1962

**Agricultural Regions of Western Australia 1962**

Department of Agriculture and Food, Western Australia

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AGRICULTURAL REGIONS OF WESTERN AUSTRALIA

1962

Notes Prepared By The
Western Australian Department of Agriculture.
AGRICULTURAL REGIONS OF WESTERN AUSTRALIA

A regional classification of the agricultural areas of the South West of the State according to physiography, climate and soils.

(Prepared by the Department of Agriculture)

INTRODUCTION:

Agriculture in Western Australia is confined almost entirely to the portion of the State south and west of a line running from 70 miles north of Geraldton to the vicinity of Esperance. Most of the development of this area has occurred in the past 55 years. A period of rapid expansion commenced when the Goldfields began to decline in about 1905 and there was another period of activity in the decade following the first World War. The depression of the 1930's led to difficulties and made some reorganisation of farming necessary. During this period the value of subterranean clover as a pasture plant, when topdressed every year with superphosphate was first realised.

A third period of extensive land development was stimulated during the post-war years by the favourable outlook for agricultural commodities and by a taxation system which encourages investment in land improvements. Land development, which is mostly being undertaken by already established farmers, is progressing at a rate of about three-quarters of a million acres a year. The expansion is still in progress and even though over ten million acres have been developed in this period there still remains a similar area which can be brought into production. The bulk of this area is light-textured sand plain country which is very deficient in plant nutrients. The use of trace elements, chiefly copper and zinc, and heavy dressings of superphosphate makes the development of this country possible and the combination of these fertiliser dressings with the growing of subterranean clover transforms this formerly useless country into productive farms.

Another important technical advance which has assisted land development since the war is the use of crawler tractors fitted with dozer blades and other devices for clearing.

From the information which is now available, it is possible to divide the agricultural areas into a number of regions based on physiography, soil type and pattern, and climatic factors. This has been attempted in the accompanying map. Climate and soil type are the two main natural determining factors of the type of agriculture in most areas. An important exception may immediately be noted in the case of those industries producing perishable or bulky fresh foods, e.g. whole milk, vegetables, and soft fruits. These are often produced as near as possible to large centres of population in spite of the expensive often involved in overcoming soil and climatic disabilities.

DEFINITION OF REGION

Before proceeding to discuss the regions which have been outlined, it is necessary to make clear what is meant by "region" as the term is here employed. A region is used in this discussion as an area of land in which the soil pattern is generally similar and in which the climatic conditions also have a restricted range. It is obvious that uniformity of either soil or climate is not possible unless each region is of very small dimensions. From accumulated experienced, the
main important differences in climatic and soil conditions in various parts of the agricultural areas are, however, appreciated by trained agriculturists and this experience has been utilised in preparing the accompanying map. For example: the difference between 8 and 10 inches of winter rainfall in the outer wheatbelt areas is of considerable importance, whereas in the much wetter districts of the extreme South West the difference between 35 and 45 inches in the same period may have considerably less significance.

SOIL PATTERN:

The soil pattern throughout the agricultural areas of Western Australia is of considerable complexity. This is chiefly due to the presence of extensive areas of sandy soils and of laterite (ironstone) which are the remnants of soils formed in an earlier period when the climate is believed to have been considerably wetter over vast areas of the State. This past climatic history of the whole of our agricultural areas, along with changes in sea-level and in the dissection of the land mass by the normal forces of erosion, has resulted in a complex of soil pattern.

CLIMATE:

The agricultural areas of Western Australia receive most of their rainfall in the winter period— from May to October. Except in the cooler southern coastal districts, rainfall during the November-April period is of little value for crop growth. In the winter period when moisture conditions are favourable, temperatures are low, though seldom low enough to check plant growth completely. There are, however, well recognised differences between the southern and northern agricultural areas with respect to rate of growth and time of maturity of annual crops and pastures. The northern areas have higher spring (September-October) temperatures than do the southern districts. Under low rainfall conditions high temperatures during the growing period and especially in spring, reduce the efficiency of the rainfall and many climatic indices are designed to take this into account, e.g., the Meyer ratio of precipitation to the saturation deficit of the atmosphere and various relationships between precipitation and evaporation.

In this study, however, it was felt that on account of the small amount of precise data available from meteorological records concerning either relative humidity or evaporation, a consideration of the winter and summer rainfall along with the mean temperature for the May-October period and the mean maximum temperature in September and October would give satisfactory criteria by which to express the climatic conditions in the various agricultural regions. These climatic data are given in the notes on the individual regions.
REGION 1.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>12 - 14 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May - October)</td>
<td>8 - 11 inches</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>57° - 69°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>75°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

Undulating country of 600-1200 feet elevation, generally characterized by broad valleys and low rises. The land is broken in parts by low rough hills in which granite appears to predominate. Apart from the rough country the chief soils are:

1. Brownish red sandy loams and loams with a hardpan at a depth of 2-3 feet.
2. Sandy and gravelly heath soils.

It is of interest that the heath soils often occur in the lower levels. On the brownish-red hardpan soils the characteristic timber is Eastern York gum. There are patches of salmon gum and areas of mallee country.

AGRICULTURE:

This area was settled mainly for wheat growing in the late 20’s just prior to the depression. Subsequent experience showed that the combination of low and uncertain rainfall with shallow soils made parts of the region unsafe for crop production. Earlier cereal varieties and better management has made cereal production quite stable. Properties are generally large and combine large numbers of sheep with the cropping programme. Although underground water supplies are not plentiful, it is usually possible to obtain sufficient for farm requirements by sinking wells down to 100 ft. Rainfall intensity and scarcity of suitable catchments are not conducive to the development of farm dams. Soil salinity and wind and water erosion are of little importance.

REGION 2.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>13 - 15 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May - October)</td>
<td>9 - 12 inches</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>57° - 68°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>75°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

Undulating country 600-1200 feet in elevation, broken by low rough hills in parts. The southern part of the region is granitic but in the north, there are considerable areas of sedimentary rocks overlying the granite, which influence the soil characteristics.

A very considerable proportion is occupied by sandy and gravelly soils with heath vegetation. On the better class brown to red-brown sandy loam to sandy clay loam soils, the Eastern York gum (generally growing where hardpan occurs), salmon gum, and jam are common. Associated with the granitic hilly country, brown to red-brown sandy soils, which carry jam in the virgin state are characteristic. Deep red-brown sandy loams are characteristic of the sedimentary rocks in the northern areas.
AGRICULTURE:

Wheat and wool production is the chief agricultural enterprise throughout this region. Oats for farm requirements are grown on most holdings. Nearly all farms carry sheep. Some farms also carry pigs particularly in periods of low wheat prices. Higher spring temperatures are experienced here than in the main wheatbelt to the south and west, resulting in earlier maturing of crops but also accentuating the effects of dry spring weather. The area can be regarded as a reliable wheat and sheep farming district. Farm dams are more numerous than in Region 1, but wells are the main sources of water supply. Soil salinity and wind and water erosion are of only minor importance.

REGION 3

CLIMATIC DATA:

Annual Rainfall

Winter Rainfall (May-October) . . . 15 = 18 inches

Summer Rainfall (November-April) . . . 11 = 14 "

Farm Winter Temperature (May-October) . . . Low and unreliable

Mean Maximum Temperature (September-October) . . . 70° - 75°

PHYSIOGRAPHY AND SOILS:

This region includes two distinct geological forms: (1) in the north, a sedimentary series including sandstones and limestones as well as coal measures; (2) In the south, granitic country. The northern area, while generally undulating, is sharply dissected in parts by the Irwin River and its tributaries and meanders and breaks are common.

There is a wide variety of soils, including sandy and gravelly types of heath country, brownmallee sandy loams, loams and clays of timbered areas, and grey clays of the bluebush plains of Nangetty. South of Arrino granitic formations predominate and the country is generally gently undulating. Beside the sandy and gravelly heath soils are important areas of brown soils which in the virgin state carried York gum and salmon gum, and brown and grey sandy soils of the granitic hill-lands.

AGRICULTURE:

This is one of the most reliable wheat and wool producing areas in the State. Oats are grown extensively, mainly for farm use, while barley is an important crop on some farms. Fat lamb production is important due to the mild winter and spring temperatures which enable the lambs to catch the early market. Excellent quality export lambs of the "Downs" type are obtained from the district (Coorow-Carnamah). In the northern part of the zone there is some beef cattle production and fattening is an important activity (Mingenew). Pigs are produced throughout the area.

The winter and spring rainfall is more reliable than in Region 2. Farm water supplies are reliable. Both wells and dams are used, wells predominating in the northern part.

Two main salt lake channels cross the region in an east-west direction. A rise in the water table has caused soil salinity trouble in certain low lying parts of the drainage system, but it is not general. At various places in the region there is evidence of wind and water erosion but only in
a few cases has it reached a serious stage.

REGION 4.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Climate</th>
<th>Rainfall/Mean Temperature (°F)</th>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>15 - 20 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>42 - 46 °F</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low and unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>58 - 60°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-Oct)</td>
<td>70 - 75°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

Undulating to hilly-country ranging from sea-level to about 1,000 feet elevation. The area may be described as a dissected plateau of sedimentary rocks with the underlying gneissic and related rocks exposed by streams such as the Hutt, Bowes, Chapman and Greenough Rivers.

Much of the higher residual country is characterised by poor sandy and gravelly soils but there are patches of York gum and related timbers growing on grey clay and red-brown loamy soils. Most of the agricultural country is on the brown and red-brown sands and loams formed on the gneissic rocks where the vegetation included jam, wattle and York gum. These soils may be shallow and stony but generally exhibit a good subsoil. South of Geraldton are the well known Greenough Flats: these and other brown soils of the vicinity are formed by alluvium brought down by the Chapman and Greenough Rivers. Along much of the coast behind a narrow sandy litteral, are limestone cliffs, backed by a heath-covered sandy soil.

AGRICULTURE:

Stock raising and cereal growing are the chief agricultural activities in this region. Stud merino flocks are carried in the northern part (Northampton). Stock fattening is an important activity in the southern part. Considerable quantities of oats are grown for farm use. Wheat for grain is produced throughout the area but the incidence of rust is higher here than elsewhere in the wheatbelt. Although the rainfall is reliable crop yields are usually below those in Region 3. The use of subterranean clover is now general and has had an important influence in the raising of the stock carrying capacity of the district. The W.A. blue lupin is used for the summer fattening of sheep. A few fat lambs (mainly first cross) are produced. Most of the stock water on farms is obtained from wells.

Tomatoes and vegetables for the early metropolitan market and tomatoes for the Melbourne market to a total value of nearly £200,000 per year are produced in the immediate neighbourhood of Geraldton. Some of this production is assisted by supplementary water supplies carted from the Geraldton water scheme.

Encroachment of salinity, generally to a minor degree, is noted in many depressions and creeks. Wind erosion occurs on sandy soils where the vegetation cover has been destroyed and water erosion has caused damage on some of the arable hilly country.
**CLIMATIC DATA:**

- **Annual Rainfall**: 18 - 25 inches
- **Winter Rainfall (May-October)**: 13 - 20 inches
- **Summer Rainfall (November-April)**: Low & unreliable
- **Mean Winter Temperature (May-October)**: 57 - 60°F
- **Mean Maximum Temperature (September-October)**: 70 - 73°F

**PHYSIOGRAPHY AND SOILS:**

Gently undulating sandy and gravelly heath country with some ridges and breakaways. The area consists generally of a low plateau of Jurassic sandstones, fringed on the west by coastal limestones and dunes. It is dissected by the Arrowsmith and Hill Rivers.

**AGRICULTURE:**

Agricultural development in this region is very recent. Using subterranean clover as a basic pasture it has been possible to develop some of the scrub plain soils of the area to allow stock to be carried. Some cropping also takes place—especially during the development years and after a few years of subterranean clover pasture. Up to the present two main areas have been developed—one to the west of Carnamah (Brunabba War Service Land Settlement Area) and the other in the northern part of the Denmaragan district (Baggingarra). These still exist, while considerable areas suitable for agriculture and these are likely to be developed within the next 10 - 15 years.

**REGION 6**

**CLIMATIC DATA:**

- **Annual Rainfall**: 11 - 12 inches
- **Winter Rainfall (May-October)**: 7 - 8 inches
- **Summer Rainfall (November-April)**: Low & unreliable
- **Mean Winter Temperature (May-October)**: 55 - 57°F
- **Mean Maximum Temperature (September-October)**: 75°F

**PHYSIOGRAPHY AND SOILS:**

The country is gently undulating with elevations 900 - 4500 feet. A number of rather prominent granite hills occur throughout this region, as also in Regions 7 and 8. Large areas of yellow sandy and gravelly soils, associated with laterite, known generally as scrubplain or sandplain are also common at high levels.

Broad valleys with salt lakes represent remnants of an old active drainage system but under the low and light rainfall now prevailing only occasionally does any large volume of water move along these valleys.

Brown, red-brown and grey solonised soils with sandy loam to clay loam surfaces and calcareous sandy clay subsoils are general in the broad valleys and also at the high levels, carrying in the virgin state such timbers as salmon gum, gimlet and morrel. In the north-western parts red-brown sandy loams overlying a cement at 9 - 12 inches occur. Intermediate soils between the forest and scrubplain groups also occur, carrying

mailes vegetation.
Associated with the low rainfall conditions soil salinity is a factor of agricultural importance in certain soil types, particularly in the heavy soils; those associated with morrel, and those which occur in low-lying areas adjacent to salt lake systems. Wind erosion occurs to a certain extent but is not regarded generally as serious.

AGRICULTURE:

Development for wheat production took place in the late 1920's. Subsequent experience revealed a combination of low rainfall and some unsatisfactory soil conditions. Considerable writing down of debt and reconstruction of farming was necessary in this area during the 1930's. Present policy is relatively large areas (5,000 acres) to be used for grazing merino sheep and cropping to early varieties of cereals, mainly wheat. The use of trace elements has also made the development of large tracts of lighter mallee and scrub plain soils possible.

Parts of this area are served by the Goldfields Water Supply. Otherwise farms are dependent mainly on dams, a number of which have been constructed by the Government.

REGION 7

CLIMATIC DATA:

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>12</td>
</tr>
<tr>
<td>Winter Rainfall (May-Oct)</td>
<td>8</td>
</tr>
<tr>
<td>Summer Rainfall (Nov-Apr)</td>
<td>Low &amp; unreli-</td>
</tr>
<tr>
<td></td>
<td>able.</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-Oct)</td>
<td>55 - 75°</td>
</tr>
<tr>
<td>Mean Maximum Temperature (Sept-Oct)</td>
<td>73 - 75°</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

Physiographic and soil conditions in this area are generally similar to Region 8 - p.v. for details. Elevations 300 - 1400 feet.

Soil salinity is not generally serious but is liable to be of importance in certain soil types, particularly the heavier types and those generally described as 'snuffy morrel soils' and soils in low-lying areas associated with the salt lake systems.

Soil erosion is generally of minor importance but areas of light soils may be affected by wind-drift.

AGRICULTURE:

This region is now considered to be a reliable cereal growing area with sheep for wool contributing about equally to the farm income. All cereals are produced with wheat being the most important. Early varieties of subterranean clover have shown some promise on the lighter soils of the area and the establishment of clover pastures is now in progress. Water is reticulated from the Goldfields Water Scheme or obtained mainly from farm or Government dams.

REGION 8

CLIMATIC DATA

<table>
<thead>
<tr>
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<th>inches</th>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>12 - 14</td>
</tr>
<tr>
<td>Winter Rainfall (May-Oct)</td>
<td>8 - 10</td>
</tr>
</tbody>
</table>
Summer Rainfall (November-April) . . . Low & unreliable
Mean Winter Temperature (May-October) . . . 54 - 57°F
Mean Maximum Temperature (September-October) . . . 71 - 75°F

PHYSIOGRAPHY AND SOILS:

Gently undulating country with a number of broad valleys containing salt lakes and channels constituting the remnants of old river systems. Elevations range from 750-1300 feet above sea-level. The high level portions have yellow sandy and gravelly soils associated with laterite and are commonly referred to as sandplain or scrubplain and classified as third class land. High granite outcrops occur throughout and a number have been utilised as water catchments for public schemes.

In the broad valleys and also in parts at high levels are brown, red-brown and grey solonised soils with sandy loam to clay-loam surfaces and calcareous sandy clay subsoils. These in the natural state carry salmon gum, gimlet and morrel timbers and in original land classifications were usually referred to as first class land. Considerable areas of intermediate soils carrying mallee also occur, often with sandy surfaces several inches deep overlying sandy clay subsoils. These were originally graded second class.

Some of the heavier soils and the powdery or snuffy types associated with morrel are so saline as to restrict productivity under the comparatively low and light rainfall. Such saline soils are mostly on the slopes and floors of broad valleys but are also found at high levels. Salt encroachment is most serious where the salt water table rises close to the surface in low-lying areas. While salt has proved a serious problem on many farms, the great majority are practically unaffected. Altered forms of land use with emphasis on grazing can successfully utilise moderately saline areas.

Soil erosion is becoming evident on high sloping land under cultivation. Considerable damage is often experienced from the flood waters spreading over the flats especially in wet winters. On light sandy soils, especially "pear" country, wind erosion occurs on neglected sites.

AGRICULTURE:

The production of wheat for grain and sheep for wool are the chief activities throughout this region. Oats are extensively grown while the production of two-row barley is receiving attention in recent years. Some fat lambs (first cross) are produced. Pigs are also carried. The development of parts of the region has been made possible by the use of subterranean clover - notably the scrub plain soils of the Wongan Hills area. Clover pastures now occur throughout the area and have increased crop yields as well as contributing to improved pasture production. There are still large areas without subterranean clover, however, and those would benefit from its use.

The Goldfields Water Supply serves the central part of this region. Wells predominate in the north and dams in the southern part.

REGION 9

CLIMATIC DATA:
Annual Rainfall . . . 13 - 15 inches
Winter Rainfall (May-October) . . . 10 - 12 inches
Summer Rainfall (November-April) . . . Low & unreliable
Mean Winter Temperature (May-October) . . . 54 - 57°F
Mean Maximum Temperature (September-October) . . . 70 - 75°F.

PHYSIOGRAPHY AND SOILS:

Undulating country, generally similar to Region 8, and dissected by similar broad valleys and drainage lines. Elevations 650 - 1200 feet. With higher rainfall winter streak flow is more regular than in Region 8 - as, for example, in the north and east branches of the Mortlock River, and also the north branch of the Moore River and the salt channel in the vicinity of Quairading.

A variety of soils, from sandplain to heavy types, occurs as in Region 8 and the proportion of each on any property is an important factor in determining its farming potentialities.

Soil salinity is a hazard, mostly in low-lying country where the rise of the salt water table has occurred with the development of the country. Considerable areas have become affected by salt in the vicinity of some of the major drainage channels, such as occur south of Damboring, north of Cunderdin and east of Quairading, but these low-lying areas do not constitute a large proportion of the region.

AGRICULTURE:

This is a very reliable district for cereal crop production. Wheat for grain is the most important cropping activity; malting and two-row barley are important income districts. Appreciable areas are sown to oats, some of which are marketed.

Sheep are an integral part of all farms. The bulk are merinos but appreciable numbers of early fat lambs for the local and export markets are produced. Some beef cattle are also carried. The water position is similar to that in region 8. On the lighter soil types the growing of subterranean clover is general and as in other areas in recent years has played an important part in increasing productivity.

REGION 10

CLIMATIC DATA:

Annual Rainfall . . . 16-22 inches
Winter Rainfall (May-October) . . . 12-16 "
Summer Rainfall (November-April) . . . Low & unreliable
Mean Winter Temperature (May-October) . . . 54 - 57°F
Mean Maximum Temperature (September-October) . . . 69 - 72°F.

PHYSIOGRAPHY AND SOILS:

Elevations in this region range from 450 - 1250 feet. There is much greater dissection than in Regions 8 and 9, to the east. The Moore River system in the north, and the Avon River system in the central and southern portions of this region have cut relatively deep valleys.

At high levels laterite and sandy and gravelly soils still occur but over large areas, especially in parts of the Avon Valley, the laterite, if ever present, has been completely removed and the underlying granites with basic dykes are exposed
and have weathered to produce the red-brown earth soils characteristic of the Avon Valley in such districts as Beverley York, Northam and Toodyay. The brown and red-brown loams associated with York gum and jam in the Avon Valley were some of the earliest soils to be used for agriculture in the State. Intermediate soil types with grey sand to sandy loam surfaces and mottled clay subsoils with more or less ironstone gravel also occur and are often associated with wandoo (white gum). Brown and grey heavy soils with sandy clay-loam surfaces and sandy clay subsoils occur in various parts on flats and slopes and are frequently associated with salmon gum timber.

Soil salinity in this region is chiefly associated with the creeks and gullies or as seepages on slopes which have developed since the vegetation was cleared from the countryside. Most water-courses near their sources show salt affected areas but they seldom constitute a major part of any paddock or farm. In some instances the rise of a salt water table associated with a flat has rendered larger areas unproductive. As in Region 9, water erosion is increasing in the undulating and steeper country and will require adjustment of agricultural methods. Wind erosion occurs in isolated areas on light soils.

AGRICULTURE:

This region constitutes the most western section of the wheat growing districts. Agricultural pursuits are more diversified than in the country to the east and wheat production is usually of reduced importance in the farming operations. The bulk of the State's malting barley is grown in this region. Oats are grown extensively and large quantities are marketed.

This region is an important sheep producing area. Although merinos are the most numerous, there are numbers of British breeds and their crosses. Nearly half the State's export lambs are drawn from this region. There are a number of studs, both merino and British breeds. Breeding is increasing in importance as a sideline activity.

The use of subterranean clover for pasture improvement is general throughout the region. Clover seed and clover hay production are important activities on some properties.

Appreciable quantities of winter vegetables for the metropolitan market are produced in the York-Northam area, assisted by irrigation from the Goldfields Water Scheme.

Grapes, citrus fruits and honey are also produced.

A strip through the centre part of the area is served by Goldfields Water Supply. Otherwise wells constitute the main source of supply.

REGION 11

CLIMATIC DATA:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>13 - 15 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>9 - 11</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54°F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>68 - 71°F.</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region consists of a series of large valleys in which occur large salt lake systems, but between the valleys and
constituting the major portion of the area are extensive high level scrub plain and mallee tracts. The valleys appear to represent tributaries of an ancient river system draining north west to the main Avon-Swan drainage line, but under the rainfall now prevailing, local run-off occurs into the extensive open salt lakes and associated flats carrying tea-tree vegetation. The valley floors are 900 - 950 feet above sea-level with the intervening scrub plains reaching levels of 1,200 - 1,300 feet. The soils with domed clay sub-soils occur and are regarded as belonging to the solonetz group. In the virgin state the valley soils in this region appear to have contained moderate to large amounts of salt in the sub-soils. Redistribution following clearing and development for agriculture has resulted after twenty years in a slight to severe salt problem on many farms, depending on their situation relative to the salt lakes and the types of soil occurring on them. A small amount of wind and water erosion is also associated with certain salt affected soils as well as sandy surfaced types. In the valleys and especially on the eastern side of the lake systems, grey to brown loamy soils with calcareous clay loam and clay sub-soils are of general occurrence.

Many areas of the well known snuffy grey calcareous soil associated with morrel timber are included. The valley soils were originally timbered with morrel, blackbutt, salmon gums and ginnat and these are the main soils which have been developed for agriculture.

**AGRICULTURE:**

Wheat and wool production are the chief farming activities in this region. Pig raising is important on some farms. Farm water supplies are often inadequate in dry seasons but are supplemented by a number of rock catchment tanks constructed by the Government. Underground water is frequently too salty for stock.

**REGION 12**

**CLIMATIC DATA:**

<table>
<thead>
<tr>
<th>Annual Rainfall</th>
<th>15-17 inches</th>
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<tr>
<td>Winter Rainfall (May-October)</td>
<td>10-12 inches</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65-67°F</td>
</tr>
</tbody>
</table>

**PHYSIOGRAPHY AND SOILS:**

Country in this region is gently undulating and is well drained by creeks which are tributary to the Pallinup River. Elevations range from 500 - 1200 feet. The soils are mostly developed from granite and are grey to reddish brown in colour and some very fertile soils are associated with diorite. Red sandy loams are associated with York gum and jam; red brown clay loams with subsols with salmon gum and morrel; clayey clay loams with mboor; and brown loams with morrel and moort. In the main south eastern portions of the region red brown friable sand loams associated with Yate. Sandy surfaced soils carrying heath or mallee in the virgin state are interspersed between the soil types original carrying timber as described above. The soils of the heaths or peppermint plains often have a cementy layer about
12" below the surface. Gravelly soils on ridges throughout the region originally carry mallet. Soil salinity is chiefly restricted to the lower level seepage and drainage lines and is not a serious hazard to the total productivity.

AGRICULTURE:

This region includes limited areas of some of the best cereal producing soils in the wheat belt. It enjoys a reliable rainfall with a better spring rainfall and cooler conditions than are experienced in the main wheatbelt. The area is a first class sheep and wool district and some of the State's leading merino studs are located there.

Subterranean clover pastures have improved pastures and crop yields on the lighter soils of the area. Farm water supplies are generally sufficient for present needs and obtained mostly from dams.

REGION 13

CLIMATIC DATA:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>15-20 inches</td>
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<tr>
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<td>11-15 &quot;</td>
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<tr>
<td>Summer Rainfall (November-April)</td>
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<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>55 - 54°F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65 - 70°F.</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

There is a large proportion of high country in this region in which the Avon, Hotham, Arthur, Buchanan and Beaufort Rivers all have their sources, though they reach the ocean at such widely separate places as Fremantle, Mandurah and Augusta. Elevations range from 800 - 1200 feet. There are possibly a few higher points.

As with other regions previously described, sandplains associated with laterite and granite outcrops in the form of low rounded hills occur at the highest levels. The valleys are more mature than in the lower reaches of these rivers and relatively large flats, believed to be covered with alluvial materials, are therefore more common than, for example, in Region 10. In general the soils of this region are grey in colour but brown and red-brown soils similar to the red-brown earths of the Avon Valley do occur, especially associated with basic rocks. Besides the sandy and gravelly soils of the scrubplain, there are large areas of soil with grey sand to sandy loam surface covering a mottled gritty clay subsoil. With these, jam, York gum and white gum are commonly associated.

In the eastern portions of the region and on the heavier soils associated with large flats, salmon gum, morrel, yorrle and blackbutt are commonly found.

Soil salinity is a serious problem on some large flats where, following clearing of the countryside, an increased amount of drainage water reaches broad valleys and has caused a rise in the level of the saline ground water. The flats associated with the drainage lines leading into Dumbleyung Lake from the east and south are well known examples. To a lesser extent the grey, heavy soil flats associated with the Avon River near Yealering are also affected. In a smaller way, salt affected areas are common in creeks and gullies or as seepages on slopes.
Water erosion is increasing, accelerated by the abnormally wet winters of 1945 and 1946. Flooding of low-lying flats is an associated problem. Wind erosion occurs to a minor extent on some of the more sandy soils.

AGRICULTURE:

Wheat and wool production constitute the major farm enterprises in this region. Oats and barley production are also important. Some export lambs are produced and cattle fattening is also undertaken. A number of merino studs are located in the region. The use of early subterranean clover is general throughout the area. Water supplies from dams and wells are fairly adequate for present farm needs.

REGION 14

CLIMATIC DATA.

<table>
<thead>
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<th>Data</th>
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<tbody>
<tr>
<td>Annual Rainfall</td>
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<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>53 - 55°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65-70°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region ranges in elevation from 600 - 1300 feet. It is well dissected by the Avon River tributaries in the north, by the Hoitham and Williams Rivers in the central part, and by the Arthur, Beaufort and Belgarup Rivers (Blackwood tributaries) in the southern portion. The main rocks underlying the area appear to be granites with basic dykes of restricted occurrence in various places. Laterite residuals are very common as relatively flat-topped hills which break away rather sharply to the gravelly slopes below them. Mallet (Eucalyptus astringens) is associated with many of these gravelly ridges. The parent material of the soils are the underlying weathered granite together with more or less of the sand and gravel which are breakdown products from the disintegration of the old laterite. Soils with grey or grey-brown sand to sandyloam surfaces and more or less ironstone gravel are most common. They have mottled, gritty clay subsoils. There are limited areas of alluvial flats which, however, are often salt affected. Brown and red-brown loams with clay subsoils form on the basic dykes.

In general the soils are neutral to slightly acid in reaction on the surface and neutral to slightly alkaline in the subsoil. Wandoo, jam and Casuarina are common in the natural vegetation of these areas. York gum is more restricted than in regions 10 and 13 to the east, but occurs on the heavier soils associated with the more basic rocks. Jarrah and redgum are common in the western parts of the region. Flooded gum is associated with the flats and watercourses but also grows on some soils on higher slopes in the Kojonup district. Soil salinity and gully erosion are common associated with seepage areas and the drainage lines but neither is a serious hazard to the total productivity.

AGRICULTURE:

Extensive agricultural development has occurred since 1940 following the realisation of the potentialities of early subterranean clover and superphosphate. The initial fertility of the bulk of the soil types was low but has been rapidly built
up, through the use of sub clover and superphosphate. There is still scope for further development. Sheep raising mainly for wool production is the most important enterprise. Beef cattle numbers are high and are still increasing while pigs are carried on some farms. Cereals, chiefly oats, are grown largely for farm use. Grazing fattening stock on dry pea crops in the summer is practised in the northern part of the region.

**REGION 16**

**CLIMATIC DATA:**

- Annual Rainfall: 24-35 inches
- Winter Rainfall (May-October): 20-30 inches
- Summer Rainfall (November-April): Under 5 inches
- Mean Winter Temperature (May-October): 53-54°F
- Mean Maximum Temperature (September-October): 75-80°F

**PHYSIOGRAPHY AND SOILS:**

Life Region 14, this area is well dissected by the Hotham, Williams and Blackwood Rivers and their tributaries and is also the source of the various tributaries of the Collie River. Elevation ranges from 600-1200 feet with large areas of laterite and gravely soils at high levels. Some of these are relatively undissected, for example north-east of Wilga. Such areas are as yet little used for agriculture but are an important source of jarrah for timber. There are a greater variety of better soils on the more dissected areas. Grey to Brown sands, sandy-loams and loams, often gravely with sandy and gritty clay subsoils, are common. The soils are neutral to slightly acid reaction. Residual areas of brown and red-brown loams with clay subsoils are associated with basic rocks, e.g., in parts of the main Blackwood Valley.

The western edge of this region joins the high rainfall country of the Darling Range and the rainfall is considerably higher on the west side than on the eastern edge, falling from about 35 inches on the west to 24 inches on the east side. There is some soil salinity and water erosion on the drainage lines but neither is a major problem.

**AGRICULTURE:**

Agricultural development, particularly in the northern part of the zone, is associated chiefly with the river valleys. Sheep raising for wool production is the chief farming enterprise and some fat lambs are produced. Stock fattening is also carried on. Both midseason and early subterranean clover are extensively grown and seed production is important. Some success is being achieved with Wimmera rye grass and Phalaris tuberosa is showing promise. Flax growing became important during the war period but has declined in recent years. Caten hay is grown, mainly for use on the farms where it is produced.

There are considerable areas of land in this region capable of being brought into production through the use of subterranean clover but clearing costs are relatively high. Farm water supplies are adequate.

**CLIMATIC DATA:**

- Annual Rainfall: 18-25 inches
Winter Rainfall (May-October) .......... 13-19 ins.
Summer Rainfall (November-April) .... Over 5".
Mean Winter Temperature (May-October) .... 53° F.
Mean Maximum Temperature (September-October) .... 65° F.

PHYSIOGRAPHY AND SOILS:

The Stirling Range, with several peaks over 3,000 feet and rising to 3,640 feet at Bluff Knoll, is the outstanding physiographic feature of this region. It occupies the southern portion with outliers extending west of Cranbrook and Tenterden for distances of 15-20 miles. Except in the Stirling Ranges, elevations range from 700 - 1100 feet above sea level.

North and west of the Stirling Range drainage is by the Gordon River and its tributaries. The main river has its source north of Tambellup in the vicinity of Broomhill. Lake basins are common in the region, both north and west of the Stirling Range.

In the vicinity of the Stirling Range the soils are influenced by the disintegration products of the quartzite and in many places are characteristically coarse and gritty. As in most other regions, soils with laterite gravel are common at high levels. Grey sands, more or less gravelly, with yellow gritty clay subsoils, are very common. Some areas within this region are relatively undissected, for example west and south-west of Tenterden. Such areas may be more or less unaltered remnants of the Tertiary land surfaces.

Wandoo, jam and Casuarina are common among vegetation associations of the area. Flat-topped yate is also extensive in the flat depressions.

Soil salinity and erosion occur as described for region 14.

AGRICULTURE:

Lighter soils predominate in the southern part of the area round Cranbrook and Tenterden. They are of better quality to the north and west. Sheep raising is the chief activity with some cattle raising along the Frankland and Gordon Rivers. Both wheat and oats are grown. The use of sub clover has made possible the development of large areas of lighter soils and land is still being taken up and developed.

REGION 17

CLIMATIC DATA:

Annual Rainfall .......... 25-35 inches
Winter Rainfall (May-October) .... 19-27 inches
Summer Rainfall (November-May) .... Over 5"
Mean Winter Temperature (May-October) .... 53° F.
Mean Maximum Temperature (September-October) .... 63 - 94° F.

PHYSIOGRAPHY AND SOILS:

This region is drained by several rivers, all of which except the Frankland have most of their headwaters in the region. From west to east the rivers are - the Perup, Tone, Frankland, Kent, Denmark, Hay and Kalgan. Considerable areas are at relatively high level and are little dissected, for example west of Mr. Barker and Kendenup. Elevations range from 500 - 1100 feet,
except in the Peaks of the Range east of Mount Barker, which rises to about 2,000 feet.

Most of this region is underlain by granite but in the Kalgoorlie area, between the Stirling Range and the Paroo, and at the east end of the region, Miocene rocks of the Plantagenet series occur. Massive laterite and laterite gravel are very common, especially on the low hills of the undulating terrain; and so the bulk of the soils are characteristically gravelly with clay subsoils at various depths. Grey podsolised sandstones lying iron-stone and gravel occur on undisturbed areas associated with a variety of swamp and semi-swamp soils. In the deeper valleys brown and grey loams with clay subsoils are more common and have been largely developed for agriculture.

A detailed soil survey of 25,000 acres has been carried out by C.S.I.R.O. Division of Soils in the Rocky Gully area adjoining the east side of the Frankland River.

AGRICULTURE

This is a mixed farming area. Mount Barker is the second most important apple growing centre in the State. Sheep raising is the most common farming activity, wool production and fat lambs being of about equal importance. Beef cattle numbers have increased in the last ten years. Subterranean clover is the main pasture species throughout the region and Wimmera rye grass is frequently grown in association with it.

REGION 18

CLIMATIC DATA:

<p>| | |</p>
<table>
<thead>
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<tr>
<td>Annual Rainfall</td>
<td>30-50 ins.</td>
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<tr>
<td>Winter Rainfall (May-October)</td>
<td>25-40 &quot;</td>
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<tr>
<td>Summer Rainfall (November-April)</td>
<td>Over 5</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>52 - 55°F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65 - 70°F.</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region is dominated by the Darling Range, the scarp of which forms the boundary between this region and regions 27 and 28 on the west coastal plain. The Avon, Murray and Collie Rivers pass through the region and the Helena, Darkin, Canning, Serpentine, Dandaragan, Harvey and Brunswick Rivers have their source in this high rainfall area.

Elevations range from 600 - 1300 feet, except for isolated granite peaks such as Mt. Dale, Mt. Randall, and Mt. Cooke (1910 feet).

The soils of the region are mostly very gravelly laterite residuals (sometimes referred to as residual podsols). Laterite boulders are common over extensive areas. Colluvial and alluvial soils of limited extent are associated with creeks and rivers and these are developed for agriculture to a limited extent.

AGRICULTURE:

This is essentially a forest region. A large proportion is reserved for State forest and is an important source of jarrah and wandoo timber. The catchment reserves for the Mundaring Weir, on the Helena River, and the Canning Dam, on the
Canning River, also occupy large areas.

This region is also the source of irrigation waters used in region 27 and which is obtained from Drakesbrook, Sampson's Brook and the Harvey and Collie Rivers.

Agricultural development is limited to the Murray and Collie River valleys and to the country east of the Darling Range where sheep and beef cattle production are the main activities.

**REGION 19.**

**CLIMATIC DATA:**

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Annual Rainfall</td>
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<td>Winter Rainfall (May-October)</td>
<td>35-45 &quot;</td>
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<tr>
<td>Summer Rainfall (November-April)</td>
<td>Over 5</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>53-54°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>63°F</td>
</tr>
</tbody>
</table>

**PHYSIOGRAPHY AND SOILS:**

This region ranges in elevation from about 200 to 800 feet above sea-level though little precise information is available.

The Blackwood River crosses the central part of the region while its northern margin is drained by the Margaret River, the southern edge of the Scott River, and the south-eastern portions by the Barlee Brook and other small tributaries of the Donnelly River.

A soil survey of the southern portion between the Blackwood and Scott Rivers was carried out in 1944-45 by C.S.I.R. Division of Soils.

**AGRICULTURE:**

The area is very largely still under forest. A small area has been developed for agriculture at Nillup locality east of the Blackwood River where dairying and pig raising are carried on. In the north east near Nannup there is some production of fat cattle.

**REGION 20.**

**CLIMATIC DATA:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>35-45 inches</td>
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<tr>
<td>Winter Rainfall (May - October)</td>
<td>28-38 &quot;</td>
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<tr>
<td>Summer Rainfall (November-April)</td>
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<td>Mean Winter Temperature (May-October)</td>
<td>53°F</td>
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<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>63-64°F</td>
</tr>
</tbody>
</table>

**PHYSIOGRAPHY AND SOILS:**

This region ranges from 200 to 800 feet above sea level except for a number of outstanding granite peaks such as Mt. Lindsay, 1489 ft, Mt. Frankland, 1384 feet, Mt. Roe and Mt. Johnson.

Little precise information about the soils is available though some reconnaissance work has recently been carried out by soil surveyors.
The Manjimup-Nornalup road traverses the western end of this region, the Rocky Gully - Kent River Road passes through the centre and the Denmark - Mount Barker road cuts across the eastern end. These traverses show that there are quite extensive areas of sandy poorly drained soils as well as gravelly and loamy hill-slope soils carrying moderate and large timber, principally jarrah, but with some small areas of karri.

**AGRICULTURE:**

The only agricultural development in this region has taken place since 1945. War Service Land Settlement Schemes were responsible for most of this development at Rocky Gully and between Denmark and Mount Barker. Fat stock raising on chiefly clover pastures is the most important activity with some dairying also carried on.

**REGION 21**

**CLIMATIC DATA:**

- **Annual Rainfall**: 30-45 inches.
- **Winter Rainfall (May-Octo.-r)**: 22-35 inches.
- **Summer Rainfall (November-Apr. 1)**: Over 5 inches.
- **Mean Winter Temperature (May-Octo.-r)**: 54 - 57°F.
- **Mean Maximum Temperature (September-October)**: 65 - 68°F.

**PHYSIOGRAPHY AND SOILS:**

Physiographically, this region is notable for extensive relatively flat areas with numerous associated swamps but in the coastal strip high granite hills and peaks and coastal limestones and granite headlands occur. Prominent peaks are Mt. Melville and Mt. Clarence, at Albany, and Mt. Gardner and Mt. Many-Peak further east. Except for these peaks and coastal hills and the region is mostly under 500 feet elevation.

Large areas are underlain by sediments of the Plantagenet series of Miocene age. More recent sedimentary materials are also extensive. The Ray River at the west end, and the King and Kalgan Rivers in the centre, are the main drainage lines. Some areas, for example north of Mt. Many-Peak and west of Redmond, have little external drainage.

A wide variety of soils occur, many being poorly drained. Grey podsolised sands with ironstone or clay subsoils are common in the western half, also poorly drained sandy humus podsoils formed on sand-filled troughs.

Stunted jarrah vegetation associations are common, also on the wetter areas open treeless vegetation with blackboy, kangaroo "grass" and a variety of scrub. A variety of swamp soils, peaty, marly and sandy, sometimes with clay subsoils, occur and many are used for potatoes and vegetables. Some show deficiencies of trace elements, especially copper and manganese, while in others extreme acidity has been a problem.

In the high granite hills north of Bornholm brown and grey sandy loams with yellow clay subsoils occur similar to the soils of the Denmark district, further west. These hills were previously timbered with large karri and form a striking contrast to the flats and swamps to the north and south. At some earlier period these hills were no doubt an island.

The soils north of Mt. Many-Peak, formed from the Miocene sediments, are an interesting group which have recently
been under investigation. The clay subsoils have domed structure while the reaction and base status suggest that these soils are "solodi".

AGRICULTURE:

Although settlement first occurred in this region over 100 years ago agricultural development was until recently still sparse. For many years the chief activity was the production of potatoes, which is still an important source of income. In recent years, as a result of the use of subterranean clover and superphosphate, as well as cheaper clearing methods, attention has been devoted to stock raising and dairying. Fruit growing is a minor activity. Subterranean clover is the dominant pasture plant but a cooler summer climate and a heavier summer rainfall than elsewhere allows perennial species to be utilised. Along the outlying water courses and swamps white clover usually tends to replace subterranean clover.

REGION 22

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>Winter Rainfall (May-October)</td>
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<tr>
<td>Summer Rainfall (November-April)</td>
<td>Over 10 in</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54 - 58 °F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September October)</td>
<td>62 °F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This high rainfall coastal region, with mild winters and fairly cool, relatively moist summers, has a variety of physical features and hence a complex soil pattern. A coastal fringe of lime sand-hills is associated with headlands of granite similar to the coast in Region 21 to the east. Several inlets separated from the ocean by sandbars occur along the south coast and are considered to be drowned valleys. Also, over extensive areas and notably between Denmark and Northcliffe, flat, poorly drained sandy areas of low elevation occur. The soils of these flats are humus podsols and often carry only an open vegetation of blackboys, kangaroo "grass" and small scrub.

Steep hilly country up to 1,000 feet, formed from granitic rocks with a few basic dykes, occurs in parts and carries, or has carried, big karri timber. Such country occurs between Denmark and the Deep River, west of Nornalup inlet, and also about Northcliffe. On such hills grey and brown sandy loams with more or less laterite gravel and yellow clay subsoils are common. They are neutral to slightly acid in reaction. Grey, sandy iron and humus podsols with stunted jarrah vegetation are also common, while massive laterite occurs in parts at various elevations.

North of Cape Leeuwin the west coast is rocky with a combination of granite and coastal limestones. The inland country is drained by the Margaret River and small tributaries of the Blackwood and a variety of sandy and gravelly soils podsolised to varying degrees, occur.

Detailed soil surveys in this region have been carried out at Denmark, Margaret River, and Witchcliffe.

AGRICULTURE:

Most of the soils suitable for agriculture development
carry a dense forest cover which constitutes the chief obstacle to economic development. Clearing is very costly and the usual practice is to ringbark the larger trees and leave their removal to a later stage. Following removal of the small trees and scrub, pastures can be established.

Agricultural development has occurred only at the extremities and two other isolated localities in the coastal region. Like region 21, this area is suitable for subterranean clover pastures in association with certain perennial species. Similarly it enjoys a longer growing season than the rest of the agricultural regions and the summer climate is mild. Dairying for butter fat production is almost the sole agricultural activity. There is some pig raising in association with dairying. Farm water supplies are plentiful.

REGION 23

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Season</th>
<th>Rainfall</th>
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</tr>
</thead>
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<td>Summer (Nov-Apr)</td>
<td>30-34</td>
<td>Over 5</td>
</tr>
<tr>
<td>Mean Winter</td>
<td>Over 5</td>
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</tr>
<tr>
<td>Mean Max Temp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sept-Oct)</td>
<td>63-66</td>
<td></td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region forms the south end of the comparatively flat coastal strip comprising regions 23, 26, 27 and 28. There is a fringe of coastal lime sandhills, as in the other west and south coastal regions. Drainage of this area is rather imperfect and is by short stream flowing north from a low scarp at the south boundary of the region or west to the coast south of Cape Naturaliste.

A variety of soils occur: Grey, deep sands, podsolised and in some cases with hardpans, are common but some brown loams also occur as well as gravelly sands with yellow clay subsoils on the hillslopes where these are found. Brown sandy soils underlain by limestone occur in the coastal strip between Busselton and Ludlow. On these areas the natural vegetation consists of tuart and peppermint.

AGRICULTURE:

Although Busselton was one of the sites of the State's earliest settlement, agricultural development of the region was very restricted until the early 1920's when the realisation of the value of subterranean clover and superphosphate enabled developments to be accelerated. Subterranean clover is the chief pasture plant. Perennial species, although of some importance, are not so useful as in regions 21 and 22, where summer conditions are more favourable. Kikuyu grass however, is proving very useful. Dairying for butter fat production is the major activity. Pig raising is associated with dairying. Beef production as a main activity is restricted to a few farms, but some income is obtained by nearly all dairy farmers from the sale of surplus stock. Potato production is an important undertaking on some farms, notably in the Marybrook district.

REGION 24

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Season</th>
<th>Rainfall</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
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<td></td>
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<tr>
<td>Winter (May-Oct)</td>
<td>35-60</td>
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<td>Summer (Nov-Apr)</td>
<td>30-50</td>
<td>Over 5</td>
</tr>
<tr>
<td>Mean Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Max Temp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sept-Oct)</td>
<td>64 F</td>
<td></td>
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</tbody>
</table>
PHYSIOGRAPHY AND SOILS:

This high rainfall region ranges from relatively flat high country in the vicinity of Wilgarup to well dissected, moderately steep topography in the southern and western parts. The high country north of Manjimup drains south-west via the Donnelly River and south-east via the Wilgarup and Warren Rivers. Smaller Warren tributaries drain the country south of Jardee to Pemberton. Elevations range from 400 - 1,000 feet.

Rock outcrops are uncommon in the area but it seems to be underlain by granitic rocks, probably with some basic dykes. The dominant soils on the hill slopes are brown, red-brown and grey loamy sands to loams with yellow clay subsoils and slightly acid in reaction. Laterite gravel is very common in the soils of the area, especially on the higher slopes and hill tops.

The undissected high portions in the vicinity of Wilgarup are poorly drained and rather swampy. Colluvial soils at the head of many valleys are a source of the permanent creeks of the area. The seepage moisture in these areas and at the foot of hill slopes makes them valuable as summer land for pastures, tobacco, potatoes.

AGRICULTURE:

This is a heavily timbered area with large areas reserved and used for forest purposes for the milling of both karri and jarrah.

Land development for agriculture has been along the lines indicated for region 22. Pasture development is also similar but perennial species have been less successful. Of these kikuyu has been the most prominent.

Dairying and fat stock production are the chief activities. Apples, tobacco and potatoes are important sources of income to farmers in this region. Hops are grown on a very small scale. Beef production is an important sideline and there are a few farmers for whom it is a major source of income.

REGION 25.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Season</th>
<th>Rainfall (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter (May-October)</td>
<td>30-45</td>
</tr>
<tr>
<td>Summer (November-April)</td>
<td>25-35</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Winter</td>
</tr>
<tr>
<td>Mean Maximum Temperature</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

Elevations range from 200 to 1,000 feet in this region, which is deeply dissected by the Blackwood River and tributaries in the southern part and by the Preston and GAPel Rivers in the north. Laterite residuals are extensive, particularly in high-level areas which are mostly very gravelly or stony with laterite boulders. Many such areas are reserved and utilised for forest purposes as a source of jarrah. Granite rocks with basic segregations or basic dykes underlie most of the area but other notable geological features are the occurrence of tin and tantalite at Greenbushes, the Donnybrook sandstones, and the high-level sedimentary deposits to be seen in the railway cuttings north and south of Kirup. Grey and brown gravelly sands and sandy loams with yellow clay subsoils are common on slopes with important areas of soils formed on colluvial and alluvial materials in the minor valleys.
Red-brown and brown loams with clay subsoils formed from basic rocks are common along the main Blackwood Valley and are important as orchard soils in the Bridgetown and Ballingup areas. Brown loamy alluvial soils of the lower Preston Valley in the neighbourhood of Donnybrook are also important orchard soils.

AGRICULTURE:

Although this is a high rainfall region, as is Region 24, the spring temperatures are warmer and the summers hotter and somewhat drier. In some of the valleys agriculture has been established for a long time, and is very diverse, including mixed fruit (in the Preston Valley), apples, dairying, cattle and sheep.

This region includes the main apple producing district of the State in which there are many specialist growers. Fruit growing is also combined with live stock farming on many properties. Dairying is carried on throughout the region but beef, particularly near Bridgetown, and fat lambs are also important.

Subterranean clover is the dominant pasture plant promising results have been obtained from perennial ryegrass and Phalaris tuberosa.

REGION 25.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>36-40 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>30-34 &quot;</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Over 5 &quot;</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>55-57° F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65-67° F.</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This small region embracing principally the Boyanup and Capel districts is part of the relatively flat coastal strip extending southwards from Perth to Cape Naturaliste. Elevations range from sea level to 200 feet. As in the other coastal regions there is a strip of sandhill soils adjoining the coast. Behind this lie flat areas of alluvial origin with brown and grey sandy loams and loams with clay subsoils. The Capel River drains the southern portion of the region. The northern portion from Boyanup to Bunbury is traversed by the Preston River.

AGRICULTURE:

Development has been rather easier than in some of the other southern regions, owing to lighter timber. Subterranean clover is the major pasture species. Other pastures include perennial rye and Phalaris tuberosa. Couch grass is an early introduction which survived and spread widely.

Dairying and fruit growing, (apples, stone fruits and grapes) are the chief activities. Pig raising is carried on. Beef production is also important.

REGION 27.

CLIMATIC DATA:

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>38-43 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>34-37 &quot;</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>4-6 &quot;</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54-57° F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>65-67° F.</td>
</tr>
</tbody>
</table>
PHYSIOGRAPHY AND SOILS:

Elevations in this region also range from sea-level to 200 feet. The highest elevations are in the belt of coastal sandhills and again in the talus slopes along the eastern edge of the region. The central portion is a large flat covered by alluvial material giving the brown, grey and chocolate loams and clay loams with yellowish clay subsoils, which are being developed under irrigation and promise to be some of the most highly productive soils in the State. These soils are slightly to moderately acid in reaction.

In the virgin state these flat areas were frequently flooded in winter by streams draining from the Darling Ranges and without direct outlet to the ocean. Drainage schemes, together with the diversion of the Harvey River from its natural course (into Peel Inlet) through an artificial cut in the vicinity of Myalup, west of Harvey, has greatly improved the winter drainage situation.

The belt of sandy soils extending inland from 5-10 miles from the coast is inherently very infertile. Some areas are used for pine plantations and trace element deficiencies may occur.

The soils of the foothills on the eastern edge of the region range from sandy and gravelly types with clay subsoils to brown and red-brown loams, especially in the vicinity of Brunswick and Wokalup. Benger Swamp, a large area of black heavy soils flooded in winter, is well known as a summer potato growing area.

AGRICULTURE:

This is one of the State's chief agriculture regions and includes its three irrigation districts. Clearing of the higher country has been relatively easy but costs have been higher on the coastal plain. Drainage schemes, in association with irrigation, have been of considerable importance in increasing the winter productivity of the country along the foot of the Darling Range.

Subterranean clover is the dominant pasture constituent, in the non irrigated country. Where irrigation waters are available permanent pasture is usually established; the main constituents are Paspalum, perennial rye grass and white clover. Cocksfoot and Phalaris toeresa are used to a limited extent.

The chief activity is dairying to supply the metropolitan milk market and local cheese factories, butter factories and condenseries. Cattle fattening, vealer production and pig and sheep raising are undertaken in this region. A large part of the State's potato production is centred in this area. Vegetable production has increased during the war years. Citrus and stone fruits are grown commercially. Some clover hay is produced and baled for sale.

REGION 28

CLIMATIC DATA:

Annual Rainfall
Winter Rainfall (May-October) 35-40 inches
Summer Rainfall (November-April) 31-36 "
Mean Winter Temperature (May-October) Under 5. 
Mean Maximum Temperature (September-October) 54 - 57°F.
Mean Temperature (September-October) 66 - 68°F.

PHYSIOGRAPHY AND SOILS:

This region has the same general characters as Region 27-
nately, a coastal sandhill belt in which swamps of various sizes occur within a central flat area of rather imperfect winter drainage and on the eastern side the talus slopes of the Darling Range foothills. The foothill soils are more sandy and gravelly than in Region 27, and the soils of the flats are generally grey sands and sandy loams with yellow clay subsoils.

The variety of soil conditions both with respect to inherent fertility and winter drainage gives sharp contrasts in productivity over short distances. So far this area is not served by any general irrigation scheme.

AGRICULTURE:

Development is generally less costly in this region than in 27 but it does not contain such extensive areas of good quality agricultural soils.

Subterranean clover is the major pasture species. The chief activity is dairying and the region is in one of the zones which supplies fresh milk to the metropolitan area.

Considerable numbers of cattle are fattened for beef and a few sheep are carried principally for fat lamb production. Some clover hay is produced. Dried fruits are produced in small quantities.

REGION 29

CLIMATIC DATA:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>30-40 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>27-32 ''</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Most under 5</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54-58°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>66-71°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region includes the metropolitan area. Its boundaries have not been determined by any particular climatic, soil or physiographic features but rather by the general limits of the area within which various types of agriculture have been developed, particularly to serve the needs of the large population of the Perth metropolitan area. It embraces a portion of the sandy coastal strip described for regions 26, 27 and 28. There is also an alluvial belt including the brown and grey alluvial soils of the Swan River, utilised particularly for vine fruits in the areas north of Guildford and Midland Junction. Portion of the Darling Range forms the eastern section of the region. Here, while the greater part of the area is highly calcareous, development has taken place on the soils of the valley slopes and floors where colluvial and alluvial material has given pockets suitable for fruit growing and vegetable culture.

The soils of the strip immediately adjoining the coast are highly calcareous. Passing inland yellow and orange sands with limestone at various depths occur. This sandy soil is utilised under sprinkler irrigation for intense vegetable culture, especially in the Spearwood, Osborne Park and Balcatta districts.

Throughout the sandhill belt local swamps occur with more or less peaty soils. These are also used for vegetable growing. In the valleys of the Canning, Helena and Swan and their minor tributaries fruit growing is common as mentioned previously. Some of these valleys have quite a large proportion of
basic rocks among the granite which forms the bulk of the Darling Range region. These basic rocks give rise to brown and red-brown soils and have no doubt contributed to the fertility of the alluvial material forming the basis of the soils in such districts as the Swan vineyard areas and the Roleystone, Kelmcott and Gosnells areas.

AGRICULTURE:

Besides the various agricultural pursuits mentioned above in discussing various groups of soils, it is also in this region that the majority of the State's poultry farms — for eggs and meat — are situated. Proximity to market, transport facilities, electrical power and reticulated water are important factors determining the location of various agricultural pursuits in this region. The growth of bulky fresh vegetables in close proximity to the market on sandy soils which are inherently quite infertile is an interesting example of the extent to which natural soil deficiencies may be overcome by fertilisers and irrigation when it is desired to produce as close as possible to the market.

The alluvial belt adjoining the Swan River north of Guildford and Midland Junction and extending to the foothills is one of the most intensively developed areas in the State. Vine fruits, especially currants, and grapes for wine making, are the important products of this area.

The fattening and holding of both cattle and sheep in reasonably close proximity to the Midland Junction stock markets is also quite an important activity in various sections of this region north and south of Midland Junction on the outwash soils from the Darling Range foothills.

The Chittering Valley (the valley of the Brockman River) forms the northern point of this region as defined, and is a noted area for citrus production. Citrus, apples, pears and a variety of stone fruits are grown in the valleys and higher slopes of the dissected Darling Range country, as well as along the alluvial stretches of the Canning River. This fruit is mostly for the Metropolitan market and for distribution to outer districts of the State.

REGION 30

CLIMATIC DATA:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>20 - 35 inches</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>16 - 31 &quot;</td>
</tr>
<tr>
<td>Summer Rainfall</td>
<td>Under 5</td>
</tr>
<tr>
<td>Mean Winter Temperature</td>
<td>56 - 58°F.</td>
</tr>
<tr>
<td>Mean Maximum Temperature</td>
<td>66 - 71°F.</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This is an undulating region with large areas of sandy soils. Geologically, it is of considerable interest as it includes the Cretaceous chalk and phosphatic deposits of the Gingin and Dandaragan areas. Its eastern margin joins the northern portion of the Darling Ranges with granitic rocks and basic dykes or basic segregations. The Coastal strip, in common with other coastal regions, has calcareous sandy soils. Elevations range from sea level to 800 feet.

The principal drainage is by the Moore River and the Gingin brook. The best known soils of the area are those of
Gingin and Dandaragan. The Gingin clay is a rendzina—a black clay soil developed from the underlying chalk. Its occurrence is restricted, however, and much more extensive are the brown and red-brown sands derived from ferruginous sandstones and green-sands. The Whakea sand is a well known type.

A soil survey of an area at Gingin was carried out in 1933 and 1934 and is reported in the Journal of the Royal Society of W.A., Volume 22, 1936.

**AGRICULTURE:**

Agriculture is developed only in the south-eastern portion of this area. Much of the remainder is similar to that of region 5 to the north. Parts of it have been utilised for extensive cattle grazing and are now being developed for stock raising with the aid of subterranean clover and trace elements.

In the south-east the main enterprises are sheep raising (including fat lambs) and cattle fattening. Lupins are extensively used for fattening store sheep brought in from other areas. Cereal cropping is a minor activity. Subterranean clover is important on some soil types.

Water supplies are generally adequate and are obtained mainly from wells.

**CLIMATIC DATA:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>12 - 14 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>8 - 10 &quot;</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; Unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature (May-October)</td>
<td>54 - 55°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (Sept-Oct.)</td>
<td>68 - 71°F</td>
</tr>
</tbody>
</table>

**PHYSIOGRAPHY AND SOILS:**

This region is referred to as the Lakes District, on account of the occurrence of a number of large salt lakes, of which Lakes King, Gamm, Carmody and Varley are the most well known. This district was the scene of an extensive soil survey in 1930-31 to determine the extent of saline soils. The soil and physiography are described in the Journals of the Department of Agriculture, W.A. Volume 17, No. 3 September, 1940.

The region consists of a large broad valley, flanked on the north-east and west sides by high level areas of scrub plain with sandy and gravelly soils.

The main valley with its subsidiary valleys probably represents the remnants of an ancient river system. It is not certain whether this represents part of the Avon-Swan drainage system or whether the drainage would have been to the south coast. The valley floor is now about 1,000 feet above sea level with the scrub plains at about 1,200 feet. A number of large granite outcrops occur throughout the area.

The soils of the valleys include considerable areas of grey powdery calcareous soils, originally timbered with Kondinin Blackbutt and Morrell, and containing rather excessive amounts of salt for satisfactory agricultural use. Soils with sand or sandy loam surfaces and calcareous sandy clay sub-soils are much less liable to salinity troubles when developed for agriculture.
AGRICULTURE:

Settlement of this district commenced in 1928, as part of the proposed 3,500 Farms Scheme. The extent of the development which has taken place, is much less than was originally planned because of the abandonment of the 3,500 Farms Scheme and the fall of wheat prices in 1929-30. The area is well suited to stock raising - chiefly merino sheep. Cereals, wheat, oats and barley, are successfully grown on the soils not affected by salinity. Improved grain handling facilities and good roads have increased cereal production and some further land development has taken place in recent years on the scrubplain soils.

REGION 32

CLIMATIC DATA:

No precise climatic data are available for this region, but from adjoining regions the limits appear to be as follows:-

<table>
<thead>
<tr>
<th>Season</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rainfall</td>
<td>11-14 inches</td>
</tr>
<tr>
<td>Winter Rainfall (May-October)</td>
<td>7-10 inches</td>
</tr>
<tr>
<td>Summer Rainfall (November-April)</td>
<td>Low &amp; unreliable</td>
</tr>
<tr>
<td>Mean Winter Temperature</td>
<td>54-55°F</td>
</tr>
<tr>
<td>Mean Maximum Temperature (September-October)</td>
<td>72-74°F</td>
</tr>
</tbody>
</table>

PHYSIOGRAPHY AND SOILS:

This region was intended to be the site of a large portion of the 3,500 Farms Scheme, which was under consideration in 1929. Because of the doubts concerning soil salinity, considerable soil reconnaissance and sampling was undertaken. The results of these soil investigations, together with other soil data and a general discussion of the region has been published in the Journal of the Department of Agriculture of W.A., Volume 16, No. 2, June 1939.

The general features of this region are therefore described as follows:

"In common with the bulk of the Western Australian wheat belt it may be described as a gently rolling, slightly dissected plain, broken at wide intervals by low hills and ranges of basic intrusives and suriferous rocks and, at the Fitzgerald Peaks, by a high granite boss (Peak Charles, 2,100 feet above sea level). The lower portions of the plain are probably ancient valley formations, formed by dissection of the plain, and are generally 800 to 1,000 feet above sea-level. The lowest portions of these valleys are commonly occupied by broad salt "lakes" or salines and at higher levels are the normal woodland soils - the first class soils of the land classification. The soils of the higher portions of the plain, generally 1,000 to 1,300 feet above sea level, are characteristically sandy and gravelly in nature. They are not related pedologically to the normal woodland soils but are highly leached and acidic in reaction. Further more, they support a heath vegetation and are generally regarded as of low agricultural value".

AGRICULTURE:

Concerning the possible agricultural development of this area the same article states - "It is suggested that from the soil point of view, agricultural development would be possible in the light of the knowledge of the nature of the soil types of the area and the results of many years of farming experience and agricultural research in the Salmon Gums and other districts."
CLIMATIC DATA:

Annual Rainfall .. 11-16 inches
Winter Rainfall (May-October) .. 7-11 inches
Summer Rainfall (November-April) .. 4-5 but unreliable
Mean Winter Temperature (May-October) .. 54°F
Mean Maximum Temperature (September-October) .. 72°F

PHYSIOGRAPHY AND SOILS:

This region sometimes called "the Esperance mallee", ranges from 500 feet elevation in the south to about 1,000 feet around Dowak, north of Salmon Gums. It is an undulating area with no well defined drainage lines. On the east and west of the northern portions are extensive salt lake systems and there are many individual salt lakes of varying size, especially in the areas east of the railway between Circle Valley and Scaddan. Within this region an area of 582,000 acres has been subjected to a detailed soil survey because of the salinity problem which was a major factor in the abandonment of farm lands in the district. The soils fall into three main groups:

1. Grey to brown sandy surfaced soils with yellow grey calcareous sandy clay subsoils. These are not generally affected by salt after clearing and have proved most suitable for cereals but are subject to some wind erosion.

2. Grey brown and red brown heavy crab-holey soils generally containing large amounts of soluble salts. Although apparently the best looking soils, these types have proved largely unsuccessful for wheat growing but can be used for grazing especially if Wimmers ryegrass is introduced.

3. Grey powdery calcareous soils known locally as "kopi" associated with morrel timber and certain mallees. These soils are also very prone to salinity troubles when developed for cereal growing, but produce good quality volunteer pasture for stock grazing.

All these groups of soils are very similar below a depth of 6 or 8 feet where sandy clay strongly acid in reaction is found. From rock outcrops in the salt lakes it is believed that the underlying granites of this region have a thin overlay of sedimentary rocks possibly of Miocene age. A notable feature of this region compared with other parts of the agricultural areas is the very small amount of soils associated with laterite gravels. Many species of Eucalyptus mostly of mallee habit are found and teatree undergrowth is general. Areas with salmon gum, morrel and Dundas blackbutt trees are common in the drier northern parts of the region.
AGRICULTURE:

The area was opened up for wheat growing chiefly after the 1914-18 War and in the mid 1920's there were about 500 settlers. The various soil problems of the locality together with its isolation from markets reduced the number of farmers who remained to about 70. The area is now considered suitable for sheep raising in holdings of 3,000-4,000 acres with wheat for grain. The herbage produced on cleared areas is of good quality and Merino sheep give large wool yields. Twenty years experience shows the rainfall to be less reliable than for areas of the same annual average in the main wheat belt. Summer rains, though uncertain, have often proved of value to the perennial grass Danthonia sp and to the biennial Shepherd's lucerne (Lepidium hyssopifolium). Early wheat varieties and the development of region 34 to the south has led to increased interest and productivity in the area.

Wind erosion of the sandy surfaced soils associated with overgrazing in drought periods has increased in recent years. The control of mallee suckers still continues to be a problem on lands not frequently cultivated. Earth tanks provide farm water supplies but often fail in drought periods.

REGION 34.

CLIMATIC DATA:

- Annual Rainfall: 16-26 inches
- Winter Rainfall (May-October): 11-20 inches
- Summer Rainfall (November-April): 5-6 inches
- Mean Winter Temperature (May-October): 55-56°F.
- Mean Maximum Temperature (September-October): 67-70°F.

PHYSIOGRAPHY AND SOILS:

The eastern portion of this region from Hopetoun to east of Esperance consists of a large scrub plain ranging from 200-600 feet in elevation, with several short rivers draining to the south coast. West of Hopetoun the physiography is more rugged with a number of ranges of hills and several prominent peaks such as East Mt Barren, West Mt Barren, and Mt Maxwell. There are also several rivers with their head waters up to 50 miles inland. Of the soils, little is known in detail. The Esperance sand plain has sandy and gravelly soils associated with laterite gravel. In the vicinity of Ravensthorpe where copper and gold mining have been carried out the geological formations, including the dolerites and epidiorites of the "pregold greenstones", have formed heavy textured soils. West of Hopetoun, rocks of the Stirling Range series and also Miocene sedimentary rocks have probably characteristic soils associated with them.

AGRICULTURE:

This region was almost wholly undeveloped for agriculture except for some wheat and sheep raising in the Ravensthorpe district, until very recently when utilisation of the sandy surfaced soils around Esperance commenced. With subterranean clover, superphosphate, and copper and zinc, these soils have
become very productive and almost a million acres have been estimated for development. Sheep and beef cattle raising are the agricultural activities on these newly developed areas. It is estimated that a further 3 million acres of suitable land exists in the Esperance area and this will no doubt be developed with the improvement of port facilities for superphosphate, grain, and stock.

West of the Esperance area the soils are similar and will be suitable for a similar type of development. War Service Land Settlement schemes at Jerramongup and Gairdner River in the west of the region have shown that Agricultural development can be successful in this sector.