17. KOWREE LAND-SYSTEM

In the far-western parts of Victoria, towards the South Australia border, there are many different types of land which make this part of the State interesting to the agriculturist, whether landholder or scientist.

One of the commonest types of land consists of dry sclerophyll forests and heath woodlands of rough-barked species such as brown stringybark, messmate and apple box, which have a prominent heath understorey and which grow in deep, acidic sands, that is, the nomopodzols and leptopodzols. Areas of this type occur in widely scattered places between the Nhill-Serviceton line in the western Wimmera and the southern coastline. Most of them have been mapped and described previously. In the Shire of Kowree, Blackburn and Gibbons (1956) named the Kowree, Tallageira and Little Desert land-units, and in south-western Victoria, Gibbons and Downes (1964) named the Kanawinka and Follett land-systems.

This type of land also occurs within the area surveyed for this report and it has been mapped as the Kowree, Grampians Plains and Moora Valley land-systems. The name of Kowree has been adopted from the earlier report of Blackburn and Gibbons because this land-system is very similar to, and in places continuous with, the Kowree land-unit named by those authors.

Kowree land-system has an area of 160 square miles and its features of environment and land-use are illustrated in Figure 21. It contains differences of land-form, rainfall and soil which have led to a sub-division of the mapping unit into the Kowree and Lambruk land-units.

Land-Units

Kowree land-unit covers 98 square miles in tile north-western parishes of Kalingur, Tooan and Jilpanger and it has the ridge, sand dune and sand sheet land-forms. It is a continuation of one section of Kowree land-unit mapped by Blackburn and Gibbons.

The deposits of Early Holocene siliceous sand form a mantle over two N.N.W-S.S.E. ridges which are about 100 feet higher than the plain and up to fifteen miles in length. The ridges continue to the north and south into the Shire of Kowree. Their origin and the material of which they are composed are both uncertain. Some workers have suggested that the entire system of N.N.W-S.S.E. ridges in western and north-western Victoria, of which these two are examples, are stranded coastal dunes formed during the retreat of the Tertiary Murray Sea to the present position of the Southern Ocean (Anon. 1961a, Blackburn 1962). Closely associated with the two ridges on their eastern (leeward) sides are further deposits of sand which have been formed into sand dunes and sand sheets, presumably by the action of the wind. The term, sand dune, is something of a misnomer because the land-forms referred to are not distinct ridges of sand with a definite shape and line of orientation but rather they form all undulating landscape with no orderly arrangement.

The common soils in the land-unit are iron leptopodzols and they are found on the sand dunes and ridges. They have an A horizon of pale pinkish brown or greyish brown sand, gradually changing in colour to a B horizon of yellow sand between 12 and 24 inches below the surface. Iron nomopodzols are much more restricted in extent and they are found in many of the depressions between the sand dunes. These soils differ from the leptopodzols in having a deeper and paler (offwhite) A horizon. A minor soil type occurs on the ridges. It has a comparatively shallow sandy A horizon with little evidence of podzolization and there is a clay subsoil generally less than 30 inches below the ground.
called soils of this type deep, coarse sandy solodic soils.

The sand sheets are scattered among the sand dunes as minor features of the landscape and their soils belong to the Warratong series of solonetzic soils, that is, the soils have shallow A horizons of pale brown sand overlying a clay subsoil with a domed or columnar surface. The tops of the clay domes are usually less than 18 inches below the surface.

The podzols support closed heath woodlands of brown stringybark and this plant community covers the ridges and most areas of sand dunes. There are scattered areas of dunes without a tree cover but with a heath community. The dominant member of the heath species, both in the woodlands and on the treeless heaths, is desert banksia which grows in shrub form up to about ten feet in height. The deep, coarse sandy solodics on the ridges support yellow gum and apple box as well as brown stringybark, and the heath species are not as prominent as in the podzols.

The sand sheets are wetter sites with more fertile soils and they are associated with yellow gum woodlands which have an open, sparse understorey of scattered heath species. Two common members of the heath layer are silver

banksia and beaked duckbush *(Hakea)* and the latter is a reliable indicator (throughout the survey) of soils with a clay subsoil close to the surface.

At present, most of the land-unit is uncleared and unused. It has a low potential for agriculture because, under the prevailing climate, its soils give rise to hazards of production and economics which must be carried by those who attempt development.

The Production hazards are related to problems of pasture nutrition and soil moisture in the podzols. Briefly, the first problem is to overcome deficiencies of phosphorus, nitrogen, potassium, copper and zinc and to reduce the acidity of the soil, all of which are necessary for the successful establishment and maintenance of introduced pastures. The second problem is to overcome the moisture stress that pasture plants in sandy soils experience during the dry period of the year. This is of particular concern on the dunes, because of the great depth of sand, and to a lesser degree throughout the area in general.

Even if a vigorous pasture can be developed, its cost and doubtful productivity may make it uneconomical.

There have been some attempts around the edges of the land-unit to establish introduced pastures. These have shown that a pasture of some value can be grown only when good seasonal rains are received during the first two years, and when grazing is carefully controlled by sub-divisional fences to separate the podzols from the more fertile solonetzic soils. Phalaris, perennial veldt grass and evening primrose have been successfully established in this way. Legumes are more difficult, but lucerne has persisted under the conditions just described when sown with superphosphate, copper, zinc and lime. Recent experience on similar land in South Australia has confirmed the need for careful techniques of pasture establishment. Even with a careful programme of establishment and maintenance, pastures on the podzols are inferior to pastures of the same age and composition growing in nearby solonetzic soils where only superphosphate need be applied.

The areas of yellow gum woodlands have a greater potential than the ridges and dunes for establishing introduced pastures. They are comparatively wet sites that receive seepage water from the dunes, and their solonetzic soils have a clay subsoil close to the surface which holds up moisture to the roots of pasture plants. However, most of the woodland areas are scattered and small and are therefore uneconomic propositions for development.

Under the present plant cover, there is no erosion hazard or erosion. The only hazard arises during the early stages of pasture development. Rilling and gullying may occur on the ridges and dunes if heavy rain falls when the ground is hare, that is, between clearing operations and the development of a cover of pasture or heath re-growth.

Lambruk land-unit comprises a number of small areas of the land-system which are located on the plains around the western Black Range and Rocklands Reservoir. Their total area is 62 square miles and for the most part their only land-form is the sand sheet. There are also sand dunes in that part of the land-unit on the boundary between the parishes of Lambruk and Beear.

Generally the soils are iron nomopodzols which support short, dry sclerophyll forests of brown stringybark and a well-developed heath ground layer. In some parts there are deep sandy solodic soils with brown stringybark and yellow gum and a heath layer of shorter and sparser plants. As in Kowree land-unit, the first of these two combinations of soil and vegetation indicate deep podzols with clay subsoils at depths greater than three feet. The second combination again indicates sandy soils with clay subsoils much closer to the surface, generally less than three feet.

The potential of this land-unit for pasture development is no higher than that of Kowree land-unit because, although the average rainfall is higher and dunes are uncommon, the soils are nomopodzols which are more infertile than the leptopodzols in the Kowree land-unit

Summary

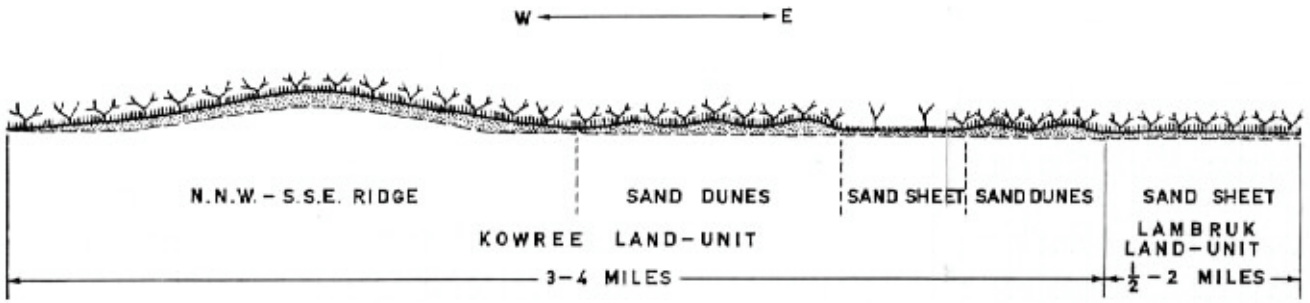
It is suggested that no attempts should be made to establish complete farm units in this land-system and in similar land-systems where podzols are the dominant soils. If there is to be development, it should be restricted to small areas adjacent to prosperous farms located in the neighbouring land-systems. In this way the uncleared stringybark areas can be developed a little at a time by landholders who have the support of an established farm to absorb any losses from the attempts to develop the podzols.

The land-system is also of doubtful value for commercial pine plantations because the soils are too infertile and the climate is too dry (see pp. 60 and 61). Foresters consider that deep, white, acidic sands (the nomopodzols) are of marginal value only and should not be planted to pines until all the available areas of more fertile soils are used. The

leptopodzols in Kowree land-unit are not as infertile as the nomopodzols, but the rainfall is too low to support the growth rates necessary for profitable commercial plantations.

KOWREE LAND-SYSTEM

(i) Distribution of land-forms



(ii) Land-system diagram

Land Unit		Kowree			Lambruk
Climate		Average annual rainfall 18-19 inches: growing season May to September and October			24-26 inches
Land Form		Ridge	Sand dune	Sand sheet	
Geology		Mantle of Early Holocene siliceous sands	Early Holocene siliceous sands	Sand and clays	Siliceous sands
Topography		Long, gentle slopes 2-4%	Short, gentle slopes 1-3%	Flat	
Soil		Iron leptopodzols (dominant) iron nomopodzols (minor)		Solonetzic soils (Warratong series)	Iron nomopodzols
Land-Class		5 (small areas of strictly controlled light grazing)		2A	5
Land-Use	Present	Mostly unused, there are a few attempts at pasture development along the edges of the land-system			
	Problems	To find some productive form of land-use; the soils are mostly too dry and infertile for widespread agriculture; the timer is unsuitable for commercial exploitation			
Water and Wind Erosion	Hazard	Low, except when the ground is bare after clearing		None	
	Actual	None		None	
Native Vegetation	Structure	Closed heath woodlands and heaths		Tall woodland	Dry sclerophyll forest
	Species	Brown stringybark is dominant; in some parts of the ridges yellow gum and apple box are minor species. The heath understorey is dominated by *Banksia ornata*. Some areas of dunes are treeless heaths with *B. ornata*.		Yellow gum, Heath species	Brown stringybark Heath species

Figure 21 – Kowree Land System