the most widely grown variety in Australia.

Since 1930, the baking quality of Victorian wheat has improved markedly. This has been due partly to varietal improvement and partly due to improved soil fertility by the use of legume leys with a resultant continuing effect on grain protein content.

The following table shows the areas under the principal varieties of wheat, including wheat for hay, for the seasons 1967-68, 1968-69, and 1969-70. Varieties are tabulated in order of popularity for the last mentioned season.

VICTORIA—PRINCIPAL VARIETIES OF WHEAT SOWN

Variety (in order of popularity, season 1969-70)	Season 1967-68		Season 1968-69		Season 1969-70	
	Acres sown	Percentage of total area sown	Acres sown	Percentage of total area sown	Acres sown	Percentage of total area sown
Insignia	1,562,248	46.84	1,940,328	48.20	1,508,592	45.17
Olympic	823,033	24.68	813,166	20.20	753,515	22.56
Heron	152,488	4.57	253,611	6.30	310,679	9.30
Pinnacle	473,854	14.21	507,223	12.60	299,889	8.98
Summit	63,371	1.90	205,304	5.10	242,383	7.26
Emblem	110,491	3.31	136,870	3.40	86,114	2.58
Insignia 49	55,226	1.66	72,460	1.80	61,554	1.84
Sherpa	30,864	0.93	32,205	0.80	24,570	0.74
Falcon	15,212	0.46	16,102	0.40	11,621	0.35
Beacon	14,969	0.45	12,077	0.30	10,643	0.32
Robin	..	..	..	..	6,027	0.18
Quadrat	9,415	0.28	8,051	0.20	5,527	0.17
Gamenya	..	..	..	..	2,490	0.07
Baldmin	..	..	3,079	0.08	2,377	0.07
Stockade	4,640	0.14	..	..	..	..
All other varieties	19,059	0.57	25,100	0.62	13,801	0.41
Total	3,334,870	100.00	4,025,576	100.00	3,339,782	100.00

Alternative crops to wheat

The reduction in market opportunities for wheat and the introduction of the wheat quota delivery scheme resulted in a serious loss of income for Victorian wheat farmers, many of whom were dependent on wheat for more than 60 per cent of their farm receipts.

The reduction in wheat production left the major farm resources—labour, machinery, and land—underemployed and favoured the adoption of other annual crops with similar climatic and cultural requirements. The other important alternative enterprises open to wheatgrowers were the several forms of livestock production, particularly sheep or cattle on land diverted from wheat to pasture. This, however, involves additional capital in comparison with cropping and in much of the wheat belt offers a comparatively low return per acre. In 1970-71 about one third of the

1.4 million acres taken out of wheat production was sown to increased acreages of other crops and the remainder returned to pasture.

The crops which could be grown in the wheat belt included oats, barley, ryecorn, field peas, safflower, linseed, rapeseed, and canary seed. Summer growing crops such as sorghum, millet, maize, soybean, and sunflower, which are grown in some other wheat-producing areas of northern Australia, Europe, and North America, are not suitable owing to the lack of summer rainfall in the Victorian cereal belt.

The major factor in the choice of a satisfactory alternative crop has been the availability of suitable markets. The world market for many grain products is affected by changes in wheat supplies, and the prices of many of the possible alternatives, particularly oats, barley, and ryecorn, has tended to be much lower than previously; nevertheless, the market for barley offered some opportunity to expand the volume of sales, even though this may have resulted in a further fall in price. Barley was the most widely chosen alternative crop and acreage increased by about 50 per cent in 1970-71. A subsequent rise in the price of barley resulted in far better returns from this crop than had been expected.

Oats, for which very low prices had been obtained in 1969-70, were also sown more widely, although much of the increase was designed to safeguard the winter feed requirements of additional sheep and cattle. Field peas and ryecorn also suffered from a lack of satisfactory markets and were not widely adopted.

Two new crops which appeared to show most promise were safflower and rapeseed, both of which are used for the production of edible vegetable oils for shortenings and other culinary uses. Rapeseed contains about 40 per cent to 45 per cent of oil and safflower 35 per cent to 40 per cent. The meals remaining after the oil has been extracted are a valuable source of protein for incorporation in prepared animal feeds. Local markets existed for limited production and there was fair promise of opportunities to export any surplus. In suitable areas, these crops promised to return about 80 per cent as much as wheat.

Rapeseed had already been adopted on a limited scale in the medium rainfall cropping areas of the Western District, partly as a replacement for linseed, but has now replaced that crop as the major oilseed crop in Victoria because of the larger demand for edible vegetable oils. Some 10,000 acres of rapeseed were sown in the main wheat districts in the 1970-71 season in addition to about 36,000 acres in the medium rainfall districts. The varieties used were Target (*Brassica napus*) and Arlo (*Brassica campestris*) introduced from Canada. Rapeseed is a vigorously growing winter crop; however, the seed pods shatter readily when ripe and some changes in harvesting technique from that used for cereals were necessary to avoid heavy losses of seed.

Safflower is a late-maturing crop which makes very slow winter growth in most of Victoria. It requires good reserves of subsoil moisture to allow the seed to fill and mature after the normal spring rains have finished. It is thus best adapted to those districts which have warmer temperatures in winter and well structured clay subsoils. Experiments conducted by the Department of Agriculture in the early post-war years indicated that safflower

could be grown in the Mallee and Wimmera with moderate success although returns were not as good as those from wheat. One of the main problems was weed invasion during the period of very slow winter growth. With the changed wheat situation, an opening was provided for the introduction of this crop into Victoria and large acreages were sown in the Wimmera and southern Mallee under contract to processors. The main variety used was Gilla from the U.S.A., but smaller acreages were also sown to lines selected in Australia by the processors.

Canary seed, for which there is a small relatively lucrative local market and a widely fluctuating overseas demand, was adopted on a small number of Wimmera farms.

Oats

Oats are the second most widely grown crop in Victoria, and in recent years the area of this cereal has averaged about 1.3 million acres. Nearly 72 per cent of this is normally harvested for grain, some of it after winter grazing. Although oaten hay was important in the past, only about 15 per cent of the acreage is now harvested for this purpose, the remainder (13 per cent) of the area being used solely for grazing.

As the land on which oats are grown is normally not fallowed or as well prepared as that intended for wheat, oat production shows greater fluctuations than wheat production. This seasonal variability is particularly marked in the northern parts of the State. While the average annual grain production is about 20 million bushels (40 lb per bushel), it was 31 million bushels in 1966-67, 6.9 million bushels in 1967-68, and 30 million bushels in 1968-69. Production in 1969-70 was 25.9 million bushels.

Over half the oat grain produced in Victoria is held on farms or is used within Victoria for stock feed. Large quantities are retained for feeding during periods of seasonal shortage or in drought conditions. About a quarter of the crop goes to mills, but only a relatively small proportion is used to manufacture foods for human consumption. Milling quality oats usually command a premium of 2 cents to 10 cents per bushel above feed oats. The other uses of the grain by the mills are for the manufacture of stock foods and for the manufacture of unkilned rolled oats, mainly for export. The remaining quarter of the crop is exported as grain. More than 95 per cent of the oats exported are sold as "Victorian No. 1" grade. Prior to the 1971-72 season oat grain was sold in an open market through merchants or through the voluntary oat pool, and prices fluctuated widely according to seasonal conditions and supplies available. An Oat Marketing Board was then established following a poll held in 1970 in which oatgrowers voted in favour of a single marketing authority for oats within Victoria. Facilities for bulk deliveries exist at most main centres.

During the past ten years the area cut for hay has fluctuated around 200,000 acres in normal seasons with an average production of about 335,000 tons. About double the normal acreage was cut for hay during the 1967-68 drought and production increased by about 100,000 tons. In 1969-70 the area cut for hay was 200,000 acres and production was 406,000 tons. The hay may be cut either for farm use or for sale (mainly to chaff mills near Melbourne, Ballarat, and Maryborough).

Most of the area fed-off completely is grazed by sheep in the winter, but in dairying districts oats are sometimes sown for autumn and winter grazing

to supplement pasture growth. About 30 per cent of the oats completely grazed are in the Mallee District.

The main oat grain producing areas are in the Mallee, Wimmera, Northern, and Western Districts. The popularity of varieties has undergone marked changes in recent years. After having held supremacy for more than 40 years, Algerian was superseded as the leading variety by Orient in 1962, while Avon now holds this position. The area sown to the five leading varieties—Avon, Irwin, Orient, Algerian, and Kent—is about 87 per cent of the total oats acreage in the State.

The area harvested (season 1969–70) for hay was 199,638 acres, and for grain 883,651 acres, which produced 405,747 tons of hay, and 25,927,064 bushels of grain, respectively. The area of oats sown for grazing purposes amounted to 138,544 acres. The following table shows the area, yield, and gross value of oats for grain for each of the five seasons 1965–66 to 1969–70 :

VICTORIA—OATS FOR GRAIN

Season	Area	Production	Average yield per acre	Gross value
	'000 acres	'000 bush	bush	\$'000
1965–66	966	17,784	18.42	15,287
1966–67	1,079	(a) 31,248	28.96	19,033
1967–68	723	6,859	9.49	6,723
1968–69	991	30,230	30.49	13,029
1969–70	884	25,927	29.34	10,495

(a) Record production.

Barley

In 1969–70 both the area sown for barley (487,000 acres) and production (11.4 million bushels) were a record. The previous highest barley production was in 1968–69 when about 409,000 acres (2- and 6-row) were sown with a production of approximately 8.9 million bushels (50 lb per bushel). About 95 per cent of the barley grown in Victoria is of the 2-row type. The remainder is sown with 6-row varieties.

Although some barley is grown in all districts, the production has been traditionally centred in two distinct areas where high quality grain is produced. The largest production is in the south-western Mallee and the adjacent area of the north-western Wimmera. While wheat is the main cereal throughout the cereal growing districts, the barley crop occupies second position in the areas noted above, whereas, in most other portions of northern Victoria, oats occupy this position.

In this northern barley growing area, the best quality barley is grown on the sandier soil types. The crop is sown either on ley land cultivated in the autumn just prior to sowing or on wheaten stubble land. The variety Prior was almost exclusively sown in this area until recently. Now a smaller area in the northern Mallee is also sown to Noyep. A new variety, Weeah, produced by the Department of Agriculture, was introduced in 1968 and was widely grown by 1970. Superphosphate is the standard fertiliser applied. Average district yields are about 19 bushels per acre.

The other important area is in southern Victoria between Melbourne, Geelong, and Bacchus Marsh. Here, barley is the main crop, and the normal

practice is to sow it with superphosphate on fallowed land. The main variety has been Research, but Resibee, released by the Department of Agriculture in 1962, is now being grown to an increasing extent. While Research produced very good malting quality grain in this area, the newer variety has slightly superior quality characteristics. Yields are considerably higher than those obtained in the north, the average yield being about 32 bushels per acre. This region is close to the main barley shipping terminals, and growers' freight costs are much lower than in the northern areas.

The Victorian Grain Elevators Board has provided a bulk handling scheme for barley since 1963. The provision of extra facilities, including special aerated storages at Hopetoun, Rainbow, and Jeparit, and terminal storages at Geelong and Sunshine, with the use of existing elevators on a throughput basis before the wheat harvest, has made it possible for the crop to be handled in bulk in almost all the districts where it is grown. The increased production in 1969-70 exceeded the storage space available and growers' deliveries were regulated pending disposal of part of the crop.

The Victorian malting industry takes most of the malting quality grain for malt for local use and also uses some of the lower grade grain for producing malt for export—principally to eastern Asia, the Pacific Islands, and Africa. Lower quality barley is used for stock feeding as whole grain and manufacturing in the distilling, pearling, and prepared stock feed industries. Barley surplus to these requirements is exported.

The following table shows the area, yield, and gross value of barley for each of the five seasons 1965-66 to 1970-71 :

VICTORIA—BARLEY PRODUCTION

Season	Area		Production		Average yield per acre			Gross value
	2-row	6-row	2-row	6-row	2-row	6-row	Total	
	'000 acres	'000 acres	'000 bush	'000 bush	bush	bush	bush	\$'000
1966-67	213	14	5,066	355	23.74	24.85	23.81	7,260
1967-68	287	18	2,550	158	8.89	8.81	8.88	3,261
1968-69	387	22	8,394	491	21.68	22.45	21.72	8,868
1969-70	461	26	10,787	586	23.40	22.76	23.37	11,060
1970-71	640	25	13,509	529	21.11	21.16	21.13	(a) 16,530

(a) Subject to revision.

Australian Barley Board

History

The Australian Barley Board was constituted in November 1939 under Commonwealth legislation after representatives of growers, merchants, maltsters, and brewers had pointed out to the then Minister of Commerce that a large crop of barley was nearly ready to be harvested, that under wartime conditions grave difficulties would arise, and that some form of control was necessary to prevent a position developing which would jeopardise the interests of barley growers.

In 1948, when National Security Regulations were lifted, the Board passed to State control and the South Australian and Victorian Governments re-constituted the Board under State legislation. This legislation was to stay in force for 5 years, but has been amended several times since, and the current period expired in Victoria in 1971.

The Board consists of a chairman and six members. The chairman is appointed by the Governor of South Australia, three grower members are elected by the growers in South Australia, one grower member is elected by the growers in Victoria, one member is appointed by the Minister for Agriculture in Victoria, and one member is appointed by the industry to represent the consumers. Each of these members is elected and appointed for a period of three years.

The head office of the Board is in Adelaide and there is an office in Melbourne. Depots for the storage and handling of barley are situated at Brooklyn, Geelong, Sunshine, and Portland in Victoria and a number of storage elevators are situated throughout the barley producing areas in the country.

Functions and operations

Under the Victorian Barley Marketing Act all barley grown in Victoria must be marketed by the Board with the exception of :

1. barley retained by the grower for use on the farm where it is grown ;
2. barley which has been purchased from the Board ;
3. barley sold or delivered to any person with the approval of the Board ;
4. barley sold at any auction market in accordance with a permit granted by the Board ; and
5. barley the subject of trade, commerce, or intercourse between States or required by the owner thereof for the purpose of trade or intercourse between States.

It is the function of the Board to receive barley from growers in South Australia and Victoria, market the barley to the best advantage, and distribute the proceeds (less operating costs) to growers. In disposing of this barley the Board, under the Act by which it is constituted, must have regard to the reasonable requirements of persons requiring barley for use or consumption in Victoria and South Australia. The Board has power under the Act to license any person to receive barley on behalf of the Board and the licence to receive barley contains terms and conditions fixed by the Board. The Grain Elevators Board of Victoria is licensed to receive barley in bulk in Victoria. There is one other licensed receiver appointed by the Board to receive barley in bags on behalf of the Board.

The varieties commonly grown in Victoria are Chevalier-Pryor type, Research, and Cape, the first two varieties being two-row barley and Cape being a six-row barley. These varieties are classified by a committee into grades for the purpose of marketing. These grades are largely a natural development arising out of the market demands (there are price differentials between each grade), the highest grade being malting grade, which is at present all required by the malting industry in Victoria for the manufacture into barley malt. Only a very small amount of six-row barley is required for malting.

The Board is not subsidised in any way by government guarantee, and the payment for barley to the growers is made by a series of advances, the first advance paid on delivery. Finance for such is arranged with the Reserve Bank of Australia.

Chevalier-Pryor type barley, being suitable for a medium rainfall area, is commonly grown in the Mallee and Wimmera districts of Victoria.

However, this variety is gradually being replaced by Noyep and Weeah varieties. Research barley is more commonly grown in, and suitable for, a higher rainfall area, and is successfully produced in the higher rainfall southern areas of Victoria. This variety is gradually being replaced by Resibee variety.

Victorian deliveries of barley to the Australian Barley Board increased considerably in the post-war years with an average crop of 4.5 million bushels up to and including the season 1960-61. In the season 1953-54, 7.75 million bushels were delivered, the highest received in the post-war period. From the 1960-61 season to 1968-69 Victorian deliveries to the Board declined, and an average of 2.6 million bushels were received. In the 1969-70 season deliveries rose to 7.4 million bushels and it is expected that in the future the deliveries will increase further.

Prior to 1963-64 all barley received by the Board was delivered in new standard corn sacks. However, after recommendations made to the Government of Victoria by the State Development Committee, the Grain Elevators Board Act was amended to enable barley to be received in bulk on behalf of the Australian Barley Board by the Grain Elevators Board.

Maize

Maize is grown in Victoria both for grain and for green fodder and cultivated mainly in Gippsland. Lower values in the late 1960s and other more profitable alternatives in vegetables and livestock led to a substantial decline in the production of maize grain. The area, yield, and gross value of maize for each of the five seasons 1965-66 to 1969-70 are given in the following table :

VICTORIA—MAIZE PRODUCTION

Season	For green fodder	For grain							Av. yield per acre	Gross value
		Area			Production					
		Hybrid	Other	Total	Hybrid	Other	Total			
	acres	acres	acres	acres	bush	bush	bush	bush	\$'000	
1965-66	4,161	1,497	186	1,683	93,938	7,551	101,489	60.30	121	
1966-67	3,421	1,261	146	1,407	67,044	5,074	72,118	51.26	115	
1967-68	4,723	825	92	917	29,252	2,723	31,975	34.87	48	
1968-69	3,588	1,059	102	1,161	68,553	3,608	72,161	62.15	108	
1969-70	2,435	1,079	66	1,145	69,310	2,620	71,930	62.82	111	

Rye

Cereal rye is of minor importance in Victoria and is not usually grown as a cash crop. European migrants to Australia have created a small demand for this cereal for human consumption, thus helping to stabilise the market for rye grain.

The chief purpose for which rye is grown is the prevention of erosion by wind on sandhills in the Mallee District. There is some interest in it for winter grazing in cold districts during the winter months.

The following table shows the area, yield, and gross value of rye for each of the five seasons 1965-66 to 1969-70 :

VICTORIA—RYE PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	bushels	bushels	\$'000
1965-66	13,409	65,821	4.91	87
1966-67	11,608	77,722	6.70	106
1967-68	9,578	42,351	4.42	57
1968-69	11,689	70,239	6.01	73
1969-70	11,560	57,000	4.93	58

Hay

The pattern of hay production in Victoria changed considerably in the post-war period. More complete mechanisation and the virtual disappearance of the working horse removed the previous emphasis from cereal hay. The harvesting of large areas of cereal crops, particularly oats, grown specifically for the production of hay for the maintenance of horse teams, is no longer necessary and so there has been a marked decline in the amount of cereal hay produced.

On the other hand, there were spectacular increases in the production of other forms of fodder. The annual production of meadow hay increased from about 400,000 tons to over 2 million tons during this period. There was also a substantial increase in the amount of lucerne hay conserved. Ensilage made mainly from pasture growth increased from about 25,000 tons annually to over 300,000 tons in the post-war period, yet it still supplies something under 10 per cent of the dry nutrients in Victoria's fodder reserves.

This increase in fodder conservation has resulted in more efficient utilisation of the extra herbage grown as the result of pasture improvement in all districts. Large numbers of livestock are now being maintained with greater safety following the conservation of portion of the surplus spring growth for feeding out during periods of seasonal shortage or in drought.

As pastures have been improved and livestock production intensified, the provision of supplementary fodder has become an important factor in the Victorian grazing industry. The conservation of meadow hay fits in well with farm management routine and is a convenient method of ensuring continuity of fodder supplies.

Further information on fodder conservation will be found on pages 337-9.

Particulars of areas harvested and production of the several kinds of hay appear in the following table :

VICTORIA—HAY PRODUCTION, 1969-70

Kind	Area	Production	Average yield per acre
	acres	tons	tons
Wheaten	41,528	70,388	1.69
Oaten	199,638	405,747	2.03
Lucerne	95,135	226,843	2.38
Barley and rye	10,292	18,479	1.80
Meadow	853,364	1,739,096	2.04
Total	1,199,957	2,460,553	2.05

The following table shows, in respect of each statistical district of the State, the quantity of ensilage made during the 1969-70 season and the stocks of ensilage and hay held on rural holdings at 31 March 1970 :

VICTORIA—ENSILAGE MADE AND FARM STOCKS
OF ENSILAGE AND HAY
(tons)

Statistical District	Ensilage made, 1969-70	Stocks at 31 March 1970	
		Ensilage	Hay
Central	78,966	58,986	280,665
North-Central	5,258	6,260	114,378
Western	36,887	31,629	622,119
Wimmera	2,626	8,722	182,039
Mallee	4,439	6,839	92,590
Northern	12,155	15,635	501,154
North-Eastern	37,379	38,251	215,474
Gippsland	111,703	85,558	368,555
Total	289,413	251,880	2,376,974

Potatoes

Victoria is the largest producer of potatoes in Australia, contributing a little more than one third of the total annual requirement. Potatoes are generally used as a fresh vegetable, but substantial quantities are processed into chips, crisps, and other prepared forms, as well as dehydrated flakes. Generally regarded as a summer crop, potato planting goes on in one district or another for ten months of the year, while harvest extends over the whole year.

Early crops are grown in favoured localities where the risk of frost is not great, such as in the Bellarine Peninsula and the market garden areas south-east of Melbourne. These are lifted from October (or sooner) to December. Mid-season crops come on the market in January, February, and March from districts such as Koroit, Gembrook, Koo Wee Rup, and parts of Gippsland. The late or main crop is produced in the Central Highlands (Ballarat to Trentham), Kinglake, the Otways, and the Gippsland hill country. Its harvest commences in April and runs on until October.

VICTORIA—POTATO PRODUCTION

Season	Area	Production (a)	Average yield per acre	Gross value
	acres	tons	tons	\$'000
1965-66	34,333	240,786	7.01	11,050
1966-67	37,167	225,186	6.06	15,291
1967-68	40,329	215,941	5.35	18,566
1968-69	39,979	299,961	(b) 7.50	10,343
1969-70	39,765	279,553	7.03	17,002

(a) Includes amounts held on farms for seed, stock feed, etc., as follows : 27,851 tons in 1965-66, 26,394 tons in 1966-67, 28,783 tons in 1967-68, 36,328 tons in 1968-69, and 29,619 tons in 1969-70.

(b) Record average yield.

About two thirds of the total area of potatoes planted in Victoria is grown under spray irrigation. In most cases the water is derived from farm storages or from bores. Potato growing has become increasingly mechanised and production has, therefore, tended to pass into the hands of specialist growers having larger individual areas.

Onions

The principal onion growing areas are in the Central and Western Districts. In the season 1969-70 these areas were responsible for 91 per cent of the total onion production of the State.

VICTORIA—ONION PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	tons	tons	\$'000
1965-66	2,955	17,115	5.79	1,814
1966-67	3,295	22,375	6.79	1,464
1967-68	3,617	11,339	3.13	1,427
1968-69	3,634	21,282	5.86	905
1969-70	3,296	21,339	6.47	1,469

Linseed

Linseed is the major industrial oil seed crop grown in Victoria. Its commercial production, which began in 1947, increased to over 25,000 acres in suitable years, with an output in excess of 300,000 bushels. In wet seasons, however, weather and soil conditions seriously cut the intended acreage. Since 1964 acreage has been restricted following a reduction in demand due to the introduction of synthetic paints and floor coverings.

Linseed has proved to be well adapted to broad acre production over a wide area of mixed farming and pastoral country in the 20 to 30 inch rainfall zone in the western part of Victoria. Initially, the industry was developed on imported varieties, and, in the period up to 1955, yields were low because these varieties were not fully suited to Victorian conditions and because of their susceptibility to disease.

Greater stability has been given to the industry with the release by the Victorian Department of Agriculture of disease resistant and better adapted varieties.

Victorian linseed contains 38 to 40 per cent of oil of satisfactory quality. Linseed oil is one of the main components of paints, varnishes, and linoleum, and also has many other industrial uses. The meal or press cake which remains after the oil has been extracted is a valuable stock food.

VICTORIA—LINSEED PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	bushels	bushels	\$'000
1965-66	7,370	101,536	13.78	358
1966-67	5,012	92,752	18.51	302
1967-68	9,365	32,176	3.44	104
1968-69	14,304	203,140	14.20	658
1969-70	18,880	187,039	9.91	1,167

Tobacco

Flue-cured Virginia tobacco is the only type produced in quantity in Australia and is mainly absorbed in the manufacture of cigarettes. The use of domestic leaf is encouraged by a statutory mixing percentage applied in conjunction with concessional rates of import duty. The statutory percentage is currently set at 50 per cent and at the present high level of usage it is important that only leaf of desirable smoking quality is produced. Such leaf can be grown with some certainty only in areas having sandy friable soils and, during the summer months, with appreciable rainfall, moderate temperatures, and high atmospheric humidity.

The Victorian crop usually accounts for rather more than one third of the total Australian tobacco production. Suitable growing conditions are found in the north-eastern river valleys, and the industry is concentrated at present along the Ovens and King Rivers and their tributaries, with small outlying areas in the northern part of the State. Recent trends disclose a concentration of production in the higher parts of these valleys, with some contraction at certain climatically less favoured downstream centres and in the inundated area above the Buffalo River dam. The Mount Beauty district in the upper Kiewa Valley has also become established as a reliable centre for the production of good quality leaf.

Tobacco growing in Australia has traditionally been regarded as a rather speculative proposition due to wide fluctuations in production and market conditions, and it is only in the past decade that any degree of stability has become apparent. This has been due to a consistent upward trend in average yield which has resulted in the Victorian figure approaching a level comparable to that achieved by the world's major tobacco producing countries.

The fungus disease, blue mould, has often brought about drastic reduction of yield and has been the prime cause of most short Victorian crops in the past. At present growers are able to control this disease by implementing newly developed fungicidal spray programmes, and this is perhaps the main factor in current yield improvement.

The implementation in 1965 of a Tobacco Stabilisation Scheme, whereby a market is guaranteed for the annual sale of up to 34 million lb of leaf meeting certain quality standards, has promoted further stability in the industry.

Victorian tobacco producers are assisted in their efforts to increase yield and improve leaf quality by the Department of Agriculture, which conducts research in agronomy, plant pathology, and plant breeding at the Tobacco Research Station at Myrtleford and its substation at Gunbower, and also provides an intensive farm to farm advisory service for growers.

VICTORIA—TOBACCO PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	cwt (dry)	cwt (dry)	\$'000
1965-66	9,230	98,953	10.72	12,377
1966-67	8,455	97,792	11.57	11,938
1967-68	8,664	68,076	7.86	7,915
1968-69	9,727	107,812	11.08	13,910
1969-70	11,015	138,536	12.58	15,348

Further reference, 1963; Marketing of tobacco, 1969

Fruit industry

Victoria is a major producer of a wide variety of fruit and about 120,000 acres are used for orchards and vineyards. The three most important districts are the area within 50 miles of Melbourne (apples, dessert tree fruits, and berries), the Goulburn Valley (canning fruit), and the Mallee region (vine fruit and citrus).

Most of the fruit growing districts south of the Dividing Range receive an annual rainfall of between 25 and 35 inches. This rainfall is fairly evenly spread, but in many areas additional irrigation is essential from January to March. This water is supplied from natural catchments, rivers, or town supplies. The north-eastern section of the State has a rainfall of from 20 to 40 inches, but the average rainfall in the Goulburn Valley is 19 inches and in the Mallee only 10 inches. In these districts elaborate irrigation schemes of the Lower Murray Valley and of the Goulburn and Campaspe Rivers make possible the large scale development of the fruit industry. The distribution of water is effected mainly by gravity except for small areas of citrus under spray irrigation.

Because of the high capital expenditure invested in orchard land and equipment and with the keen competition for local and overseas markets, most Victorian growers realise that they have to produce increased quantities of better quality fruit without increasing costs. To achieve this, labour expenses are cut by high capacity spraying units for pest control and by bulk handling of the crop. Many orchardists use fruit thinning sprays to make hand thinning less time consuming. The increasing use of weedicides in orchards and vineyards has reduced the need for cultivation. Lighter pruning of apples is showing promising results in southern Victoria and this trend could also become an important factor in reducing labour costs.

Statistics on fruit growing are collected from all persons who grow fruit for sale (for all purposes). Particulars of fruit production (excluding vines) for the five seasons 1965-66 to 1969-70 are given in the following table :

VICTORIA—FRUIT GROWING

Particulars		1965-66	1966-67	1967-68	1968-69	1969-70
Number of growers		4,435	4,563	4,221	4,197	3,937
Area	acres	75,001	73,519	71,158	71,598	70,883
Gross value of fruit produced	\$'000	34,977	32,327	34,462	30,804	..
Kind of fruit—						
Apples	bushels	4,206,028	4,356,989	3,874,995	4,857,746	5,330,770
Pears	"	5,453,339	4,700,818	5,341,706	3,419,992	7,043,916
Quinces	"	21,946	25,089	15,935	17,515	22,257
Apricots	"	545,547	529,551	503,965	440,205	574,483
Cherries	"	140,207	120,731	178,410	148,824	141,741
Nectarines	"	33,323	36,723	37,372	33,358	34,502
Peaches	"	2,602,822	2,731,525	3,344,333	2,721,995	2,974,780
Plums	"	154,453	147,643	145,202	124,591	114,003
Prunes	"	20,397	21,421	15,892	12,874	18,416
Lemons and limes	"	120,554	147,881	169,596	215,255	163,930
Oranges—						
Navels	"	437,318	454,929	452,903	527,480	504,589
Valencias	"	537,940	660,194	638,522	808,095	742,038
Other oranges	"	36,389	28,647	29,849	24,217	33,216
Mandarins	"	41,207	64,350	80,286	81,181	77,752
Grapefruit	"	82,399	73,273	86,954	95,498	111,382
Figs	"	1,314	1,127	602	1,049	626
Passionfruit	"	3,520	3,914	5,356	5,532	4,534
Olives	"	36,471	15,030	38,070	23,957	34,595
Gooseberries	cwt	735	872	599	380	609
Loganberries	"	1,098	909	819	641	470
Raspberries	"	3,268	2,859	3,091	2,138	3,266
Strawberries	"	19,947	24,387	30,464	33,473	38,415
Youngberries	"	4,711	4,044	4,403	2,695	4,786
Other berries	"	666	903	771	331	843
Almonds	lb	51,322	32,522	34,484	17,947	33,657
Filberts	"	12,060	11,680	5,840	2,935	6,608
Walnuts	"	138,930	69,606	158,272	182,889	149,698

The production of the principal kinds of dried tree fruits for each of the last five seasons is shown in the following table. Particulars in respect of dried vine fruits appear on pages 333-4.

VICTORIA—DRIED TREE FRUITS
(lb)

Season	Apricots	Peaches	Pears	Prunes	Others	Total
1965-66	6,824	2,340	2,467	447,760	3,332	462,723
1966-67	16,175	716	250	306,958	215	324,314
1967-68	18,407	3,628	4,313	230,560	481	257,389
1968-69	29,832	3,038	9,916	164,909	70	207,765
1969-70	4,726	784	..	198,333	..	203,843

Cool storage

The fruit industry has been well aware of the importance of refrigeration since the end of the last century. Before the First World War several co-operative and privately owned cool stores had been built, besides the first Government Cool Stores, at Flinders Street, Melbourne. The Government also built and operated five other stores situated in the fruit growing districts close to Melbourne. These have been gradually handed over to growers' co-operatives.

The extension of electric power to rural areas throughout the State has resulted in the construction of numerous small private cool stores. More efficient refrigeration techniques and insulating materials have also helped to spread the idea of cool storage. Since the Second World War there has been a rapid increase of cool store capacity in Victoria, mainly because of the very rapid development of small cool stores built in individual orchards.

Many of the small orchard cool stores are used to pre-cool highly perishable soft fruits (apricots, peaches, plums, and berries) and tomatoes before they are forwarded to Melbourne or interstate markets. These fruits ripen in the summer and at high summer temperatures often become over-ripe and worthless in the interval between picking and marketing, unless pre-cooled at the orchard within a few hours of picking.

Most of the orchard cool stores, situated within 50 miles of Melbourne, are used, together with the larger co-operative and proprietary stores, to achieve a more gradual marketing of Victoria's apple and pear crop. This supply of good quality fruit from store at regular intervals for a period of 6-9 months calls for considerable skill and knowledge. The fruit picked is still alive and continues its living processes for a certain time, influenced by the variety, its ripeness at the time of harvesting ("picking maturity"), interval between harvesting and beginning of cool storage, temperature and humidity of cool chambers, and other factors. Cool storage behaviour of the fruit and the type of storage provided are also of great importance with the fruit exported to overseas markets.

To assist the industry with cool storage research, experimental cool chambers were set up at the Government Cool Stores, Victoria Dock, in 1923. In 1956 these were transferred to the Scoresby Horticultural Research Station, where large and better experimental chambers were constructed for this purpose.

Vine fruits

Most vine fruits grown in Victoria are marketed as dried fruits (currants, sultanas, and raisins). Smaller quantities are sold as fresh fruit or are used

for wine production. Some 50,000 acres of vines are grown in the irrigated districts of the River Murray at Mildura, Robinvale, and Swan Hill. The climate at Mildura and Robinvale provides the high temperatures and clear sunny conditions during the growing season and drying period which are essential for the production of first quality dried fruit. The Swan Hill district with slightly lower temperatures and higher rainfall is less suitable than Robinvale and Mildura.

After dipping and sun drying by the grower, the dried fruit is processed and packed in packing houses. The production of dried fruits in Victoria for the season 1969-70 amounted to 63,801 tons of sultanas, 3,383 tons of currants, and 3,269 tons of raisins. Approximately 70 per cent of this produce was exported.

During recent years the growing of grapes for table use has expanded rapidly and with some growers has become a specialised industry. The main varieties are Waltham Cross, Purple Cornichon, Ohanez, Sultana, and Muscat. Melbourne and Sydney are the main market outlets, but Indonesia, Colombo, and Singapore may grow in importance as export markets.

Grapes are grown specifically for wine production at Rutherglen, Great Western, and Nagambie. While the wine growing area around Rutherglen is slowly expanding, increasing quantities of grapes for winemaking are produced in the River Murray irrigation districts. In 1969-70, 7.2 million gallons of wine were produced.

Particulars of vine production for the five seasons 1965-66 to 1969-70 are given in the following table :

VICTORIA—VINE FRUIT PRODUCTION

Season	Number of growers	Area		Production				
		Bearing	Not bearing	Grapes gathered	Wine made	Dried fruits		
		acres	acres	'000 cwt	'000 gals	Raisins cwt	Sultanas cwt	Currants cwt
1965-66	2,561	44,788	3,829	5,660	3,152	141,206	1,047,149	62,545
1966-67	2,538	45,381	3,783	6,530	3,555	125,085	1,266,927	71,552
1967-68	2,490	44,802	3,923	5,975	5,180	101,014	1,083,418	63,314
1968-69	2,443	44,719	4,251	4,101	6,241	71,461	686,456	53,740
1969-70	2,493	45,647	4,191	6,771	7,251	65,388	1,276,025	67,669

Growing of grapes for wine, 1964; Dried fruits industry, 1967; Wine, 1968

Vegetables

The climate of Victoria is such that practically every kind of vegetable can be grown in some part of the State during the favourable season in each area. Consequently, there is a plentiful supply of fresh vegetables on the market for the whole year in normal years. These vegetables (excluding potatoes and onions), worth about \$24m to Victoria, are harvested from about 50,000 acres.

Almost half the area under vegetables is within 50 miles of Melbourne. Other vegetable producing centres south of the Dividing Range are in the Western District (the centre of processed pea production) and in Gippsland (the centre of the stringless bean growing industry for processing and also for seed bean production). These areas are fairly free of frosts and have

a well distributed annual rainfall ranging from 20 to 35 inches. Vegetables are grown on a wide variety of soils (sand, sandy loam, clay loam, peat, and volcanic). Many vegetable growers use irrigation from town water supplies, storage catchments, streams, and dams to supplement rainfall.

North of the Dividing Range the summer is longer and hotter, but winter frosts are more frequent. Many areas along the lower Murray are ideal for growing early spring crops and efficient transport enables produce to be shipped to both Melbourne and Sydney. In some instances intercropping in orchards and vineyards is practised. Tomato production for processing is now largely concentrated in the Goulburn Valley but other important production areas are situated along the Murray and Loddon Rivers and in the Maffra irrigation district in Gippsland. The greatest part of the Victorian crop comes from the Goulburn Valley.

Returns from vegetable growing can fluctuate greatly according to weather and market conditions and production methods have to be highly efficient. Market gardens near Melbourne may grow two and sometimes three crops in the one year. While a number of hand operations are still essential, mechanisation and the use of selective weedicides have greatly reduced labour costs. Peas, beans, and onions can be harvested mechanically and a number of mechanical aids are used for harvesting other crops. New varieties and improved storage and transport techniques have also increased production efficiency.

While most crops reach the consumer as fresh vegetables, an increasing amount of produce is being processed and a feature of the Victorian industry is the rapid increase in the production of peas and beans for freezing.

Details of the area, production, and gross value of vegetables are given in the table below for all the more important types, including potatoes and onions which are shown in greater detail under separate headings on pages 328-9.

VICTORIA—VEGETABLES FOR HUMAN CONSUMPTION,
1969-70

Type	Area sown	Production	Gross value
	acres	tons	\$'000
Potatoes	39,765	279,553	17,002
Onions	3,296	21,339	1,469
Carrots	2,264	30,986	2,394
Parsnips	565	6,318	992
Beetroot	203	1,966	75
Tomatoes	4,982	61,437	4,138
French beans	3,239	6,418	1,054
Green peas—			
Sold in pod	3,399	5,056	2,121
Canning, etc. (pod equivalent)	25,010	(a) 39,422	3,375
Cabbages	1,816	21,002	777
Cauliflowers	2,360	40,696	2,605
Brussels sprouts	673	2,032	660
Lettuce	2,175	14,086	2,634
Pumpkins	1,946	8,947	716
Other vegetables	4,367	22,747	2,538
Total	96,060	562,005	42,550

(a) Shelled weight 17,724 tons.

Minor crops

There are other crops cultivated in Victoria in addition to those enumerated on pages 312-3. The most important of these are nursery products, cut flowers, Japanese millet, sunflowers, agricultural seeds, vegetable seeds, and safflower.

Pastoral and dairying*Progress of stock breeding*

The first great development in Victoria, or as it was then known, the district of Port Phillip, was the pastoral interest. Millions of acres of lightly timbered land lay before the newcomers, and the quickest way to wealth was evidently by the division of the land into runs and the depasturing of sheep and cattle. Settlers and stock came at first from Tasmania and eventually from New South Wales.

According to early statistical records, there were 26,000 sheep, 100 cattle, and 57 horses in the Colony on 25 May 1836. On 1 January 1841, as a result of five years of livestock importation and breeding, there were 782,283 sheep, 50,837 cattle, and 2,372 horses. By 1 January 1851 the livestock population had increased to 6,032,783 sheep, 378,806 cattle, 21,219 horses, and 9,260 pigs.

The following table shows the number of livestock in Victoria at decennial intervals from 1861 to 1961 and the numbers of livestock on rural holdings for each of the five years 1966 to 1970. As from 1957 no allowance has been made for the small number of livestock not on rural holdings.

VICTORIA—LIVESTOCK
(‘000)

Year	Horses (including foals)	Cattle (b)		Sheep	Pigs
		Dairy	Beef		
1861 at 31 March	77		722	5,781	61
1871 " "	167		721	10,762	131
1881 " "	276		1,286	10,360	242
1891 " "	436		1,783	12,693	282
1901 " "	392		1,602	10,842	350
1911 at 1 March	472		1,548	12,883	333
1921 " "	488		1,575	12,171	175
1931 " "	380		1,430	16,478	281
1941 " "	318		1,922	20,412	398
1951 at 31 March	186	1,489	727	20,012	237
1961 " "	64	1,717	1,147	26,620	319
1966 " "	(a)	1,921	1,416	30,968	384
1967 " "	55	1,968	1,560	31,239	351
1968 " "	(a)	1,963	1,511	27,909	377
1969 " "	(a)	1,960	1,918	30,185	422
1970 " "	(a)	1,975	2,488	33,157	495

(a) Not collected.

(b) Separate figures for beef and dairy cattle are not available for years before 1943.

A table showing the sizes of holdings and the numbers of holdings depasturing stock at 31 March 1966 appears on page 309. Dot maps showing the distribution of livestock on rural holdings in Victoria at 31 March 1962 appear on pages 577 to 580 of the *Victorian Year Book* 1964.

Following an investigation into the adequacy of the wording and layout of the cattle sections of the Agricultural, Dairying, and Pastoral Statistics form, changes were introduced to the 1963-64 form.

Before 1964 farmers were asked to classify their herds as either "beef cattle" or "dairy cattle". As these two terms tended to confuse breed and purpose, farmers were asked in the new design to classify their cattle, with the exception of bulls, according to the two main purposes of (i) milk production and (ii) meat production, irrespective of breed, and to report separately the number of cows and heifers kept for their own domestic milk supply; bulls were to be reported according to their breed and age, i.e., dairy or beef and over or under one year of age. Consequently, the detailed statistics of cattle for 1970 set out in the following table are not comparable with those for years prior to 1964.

VICTORIA—DISTRIBUTION OF LIVESTOCK AT 31 MARCH 1970
(^{'000})

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-eastern	North-eastern	Gippsland	
Cattle—									
Bulls for service—									
Bulls, 1 year and over—									
Dairy breeds	5	1	8	1	(a)	7	2	9	34
Beef breeds	8	3	15	2	1	7	8	9	54
Bull calves—under 1 year—									
Dairy breeds	2	(a)	3	(a)	(a)	3	1	3	14
Beef breeds	4	2	7	1	1	3	3	3	24
Cows and heifers for milk and cream—									
Cows in milk	128	12	178	6	11	264	39	293	931
Cows—dry	44	7	112	4	3	36	35	73	314
Heifers—1 year and over	44	6	75	3	4	81	20	88	322
Heifer calves—under 1 year	42	6	78	3	5	90	19	92	335
House cows and heifers	4	2	5	4	2	4	3	2	25
Other cattle and calves for meat production—									
Cows and heifers	180	80	335	44	26	138	202	217	1,222
Calves—under 1 year	115	49	188	34	23	123	123	153	809
Other	56	24	76	9	7	51	69	87	379
Total cattle	633	192	1,082	110	84	808	522	1,031	4,462
Pigs	75	14	44	46	40	167	49	61	495
Sheep	2,595	2,652	12,004	5,185	2,229	4,442	2,005	2,046	33,157

(a) More than nil but less than 500.

Changing patterns in animal husbandry, 1963

Fodder conservation

The intensification of fodder conservation has been a natural development in farm management following pasture improvement and increased capacity for the carrying of livestock.

Even the best pastures do not provide a full ration for grazing animals throughout the year because of seasonal variations in their growth. In addition, droughts and other circumstances, such as floods or fires, have serious effects on the amount of grazing available. In most cases these feed shortages must be met by fodder conservation and hand feeding. Fodder conservation is, therefore, a highly important farm activity without which stable livestock production could not be maintained at high levels.

In Victoria, meadow hay is the main fodder conserved, being cheaply and readily available from surplus spring pasture growth in most seasons. In fact, this source of fodder is not fully exploited, since, while individual farms may cut 25 per cent or more of their farms for hay, on average less than 10 per cent of the State's improved pastures are cut each year. Nevertheless, Victoria produces some 60 per cent of Australia's meadow

hay, although it has only about 30 per cent of Australia's sown grasses and clovers. Cereal hay (mainly oaten) is also made in large quantities, especially in drier districts and in drier years, i.e., in circumstances where good pasture production may be irregular, or low due to poor spring rains.

Lucerne hay is generally produced as a quality fodder intended for cash sale, and considerable quantities are conserved, especially in irrigated areas. However, the excellent quality of much of the clover and grass hay made from improved pastures has lessened interest in lucerne for general on-farm bulk reserves although there is currently considerable interest in its use in prepared formulated feeds, and also for its possible export to overseas countries. Oat grain, which is easily stored, transported, and rationed, is an important livestock fodder favoured for sheep in both cereal growing and grazing districts. More recently wheat has also been used, farmers having become familiar with its use as a result of its enforced feeding in widespread drought conditions in 1967. Silage occupies a relatively minor position in the fodder conservation of the State, although important to dairy farmers meeting wholemilk supply contracts in dry farming areas. Silage is also used successfully for feeding beef cattle, and has special value as a drought reserve.

Most hay in Victoria is made with the mower, side-delivery rake, and pick-up baler. About one in six farms has a baler. After mowing, the crop dries for a time in the swath, and is then raked for further drying in the windrow before it is baled. Some farmers are using systems of loose hay handling and self-feeding based on simple low cost equipment, especially in northern areas or where short-term storage of hay is involved for early feeding needs.

Sometimes baled hay intended for summer or early autumn feeding is left in the paddock for self-feeding by the stock. Provided the hay is well made and, preferably, stored in stooks, there is little wastage in such temporary storage, especially if feeding is controlled. Long-term storage requires adequate protection, such as is given by a well constructed shed. A new technique of haymaking, unique to Australia, has been the practical development of a machine that rolls hay directly from the windrow into large cylindrical rolls that are usually left as completed, for later self-feeding. When tightly made such rolls weather well throughout summer and autumn and provide a valuable early ration for stock. For best effect, their feeding is chiefly controlled by temporary fencing or heavy ("mole") stocking; less often they may be picked up by a buckrake type device and stored or carted to the stock. It is likely that fodder rolling—as this technique is called—will become more widespread because of its simplicity and potentially high capacity and cheapness.

In recent years, increasing interest has been taken in new machines and techniques aimed at faster drying of hay. This is a most significant development, since it makes possible further increases in hay production as well as the production of higher quality hay because better use is made of the limited drying time available when the crop is at its best. The types of machines used include tedders, which loosen and aerate the hay lying in swath or windrow; conditioners, which crush or crimp fresh hay between rollers and enable internal moisture to move faster through the fractured cuticle of the plants; and rotary slashers and flail mowers, in which cutting by high speed impact replaces conventional mowing and the drying rate

may increase as a result of the bruising and cuticle damage that the crop experiences. Very fast drying is given with the flail mower when the flail rotor is set to distribute the cut material evenly and lightly across as wide a swath as possible. If the flail cuts too fast the cut material can pack too tightly for even, fast drying, but rather lumps and dries slowly.

The rotary slasher, if well designed and operated, can prove a suitable substitute for the conventional mower in rough conditions, for it is a robust machine, having developed from an intended specific use for slashing rough weeds and other growth. However, it does not speed up drying as much as the flail, although it is usually as fast as the conventional mower and occasionally faster if the cut swath is evenly spread.

Ensilage

Much ensilage is still made in open stacks using a mower and buckrake. This is simple, but wastage is high. The flail-type forage harvester is popular because of simple cutting action and relative cheapness. It consists of swinging blades which rotate at high speed on a horizontal shaft. The crop is thrown into an accompanying trailer or truck for transport to storage. Flail cutting has opened the way to more effective ensilage making and control of the process because the cut material packs better in storage, thereby excluding air and so preventing the heating which destroys nutrients and lowers digestibility of the resulting silage. Improved storage and feeding techniques are generally leading to more effective use of ensilage than is possible with high wastage open stack methods. Trenches and pits, if suitably sited and well made, provide excellent storage conditions. Stacks with clamp sides or bunkers also give good storage, while plastic sheeting can also be used to exclude air and water and thus reduce waste when properly applied.

Further references, 1963, 1965-1971

Dairying industry

In 1970, for the first time in its history, the dairying industry in Victoria (and Tasmania) was asked to reduce its production of milk for manufacture, as compared with the level reached in the previous season. The request was made by the Australian Dairy Industry Council in view of the prospect that, should the trend towards increased production continue, some butter would have to be sold, if at all, at very low, unprofitable prices. By October 1970 this "containment" programme was suspended because of the unexpectedly large shortfall in production in dairying districts of Queensland and New South Wales affected by drought. In the longer term, however, the industry still faced the prospect of severe curtailment of its sales to Britain, its most important export market for dairy products, if that country, together with Denmark and Ireland, were to join the European Economic Community.

In the preceding years dairy farmers in Victoria had been increasing their herds and output in order to offset the narrowing gap between costs of production and returns from sales of milk, while those without this potential left the industry. This trend began after 1956-57, when the number of dairy farms in the dairying districts reached its highest point of 26,952, carrying 912,633 cows or an average of 34 cows per farm. By 1969-70 the number of such farms had fallen to 19,068. The number of milking cows, however, had risen to 1,220,656, or 64 cows per farm.

Production containment was a serious matter for those farmers who had planned to increase their herds in order to maintain a satisfactory profit margin. Many reared their herd replacement calves on nurse cows in order to divert some milk from factory supply and to eliminate the cost of buying calf feed. Many also turned their attention to the rearing of surplus calves for meat production. Taking advantage of artificial breeding, some farmers mated a part of the herd to bulls of beef breeds, but there was a very large increase in the use of Friesian bulls, whose progeny are well suited to either milk or meat production.

Victoria now produces 53 per cent of Australia's milk, mainly from some 13,000 farms carrying 50 or more cows. These are usually viable economic units, the exceptions being those farms bought in recent years at unreasonably high prices. Most are committed to dairying; 12,741 have bulk milk tanks, of which 8,298 are refrigerated. Some 1,600 farmers with herds between 40 and 49 cows could earn a satisfactory living if they were free of debt and elected to leave the problem of depreciation to the future. Some 4,400 farmers with less than 40 cows derive only part of their income from dairying.

About 7,000 dairy farmers supply a part of their output to the Milk Board for the market milk trade.

VICTORIA—DAIRYING

At 31 March—	Number of cow keepers	Number of dairy cows	Estimated total production of milk for all purposes (year ended 30 June)	Gross value of dairy produce (a)
		'000	'000 gals	\$'000
1966	(b)	1,192	751,564	190,141
1967	(b)	1,211	790,941	210,345
1968	(b)	1,200	734,451	181,541
1969	27,061	1,209	815,791	202,245
1970	27,057	1,245	897,326	223,617

(a) Includes subsidy.

(b) Not collected.

VICTORIA—BUTTER, CHEESE, CONDENSED AND POWDERED MILK, AND CASEIN MADE ('000 lb)

Year ended 30 June—	Butter (a)	Cheese (a)	Condensed milk	Powdered full-cream milk	Casein
1966	250,680	58,158	122,650	24,506	48,531
1967	266,907	67,907	113,559	24,188	38,509
1968	241,240	73,570	95,064	24,258	37,399
1969	280,206	75,256	90,716	30,608	59,323
1970	313,753	73,866	93,102	28,575	45,638

(a) Small quantities of butter and cheese made on farms are excluded from the above table.

Further reference, 1971; Eradication of tuberculosis, 1962; Sharefarming in the dairying industry, 1967; Milk Board, 1971

Pig industry

Victoria is one of the major pig producing States of Australia. In the past a substantial part of her supplies of pig meat came from other States but as a result of the development of the pig industry in Victoria most of the pig meat consumed in Victoria nowadays is produced in this State.

Australians are relatively large meat eaters but eat much less pig meat than most other nations. Pig meat provides only about 10 per cent of the total meat consumed by Australians. That is due partly to traditional eating habits, and partly to the relative costs of sheep, poultry, and cattle meat, produced on low cost pasture, and pig meat, produced from concentrate foods such as grain. Pigs have a limited capacity for consuming pasture. Pigs have always been used to salvage waste and by-products from the production, processing, and eating of human foods. The low cost of such foods enables pigs to be raised and sold profitably. When the supply of salvage fed pigs is insufficient to satisfy demands, grain and other foods are fed to pigs in increasing quantities, either with the salvaged foods or separately. Such pig production is more costly and is therefore sensitive to variations in the selling price of pigs. The pig industry was developed largely in conjunction with the dairy industry. Pigs were used to salvage separated milk, buttermilk, and whey, the by-products of butter, cheese, and casein manufacture, and those foods provided the greater part of their diet. In the 1950s and 1960s more milk was used for human food and less was available for pigs. Pig production then became less dependent on milk but more on grain feeding, protein foods, animal by-products such as meat, bone meal, fish meal, and whale solubles. With this change in the major source of food for pigs, the structure of the pig industry changed to fewer but larger pig herds.

Pigs mature early, are prolific, and grow fast. A sow can produce a litter of eight pigs when she is twelve months old, her pigs can be ready for pork when three and a half to four months old, or for bacon when five to six months old, and then the sow can produce her second litter. There are large variations in the annual production of pigs and this causes fluctuations in the prices farmers receive for their pigs. The variations in supply are caused more by the rapid production potential of pigs, and the absence of adequate forward information on trends, than by changes in seasonal conditions. There is usually ample grain to maintain pig production. There is no scheme to support pig prices in Australia.

In the 1930s and early 1940s Australia exported pig carcasses, mainly to the United Kingdom, where it had a protected market. In 1941 over one third of Australia's pig production was exported. Since then, production and demand have come closer together and only an insignificant part of the country's production is exported.

Most pig raising units now provide the major part of the income from the farms concerned. More capital and skilled management are involved in the individual units.

The number of pigs in Victoria at 31 March 1970 was 495,128. About 70 per cent of these are held in the Central, Western, Northern, and Gippsland districts. The following table shows classifications (in statistical districts) of pigs, together with the numbers of pig keepers :

VICTORIA—PIGS AND PIG KEEPERS, 31 MARCH 1970

Statistical District	Boars	Breeding sows	All other	Total pigs	Pig keepers
Central	955	10,337	63,529	74,821	823
North-Central	259	1,989	11,595	13,843	361
Western	822	6,517	36,404	43,743	959
Wimmera	862	6,322	39,089	46,273	1,229
Mallee	992	5,901	32,650	39,543	977
Northern	2,232	24,919	139,702	166,853	1,631
North-Eastern	838	6,956	41,162	48,956	793
Gippsland	977	8,666	51,453	61,096	897
Total	7,937	71,607	415,584	495,128	7,670

The following table shows the latest statistics available of the number of dairy herds (in size groups) separated into those where pigs are held, and those where no pigs are held. The sizes of pig herds are also shown.

VICTORIA—PIG KEEPING IN CONJUNCTION WITH DAIRYING:
NUMBER OF HOLDINGS AT 31 MARCH 1969

Size of dairy cattle herd (numbers)	Size of pig herd (numbers)								Holdings with—		
	1-4	5-9	10-14	15-19	20-29	30-49	50-99	100 and over	Pigs	No pigs	Dairy cattle
1-4	178	104	59	35	46	64	54	36	576	3,487	4,063
5-9	109	59	41	19	43	43	40	14	368	1,582	1,950
10-14	69	40	39	17	23	27	33	12	260	939	1,199
15-19	38	31	19	17	22	19	18	14	178	661	839
20-29	70	52	30	24	47	34	25	24	306	965	1,271
30-49	91	90	80	34	95	85	69	37	581	1,741	2,322
50-69	70	81	75	63	107	123	90	47	656	2,008	2,664
70-99	58	60	62	60	137	205	212	98	892	3,644	4,536
100-149	47	38	41	34	67	161	273	175	836	4,637	5,473
150 and over	36	14	14	15	26	38	103	194	440	2,300	2,740
Total	766	569	460	318	613	799	917	651	5,093	21,964	27,057

*Sheep industry**Sheep breeds*

The first sheep to arrive in Victoria were Tasmanian Saxon Merinos which were brought to the Portland area by Edward Henty in December 1834. In the following year William Furlonge landed Saxon Merinos at Port Phillip, and so shared with Henty the distinction of founding the sheep industry in Victoria. Sheep numbers increased rapidly until the early 1840s, largely because New South Wales pastoralists brought their flocks southwards and John Batman's Port Phillip Association landed Saxon Merinos from Tasmania. In November 1836 there were only 41,000 sheep in Victoria, increasing to 310,000 by 1838; two years later the sheep population was 782,000. By 1851 Victoria had over six million sheep. At this time most of the available pastoral land had been taken up and was being used for grazing.

Despite periodic droughts, Victorian sheep numbers have shown a steady trend upwards. At the census of 31 March 1970 the State had 33 million sheep, which was 17 per cent of the total Australian sheep population. The geographical distribution of all sheep and rams in Victoria is shown on pages 343-4.

VICTORIA—GEOGRAPHICAL DISTRIBUTION OF BREEDS OF SHEEP (INCLUDING RAMS) AT 31 MARCH 1970

Breed	Statistical District								Total	Percentage of total sheep
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern	Gippsland		
Merino	735,224	1,464,079	5,365,284	3,961,971	1,109,238	1,845,513	840,630	895,917	16,217,856	48.91
Crossbred	1,023,874	658,105	2,235,958	594,032	796,931	1,903,793	705,485	758,250	8,676,428	26.17
Corriedale	342,423	185,555	2,084,491	330,438	91,260	236,366	155,526	134,122	3,560,181	10.74
Merino Comeback	162,033	218,406	961,050	118,132	85,314	165,714	131,480	128,118	1,970,247	5.94
Polwarth	156,927	21,529	710,727	9,893	3,045	28,331	59,034	9,836	999,322	3.01
Border Leicester	56,442	41,635	124,983	88,093	71,153	112,055	34,987	40,807	570,155	1.72
Romney Marsh	15,300	4,934	339,610	19,059	7,494	5,503	15,962	24,850	432,712	1.31
Dorset Horn	45,210	25,679	85,237	36,323	42,119	86,398	39,599	19,769	380,334	1.15
Poll Dorset	17,630	13,663	15,924	10,441	19,247	24,393	8,672	9,511	119,481	0.36
Southdown	28,990	12,893	37,590	1,090	422	12,869	3,762	12,967	110,583	0.33
Zenith	1,878	1,523	22,663	14,702	707	17,370	4,320	16	63,179	0.19
Ryeland	3,789	2,097	5,118	44	289	1,554	2,495	3,446	18,832	0.06
Cheviot	1,799	524	2,852	8	110	547	322	2,303	8,465	0.02
English Leicester	56	691	1,581	195	5	511	1,129	2,860	7,028	0.02
Perendale	2,150	141	1,773	17	..	207	840	1,052	6,180	0.02
Suffolk	1,070	109	1,566	40	364	30	84	280	3,543	0.01
All other	532	678	7,267	162	1,149	546	445	1,525	12,304	0.04
Total	2,595,327	2,652,241	12,003,674	5,184,640	2,228,847	4,441,700	2,004,772	2,045,629	33,156,830	100.00

Relative to other States (except Tasmania) the most noticeable feature of Victorian sheep numbers is the smaller proportion of Merinos (49 per cent) and the larger proportion of crossbred and comeback sheep (32 per cent) and breeds other than Merino (19 per cent). By comparison the Australian flock consists of Merinos (73 per cent), comebacks and crossbreds (15 per cent), and other recognised breeds (12 per cent). These figures indicate the importance to Victoria of the prime lamb industry which is largely based on first cross ewes (Border Leicester x Merino) and British breed rams.

Although Victoria has relatively fewer Merinos, they produce the finest quality wool. In particular, wools from the Western District enjoy a world wide reputation for their colour, style, fineness of spinning count, and their high yielding properties. With the exception of the Mallee and Wimmera and parts of the Northern District, where the South Australian types of Merino are more numerous, a majority of Merinos found in Victoria are fine- and medium-woolled types.

Corriedales comprise 11 per cent of the sheep population of Victoria. The breed is noted for its production of high quality, fine crossbred wool, and its meat producing ability. The breed originated in 1874 in New Zealand. However, it was not until 1882 when Henry Corbett mated Merino rams to Lincoln ewes, and fixed this "half-bred" type, that the breed was established in Australia. Corriedales are found throughout most of Victoria with a heavier concentration in the Western District.

Like the Corriedale, the Polwarth is regarded as a dual-purpose animal and is based on Lincoln ($\frac{1}{4}$) and Merino ($\frac{3}{4}$) blood lines. The breed was developed in Victoria for those areas which were believed to be too wet and cold for Merino wool growing. It comprises 3 per cent of the total sheep numbers and is concentrated in the southern parts of the Western District, the Central District, and the North-Eastern District.

The main British breeds of sheep in Victoria are the Romney Marsh, Border Leicester, Dorset Horn, Poll Dorset, and Southdown. Romney Marsh and Border Leicester rams are often joined with Merino ewes to produce prime lamb dams. Southdown, Dorset Horn, and Poll Dorset rams are the most important sires for prime lamb production.

VICTORIA—BREEDS OF SHEEP (INCLUDING RAMS)

Breed	31 March 1965		31 March 1968		31 March 1970	
	Number	Percentage of total	Number	Percentage of total	Number	Percentage of total
Merino	14,148,138	46.48	12,810,165	45.90	16,217,856	48.91
Dorset Horn	423,600	1.39	409,774	1.47	380,334	1.15
Corriedale	4,581,697	15.05	4,081,828	14.63	3,560,181	10.74
Border Leicester	394,872	1.30	509,229	1.82	570,155	1.72
Southdown	108,588	0.36	108,508	0.39	110,583	0.33
Polwarth	1,224,100	4.02	981,631	3.52	999,322	3.01
Romney Marsh	592,460	1.95	597,952	2.14	432,712	1.31
Ryeland	28,076	0.09	18,816	0.07	18,832	0.06
Poll Dorset	30,811	0.10	106,562	0.40	119,481	0.36
English Leicester	13,415	0.05	8,144	0.03	7,028	0.02
Cheviot	16,551	0.06	10,152	0.04	8,465	0.02
Zenith	45,938	0.15	56,493	0.20	63,179	0.20
Suffolk	2,912	0.01	4,365	0.02	3,543	0.01
Shropshire	426	(a)	1,708	0.01	542	(a)
Lincoln	18,765	0.06	6,881	0.02	4,953	0.01
Other (including Merino comeback and other crossbreds)	8,806,805	28.93	8,196,546	29.34	10,659,664	32.15
Total	30,437,154	100.00	27,908,754	100.00	33,156,830	100.00

(a) Less than 0.01 per cent of total.

The numbers of each of the breeds are continually changing as a result of seasonal conditions throughout the State and the relative prices of wool, meat, and cereal grains. In a poor season sheep numbers may decrease as a result of lower lambing percentages and increased slaughtering of "fat" stock. There is often a large seasonal variation in sheep numbers because of movement of fat and store sheep between Victoria and New South Wales and South Australia.

The numbers of sheep in Victoria in selected years since 1861 are shown in the table on page 336. The distribution of all livestock is shown in the table on page 337.

The increase in sheep numbers in recent years has been due to pasture improvement and intensification of stocking rates on established improved pastures.

However, factors such as seasonal conditions, prices of wool, mutton, lamb, and to a lesser degree, wheat, affect the number of sheep in the State in any given year. In an adverse season flocks may be reduced by lack of fodder or water, by the increase in the slaughtering of fat stock, or by the decrease in lambing. Decreased imports from other States are another factor. In addition to the seasonal movements of sheep from New South Wales and South Australia for agistment, there is a regular importation of sheep from those States for slaughtering purposes.

Lambing

Climatic conditions also play a large part in determining the proportion of lambs marked to ewes mated, and thus the natural increase from season to season may vary considerably. The following table shows the number of ewes mated or intended to be mated, the number actually mated, and lambs marked, in each of the five seasons 1966-67 to 1970-71 :

VICTORIA—LAMBING

Season	Ewes intended for mating	Ewes actually mated	Lambs marked	Proportion of lambs marked to ewes mated
	'000	'000	'000	per cent
1966-67	12,674	12,605	10,626	84
1967-68	13,205	12,476	10,101	81
1968-69	11,797	11,557	9,255	80
1969-70	14,037	13,910	12,266	88
1970-71	14,830	14,841	12,724	86

Sheep and lambs in statistical districts

The following table sets out the number of rams, ewes, wethers, and lambs depastured in each statistical district of the State at 31 March 1970, and lambing details for the 1969 season.

VICTORIA—SHEEP AND LAMBS IN EACH STATISTICAL DISTRICT AT
31 MARCH 1970
(‘000)

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-eastern	North-Eastern	Gipps-land	
Rams	31	26	137	49	25	56	24	24	372
Ewes	1,300	1,154	5,815	2,316	1,356	2,532	1,071	1,085	16,630
Wethers	707	990	2,979	1,711	323	961	544	448	8,663
Lambs	557	481	3,072	1,109	525	892	366	488	7,492
Total sheep and lambs	2,595	2,652	12,004	5,185	2,229	4,442	2,005	2,046	33,157

VICTORIA—LAMBING, 1969-70 SEASON

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Ewes mated '000	1,141	972	4,833	1,804	1,093	2,158	960	949	13,910
Lambs marked '000	1,067	857	4,183	1,524	973	1,943	831	888	12,266
Percentage	94	88	87	84	89	90	87	94	88

The following table sets out on a statistical division basis the numbers of ewes mated or intended to be mated for the 1970 lambing season classified according to whether the progeny is intended for wool or fat lamb production :

VICTORIA—LAMBING FORECAST: EWES MATED OR INTENDED TO BE MATED FOR LAMBING DURING 1970 SEASON

(As advised by farmers at 31 March 1970)
('000)

Statistical Division	Breed of ram used—				
	Merino	Corriedale or Polwarth	Shortwool breeds	Longwool breeds	Total
Melbourne	21	28	175	16	240
Central	197	148	323	32	701
North Central	380	76	404	119	979
Western	2,489	1,368	954	479	5,291
Wimmera	1,148	204	320	228	1,900
Mallee	222	48	551	258	1,079
Northern	441	116	1,245	379	2,181
North Eastern	362	139	771	154	1,426
Gippsland	251	85	452	105	893
East Central	8	6	120	7	140
Total	5,519	2,217	5,316	1,778	14,830

Production of wool

Statistics of wool production are obtained direct from growers, from fellmongeries and, for wool exported on skins, from the Department of Customs and Excise.

VICTORIA—SHEEP AND LAMBS SHORN, SEASON 1969-70

Statistical District	Shorn		Wool clipped (including crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per sheep	Per lamb
	'000	'000	'000 lb	'000 lb	lb	lb
Central	2,312	658	24,284	1,920	10.50	2.92
North-Central	2,627	574	28,852	1,684	10.98	2.93
Western	11,246	3,483	117,813	10,820	10.48	3.11
Wimmera	4,775	1,303	53,312	4,000	11.16	3.07
Mallee	1,837	519	20,367	1,620	11.09	3.12
Northern	4,211	1,077	45,260	3,299	10.75	3.06
North-Eastern	2,086	446	21,454	1,193	10.28	2.67
Gippsland	1,879	578	18,858	1,623	10.04	2.81
Total	30,974	8,638	330,201	26,159	10.66	3.03

VICTORIA—SHEEP SHORN AND WOOL CLIPPED

Season	Shorn		Wool clipped (including crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per sheep	Per lamb
	'000	'000	'000 lb	'000 lb	lb	lb
1965-66	29,668	8,003	285,564	21,779	9.63	2.72
1966-67	29,553	7,605	292,627	22,080	9.90	2.90
1967-68	28,304	6,940	257,042	17,787	9.08	2.56
1968-69	28,653	6,227	280,511	18,471	9.79	2.97
1969-70	30,974	8,638	330,201	26,159	10.66	3.03

VICTORIA—WOOL PRODUCTION AND VALUE

Season	Clip	Stripped from and exported on skins, etc. (greasy)	Total quantity (greasy)	Gross value	Average price per lb
	'000 lb	'000 lb	'000 lb	\$'000	cents
1965-66	307,343	59,601	366,943	193,797	52.81
1966-67	314,707	63,750	378,457	180,946	47.81
1967-68	274,829	57,598	332,427	133,213	40.07
1968-69	298,983	65,364	364,347	155,547	42.69
1969-70	356,511	70,879	427,390	154,693	36.19

Australian Wool Board

The present Australian Wool Board was established in May 1963, replacing the former Australian Wool Bureau. The Board consists of eleven members—a chairman, six woolgrower representatives, three members with special qualifications and a representative of the Commonwealth Government. The first chairman of the Board was appointed by the Minister for Primary Industry after consultation with the Australian Wool Industry Conference. Subsequent chairmen are to be appointed by the Minister for Primary Industry after consultation with the Board. The six woolgrower representatives are appointed by the Minister on the nomination of the A.W.I.C. while the three members with special qualifications have, to date, been appointed from a panel of names submitted by the Conference. These three members do not represent any particular interests but must be experienced in one of the following fields: wool marketing or manufacturing, wool research, finance and commerce. Members of the Board are appointed for a term of three years but their appointments are so timed that they retire in rotation (except for the chairman and the government representative).

Following the organisational changes carried out under the Wool Industry Act, the work of the Board has developed as follows :

1. Wool promotion, technical services, and product development in Australia and overseas.
2. Provision of a testing service for wool and wool products. This service is administered by a subsidiary body, the Australian Wool Testing Authority. It is used extensively by exporters of greasy, scoured, and carbonised wool to establish the moisture content of wool for invoicing purposes. Many other

tests are provided by the Authority such as yield determination for greasy wool, micron measurement of greasy wool and wool tops, and various performance tests for wool yarn and textiles.

3. Maintenance and administration of the wool stores which were entrusted to the Board by the Commonwealth Government.

4. Wool handling and transportation investigations covering movement from shed to mill, including integrated handling, selling and dumping facilities (wool complexes).

5. Responsibilities towards the framing of research programmes in wool economics, wool production, and wool textile research supported by finance from the Wool Research Trust Fund.

6. In February 1970 the Board appointed a sixteen-member advisory committee which seeks to recommend policies for the short and long term future of the woolgrowing industry.

7. The Board has committees examining how the industry can derive maximum benefit from present and anticipated wool measurement techniques, both objective and subjective, covering the fields of wool classing, transport and handling, selling, processing, and manufacturing.

Important modifications to the Australian wool auction system have also been originated by the Board, culminating in the formation of The Australian Wool Marketing Corporation Pty Ltd, which will administer the marketing changes to commence in the 1970-71 selling season.

The Board reports annually to the Commonwealth Government as well as to the Australian Wool Industry Conference which was formed in 1962. The principal function of the A.W.I.C., which is composed of representatives of Federal woolgrower industrial organisations, is to act as a link between woolgrowers, the Government, and the Australian Wool Board. The A.W.I.C. is able to advise the Government on policy matters, and in particular to consider reports and submissions from the Australian Wool Board.

Research and promotion for the wool industry have been financed by government contributions and a levy on woolgrowers. In April 1970 the wool industry accepted a Commonwealth offer increasing the Government's contribution to wool research and promotion funds. For three years from 1 July 1970 the Government will increase its present contribution for research and promotion from a maximum of \$14m a year to an average of \$27m annually. At the same time, the existing levy on woolgrowers of 2 per cent of the gross value of shorn wool production will be halved to 1 per cent.

Wool marketing system, 1961-1968; Pastoral industry, 1963; Sheep and wool growing districts, 1967

Meat industry

The farmlands of Victoria have proved most suitable for meat production and about 30 per cent of Australia's red meat is produced in this State.

The American market has brought big changes to the beef industry since the United States is interested mainly in lean meat. The demand created to supply this market has lifted the prices of bulls, dairy and beef cows, and what are known to the trade as store cattle. The prices for these cattle are close to the prices paid per 100 lb dressed weight (chilled carcass) of the traditionally prime cattle used extensively in supplying the local trade.

The local market for lamb has always been good but the demand for

export lamb is irregular largely because of variations in quality and supply affecting price. Grading is largely a matter of fatness and the leaner, meatier types used locally are the most profitable to produce in areas where lambs can be carried through for marketing from February to September. The supply of lambs is less from areas where the season favours marketing from February to September and growers have more control over lamb selling at prices above export parity.

Boneless mutton exports mainly to the United States and Japan have provided a good market for old sheep which at one time brought low prices for canning and small goods.

Pig production varies every few years but the trend is generally upward, in line with the human population. Almost all the pig meat produced is eaten in Australia. Although the consumption of pig meat per head of population in Australia is increasing slowly, it is only 10 per cent of the total meat consumption and is low in relation to that of other nations. There is considerable interstate trade in pig meat, as Victoria and New South Wales are net importers from the other States.

Table poultry production has changed dramatically in Victoria in recent years. The development of large modern production units has resulted in a big increase in broilers, turkeys, and ducks and consequent reduction in prices. Few people are keeping poultry for their own domestic requirements and consequently more poultry is purchased.

Australian Meat Board, 1971

Broiler industry

The raising of chickens for meat on a large scale has emerged in Victoria since the mid-1950s. Chickens are most efficient in converting poultry feeds, grains, and protein supplements to meat, and are also multiplied cheaply and rapidly through scientific breeding and modern artificial incubation methods.

It now takes approximately 2.4 lb of poultry feed to produce 1 lb of poultry meat, and a 4 lb chicken is grown in nine weeks. This efficient conversion and rapid growth has been achieved by extensive breeding programmes; the use of "high energy" poultry feeds, highly supplemented with vitamins and minerals; growth promoters and disease control drugs; and by the development of enclosed, factory-like broiler houses, with controlled temperature, humidity, ventilation, and light, all conducive to fast growth.

The organisation of the broiler industry as a continuous, production-line, factory-like operation, has been a major factor in the great reduction in price to consumers. Breeders, hatcheries, contract growers, poultry processors, and distributors have all co-ordinated to ensure efficient and continuous production. Seasonal effects are no longer a consideration and prices do not fluctuate. As a result, poultry meat, once a luxury, is now cheap and a normal part of the diet. Turkey meat is also cheap and plentiful.

The main broiler production centres are located on the Mornington Peninsula and in areas south-east and east of Melbourne and the Geelong area near the processing works and the main centres of consumption. Most of Victoria's production is consumed locally; very little is exported, while considerable numbers of interstate broilers are imported.

Broiler houses are fully enclosed; each house grows a "crop" of about

10,000 to 15,000 broilers, about four times a year. Chickens are stocked at a rate of 0.6 to 0.8 sq ft of floor space per bird. A one-man or one-family farm raises approximately 120,000 to 200,000 birds a year. Growers are usually contracted to supply large broiler organisations which hatch and supply the specially bred meat chickens and receive broilers back for processing and distribution.

Egg industry

The trend in the Victorian egg industry is towards large specialised farms—egg producers, hatcheries, and pullet growers—utilising modern poultry housing, equipment, and labour saving machinery.

The greater proportion of the State's estimated 4 million adult female fowls are now part of the commercial egg industry. There are, however, large numbers of small household flocks in suburban and country areas. The main areas of commercial production are centred on the outskirts of the Melbourne metropolitan area and in the Bendigo district, with large centres around Ballarat and Geelong, and substantial populations in the Wimmera, Goulburn Valley, and north-east.

One-man or one-family farms usually manage 5,000 to 6,000 layers. There are, however, many larger farms employing labour, with up to 20,000 layers, and a smaller number of much larger farms.

Housing is planned on the intensive principle, with deep litter pens or multiple bird cage units. Most of the new housing is on the laying cage system. A small proportion of layers is kept in fully enclosed, windowless houses under a fully controlled environment. Artificial lighting is used on almost all commercial egg farms to stimulate egg production. Feeding is based on grains (wheat, oats, and barley) and their by-products (bran and pollard). Meatmeal is the major protein supplement. Wide ranges of commercial, ready-mixed poultry rations are also available.

Laying stock consists mainly of a specially produced crossbred between the White Leghorn and Australorp breeds. The average State egg production is estimated at approximately 215 eggs per bird per year. Commercial stock of the local breeding farms and hatcheries is tested for profitability at the Department of Agriculture's Random Sample Laying Test at Burnley. Chicks are hatched continuously throughout the year with an emphasis on the June–November period. Hatcheries are large and use modern incubators from 5,000 to 90,000 egg capacity. Most commercial egg-type chicks are sexed when a day old by machine or hand methods and the cockerels discarded. The main power source used in the brooding of chicks is electricity, but gas brooders and hot water brooders fired by oil burners are also used.

The marketing of eggs is controlled by the Victorian Egg and Egg Pulp Marketing Board. Flocks with over twenty adult female fowls come within the Board's jurisdiction, and owners of flocks with over forty adult female fowls are required to market their eggs through the Board. Victoria produces a surplus of eggs which is exported through the Australian Egg Board.

Advisory and research services to the egg industry are provided by the Department of Agriculture, commercial firms concerned with the sale of feed, chicken drugs, and equipment, and by the University of Melbourne.

Egg marketing

A monthly collection of statistics on chicken hatchings and poultry slaughterings was commenced in Victoria in January 1966 and the following table summarises the results for each of the years 1965-66 to 1969-70:

VICTORIA—HEN EGGS SET AND CHICKENS HATCHED
(‘000)

Period	Hen eggs set (a)	Chicks hatched (b) intended to be raised for—				Total hatched
		Meat production	Egg production	Breeding		
				Pullets	Cockerels	
MEAT STRAINS						
1965-66	18,758	13,705	(c) 20	3	13,727	
1966-67	19,626	14,486	(c) 7	1	14,494	
1967-68	20,655	15,806	(c) 1	1	15,809	
1968-69	20,120	15,546	(c) ..	..	15,546	
1969-70	21,945	17,334	(c) ..	..	17,334	
EGG STRAINS (d)						
1965-66	10,956	2,135	3,710	202	41	6,087
1966-67	12,206	1,509	4,114	217	30	5,869
1967-68	12,578	1,567	4,251	209	31	6,059
1968-69	13,104	880	4,455	184	26	5,545
1969-70	14,439	1,464	4,977	211	30	6,683

(a) Includes eggs which failed to hatch.

(b) Excludes chicks destroyed.

(c) Not applicable.

(d) Egg strain chicks reported as “unsexed” have been allocated half to chicks for meat production and half to chicks for egg production. The number so reported was 907,295 in 1965-66, 486,340 in 1966-67, 410,129 in 1967-68, 223,321 in 1968-69, and 172,222 in 1969-70.

VICTORIA—POULTRY SLAUGHTERED FOR HUMAN CONSUMPTION
(‘000)

Period	Chickens (i.e. broilers, fryers or roasters)	Hens and stags	Ducks and drakes	Turkeys				
1965-66	12,039	1,013	326	67				
1966-67	13,570	911	253	166				
1967-68	15,519	990	248	95				
1968-69	13,832	r 1,326	272	114				
1969-70	16,562	1,643	246	172				
DRESSED WEIGHT OF POULTRY SLAUGHTERED (a), AND INTENDED FOR SALE (b) (‘000 lb)								
	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen
1965-66	19,487	9,508	2,556	820	793	536	105	565
1966-67	20,020	14,742	2,520	449	728	169	131	1,487
1967-68	19,053	22,333	2,963	355	635	248	145	818
1968-69	21,093	18,393	3,791	r 876	r 815	r 190	204	844
1969-70	26,750	18,309	4,402	1,423	783	97	1,655	

(a) Dressed weight of whole birds, pieces and giblets as reported by producers.

(b) Fresh: Sold immediately after slaughter or chilled for sale soon after.

Frozen: Frozen hard for storage of indefinite duration.

(r:) Revised.

The preceding statistics have been compiled from returns submitted by all known Victorian hatchers and all poultry slaughterers slaughtering more than 1,000 birds annually. It is considered that they give a high level of coverage of chicken hatchings and poultry slaughterings in Victoria.

Stock slaughtered

The following table shows the number of slaughtering establishments and details of the stock slaughtered in the State during each of the five years 1965-66 to 1969-70:

VICTORIA—STOCK SLAUGHTERED (a)

Particulars	Stock slaughtered in establishments and on farms and stations				
	1965-66	1966-67	1967-68	1968-69	1969-70 (b)
	'000	'000	'000	'000	'000
Sheep	8,160	7,310	9,227	5,609	7,376
Lambs	5,205	5,875	5,816	7,102	6,785
Bulls and bullocks	270	244	237	270	356
Cows	558	485	516	401	445
Young cattle	359	361	337	339	382
Calves—Bobby	622	570	673	433	414
Other	44	77		29	28
Pigs	705	699	701	775	842
Number of slaughterhouses	262	263	240	247	253

(a) Includes numbers of livestock condemned as being unsuitable for human consumption.

(b) Average dressed weights per carcass during 1969-70 were: sheep 48.24 lb, lambs 36.08 lb, bulls and bullocks 596.7 lb, cows 436.7 lb, young cattle 342.1 lb, bobby calves 39.7 lb, other calves 113.02 lb, and pigs 106.7 lb.

Frozen meat exported, 1969**Honey industry**

Victoria's hardwood forests each year provide an important contribution to the wealth of the State by virtue of timber production for various purposes. However, one little known facet of forest productivity is the annual harvest of honey and beeswax collected by bees from many species of eucalypts in all parts of the State. Today, Victoria ranks second among the States in apicultural activities. Eucalyptus species provide the bulk of the honey crop—up to 95 per cent of the total—with the balance made up of ground flora species such as clover and Paterson's Curse.

In recent years some concern has been felt in the industry at the increasing pressure for alienation of some types of Crown land for agricultural purposes. Much of this land has in the past been reliable bee keeping country because of its natural tree and shrub flora. These lands are generally cleared after alienation and so are lost for honey production. Parts of the Mallee, Wimmera, Western District, and north-east are areas most affected. The wood chip industry may adversely affect honey production in parts of Gippsland.

There are some 1,240 apiarists in Victoria with five or more hives. These apiarists produce an average of 8 million lb of honey per annum. Hive yields are relatively good and range from 90 to 150 lb per annum. The larger commercial enterprises would average 200 lb per annum.

The industry is, of necessity, migratory, whole apiaries with attendant plant being moved by road transport from one part of the State to another, following the flowering of various species of honey flora in the forests and on the farm lands. Hives, trucks, and plant have been designed and modified to suit the requirements of mobility demanded by the industry.

Pollination of agricultural crops is a further aspect of the industry which has received considerable attention. Each year in the past, thousands

of colonies have been hired out to fruit and seed growers to ensure profitable sets of seed and fruit. However, in recent years the advent of the newer types of insecticides and their increasing popularity, especially with fruit growers, has caused concern amongst apiarists, most of whom are no longer prepared to lease hives of bees for pollination because of serious bee losses following spray application of certain types of insecticides. It is anticipated that, with the increasing use of some of these chemicals, pollination of agricultural crops may become a serious problem in Victoria and elsewhere. The application of insecticides with the spreading of super-phosphate on pastures, especially in irrigation areas, is also causing concern.

Marketing has always been a great problem to the industry. Violent fluctuations in the annual honey crop are always, in the absence of any organised marketing scheme, attended by similar fluctuations in prices. Considerable carry-overs occasionally aggravate this. However, late in 1962 the Commonwealth Parliament passed enabling legislation for the establishment of the Australian Honey Board. The functions of the Board are to regulate export of, and export prices for, honey. The activities of the Board are financed by means of a levy on domestic consumption of honey and a publicity and research programme is being implemented.

In 1967 the Australian Honey Board established a finance scheme to enable apiarists to hold stocks of honey off the market in times of glut or poor prices. Since 1968 a number of equalisation proposals have been considered by producers to stabilise the industry but none have yet been adopted.

State interest in the industry is authorised by the *Bees Act* 1966 and extends to disease control, advisory services, research into the problems of the industry, and hygiene in the production and processing of honey. An Apicultural Research Unit is in operation at the Scoresby Horticultural Research Station.

Particulars relating to apiculture for the five years 1966 to 1970 are given in the following table. Since 1958 bee keepers with less than five registered hives have been excluded from the collection.

VICTORIA—BEE HIVES, HONEY, AND BEESWAX

Season ended 31 May—	Bee keepers number	Hives number	Production		Gross value	
			Honey '000 lb	Beeswax '000 lb	Honey \$'000	Beeswax \$'000
1966	1,243	101,387	9,608	115	1,403	55
1967	1,158	96,274	7,160	88	1,045	44
1968	1,298	95,108	7,580	92	1,114	67
1969	1,240	99,953	3,638	50	520	37
1970	1,256	102,100	8,220	103	800	65

PRIMARY INDUSTRIES OTHER THAN FARMING

Forestry

Forest estate

Of the 56,245,760 acres in Victoria, the forest estate consisted of 5,656,671 acres of reserved forest at 30 June 1970 and over this area

the Forests Commission had full control. Only a proportion of this reserved forest produces commercial timber, as large areas come within the category of protection forests and are of value in safeguarding the State's water catchments. In addition, the State Forests Department has partial control over some 9 million acres of unoccupied Crown land which must, therefore, be included in the forest estate. These Crown lands include areas of mallee scrub and alpine grasslands as well as good timbered country.

The Forests Commission of Victoria was established by the *Forests Act* 1918 and consists of a chairman and two commissioners. Subject to the *Forests Act*, the Commission has the exclusive control and management of all matters of forest policy, the granting of leases, licences, permits, and authorities, and the collection of rents, fees, royalties, and other revenue. It is the duty of the Commission to carry out plans and works for the establishment, maintenance, improvement, and renewal of natural forests and plantations of indigenous and exotic trees. It is also responsible for the prevention and suppression of fires, the training of forest officers, conduct of research work, provision of facilities for public recreation, and the protection of native flora and fauna in State forests.

Forest timber

The following table summarises the total output of all species from all forests in the State (including privately owned lands) for the years 1965-66 to 1969-70:

VICTORIA—FOREST TIMBER
(’000 cu ft)

Item	1965-66	1966-67	1967-68	1968-69	1969-70
Logs for sawing, peeling, slicing, or pulping—					
Hardwoods	69,499	68,880	70,129	75,022	72,199
Softwoods (plantation grown pines)	14,377	15,325	14,037	17,001	19,553
Total logs	83,876	84,205	84,166	92,023	91,752
Hewn and other timber (not included above)					
estimated volume—					
Firewood (a)	18,572	14,990	12,293	10,718	9,854
Other (b)	5,475	4,793	4,677	4,194	4,192

(a) Excludes mill waste used as firewood.

(b) Includes telephone and electric supply transmission poles, bridge and wharf piles and beams, fencing timbers, railway sleepers, and mining timbers from Crown lands. Similar information for private lands is not available.

The output of sawn timber from Victorian sawmills in 1969-70 was the highest for many years despite the fact that credit restrictions announced in April caused some slackening of activity towards the end of the year. The high output of sawn timber, however, was not reflected in a corresponding high intake of logs from State forests. In fact the production of hardwood logs fell by about 3 per cent due partly to wet weather interrupting harvesting. The demand for softwood logs was strong and production reached the highest recorded level.

The demand for hardwood pulp remained high and production from State forests increased by 5 per cent over the previous year. Softwood pulp production showed a sharp increase over previous years and negotia-

tions are under way with additional users which could increase the demand still further.

The number of sawmills operating in the State continued to decrease. The main reason for this trend was that a number of sawmilling businesses have been purchased by other sawmillers to achieve better economies associated with bigger mill throughputs.

Softwood plantations

Large scale plantings of softwood species were continued particularly in the north-east and south-western parts of the State. A total of 9,939 acres was planted in 1969-70 and it is proposed to increase the rate of annual planting to 12,000 acres under the Commonwealth—States Softwood Forestry Agreement.

Pinus radiata has proved itself adaptable to the sites available ; it makes rapid growth, is hardy and relatively immune from insect and fungus attack, and produces a good quality timber. While *Sirex noctilio*, the wood wasp, has been found within commercial plantations in Victoria, good management techniques have so far prevented it from causing any losses of consequence in softwood plantations.

Whenever large areas are planted with a single species, other species, not necessarily of commercial importance, are planted on about 2 per cent of the net planted areas. These plantings are strategically located to improve the aesthetic values of the area. In addition native hardwood forests are retained along major roads through plantations.

Privately owned softwood plantations were estimated to comprise 113,966 acres at 31 October 1969, and the areas are steadily increasing. Large industrial companies are planting *Pinus radiata* to provide sustained yields of softwood for sawmilling and wood-fibre industries. Private individuals plant small areas as long-term investments and many State schools maintain small endowment plantations.

The *Land (Plantation Areas) Act 1959* is designed to encourage private establishment of softwood plantations by providing that Crown lands suitable for commercial plantations and unsuitable for agriculture may, with certain safeguards, be leased for timber growing purposes and subsequently sold to the lessee.

During 1964-65 an amendment to the *Forests Act 1958* was passed enabling loans of up to \$50 per acre to be advanced to landowners for planting softwood species on land approved by the Commission as being capable of producing an economic crop. The basic intention is to encourage farmers to establish farm woodlots by providing funds interest free for the first 12 years to cover expenses.

The output from State plantations is summarised below:

VICTORIA—OUTPUT FROM STATE PLANTATIONS
OF SOFTWOOD LOGS AND PULPWOOD
(’000 cu ft)

Year	Sawlogs and peeling logs	Pulpwood
1965-66	4,412	2,408
1966-67	4,830	2,323
1967-68	4,618	1,968
1968-69	4,425	1,589
1969-70	5,403	2,006

Telecommunications

The Commission's telecommunications system consists of 46 base stations, 190 mobiles, 180 hand held portables, and 450 portable/mobile radios. In addition, twenty stations are equipped with receivers for receipt of weather information and three trailer-mounted base stations are held for use in fire emergencies. Three hundred and sixty-five miles of telephone lines erected by the Commission are maintained each year prior to and during the fire season.

Fire protection

The Forests Commission is responsible for the prevention and suppression of fires in all States forests and national parks and in certain alienated lands within one mile of State forest or national park. This area of responsibility is legally designated the Fire Protected Area. Legislation provides strict control over the lighting of fires, power to prohibit the use of fire, and to close down certain operations in the Fire Protected Area during any period of extreme fire danger.

The causes of fires attended by Forests Commission personnel in the period 1965-66 to 1969-70 were as follows:

VICTORIA—CAUSES OF FOREST FIRES

Cause	Number of fires				
	1965-66	1966-67	1967-68	1968-69	1969-70
Grazing interests	1	..	4	..	1
Landowners, householders, etc.	115	90	169	64	49
Deliberate lighting	57	104	167	74	43
Sportsmen, campers, tourists	63	33	51	20	37
Licenses and forest workers	20	15	56	18	14
Smokers	50	36	61	15	27
Lightning	83	41	67	95	37
Tractors, cars, trucks, locomotives, and stationary engines	16	35	50	25	15
Children	21	9	19	13	13
Sawmills	8	8	15	7	6
Miscellaneous known causes	32	44	53	45	22
Unknown origin	63	71	75	15	40
Total	529	486	787	391	304

Forest fires 1969-70

Summer in Victoria is usually characterised by a long dry period with many days of high temperature and strong winds. However, in 1969-70 there were heavy spring rains which delayed curing of fuels and further rain in January and February which made the fire season one of the mildest on record. There was a short period in April when strong winds for several successive days caused fires to burn out of control in the western part of the State.

Aircraft in fire control

Because of the almost complete absence of fires in remote mountain areas there was no requirement to use the helicopter or firebombers which the Commission retain on charter for fire suppression. However, research work continued into the technique of firebombing to improve its performance as

a first attack tool. The Commission now has five firebombing bases and two more are under construction.

Fuel reduction by burning

The problem of fire control is basically a problem of controlling the vast accumulation of dead fuel which occurs within eucalypt forests. In early times this fuel was periodically burnt by fires started by lightning and Aborigines with the result that forest fires were slower and less destructive than they are today. Prescribed burning is now used deliberately to control fuel quantities over large areas of forest. Techniques have been established which allow this to be done with a maximum of safety and at times and places where its ecological effects are compatible with forest management.

The areas of State forest burnt by wildfires in the period 1965-66 to 1969-70 were as follows :

VICTORIA—AREAS OF STATE FOREST BURNT
(acres)

Year	Commercial area	Non-commercial area	Total
1965-66	20,313	50,733	71,046
1966-67	7,830	30,689	38,519
1967-68	306,350	240,698	547,048
1968-69	36,969	34,638	71,607
1969-70	3,401	9,175	12,576

Forest management

The basic principle upon which Victorian State forests are managed is that of multiple use. The basic concept is that all resources are entitled to consideration but, in practice, the priority of use varies from place to place. It does not necessarily mean that every forest is managed to achieve several objectives to an equal extent at all times. It simply means that notwithstanding a primary objective, other benefits may be obtained without prejudice to the main objective. Multiple use does not preclude single use management on specific areas within the forest estate; therefore, the forest resource can provide even the most demanding of conservation objectives such as wilderness and water supply.

Timber supplies

The volume of timber to be harvested from the forests is carefully regulated to maintain the long-term productivity of the forests and to ensure steady output for the industries which use their products. The allowable rate of harvesting is determined by measurements of the forests and predictions of the rates of growth.

In the native forests the rates of growth and harvesting are monitored by making periodical remeasurements of the trees on several hundred sample areas which are taken to represent the whole forest.

Comprehensive information on the growth of the softwood plantations and the regrowth forest of mountain ash have been assembled in computer programs which will calculate their future growth and production under many different plans of management. This enables the development of the forests to be simulated for study purposes so that the best plan of management may be selected.

Forest recreation

The traditional objectives of forest management such as meeting the demand for timber and other forest products, preservation of satisfactory water catchment conditions, and erosion control are now being rivalled by increasing requirements by the general public for outdoor recreation, preservation of habitats for fauna, and a variety of historical and scenic attractions.

There are 89 forest parks, including four new parks declared during 1969-70, alpine reserves, and scenic reserves, totalling 63,715 acres where recreational and similar uses have been made the primary aim of management.

This is evidence of the increasing attention being given to this type of forest use.

Laboratory and field research

Studies of fire behaviour in a wide range of types of forests under various weather conditions are contributing to improvements in fire fighting methods, and also in methods of using controlled fire for protection of the forests, regeneration of new crops, maintenance of suitable habitats for wildlife, and other forestry purposes.

Aerial techniques have been developed for regeneration of logged areas of natural forest. Chemicals applied from agricultural aircraft desiccate scrubby growth to prepare the ground for seeding. Good control of drift during applications is obtained by using invert spray emulsions. An efficient system has been developed to spread the fine eucalypt seed evenly at the required rate.

The rapid increase in area of forests of radiata pine is supported by a vigorous research programme. The nutrition of the pine is being studied in the nurseries and on new plantation sites, and the early growth of the pines is also being improved by new methods of controlling wattles, and other competing vegetation. A tree improvement research programme has been in progress for some years, and a study of the wood grown in various types of plantations on various sites is in hand.

Entomological studies are being conducted to aid the control of some serious forest pests including the Sirex wasp and Phasmatids. Three forms of natural parasite are being used to combat the Sirex wasp; they include two wasps and a nematode or eel worm which are parasitic on the Sirex. In addition to these measures, trees infested with Sirex are being destroyed as part of the National Sirex Campaign.

Further references, 1965-1971; Fire protection, 1965; Economic aspects of forests, 1967; Commonwealth-State Reforestation Agreement, 1969; Forests (1967-68), 1970

Fisheries and wildlife

Practical management of the fish and wildlife resources of Victoria is vested in the Department of Fisheries and Wildlife, which is responsible to the Chief Secretary for the administration of the Fisheries Act and the Game Acts, and for conservation, management, and research on native and introduced fishes, birds, and mammals.

The State Freshwater Fisheries Research Station and Native Fish Hatchery are located at Snobs Creek, near Eildon. A wildlife research

centre is being developed at Lara, near Geelong. Fisheries and Wildlife officers (enforcement staff) are stationed at eighteen district centres throughout the State, and eight more district stations are proposed.

Arthur Rylah Institute for Environmental Research

On 8 April 1970 the Arthur Rylah Institute for Environmental Research at Heidelberg was officially opened by Her Majesty the Queen. The building was designed for the Department of Fisheries and Wildlife by the Public Works Department. The Institute was named after Sir Arthur Rylah, K.B.E., C.M.G., E.D., the Chief Secretary for Victoria from 1955 to 1971, as a tribute to his contribution to the conservation of nature in Victoria.

The concept of conservation, even in the context of the Rylah Institute, includes that of the conservation of man. Other aspects are use of natural resources, the aesthetic factors in the environment, and the question of the ethical use of resources to meet the needs of the present community as well as those of succeeding generations.

A thorough knowledge of the environment is the prerequisite to conservation. Therefore, within the limits of its charter but not in isolation, the Rylah Institute was constructed to provide the basic data, facts, and inventories which will permit the interpretation and the assessment for the proper use of the resources of the soil, water, and air.

The building consists of a main three storey block which comprises the laboratories and offices of the research and management sections concerned with marine and freshwater fisheries, wildlife, game, and environmental studies. At the front of the building there is an adjoining annex and this contains a library and a conference room, capable of accommodating ninety persons. The workshop and aquarium at the rear is separated from the main structure by an open courtyard. There is a natural history survey room which is mainly a museum for the storage and study of research specimens, documented ecological information, and maps. There is also a data processing laboratory which will ultimately be able to sort and analyse much of the accumulated information. One laboratory is devoted to the planning of habitat management works, while many chemical analyses required by various sections of the Department can be undertaken in the environmental studies section. An animal room is provided to house small animals for intensive study.

Many of the special items of equipment required by the various research groups within the Department are designed and constructed in the workshop. The environmental studies laboratory is equipped for chemical analysis of pesticide residues and pollutants and is provided with modern research equipment.

Many environmental factors influence the behaviour and physiology of aquatic organisms. Within the aquarium room there are up to seventy individual tanks which may be supplied with freshwater or seawater at controlled flow rates and temperatures and purified by filtration and ultra-violet irradiation.

The conference room and library are in a self-contained annexe and this makes it especially useful for evening meetings of organisations with interests allied with those of the Department. The room is designed and furnished to be readily adaptable for lectures and conferences and is equipped for film projection, recording, and the mounting of demonstrations and displays.

Fisheries statistics

The statistics of production shown in the following tables are in terms of live weight for fish, crustaceans, and molluscs. In interpreting fisheries statistics, allowance should be made for the incomplete coverage. Returns are collected from licensed professional fishermen only, and as a result the published totals fall short of total fish production to the extent of the catch by amateur fishermen, the commercial catch by persons not licensed as professional fishermen, and unrecorded catch by professional fishermen.

The following table shows the catch of fish, crustaceans, and molluscs for the years 1965-66 to 1969-70 landed at Victorian ports irrespective of the waters in which they were caught. Also included are fish, etc., landed by Victorian fishermen in South Australia.

The following table shows certain particulars about the fishing industry in Victoria for the years 1965-66 to 1969-70:

VICTORIA—FISHERIES : MEN, BOATS, AND EQUIPMENT

Year	Registered crew members	Boats registered		Value of nets and other equipment
		Number	Value	
			\$'000	\$'000
1965-66	1,566	910	4,432	821
1966-67	2,057	1,108	5,903	1,078
1967-68	2,053	1,084	6,808	1,153
1968-69	1,571	871	5,363	1,047
1969-70	1,429	795	4,966	944

VICTORIA—FISHERIES : QUANTITY AND GROSS VALUE OF TAKE

Year	Recorded production							
	Fish		Rock lobster (a)		Prawns		Molluscs	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	'000 lb	\$'000	'000 lb	\$'000	'000 lb	\$'000	'000 lb	\$'000
1965-66	18,466	2,231	1,681	1,177	11	6	29,509	989
1966-67	16,048	1,959	1,723	1,034	11	6	32,674	1,981
1967-68	17,016	2,253	1,533	1,027	5	3	35,889	2,618
1968-69	23,568	2,678	1,581	1,455	5	3	16,028	1,695
1969-70	35,235	3,137	1,788	1,500	2	2	9,718	941

(a) Includes freshwater crayfish.

VICTORIA—CATCH OF FISH, CRUSTACEANS, AND MOLLUSCS
(‘000 lb live weight)

Species	1965-66	1966-67	1967-68	1968-69	1969-70
Freshwater fish—					
Eel	175	221	235	288	272
English perch	97	145	141	53	19
Golden perch	27	21	11	6	6
Tench	26	20	28	31	18
Other	17	14	8	16	26
Total	342	421	423	394	341
Marine fish—					
Anchovy	375	441	343	2,395	n.a.
Bream, black	235	490	726	709	1,060
Flathead, rock	252	257	291	243	260
Flathead, tiger	961	1,136	1,209	1,662	2,018
Flounder	135	151	160	130	190
Garfish, sea and river	275	358	369	510	490
Luderick	147	110	83	96	152
Morwong (jackass fish)	427	272	155	284	152
Mullet, yellow-eye	640	607	513	497	630
Pike, long-finned	100	107	133	94	76
Pilchard	502	112	98	1,370	n.a.
Salmon, Australian	1,805	1,252	1,303	943	1,142
Shark, gummy	1,725	1,840	2,240	2,350	2,327
Shark, saw	350	254	212	369	274
Shark, school	3,172	3,556	3,319	3,739	4,641
Snapper	343	349	374	423	487
Snoek (barracouta)	5,268	2,791	3,676	5,360	5,558
Trevally	96	105	102	112	102
Whiting, King George	70	246	286	160	168
Whiting, school	140	234	175	363	562
Other	1,106	960	825	1,367	1,978
Total	18,124	15,628	16,592	23,175	34,895
Crustaceans—					
Rock lobster (a)	1,681	1,723	1,533	1,581	1,788
Prawns	11	11	5	5	2
Total	1,692	1,734	1,538	1,586	1,790
Molluscs—					
Abalone	961	3,379	7,470	5,751	4,712
Mussels	425	260	247	119	516
Scallops	27,957	28,726	27,896	9,885	4,164
Other	166	309	276	272	326
Total	29,509	32,674	35,889	16,027	9,718
Total all species	49,667	50,457	54,442	41,182	46,744

(a) Includes freshwater crayfish.

n.a. : Not available separately for publication, included in total.

Further references 1961-1971; Wildlife in relation to other natural resources, 1962; Introduced fish, 1963; Commercial fisheries, European carp, 1964; Freshwater research, 1965; Marine fisheries, 1966; State wildlife reserves system, 1966; Scallop fishery, 1967; Serendip Wildlife Research Station, 1968; Tower Hill State Game Reserve, 1969; Rehabilitation of species, Arthur Rylah Fish and Wildlife Research Institute, 1970; Economic aspects, 1971

Mining

The most notable recent development in Victoria's mineral industry, besides the exploitation of natural gas and oil discoveries offshore, is the continued expansion of the non-metallic minerals and the decline of the metallic minerals, especially gold. Significant progress has been made in open cut mining, especially in the extraction of brown coal and construction materials. Exploratory offshore drilling on the Gippsland shelf in Bass Strait has revealed the presence of considerable quantities of oil and natural gas. The major mineral resources of the State are described on pages 366-7 of the *Victorian Year Book* 1967. A further article on the State's minerals appears on pages 1-29 of the *Victorian Year Book* 1970.

Mineral exploration in areas under exploration licences

Mineral exploration consists in the search for, and/or appraisal of, new ore occurrences and known deposits of minerals (including extensions to deposits being worked) by geological, geophysical, geochemical, and other methods (including drilling). Exploration activity takes mainly two forms—exploration carried out in areas where production is current, that is, on a production lease; and exploration in other licensed areas, that is, in areas covered by exploration licences, authorities to enter, and authorities to prospect. Exploration information from licence holders is restricted to twelve minerals. This is collected by the State Mines Department.

In addition to the above two forms of exploration activity there is also general exploration activity such as general surveys, aerial surveys, report writing, map preparation, and other off-site activities not directly attributable to a particular lease or licence area. Information regarding all forms of mineral exploration (other than for petroleum) in Victoria and covering both metallic and non-metallic minerals, fuels, and construction materials is collected by the Bureau of Census and Statistics from every company or organisation engaged in exploration whether under licence, lease, or otherwise. In view of the vast extent of this statistical collection, the scope of the present article has been limited to mineral exploration carried out by exploration licence holders only.

Historically Victoria owes much of its wealth and development to the gold discoveries of the nineteenth century. Gold production quickly reached a peak and thereafter steadily declined until only a few small mines now survive. Significant discoveries of other minerals, notably tin and antimony, were made at different times, but apart from causing short-lived rushes, no major settlements were established as a result of these discoveries. The fact that the most significant discoveries of tin, at Beechworth, and antimony, at Costerfield, were both associated with gold, which was the more valuable mineral, was no doubt partly responsible for this. If these discoveries were made today, the prime recovery products would probably be tin and antimony, with gold the by-product.

Many other mineral discoveries were made including copper, molybdenum, iron, manganese, talc, lead, feldspar, fluorite, and phosphate. Generally, after discovery and working out of the high grade portions of the deposits, pro-

duction ceased within a few years. Exceptions were the black and brown coal deposits. Black coal production in Victoria continued for nearly 90 years. Brown coal has been worked in the La Trobe Valley since 1889 and has been used for power generation and for the manufacture of briquettes and town gas.

Many of these mineral deposits were found by prospectors and were worked under the traditional mining titles of Lease, Mineral Search Licence, or Miner's Right Claim. Since most work was concentrated around known mineral deposits these mining titles were quite adequate for both exploration and mining purposes.

During the years after the Second World War Australia experienced a number of mineral booms, commencing with the uranium boom of the 1950s and culminating in the nickel boom of 1969–70. To a greater or lesser extent these booms have also influenced prospecting activity in Victoria. Although no major mineral discoveries have been made in Victoria during this period, many mining companies and private individuals have carried out exploration programmes.

In the 1950s the type of exploration changed from conventional exploration for extensions of known deposits (although this is continuing) to exploration for completely new deposits in largely unexplored areas. The development and application of exploration techniques, first, in geophysics, and more recently in geochemistry, enabled exploration to be undertaken over very large areas. Airborne magnetic and radiometric methods and stream sediment geochemistry have enabled prospective areas to be delineated within a relatively short time. These areas could then be followed up by more detailed geological, geophysical, and geochemical methods. The traditional mining titles were not satisfactory for this type of exploration and a new exploration title, the exploration licence, was created.

Initially exploration licences in Victoria were issued for copper, lead, gold, tin, and phosphate for an area of up to 1,000 sq miles. An exploration licence gives the holder two important rights: first, he has sole right to leases for the minerals named, and second, subject to the payment of compensation, the right of entry into private land to carry out exploration. The licences are issued for a period of two years and thereafter may be renewed for periods of one year with a reduction in area on each renewal. Since passing of the Act in 1966, the number of minerals has been increased to twelve by the addition of silver, zinc, antimony, nickel, molybdenum, titanium, and zirconium, and the maximum area of a licence has been reduced to 500 sq miles.

To carry out exploration over a large area requires considerable financial resources and technical knowledge. Before a licence is granted the applicant must satisfy the Minister for Mines that he has at his disposal sufficient financial resources and technical ability to carry out an approved exploration programme. In addition, holders of licences are required to submit quarterly reports, including all results of exploration and expenditure incurred in carrying out the work. These reports are required to ensure that work is being carried out on the licence and also contribute greatly to knowledge of the economic and general geology of the State. In recent years considerable exploration in Victoria has been carried out under exploration licences. Areas for which licences have been granted are shown in Fig. 7 on page 365.

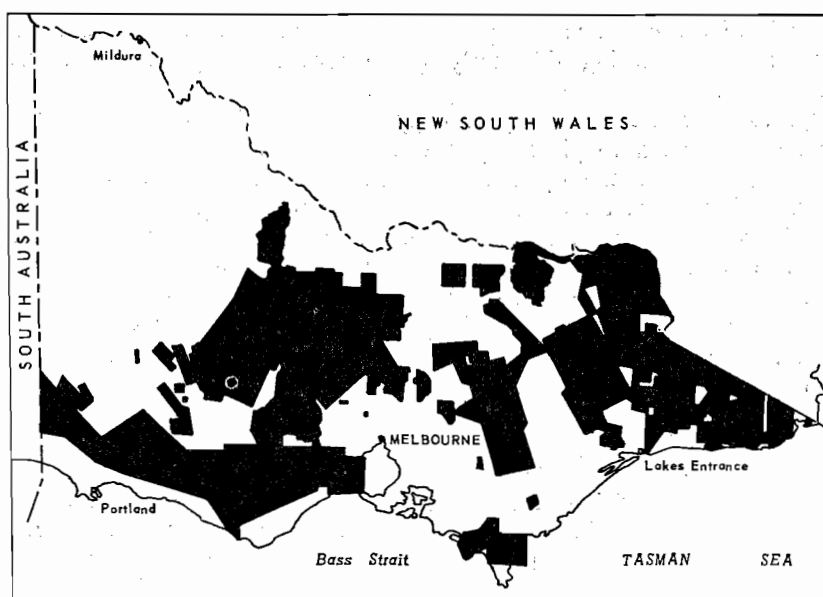


FIGURE 7. Areas which have been held under exploration licence in Victoria. December 1970.

In line with the current thinking of the time, licences have been taken out for particular minerals and it is possible to recognise four distinct phases of activity. Licences taken out in 1966 covered large tracts of potentially auriferous areas in western, east-central, and eastern Victoria. These licences were applied for when a substantial rise in the price of gold was anticipated. When this price rise did not eventuate interest in exploration solely for gold declined and all these early licences have now been abandoned.

Western Mining Corporation Ltd was one of the more active companies in this phase. After high level aeromagnetic studies to determine basement structures which may have influenced locations of ore bodies, the company concentrated its search on the Allendale area near Creswick. This was an area which had proved to be one of the richest deep lead systems in Victoria, although no reef mining had taken place. Induced polarisation surveys yielded several anomalies which were drilled. Target zones were usually at a depth of about 800 ft. No significant reef intersections were made but mineralised zones with low gold values were obtained, indicating that induced polarisation surveys represent a useful exploration tool for gold in this area. Similar methods were used by the company at Clunes where quartz intersections assaying up to 2 dwt of gold per ton were obtained.

During the same period Planet Gold Ltd took up licences at Cassilis in eastern Victoria; around Woods Point, Walhalla, and Gaffneys Creek; around Kyneton and Blackwood; and at Ararat and St Arnaud. Initial work was concentrated at Cassilis where geophysical and geochemical surveys and detailed structural studies of the known reef distribution were followed by diamond drilling. A total of 19 holes with an aggregate footage of 9,385 ft were drilled. Several reef intersections were obtained but sufficient tonnage

and grade of ore could not be proved to warrant mining. Another area to receive attention during this early phase was Bethanga where induced polarisation surveys were used by Mines Exploration Pty Ltd in an attempt to delineate the complex copper-gold-sulphide lodes. Drilling of the anomalies failed to yield any ore intersections.

During the last century the Beechworth Eldorado area was one of Australia's important tin fields. Total production was approximately 9,000 tons of tin concentrates. Most of the tin came from mineral workings along Reedy Creek and tributaries between Beechworth and Eldorado. Recently North Broken Hill Ltd carried out a detailed assessment of the mineral tin deposits of this area. Only minor blocks of ground suitable for dredging were located, the largest having an estimated volume of 17 million cu yards with an average grade of 11c per cu yard, at 1967 prices.

The second phase began in 1966 when there was a considerable increase in exploration for phosphate deposits. The occurrence of typical marine phosphorite in Ordovician sediments near Mansfield and minor occurrences of nodular phosphates in Tertiary sediments of the Otway basin, together with the large consumption of superphosphate and availability of port facilities, all made Victoria an attractive exploration prospect. The companies Planet Mining Company Pty Ltd, Esso Mineral Company of Australia, Continental Oil Company of Australia, and IMC Development Corporation were granted licences. All had licences in the Otway Basin and in addition IMC investigated several Palaeozoic areas.

There is a common association of phosphate with chemically precipitated sediments such as chert, so that geological principles and known stratigraphy of an area could be used to delimit the potential phosphatic areas. The existence of a simple quantitative field test for phosphate enabled testing of outcrops and subsurface samples from bores to be carried out very rapidly. This was an example of exploration ideally suited to exploration licences. Although large areas were initially taken up, they were quickly dropped when nothing was found and few of the licences ran the full two year period. Most of the licence holders carried out drilling programmes and although no phosphate deposits were located a considerable amount of new geological information was obtained.

The third phase, which commenced in 1968, is still continuing and is the least definite of the four. It is characterised by a marked increase in exploration for base metals. The main area of interest is eastern Victoria and exploration has been concentrated in the Buchan area for conformable lead deposits in the Buchan Caves limestone and for porphyry copper deposits with associated molybdenum, in the volcanic and granitic rocks. Although geochemistry had been used by earlier licence holders, the first extensive use of stream sediment sampling in Victoria was in the initial stage of exploration of these licences. As yet no major mineral deposits have been located. During the same period licences were granted for tin exploration in north-eastern Victoria, base metals at Waratah Bay, and antimony at Clonbinane and Costerfield. Exploration has been most successful at Costerfield where a small antimony-gold ore shoot has been located on the previously worked Brunswick Reef. Although the ore shoot only contains an estimated 15,000 tons of ore, its value, in place, is

about \$2.5m. Shaft sinking operations are at present in progress on this reef.

The final phase of exploration commenced late in 1969 and extended into early 1970. It corresponded with a steep rise in the world price of antimony and numerous applications for licences were made for areas in central Victoria. It is noteworthy that, whereas previously most applications were made by recognised mining companies, many of these later applications were by private individuals or companies with little or no previous exploration or mining experience. The myriad of overlapping licence applications, together with the problem of establishing technical competence and financial standing made the administrative screening of these licences extremely difficult. At the end of 1970 little or no exploration had been carried out on these licences. In general, most of the proposed exploration programmes include geological mapping and stream sediment geochemistry as the first stage of exploration.

Details of private exploration expenditure as reported by informants in the Annual Mineral Exploration Census (excluding petroleum exploration) conducted by the Bureau of Census and Statistics is set out in the following table :

VICTORIA—PRIVATE MINERAL EXPLORATION (OTHER THAN
FOR PETROLEUM) EXPENDITURE
(\$'000)

Particulars	Private exploration on—			
	Production leases	Other licensed areas	Other	Total
1965—Drilling	672	29	..	702
Other	133	171	..	304
Total	806	200	..	1,006
1966—Drilling	676	98	..	774
Other	111	346	..	457
Total	787	444	..	1,231
1967—Drilling	548	276	..	824
Other	108	519	..	628
Total	656	796	..	1,452
1968—Drilling	328	435	..	762
Other	179	460	75	714
Total	507	895	75	1,476
1968-69—Drilling	173	372	..	545
Other	436	581	38	1,055
Total	609	953	38	1,600
1969-70—Drilling	191	495	..	686
Other	800	640	227	1,667
Total	991	1,135	227	2,353

Natural gas and crude oil in Victoria, 1960-1971

Natural gas in commercial quantities was first discovered in Victoria early in 1965 and crude oil two years later. During the next four years one gas field, one oil and gas field, and two oil fields were developed. By the end of 1971 about 94 per cent of Victoria's 580,000 gas consumers were using natural gas and Victorian crude oil was satisfying about 62 per cent of Australia's current refinery requirements of 500,000 barrels a day. When the Kingfish B platform in eastern Bass Strait came on stream on 1 November 1971 the Esso and B.H.P. current development programme, commenced in 1966, was completed.

Exploration

Following the completion between 1960 and 1963 by Hematite Petroleum Pty Ltd (a wholly owned subsidiary of The Broken Hill Proprietary Co. Ltd) of geophysical surveys in its petroleum exploration permit areas (now designated Vic/P1 and Vic/P2) in the offshore parts of the Gippsland Basin in eastern Bass Strait, that company entered into a farm-out agreement with Esso Exploration and Production Australia Inc. in April 1964 by which Esso would carry out an exploratory drilling programme in the area.

Natural gas was discovered about 15 miles offshore in February 1965 in a reservoir now known as the Barracouta field. Another gas field, Marlin, was discovered early in 1966. This, together with the Barracouta discovery, confirmed that adequate reserves were available to supply the Victorian market for at least the next thirty years.

In April 1967 oil was discovered in the Kingfish field further out in Bass Strait. Another oil field, Halibut, was discovered nearby later in the same year. Subsequent testing and evaluation, and, in the case of Kingfish, the drilling of two confirmatory step-out wells, proved the existence of two oil fields of high commercial significance, one of which, Kingfish, was declared to be a major field by world standards.

After two confirmatory step-out wells had been drilled on the Snapper and Tuna structures, which had been discovered in 1968, the former was declared in 1970 to be a large commercial gas field and in April 1971 Esso and B.H.P. announced that the Tuna field contained commercial reserves of oil and gas.

From 1965 to 1970, 52 exploratory wells were drilled in Victorian waters in the Gippsland and Otway sedimentary basins. Of these nineteen proved to be commercial discoveries, either as wildcats or confirmatory step-out wells in the six fields named. Over the same period 26 wells were drilled on land in Victoria but all proved to be dry holes. Offshore exploration by Esso/B.H.P. and Shell in the Otway Basin in western Victoria during the years 1967-1970 proved unsuccessful.

In late 1971 N.S.W. Oil and Gas Company NL drilled Flying Fish No. 1 well a few miles offshore in the Gippsland Basin in permit area Vic/P8. On 16 November 1971 Esso and B.H.P. announced that commencing early in 1972, the partnership would undertake a new programme of exploratory drilling, including five wells in the Gippsland Basin.

Reserves

The discoveries made from 1965 to 1970 resulted in the Esso and B.H.P. partnership announcing that initial recoverable reserves in the six fields were estimated to be 9.3 trillion cubic feet of natural gas and 1,591 barrels of crude oil. In addition there is an estimated 0.2 trillion cubic feet of gas in the Golden Beach field discovered by B.O.C. Australia Ltd in an offshore tenement shared with the original permit holder Woodside Oil NL and a number of other companies.

GIPPSLAND FIELDS—INITIAL RECOVERABLE RESERVES OF GAS AND OIL

Field	Natural gas	Crude oil	Years field discovered and proved
Barracouta	trillion cubic feet 1.8	million barrels 7	1965 (gas) 1968 (oil)
Marlin	3.5	..	1966
Halibut	0.3	440	1967
	{ dissolved gas in crude		
Kingfish	..	1,060	1967-68
Snapper	3.2	..	1968-69
Tuna	0.5	84	1968-70
Golden Beach	0.2	..	1967
Total	9.5	1,591	..

Sources : Oil and Gas Division, B.H.P., Woodside Oil N.L. (Golden Beach).

*Development of the Gippsland gas and oil fields**Natural gas*

Anticipating that adequate markets for natural gas would be secured, the Esso/B.H.P. partnership commenced the development of the Barracouta and Marlin gas fields early in 1967. The jackets and decks for the necessary development platforms were fabricated at Barry Beach in Corner Inlet, about 120 miles south-east of Melbourne, where a large marine terminal was established between 1966 and 1968 to fabricate the offshore platforms, to coat and store pipe for the necessary undersea and onshore pipeline, and to service exploration rigs, and later, the production platforms.

The Barracouta platform was towed out into the waters of eastern Bass Strait in December 1967 and set in position about 15 miles offshore in 150 ft of water. Within 15 months the planned ten development wells had been drilled (including a deep exploratory probe which located a reservoir containing 7 million barrels of high grade crude oil), production equipment installed, and a 30 mile, 18 inch undersea and offshore pipeline laid. On 7 March 1969 natural gas commenced flowing to the treatment facilities at the Gippsland Gas Processing and Crude Oil Stabilisation Plant then in the course of erection at Longford, a few miles south of Sale, in east Gippsland. The second gas production platform, Marlin, was erected during 1969 about 30 miles offshore in 195 ft of water and after four development wells had been completed in 1969, gas commenced flowing ashore to Longford on 21 January 1970 through a 67 mile, 20 inch undersea and onshore pipeline. Development drilling from this platform was temporarily suspended

in December 1968 following a serious blow-out and is scheduled to be resumed during 1972. The bringing on stream of two separate gas fields with separate pipelines to the treatment plant ensures security of gas supply to the Victorian market and complied with a condition of the contract between Esso/B.H.P. and the gas utilities.

Between 1968 and 1970 Esso and B.H.P. erected combined gas treatment and crude oil stabilisation facilities at Longford at a cost of about \$51m. At this plant, varying percentages of the heavier hydrocarbons—ethane, propane, butane, and pentanes—are removed from the field gas to yield a dry, pipeline quality gas suitable for marketing to homes and industry. The plant also treats the crude oil from the oil fields by removing the dissolved gases for maximum safety of transmission and storage of the oil and passing them to the gas treatment facilities. The dry gas is piped to Dandenong through the trunkline built by the Victorian Pipelines Commission in 1968 at a cost of about \$20m. This pipeline, which commenced operating on 16 March 1969, was taken over by the Gas and Fuel Corporation of Victoria on 1 July 1971, when the Commission was abolished by Act of Parliament.

The ethane, propane, and butane remaining after the treatment of the gases received from the Barracouta and Marlin fields and those removed from the crude oil are conveyed as gas liquids through a 118 mile, 10 inch pipeline built by Esso and B.H.P. during 1968 and 1969, to a fractionation plant at Long Island Point near Hastings about 40 miles south-east of Melbourne. Both the initial and first expansion stages of the construction of processing facilities which will eventually produce about a million tons a year of marketable propane and butane and large volumes of ethane gas, have been completed at this plant, the erection of which commenced in 1968. Six refrigerated storage tanks, each with a capacity of 135,000 barrels of propane and butane, have been erected and a seventh tank, of 270,000 barrel capacity, is currently being built to store butane. The initial stage of the plant was commissioned in April 1970 and the first consignment of propane and butane was loaded into a refrigerated carrier at the adjacent liquids jetty and shipped to markets in Japan early in July 1970.

Crude oil

After construction of the platforms for the development of the Barracouta and Marlin gas fields had been completed in 1968, Esso and B.H.P. commenced work at Barry Beach Marine Terminal on fabricating the jackets and decks for the platforms necessary to develop the Halibut and Kingfish oil fields. The first of these, Halibut, was erected early in 1969 in 238 ft of water about 40 miles offshore. Development drilling from the 24 well capacity platform was completed early in 1970 and on 13 March crude oil commenced flowing to the treatment facilities at Longford through an 82 mile, 24 and 26 inch pipeline, 47 miles of which was laid on the sea floor.

The two 21 well Kingfish platforms were erected in waters 255 ft deep about 48 miles offshore during 1969 and 1970. Development drilling from the Kingfish A platform commenced on 31 March 1970 and was completed early in 1971. On 22 April 1971 the Kingfish field came on stream and crude oil commenced flowing through a 2.3 mile, 16 inch pipeline to the Kingfish B platform where it was fed into the Halibut to Longford oil

pipeline. Development drilling from the sister Kingfish B platform commenced on 22 October 1970 and was completed in October 1971. This platform came on stream on 1 November 1971. A summary of wells drilled from the five development oil and gas platforms is given in the following table :

GIPPSLAND BASIN—OFFSHORE PRODUCTION WELLS DRILLED FROM FIXED PLATFORMS

Platform	Well capacity of platform	Date drilling commenced	Number of wells drilled	Date production commenced	Number of producing wells
Barracouta	10	8.3.68	10	7.3.69 (gas) 8.10.69 (oil)	4 6
Marlin	24	2.8.68	(a) 6	21.1.70 (gas)	4
Halibut	24	22.3.69	(b) 21	13.3.70 (oil)	19
Kingfish A	21	31.3.70	21	22.4.71 (oil)	21
Kingfish B	21	22.10.70	21	1.11.71 (oil)	21
Total	100	..	79	..	75

Source : Esso Australia Ltd, November 1971.

(a) Includes two wells plugged and abandoned (A-2 and A-7). Drilling ceased after blowout on A-7 well on 2 December 1968.

(b) Includes one well abandoned and one well suspended. Total number to be drilled in current programme.

During 1971 the 26 inch onshore section of the Halibut-Longford oil pipeline was looped by the laying of a 17.8 mile, 30 inch pipeline to improve the throughput of crude from the Kingfish field. On 26 April 1971 the production of crude oil from the Gippsland fields at the platforms exceeded 300,000 barrels a day and in November 1971 reached 350,000 barrels a day. This results in approximately 315,000 barrels a day of stabilised crude or about 62 per cent of Australia's refinery requirements.

After treatment in the stabilisation facilities at the Gippsland Gas Processing and Crude Oil Stabilisation Plant at Longford to remove the dissolved gases to ensure safe transportation and handling, the crude oil is conveyed through a 117 mile, 28 inch pipeline built by Esso and B.H.P. in 1969, to the eight 268,000 barrel capacity storage tanks and the shipping terminal located at Long Island Point. From there it is conveyed by tankers to refineries in Victoria, New South Wales, South Australia, Queensland, and overseas ; and by a 7 mile, 42 inch pipeline to the nearby BP refinery at Crib Point. Some of the crude conveyed through this line is also shipped from the Crib Point liquids jetty which services the BP refinery following the installation of additional facilities in 1970. The bulk of the crude oil and all the propane and butane are, however, loaded into tankers and carriers, respectively, at the Long Island Point liquids jetty built by Esso for the Victorian Government during 1968 and 1969 at a cost of \$6m.

The production of natural gas, crude oil, propane, butane, and ethane during the years 1968-69 and 1969-70 is shown in the table on page 376.

Purchase and distribution of natural gas by Victorian utilities

On 16 March 1967 the four gas utilities then operating in Victoria as the buyers, and Esso and B.H.P. as the sellers, signed a Letter of Intent for

the supply of natural gas over a 20 year contract period at prices ranging between a maximum of 3.2 cents a therm and a minimum of 2.58 cents a therm, depending on quantities taken and to remain firm over that period. This Letter of Intent was later confirmed by contracts between the buyers and the sellers.

Natural gas commenced flowing from the Esso and B.H.P. treatment plant at Longford on 16 March 1969 and was turned in from the Victorian Pipelines Commission's station at Dandenong to the Gas and Fuel Corporation's Melbourne distribution system on 31 March 1969. On 14 April 1969 Victoria's first consumer was connected. The Corporation and the other Melbourne gas utility, The Colonial Gas Association Ltd, had commenced planning in 1966 for the introduction of natural gas. Old pipelines were checked and up-graded and a number of new ones laid to form a fully integrated network. The principal distribution pipelines laid were the Corporation's 51 mile, 18 inch transmission main around the eastern and northern suburbs from Dandenong to West Melbourne between 1966 and the end of 1969, and the 21.6 mile, 30 inch transmission line from Dandenong to West Melbourne in 1969 and early 1970, thus ringing the city with a new 73 mile integrated pipeline system. Costing about \$11m, the complete line became fully operational in May 1970.

In addition to this pipeline, the Corporation and The Colonial Gas Association laid a number of high pressure transmission pipelines in various suburbs around Melbourne. The Corporation also laid pipelines to supply Sale, Maffra, Edithvale, Mornington, Broadmeadows, and Craigieburn.

The combustion characteristics of natural gas vary considerably from those of manufactured gas and it therefore became necessary to modify all gas burning appliances before the new fuel could be used. Both companies embarked on programmes to convert all appliances at no cost to the consumer. The Colonial Gas Association, which commenced supplying natural gas to its customers in May 1969, completed the conversion of the 170,400 appliances owned by its 78,653 customers in its two franchise areas in Melbourne in March 1970 at a cost of about \$5.3m. On 23 December 1970 the Gas and Fuel Corporation completed, at a cost of about \$31m, the conversion of the 1.1 million appliances owned by its 446,000 customers in its Melbourne and Gippsland franchise areas. Melbourne thus became the first capital city in Australia to be wholly converted to natural gas.

Natural gas was supplied to the Gippsland towns of Warragul, Trafalgar, Morwell, Traralgon, and Sale in November and December 1969 through pipelines laid between 1955 and 1970 and supply commenced to Geelong, 45 miles south-west of Melbourne, on 15 March 1971. The Victorian Pipelines Commission, which had been established by Act of Parliament late in 1966 to build natural gas trunklines in Victoria, laid a 33 mile, 14 and 16 inch pipeline from Brooklyn to Corio late in 1970 and early in 1971 to supply Geelong, at a cost of approximately \$4m. This line is now owned and operated by the Gas and Fuel Corporation following the abolition of the Victorian Pipelines Commission on 1 July 1971 and the transfer of its assets and function to the Corporation. The Geelong Gas Company in 1970 laid a system of pipelines from Corio to the various suburbs of Geelong which it supplies with gas.

The Gas and Fuel Corporation, which over a number of years since its inception in 1951 had purchased a number of gas utilities in various parts

of Victoria, obtained from The Gas Supply Co. Ltd its undertaking at Sale in 1969 and the balance of that company's assets in Victoria in 1970. The latter comprised gas-making, distribution, and marketing facilities in ten country towns including Victoria's third largest city, Ballarat. In June 1971 the Corporation purchased over 90 per cent of the shares in The Geelong Gas Company and assumed ownership of the company. At present the company continues to operate under its own name and the original Act of Parliament by which it was established.

When the conversion of The Geelong Gas Company's 23,000 customers was completed in August 1971, about 95 per cent of Victoria's 576,000 gas users were burning natural gas. The remaining 30,000 customers, all located in country areas, are using reformed or tempered liquefied petroleum gas. This number will be further reduced when natural gas is supplied by the Gas and Fuel Corporation to Ballarat and Bendigo in 1973 following the laying of a 122 mile high pressure pipeline system in 1972 and 1973 linking Melbourne to those cities.

Among the most important items of gas legislation passed during 1970 was the *Gas Franchises Act* 1970. This Act defines the geographical boundaries of the franchise areas of the Gas and Fuel Corporation of Victoria and The Colonial Gas Association Ltd within the State of Victoria and establishes the rights, subject to certain conditions and exemptions, of each of the two organisations to supply gas within those areas.

Since natural gas became available in April 1969 the sale of gas by the Victorian utilities has more than doubled. Between January and the end of October 1971, the first year natural gas had been in use in Melbourne and Gippsland, and including Geelong from March; consumption by all the gas utilities has varied from a daily average of 42.21 million cubic feet during January to a seasonal peak daily average of 97.38 million cubic feet during July and August and a daily average of 81.39 million cubic feet in October.

On 19 January 1971 the Gas and Fuel Corporation and Australian Paper Manufacturers Ltd announced that agreement had been reached for the Corporation to commence supplying natural gas to A.P.M.'s plants early in 1972. The contract is for around 25 million therms a year, rising over several years to almost double that volume. The gas will be used at both the Fairfield paper and paper board mill and at the Maryvale pulp and paper mill near Morwell, in Gippsland. Since then the laying of two pipelines to convey the gas to the mills concerned has been completed and supply is expected to commence early in 1972.

The largest single contract for the sale of natural gas occurred later in the year following an announcement on 8 June 1971 that 1.2 trillion cubic feet of natural gas from Victoria's Gippsland fields reserves had been allocated to the State Electricity Commission of Victoria for use as a fuel in a new peak and intermediate load power station to be built at Newport, Melbourne. It is expected that the first of the two 500 MW generators will be commissioned in 1976 and the second one in 1978.

Distribution of crude oil and L.P.G.

The first load of Gippsland oil, comprising 105,000 barrels of Barracouta crude, left the Long Island Point liquids jetty on 24 March 1970 in the tanker *Hemiglypta* for the P.R.A. refinery at Port Stanvac, South Australia.

The liquids jetty, built by Esso for the Victorian Public Works Department during 1968 and 1969 at a cost of \$6m, is 2,200 ft long, has a 356 ft berthing head, and is served by a channel and turning basin dredged to a depth of 47 ft. It has the capacity to load crude oil into tankers up to 100,000 tons deadweight and propane and butane (L.P.G.) into large refrigerated carriers. In Victoria, the first deliveries of Gippsland crude were made to the P.R.A. refinery at Altona on 27 March 1970, to the BP refinery at Crib Point on 3 April 1970, and to the Shell refinery at Corio on 7 April 1970.

In addition crude oil is conveyed to the BP refinery at Crib Point through Esso and B.H.P.'s 7.2 mile, 42 inch distribution pipeline laid in early 1970 for the dual purpose of supplying the refinery and connecting the Long Island Point tank farm to the Crib Point liquids jetty to increase tanker loading capacity and provide alternative shipping facilities. The first load of Gippsland crude was shipped from this jetty on 5 July 1970.

Since the first Gippsland oil field, Barracouta, came on stream in October 1969, it has, together with the large Halibut and Kingfish fields, produced a total at the platforms of 134.6 million barrels of oil to the end of October 1971. This volume is reduced during the stabilisation process by about 9 per cent and 124.4 million barrels of crude have been taken by pipeline to the Long Island Point Tank Farm for distribution to refineries.

Government approval was given to W.A.G. Pipeline Pty Ltd in April 1971 to lay a crude oil distribution line 84.4 miles long from Long Island Point around Port Phillip Bay to supply Victoria's two other refineries—P.R.A. at Altona and Shell at Corio, north of Geelong. Laying of the pipeline commenced late in September 1971 and is scheduled to be completed about the middle of 1972 at a cost of about \$13 to \$14m. The diameter of the 51 mile section to Altona is 24 inches and the balance of the line to Corio is 16 inches.

The first load of propane and butane, for which markets in Japan had been arranged independently by Esso and B.H.P., left Long Island Point in the refrigerated carrier *Bridgestone Maru 1* on 4 July 1970. To the end of October 1971, 598,275 metric tons have been shipped with carriers being loaded at the rate of one every 2 to 3 weeks. At the Altona Petrochemical Co. Ltd, a member company of the Altona petrochemical complex, an ethane cracker to produce ethylene basestock has been built at a cost of \$18m and approval has been given by the Government to Esso and B.H.P. to lay a 49 mile, 10 inch pipeline from the Long Island Point Fractionation Plant to convey ethane gas to Altona. It is expected that laying of this line will commence early in 1972.

Refining and marketing

Large scale refining of crude oil in Victoria commenced in 1954 when the Vacuum Oil Company, later to become Mobil Oil Australia Ltd, extensively enlarged a small refinery at Altona in 1954 at a cost of \$40m. This refinery is now operated by Petroleum Refineries (Aust.) Pty Ltd, which is owned 65 per cent by Mobil and 35 per cent by Esso. Also in 1954, Shell commenced production at its newly built refinery at Corio near Geelong

and laid Victoria's first long distance petroleum products pipeline to Shell commenced production at its newly built refinery at Corio near Geelong and laid Victoria's first long distance petroleum products pipeline to Melbourne. The refinery cost \$60m and has a capacity of 2.4 million tons a year. A second pipeline to convey fuel and furnace oils was laid to Melbourne by Shell during the early 1960s.

The expansion of the automobile industry in the 1960s, coupled with the demand for furnace and fuel oil in industry and for transport and shipping of light oils for the manufacture of petrochemicals, resulted not only in the establishment by BP Australia Ltd of Victoria's third refinery at Crib Point costing \$40m and having a capacity of 2.4 million tons a year, but also in expanding the two established refineries—P.R.A. at Altona and Shell at Corio. In 1966 BP Australia laid a 24 mile products pipeline from Crib Point to its distribution terminal at Dandenong.

Until 1969 the output of all Australian refineries had been designed for the processing of heavy crude oils imported from the Middle East and Indonesia and blended with small amounts of light indigenous Australian crudes from Moonie and Barrow Island. The Gippsland fields, however, produce light crudes with a high wax and low sulphur content, containing mainly fractions suitable for the production of petrol, jet fuel, and diesel oils. The average yield of Gippsland crudes is naphtha 35 per cent, kerosene 10 per cent, diesel oil 22 per cent, light ends 5 per cent, and residuals 28 per cent. Petrol is derived from the naphtha and the residuals; and jet fuel and lubricating oils can be produced. Therefore, some modifications to Australian refineries were required to process these different types of crude.

Between 1967 and 1970 the P.R.A. and Shell refineries in Victoria undertook an expansion programme to cope with increasing market demands and at the same time converted existing equipment and installed new plant to enable Gippsland crude to be processed efficiently. First, the Shell refinery undertook a \$10m expansion programme in 1967 and 1968 and followed this with the installation in 1970 of a new \$5m gasoline alkylation plant. The P.R.A. refinery at Altona completed late in 1970, at a cost of \$26m, a conversion and expansion programme comprising a new crude processing unit, a new naphtha reformer, a new naphtha treater, and various other work upgrading existing refinery facilities. The BP refinery installed facilities costing about \$1m to improve the handling of the Gippsland crudes and a further \$1m was spent on facilities for the shipping of Gippsland crude from the adjacent liquids jetty.

When the work was completed the Shell refinery had increased its processing capacity to 118,000 barrels a stream day (BSD). Production at the P.R.A. refinery can range from 85,000 to 95,000 BSD according to the feedstocks used, while the BP refinery at Crib Point remains unchanged at 50,000 BSD. The total cost of the various expansion and conversion programmes amounted to about \$50m and increased Victoria's refinery capacity to about 263,000 BSD or 38 per cent of the Australian total.

Petroleum products are distributed throughout Victoria through a number of industry terminals and about 5,200 retail outlets operated by nine major oil companies. The principal products marketed in Victoria's marketing area (which includes part of southern New South Wales) during 1970-71 were :

	'000 gallons
Motor spirit	658,685
Automotive distillate	144,086
Industrial diesel fuel	100,125
Furnace fuel	377,652
Heating oil	65,448
Aviation turbine fuel	47,749
Aviation gas	3,095
Lighting kerosene	13,096
Power kerosene	4,053

These quantities total 1,413,989,000 gallons or 25.5 per cent of the Australian total of the main petroleum fuels.

The following table sets out details of oil and gas production for the years ended June 1969 and 1970 :

**VICTORIA—OIL AND GAS PRODUCTION
FROM GIPPSLAND FIELDS**

Product		1968-69	1969-70
Crude oil	'000 barrels	..	13,474
Natural gas (a)	MMSCF (b)	738	9,668
Commercial ethane		..	17
Commercial butane	'000" barrels	..	98
Commercial propane	"	..	137

(a) Includes commercial gas and gas for field usage.

(b) Million standard cubic feet.

Mineral production

The mineral production of the State, as recorded by the Mines Department, from lands occupied under the Mines Act (excluding stone produced in quarries and salt) for the years ended December 1967, 1968, and June 1969, is as follows :

VICTORIA—MINERAL PRODUCTION

Minerals	1967		1968		1968-69	
	Quantity	Value	Quantity	Value	Quantity	Value
	fine oz	\$'000	fine oz	\$'000	fine oz	\$'000
Precious metals—						
Gold	10,996	(a) 468	11,069	(a) 431	10,163	368
Silver	99	(b)	260	(b)	165	(b)
Other minerals—						
Bauxite	ton 2,020	11	ton ..	..	ton 4,016	20
Tin concentrates	47	90	92	162	61	81
Coal, black	32,066	251	26,314	209	13,102	105
Coal, brown	23,383,607	20,686	22,970,653	21,555	23,128,491	20,880
Copper concentrate	74	4	162	6	865	41
Fireclay	34,581	57	18,897	24	21,209	28
Gypsum	224,065	355	77,472	167	64,252	130
Kaolin and other clays	1,808,598	3,127	2,008,000	3,342	1,868,606	1,780
Limestone	1,992,158	2,671	1,819,517	2,379	1,871,754	2,466
Iron ore	480	6	174	1	559	15

(a) Includes gold subsidy \$125,332 for 1967, \$87,824 for 1968, and \$32,867 for 1968-69.

(b) Value of silver production in Victoria \$71 in 1967, \$500 in 1968, and \$154 in 1968-69.

The following table shows the average annual production and value of black and brown coal for each of the five year periods from 1926 to 1960 and the production and value for each of the years 1961 to 1968-69 :

VICTORIA—COAL PRODUCTION AND VALUE (a)

Period	Black coal		Brown coal	
	Production	Value	Production	Value
	tons	\$'000	tons	\$'000
1926-1930	668,177	1,786	1,515,592	386
1931-1935	472,030	888	2,445,215	512
1936-1940	324,903	568	3,608,751	712
1941-1945	286,277	818	5,010,555	1,052
1946-1950	156,290	722	6,648,430	2,404
1951-1955	143,535	1,590	8,728,116	7,186
1956-1960	100,893	1,050	12,193,625	11,302
1961	66,363	718	16,279,168	15,444
1962	56,721	632	17,137,438	15,682
1963	50,481	588	18,456,445	16,158
1964	47,058	544	19,034,792	17,304
1965	42,247	515	20,658,856	18,436
1966	35,519	497	21,782,977	20,064
1967	32,066	251	23,383,607	20,686
1968	26,314	209	22,970,653	21,555
1968-69	13,102	105	23,128,491	20,880

(a) Value of output at the mine.

Further references, 1965-1971; Mining in Victoria, 1964; Underground water, 1964; Groundwater in Victoria, 1969; Victorian clays, 1970; Brown coal, 1971; Minerals in Victoria, 1970; History of the Mines Department, 1970; Natural gas and crude oil development, 1971.

Quarrying

Information in the following table has been obtained from "regular" quarries which are known to have a fixed plant and which are in permanent production, and from mines producing construction materials as by-products of their main activity :

VICTORIA—CONSTRUCTION MATERIALS PRODUCTION

Year	Sand	River gravel and gravel boulders	Dimension stone	Crushed and broken stone	Other quarry products
	'000 cu yd		ton	'000 cu yd	
1965	2,956	664	14,347	9,827	728
1966	3,148	492	9,546	11,198	754
1967	3,009	596	10,530	12,869	602
1968	3,687	570	7,149	12,255	1,022
	'000 ton		ton	'000 ton	
1968-69p	4,730	594	9,054	14,432	1,042

p: Preliminary.

In addition to the production set out in the preceding table, a considerable quantity of material is won by contractors operating shallow pits for or on behalf of local government authorities. Some of these work mine tailings. This itinerant activity was first covered by statistical returns for 1961. However, the statistics are available only from 1962. Reported production data for the years 1965 to 1968-69 are :

VICTORIA—CONSTRUCTION MATERIALS: ITINERANT ACTIVITIES

Type of material	1965	1966	1967	1968	1968-69
		'000 cu yd			'000 ton
Sand	244	266	422	384	538
Gravel and gravel boulders	2,072	1,994	2,156	1,856	2,150
Crushed and broken stone	2,123	1,537	678	883	1,142
Other quarry products	1,040	818	875	435	821

Further references, 1966-1971

VALUE OF PRODUCTION

The value of production as estimated in the following tables is based to a large extent on returns received annually from individual producers throughout the State. As a measure of total production it is incomplete, as it does not include the building and construction industry. It also omits factories employing less than four hands (unless power-driven machinery is used) and excludes agriculturists with holdings of less than one acre.

A detailed account of the period covered for individual rural industries is given on page 305. Except in the case of mining and quarrying, statistics for the non-rural industries refer to the year ended 30 June. Statistics for mining and quarrying relate to the year ended 31 December of the first year shown.

Gross value

Gross value is defined as the value placed on recorded production at the wholesale price realised in the principal market. In cases where primary products are absorbed locally, or where they become raw material for secondary industry, these points are presumed to be the principal markets. Care is taken to prevent, as far as possible, all overlapping or double counting. The primary value of dairy production, in accordance with the above definition, is the price paid at the factory for milk or cream sold by the farmer; the value added by the process of manufacturing into butter, etc., is included in manufacturing production.

VICTORIA—GROSS VALUE OF PRIMARY PRODUCTION EXCLUDING MINING (\$'000)

Industry	1965-66	1966-67	1967-68	1968-69	1969-70
Agriculture	262,852	325,461	221,960	331,715	319,698
Pastoral	413,558	376,196	355,318	345,275	385,025
Dairying (a)	190,141	206,638	181,541	202,245	225,142
Poultry and bees	51,975	57,658	51,316	47,377	49,325
Trapping	5,785	4,244	3,621	3,623	3,078
Forestry	29,691	29,675	27,845	28,517	30,010
Fisheries	4,403	4,980	5,725	5,928	5,839
Total gross value	958,405	1,004,852	847,326	964,681	1,018,117

(a) Includes subsidy: 1965-66 \$14,569,000, 1966-67 \$14,575,000, 1967-68 \$14,913,000, 1968-69 \$16,667,000, 1969-70 \$16,597,000.

Local value

The gross value of production, less costs of marketing (freight, cartage, brokerage, commission, insurance, and containers), represents the gross production valued at the place of production, that is, local value, details of which are shown in the following table :

VICTORIA—LOCAL VALUE OF PRIMARY PRODUCTION
EXCLUDING MINING
(\$'000)

Produce	1965-66	1966-67	1967-68	1968-69	1969-70
Agriculture—					
Barley	2,938	6,174	2,606	6,470	8,982
Maize	99	111	39	80	99
Oats	12,555	14,498	6,229	10,560	8,189
Wheat	75,456	87,279	36,735	95,832	87,223
Onions	1,507	1,188	1,266	649	731
Potatoes	7,763	12,649	16,132	6,891	13,680
Other vegetables for human consumption	19,425	21,862	20,713	19,668	20,987
Hay and straw	39,350	73,108	48,307	71,956	33,841
Fruit	27,654	24,302	26,940	23,469	37,077
Vineyards	17,670	18,688	19,496	16,160	21,344
Other crops	21,295	22,095	17,527	24,688	27,781
Total	225,713	281,954	195,992	276,423	259,934
Pastoral—					
Wool	168,613	167,123	124,143	145,557	143,040
Sheep, slaughtered	57,113	57,081	71,981	56,192	67,430
Cattle, slaughtered	145,403	119,187	128,648	118,882	146,015
Total	371,130	343,391	324,772	320,631	356,485
Dairying—					
Whole milk used for—					
Butter	87,544	96,922	72,345	95,110	109,859
Cheese	11,201	14,792	15,756	13,727	11,991
Condensing, concentrating, etc.	16,365	16,552	14,027	14,409	12,306
Human consumption and other purposes	35,410	37,731	39,925	37,844	41,455
Subsidy paid on wholemilk for butter and cheese	14,569	14,575	14,913	16,667	16,597
Pigs, slaughtered	17,513	17,540	16,905	16,392	19,372
Total	182,601	198,111	173,871	194,148	211,580
Poultry and bees—					
Eggs	33,914	35,173	33,535	31,163	33,395
Poultry	11,546	15,423	11,995	11,731	11,830
Honey and beeswax	989	758	782	396	821
Total	46,449	51,354	46,311	43,291	46,046
Trapping, etc.—					
Rabbits and hares	4,826	3,470	3,051	2,875	2,371
Rabbit and hare skins, etc.	595	506	359	524	513
Total	5,421	3,976	3,409	3,400	2,884
Forestry—					
Sawmills	22,494	23,798	23,235	25,865	26,137
Hewn timber	2,928	2,516	2,477	2,231	2,076
Firewood	3,278	2,554	1,586	1,371	1,348
Bark for tanning	108	89	80	63	59
Other	62	77	70	48	52
Total	28,870	29,036	27,448	29,577	29,672

VICTORIA—LOCAL VALUE OF PRIMARY PRODUCTION EXCLUDING MINING—*continued*
(\$'000)

Produce	1965-66	1966-67	1967-68	1968-69	1969-70
Fisheries—					
Fish	1,872	1,643	1,933	2,269	2,619
Crayfish	1,040	909	1,012	1,436	1,481
Scallops	789	1,344	1,310	875	196
Other	96	411	898	697	639
Total	3,797	4,307	5,153	5,277	4,935
Total local value	863,980	912,128	776,957	872,747	911,537

(a) More than nil, but less than \$500.

Net value of production

Net value of production is computed by subtracting from local value the cost of materials used in the process of production. These materials include stock feed, seed, manures, power, petrol, kerosene, other oils, dips, sprays, and other costs. No deductions have been made for depreciation or certain maintenance costs. The net value of production is the only satisfactory measure to use when comparing or combining the value of primary industries with those of other industries. Details for primary industries excluding mining are shown in the table below :

VICTORIA—NET VALUE OF PRIMARY PRODUCTION EXCLUDING MINING
(\$'000)

Division of industry	1965-66	1966-67	1967-68	1968-69	1969-70
Rural—					
Agriculture	202,674	255,016	169,501	247,194	216,421
Pastoral	346,230	315,142	254,187	262,707	303,234
Dairying	135,601	145,567	140,097	166,117	185,090
Poultry	28,192	32,464	27,705	25,675	25,409
Bee farming	989	758	782	396	821
Total rural	713,686	748,947	592,272	702,089	730,975
Forestry, fishing, trapping	38,088	37,319	36,179	38,242	37,492
Total net value	751,774	786,266	628,451	740,331	768,467