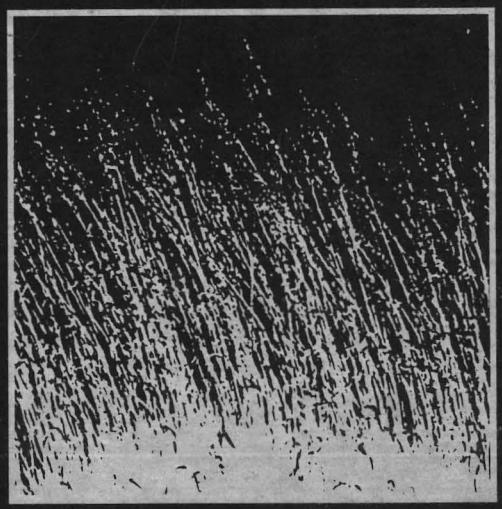

READING THE REMOTE

Landscape Characters Of Western Australia

READING THE REMOTE

Landscape Characters of Western Australia

Conservation and Land Management

DEPARTMENT OF PLANNING AND URBAN DEVELOPMENT

Department of Environmental Protection

This project is partially funded under the National Estate Grants Programme,
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Foreword

TODAY it seems, more than ever, that we have a relentless desire to experience the diversity of our landscapes. In Western Australia, the quality of this experience is significantly enriched by the presence of the most isolated landscapes in the world. Deep gorges, vast deserts, rugged ranges, endless coastlines and majestic forests are all aspects of this experience and image of Western Australia. The remoteness and corresponding aesthetic character of these unique landscapes are of great economic, cultural and spiritual significance to us.

This study expands our knowledge of landscape character in Western Australia. It primarily focuses on the experience of *reading* landscape character - a process whereby essential aesthetic qualities can be differentiated between landscapes and whereby significance and uniqueness can be defined. It is the first study of its kind in bringing together a descriptive inventory of the varied and distinctive landscape characters throughout the State. Apart from being personally rewarding, this knowledge is vital for the sensitive management of local and regional landscapes.

It is intended that this landscape character classification study will become a major common resource base for all government and non-government agencies and community groups working in the fields of landscape planning and management. From the base-line definition of landscape character, visual landscape quality can be assessed systematically. It is then possible to predict what impacts particular land uses or proposed developments will have on the appearance and experience of a landscape, and to develop appropriate policies, guidelines and specifications to protect it.

Our appreciation and understanding of landscape is evolving. This study is a significant and vital step along this pathway of discovery. Further discussion and research is required, and will provide additional insights into the perception of landscapes, their qualities and attributes, associated community values, as well as the appropriate means for conservation and management.

We welcome your comments on this stage of the study as valued contributions in the State's ongoing research collaboration and understanding of *reading the remote* landscapes of Western Australia.

Project Advisory Group

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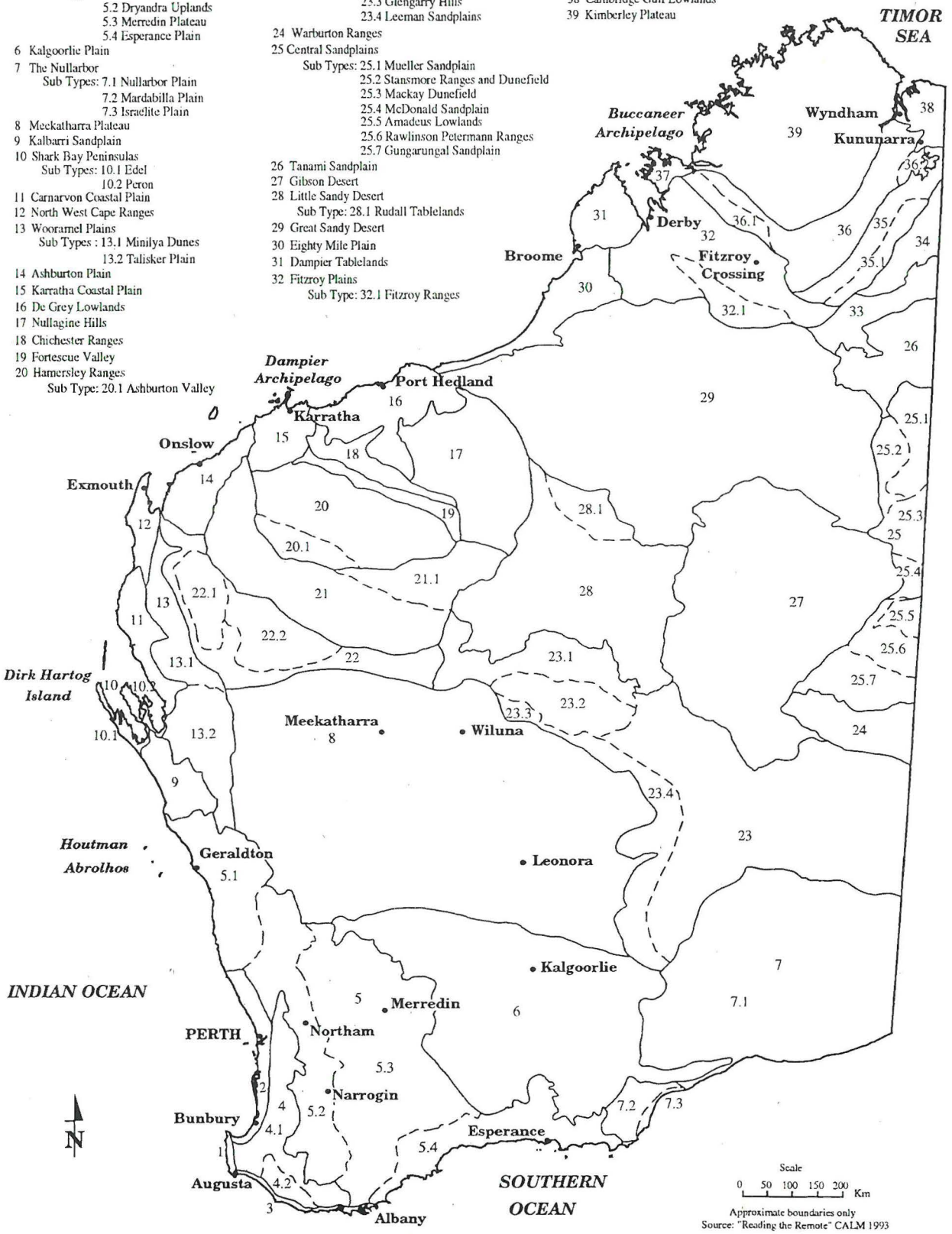


Introduction

Why Classify Western Australia's Landscapes?

Western Australia's landscapes encompass some of Australia's most important scenic areas. While the area of native vegetation cover has been significantly reduced since European settlement, the State still contains some of the least modified landscapes in Australia.

Most people's understanding and response to their environment is mainly visual. They admire the shape of a rock outcrop or old building, the lines of tree trunks in the forest, the colour of wildflowers or the texture of a ripe wheatfield. For many people, a landscape's visual values are the most direct way they will experience an area and, therefore, are often the criteria by which land management practices are judged. Landscape protection has broad appeal in the community because it has significance for a range of interest groups. In recent years the community has become increasingly concerned about the appearance of some Western Australian landscapes.

The aesthetic qualities of the landscape are also the resource base for tourism in many areas, and provide an important source of employment and economic return to the community. Landscape is also an important resource because it acts as an indicator of environmental health, contributes to our quality of life, and provides people with a sense of place.

Some Western Australian landscapes have been considerably modified by farming, grazing, urban and industrial development. Very little native vegetation remains in the wheatbelt, although fencing to protect remnant vegetation, roadside planting and rehabilitation of salt-affected areas is occurring. Outer metropolitan areas have been cleared and recontoured for new suburbs. Urban expansion has also resulted in a loss of uncleared open space and in unsympathetic changes to cultural landscapes. This makes it even more important to manage the State's remaining natural and cultural landscapes sensitively, and to work towards restoring those that have been degraded.

The Australian Heritage Commission (AHC) recognises that landscape is a part of the environment by listing aesthetic importance as one of the criteria used to assess heritage values. The AHC recognises that protecting aesthetic characteristics within the landscape, as well as its fauna and flora, is important.

Once the visual characteristics of landscapes are inventoried, classified and assessed, it is possible to study their representation and significance and to ultimately develop appropriate planning and design policies, guidelines and specifications to protect and enhance them.

Primary Uses Of The Study

This study provides an advanced level of data inventory and assessment information for landscape management systems and practices applied throughout the State. Here, aesthetic landscape values are often managed (together with other natural and cultural resources) at both the broad scale and site specific level. While all landscapes have some aesthetic value, some are of greater value and importance than others, and some are more sensitive to change than others. Strategic landscape planning guidelines and site planning and design specifications can be developed in accordance with locally and regionally sensitive landscape quality objectives and landscape management priorities. Key formal aesthetic descriptors and corresponding landscape attributes of form, line, colour, and texture can be referred to and managed for.

It is envisaged that this work will become a major reference document for those interested in the research, management and communication of Western Australia's landscapes. Landscape character descriptions will assist in developing the perceptual skills of visitors and residents alike, aiding

environmental interpretation and education programs. Its application will also directly assist those concerned with the assessment and management of National Estate Values. Aesthetic landscape character and corresponding social values are significant components to several of the criteria used to assess National Estate areas.

To date, a number of significant broad scale landscape assessment projects and management strategies have utilised landscape character type data developed from this study. CALM, DPUD and the EPA, together with a number of rural Shires, have focused their efforts in the south-west regions on both public and private lands and waters. Here, character type data has been incorporated into landscape quality assessment procedures, defining broad visual management zones, priority areas and action plans, accompanied by landscape management policies, objectives and guidelines.

At the site specific scale, a visual landscape management process may also require a proposed development site to be analysed in terms of its topography, slope, vegetation species, structure, density and patterns, views, viewer position, soil stability and scale and type of activity. This enables detailed planning and design recommendations to be prepared to ensure that land use activities have minimal visual impacts and landscape quality is either sustained or enhanced.

CALM uses a landscape management system to manage landscape values in State forest and national parks, and to minimise the impacts of silviculture, recreation and tourism. DPUD has carried out a landscape management study of the Darling Scarp, defining areas of visual landscape sensitivity, as well as introducing a landscape protection zone in the metropolitan area.

Considerable landscape assessment work has also been undertaken for portions of Western Australia's coastal zone. Landscape management plans have been integrated into national park management plans, rural planning strategies, environmental impact and development planning assessments, and townscape programs. Rural planning strategies have incorporated guidelines based on broadscale analysis of landscape character, while several specific coastal development have received detailed visual impact assessment that focused on managing significant views, and on the capacity of the landscape to absorb changes.

Detailed visual assessment has also been used in several structure plans. In several cases, Geographic Information System computer programs were used to identify visually sensitive areas, to simulate developments and to define areas that could be developed without degrading the landscape. For example, the Shires of Augusta-Margaret River and Busselton have defined development areas for visually sensitive coastal areas and incorporated this information into development, siting and design guidelines and town planning scheme amendments.

For cultural landscapes, one of the successful outcomes of the State's Townscape Program is the improved appearance of some of the State's country towns. Other recent efforts include the careful siting of major roads and transmission lines where they pass through sensitive landscapes, roadside planting, and streetscape guidelines for local government authorities.

It is intended that this landscape character type classification study will become a major common resource base for all government and non-government agencies and community groups working in the fields of landscape planning and management. From the baseline definition of landscape character types, visual quality can be assessed systematically.

In summary, it is expected that this study will:

- assist in the development of a common vocabulary by which the general community and land managers can discuss the aesthetic characteristics of landscape;

- provide a data base and systematic process from which students, educators, natural resource scientists, land planners and designers and others concerned with the inventory, assessment and management of landscape in Western Australia may borrow and benefit;

- increase community awareness, appreciation and understanding of landscape types, diversity and uniqueness in Western Australia.

Project Background

This project has its origins in 1987 in the work of the Western Australian State Landscape Advisory Committee. This committee, consisting of individuals representing various Western Australian land planning and management agencies and professions stated "that in order to gain an appreciation of the overall landscape of the State and to provide a basis for landscape planning, it is essential to survey the landscape character of the State. This can be achieved by undertaking a broadscale classification of the State's landscape character types".

Following CALM's formulation of a Landscape Management Policy and Visual Landscape Management System in 1989, preliminary research for the Landscape Character study commenced, funded by CALM, EPA and DPUD. The aim of this initial stage of the study was to prepare a preliminary Landscape Character Type classification map of Western Australia and an accompanying set of summarised descriptions.

The current stage of the study commenced in 1992 and is jointly funded under the National Estate Grants Program by CALM and the Australian Heritage Commission (Federal Government) and The Heritage Council of Western Australia (State Government).

The study has subsequently evolved with extensive reviews undertaken by members of the Project Advisory Group and environmental resource specialists across the State. Data sets, classification maps and extensive character type descriptions were progressively refined, culminating in the development of this published document, prepared by the original consultant and Project Advisory Group.

Key Study Aims

In accordance with the State's landscape assessment systems (Government of W.A., 1992; Department of Conservation and Land Management, 1989), the key aims of this study are as follows :

- undertake a broadscale classification of the State's landscapes;
- map and describe the characteristic landscapes in terms of their common distinguishing visual landform, vegetation, waterform and land-use characteristics; and
- develop visual quality frames of reference criterion and aesthetic character summaries for each characteristic landscape.

Understanding Terms

For the purposes of this study the following definitions of key terms are used -

• ***Landscape*** is defined as a combination of all the physical components encompassed in a view, both natural and cultural.

• ***Landscape Character*** is where there is an apparent harmony or unity among all the natural elements of a landscape, including the landforms, geology, vegetation etc. Each area has its own distinguishing landscape character, and each invokes a distinct response (Simonds, 1961).

• ***Landscape Character Type*** is a broad scale area of land and water with common distinguishing visual characteristics. Delineation of each Character Type is based on an inventory of the physical landscapes and its overall visual appearance. Total visual character is presented as an amalgamation of landform, climate, vegetation, waterform, cultural and land-use patterns (Leonard & Hammond, 1984).

• ***Landscape Character Sub Types*** are identifiable subdivisions within a character type which exhibit characteristics common to the mother type, and yet are marked by distinctive likenesses peculiar to each sub type (Leonard & Hammond, 1984).

• ***Scenic Quality*** is the relative visual character of a landscape, expressed as an overall visual impression

or value held by society after perceiving an area of land/water.

• ***Aesthetic Character*** is a visual summary of the landform, vegetation, waterform and land use attributes of a landscape, described in formal aesthetic terms of form, line, colour, texture and scale.

Project Method

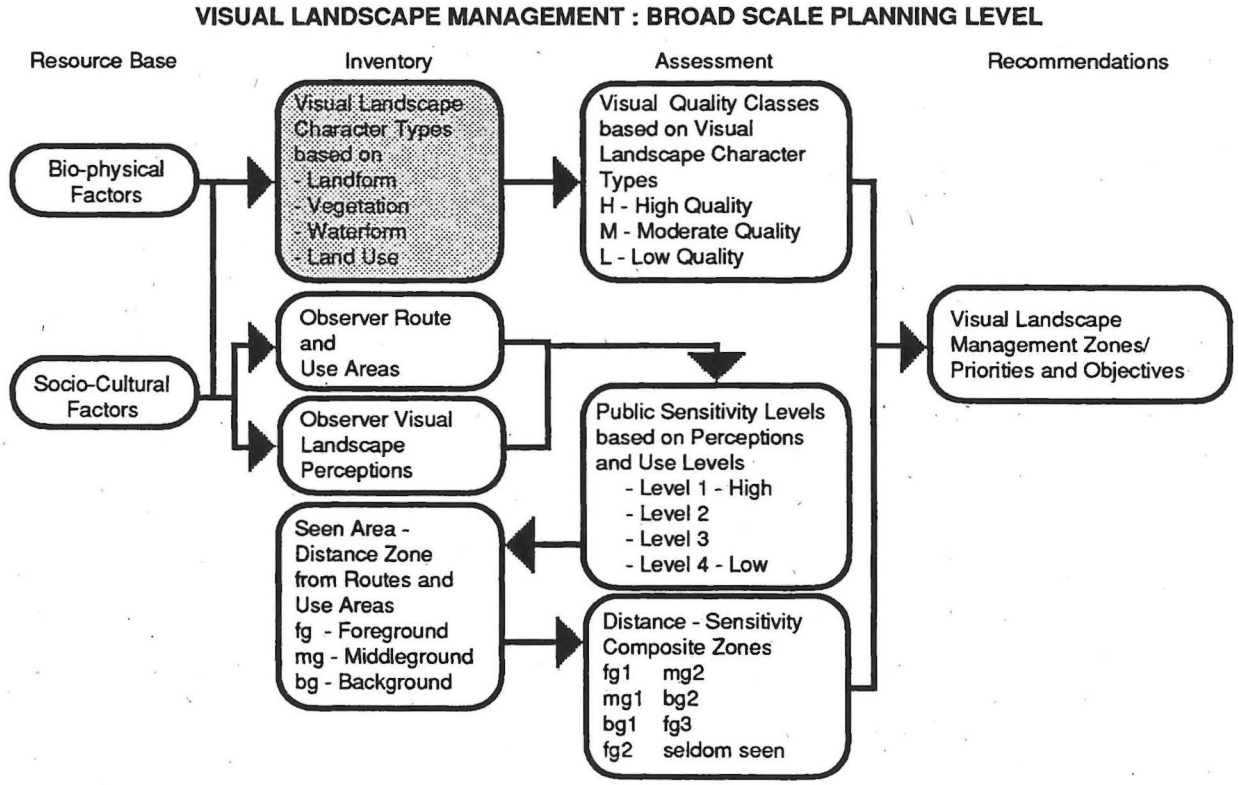
Background

The development of landscape management, assessment and classification systems in Western Australia has essentially been directed by the research and operational practices of land management agencies and educational institutions in the UK and USA. CALM, for example, have adapted a visual landscape management system developed by the US Bureau of Land Management and US Forest Service (US Bureau of Land Management, 1980; USDA, Forest Service, 1974). Refer Figure below. This landscape assessment model has its origins in formal aesthetic theory with compositional principles such as form, line, colour and texture derived from artists' scenic perceptions of 18th and 19th century landscapes. Landscape or scenic *beauty* prevails as the impetus for aesthetic quality. This visual landscape management model provides a systematic process of inventorying and assessing the landscape resource base, with management objectives and priorities defined. The landscape character type data is an essential component of the system's inventory.

Mapping Classification

Preliminary character type boundaries were drawn from available data (see map references), and mapped at 1:1,000,000, ensuring that the divisions were based on the visual elements in the landscape rather than only by natural system boundaries - which are not always visually distinct in the landscape. Landsat imagery was used extensively to assist with this boundary verification process. At scales of 1:1,000,000 and 1:250,000, these illustrate many visual boundaries which do not fall into any mapped natural systems, e.g. the Wheatbelt.

Where possible, specific field work for character type boundary verification was undertaken by the Project Team, but due to the cost and practical problems involved with 'ground truthing' of the entire State, heavy reliance was placed upon Government field staff and experts familiar with various areas of the State. The Study methodology flow diagram on page 7 summarises the classification process.



Visual Landscape Management System, Department of CALM (adapted from USDA, Forest Service 1974)

PROJECT METHOD

Some Landscape Character Type boundaries are visually distinctive and strong in definition, such as the western edge of the Darling Scarp, forming a clear line between the Darling Plateau and the Swan Coastal Plain Landscape Character Types. Often boundaries between Landscape Character Types are not so definitive. These soft lines occur generally in areas where no abrupt change in the landscape is visually obvious, but where there is a gradual transition from one character type to another. The boundary lines in these instances were placed in the transitional areas where influences or characteristics from abutting character types were evident. The guides used for the placement of these soft lines were generally the natural system boundaries, particularly surface geology/ landform, vegetation, soils and climate. Where no visual boundaries are apparent due to factors such as clearing, and where vegetation cover or type cannot be relied upon, unseen factors such as soil type boundaries, which have an underlying influence on more obvious visual elements in the landscape character, have been used.

It is important to note here that due to the limited resources of this study, the process of sampling the physical features of the landscape had to be 'broad brush'. Existing scientific material and photographic imagery has been used extensively, with little ground level reading or field work. This sampling process has significant limitations in identifying landscape features derived from personal experience of the landscape, and in particular cultural landscape features, which together are the core meaning of aesthetic value. Such information was beyond the scope of this project and was therefore not researched.

Landscape Character Type Descriptions

Expansion of the character type descriptions to provide detailed landscape information was the major task of the study. Research for various areas to provide biophysical and cultural descriptions of individual Character Types and Sub Types under headings of Climate, Landform, Vegetation, Waterform and Land Use was carried out. Detailed visual information taken from ground and aerial photographs (at 1:50,000 and 1:25,000) and videos were used to capture visual details of the Character Types and supplement more specific information for the aesthetic character summaries of *Form*, *Line*, *Colour* and *Texture* landscape attributes.

The descriptive text is designed to give the reader a mental picture of the character type areas which have been classified and mapped for the State, and to describe the primary contributing formal aesthetic factors of each Landscape Character Type. For each area, factors described included the general climate, its landform comprising geology and soils; the vegetation - including cover, height and sparseness; waterforms - including shapes and types; and land use - including activities, built forms and clearings in native vegetation.

Land Use and Cultural Influences

Cultural activities and land use are also factors which can determine a Character Type. The Wheatbelt Plateau Landscape Character Type is the best example of this. It has been delineated as a separate character type, as the dominant visual aesthetic feature is the extensive area of cleared agricultural land. The research of land uses and cultural factors in influencing character type definition is by no means extensive. Further work is required here.

Landscape Character Sub Types

Over the broad areas of homogeneous landscapes which have been classified into Character Types, often slight visual differences occur from one area to another. This may be due to no more than a localised climatic influence or a slight topographical change. Where these differences are not distinctive enough to warrant a separate Character Type boundary, yet a division between the two zones was visually dominant, then Sub Types of the Character Type were established.

Visual Quality Classification - Frames of Reference

Descriptive criteria for the assessment of visual quality have been prepared for each landscape character type and sub-type. The criteria are referred to as Frames of Reference as they describe the relative range of visual quality (high, moderate, low) and provide the base data for the comparative classification of visual components of landscape. The criteria are written in terms of diversity and uniqueness in landform, vegetation and

waterform, and are based on Australian and International perception research studies (see Leonard & Hammond, 1984; Williamson, 1979).

Aesthetic Character Summaries

The overall guidelines for the descriptive text are formed from four formal aesthetic component elements found within the visual landscape. These are referred to as visual landscape dominance elements, namely *Form, Line, Colour* and *Texture*.

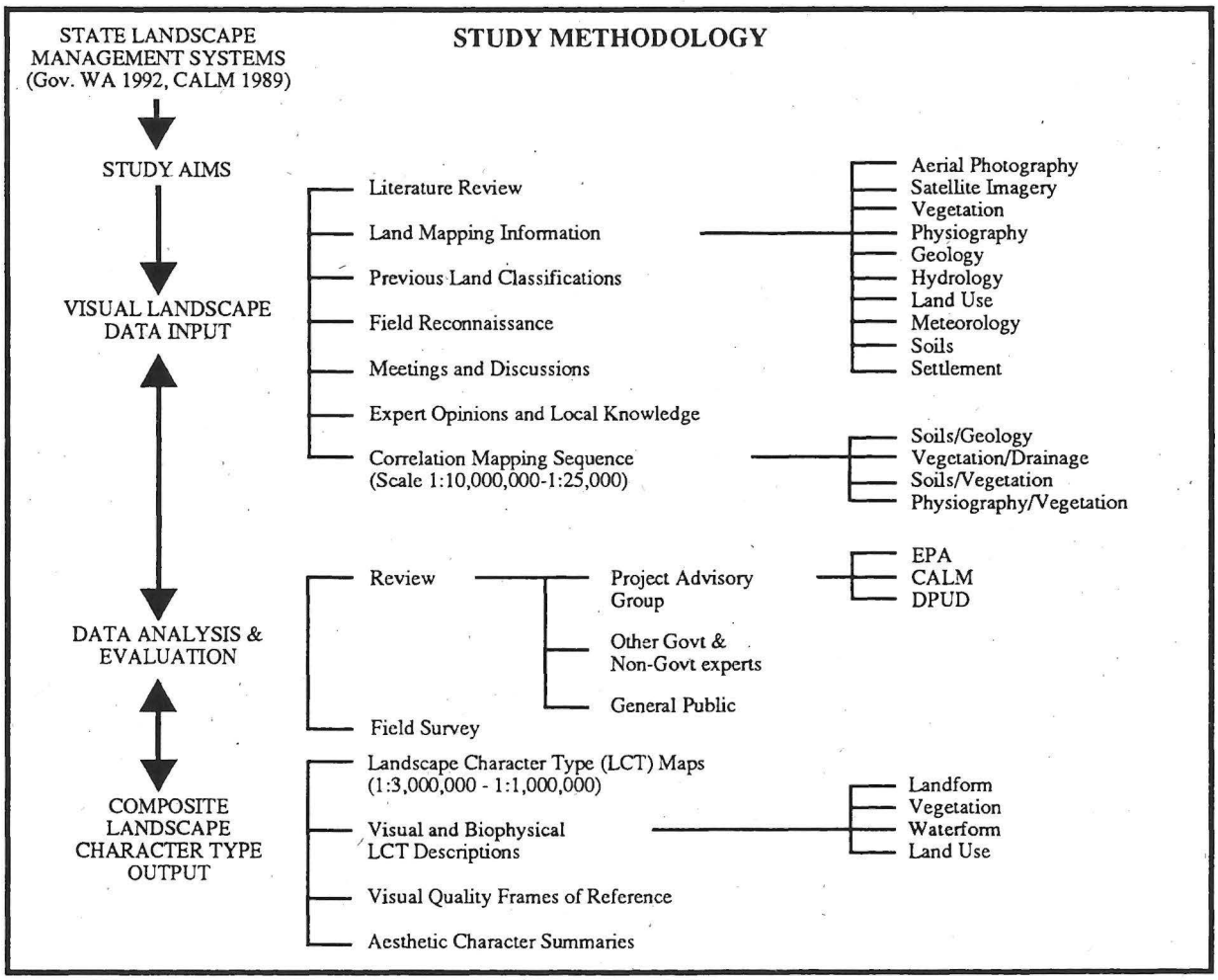
Form is the mass of an object or of a combination of objects that appears unified. If seen in only two dimensions it is called a shape. Most landscape objects are three-dimensional, however, and are viewed as forms.

Line represents an extended series of points arranged in a row or close sequence. Line can make up the silhouette of a form or can be considered separately. In the landscape, lines are created by ridgelines, timberlines, shorelines, powerlines, etc. They are also found in tree trunks, roads and vegetative boundaries.

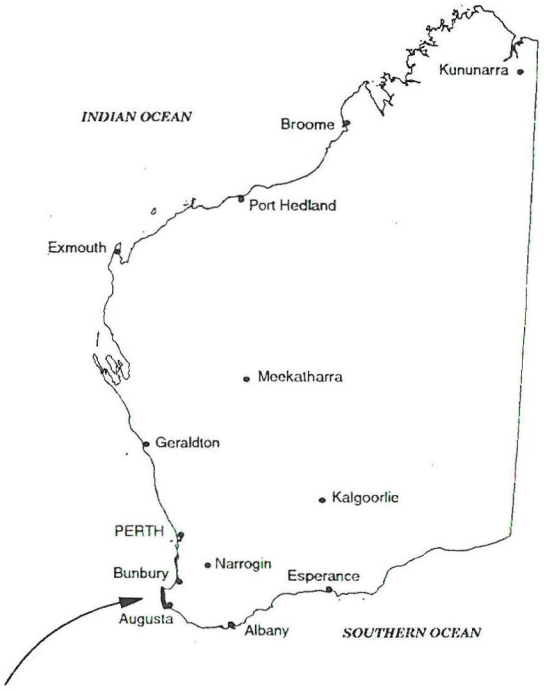
Colour enables the differentiation of objects even though they may have similar form, line, and texture. Distant colours are often muted by a bluish atmospheric haze. Foreground colours are stronger and more dominant. This is especially true when viewing the same colour at various distances.

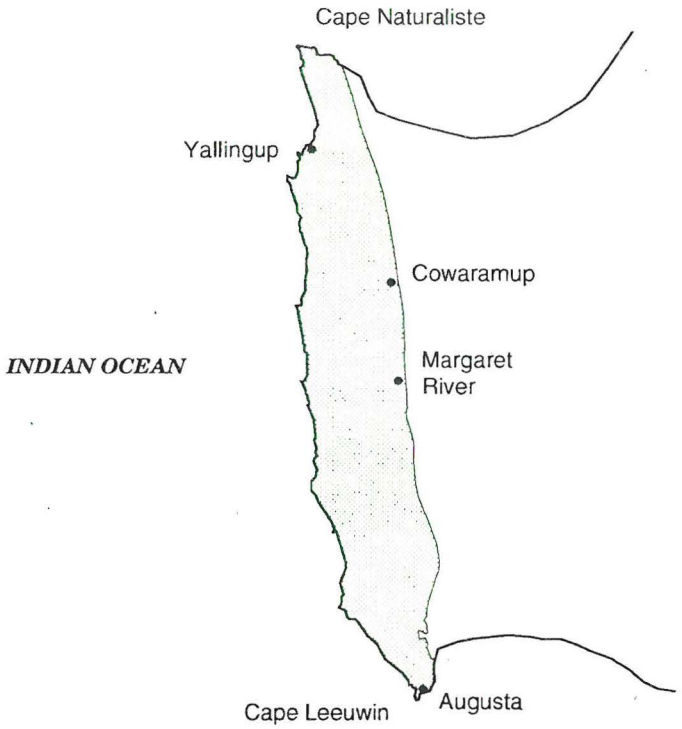
Texture represents the structure and surface characteristics of the landscape. Textures range from fine and smooth to coarse and rough. When viewing the same surface cover the texture will usually appear to be more coarse and rough in the foreground and progressively finer and smoother as distances increase to the background.

The aesthetic character summaries are based on visual attributes of the physical landscape, and therefore do not include the full spectrum of aesthetic quality, for example - smell, touch, sound, etc.



1. Leeuwin Naturaliste Coast





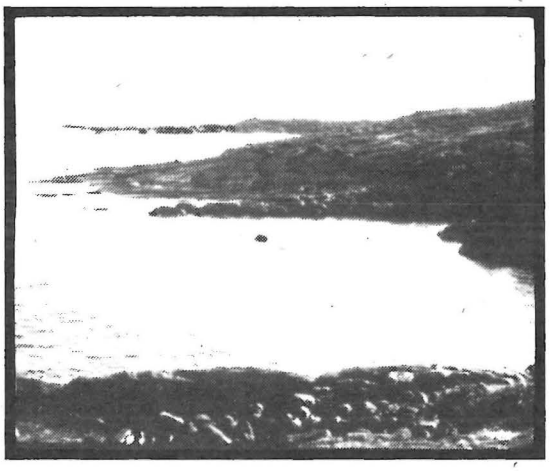
Scale
10 0 10 20 30 40 50 Km

Approximate boundaries only
Produced by Land Information Branch,CALM

Leeuwin Naturaliste Coast Landscape Character Type

General Description

The Leeuwin Naturaliste Coast is the most westerly of the Landscape Character Types of the south-west coast. It lies between Cape Naturaliste in the north and Cape Leeuwin in the south and terminates inland just west of the Dunsborough faultline. It is comprised of three zones: the narrow coastal strip and associated dunes, the central ridge of abrupt, steep, limestone hills, and in the east, undulating gravel and pale, sandy slopes.



The prevailing winds and salt spray determines the height and density of the exposed patchwork of coastal heathland vegetation. Diverse woodlands exist in more protected zones, and on the top of the central ridge, a stunted Jarrah Marri forest is located, growing to its normal size to the east. Towering creamy yellow and grey variegated trunks of the Karri tree, benefitted by the high rainfall and loamy soils, are a highlight on the lower third of this Character Type.

The well drained undulating slopes to the east are generally cleared for agriculture, most notably viticulture. This is associated with the small town of Margaret River, which is one of the Leeuwin-Naturalist Coast's major population centres.

Climate

The Leeuwin-Naturaliste Ridge and its close proximity to the ocean are the major influencing factors on the climate of this Character Type.

Onshore winds are an important feature of the climate, and they vary daily and seasonally. The regular passage of cold fronts occur every three to five days throughout winter, bringing strong north-west winds reaching speeds of 35-50 kmph. In summer, land breezes from the east and south-east bring light and variable winds of less than 25 kmph.

Rainfall occurs largely between May and August, varying between 500mm and 1200mm per annum with an average of 800mm to 850mm. Cape Naturaliste records over 1000mm per annum with Margaret River inland at 1150mm.

The hottest months are January and February with an average daily summer maximum of 26°C and a daily winter maximum of 18°C. A general tendency is for the temperature to decrease and for the rainfall to increase from north to south throughout this Character Type.

Landform

The Leeuwin-Naturaliste coastal strip is a panorama of abrupt rocky shorelines, sweeping asymmetrical beaches such as at Yallingup, and embayments such as at Hamelin Bay, punctuated and shaped by rugged granitic headlands and towering granite and limestone sea cliffs. The exposed rugged granite and pale limestone capping also form the numerous islets and reefs that fringe the shore, creating the heavy surf for which this coast is renown.

Wind sculptured foredunes and parabolic dunes backdrop the gently undulating white sand beaches, often to rise steeply as the western flanks of the central ridge. While most dunes throughout the coastal strip are stabilised, blowouts occur where the vegetation cover has been disturbed. The extensive mobile

sandsheet at Boranup is clear evidence of the extreme wind action at work on this high energy coast. To the north of Boranup, in the Hamelin Bay area, a small area of unique conical dunes are also evident.

Central to the Character Type, and its most prominent feature, is a discontinuous limestone ridge, known locally as the Leeuwin Naturaliste Ridge. Formed on a granite bed, the exposed margins of the ridge are seen as abrupt, pale limestone seacliffs at Biljedup Brook and Wilyabrup. Generally, the margins are obscured and softened by rounded, undulating hillslopes rising from 100m to 200m in height. The sands of the ridge, initially a coastal dune deposit, have solidified and dissolved to form the dark, cool cave systems that are an interesting feature of this region. The most accessible of these often spectacular formations can be found between Yallingup and Augusta. Sea caves of granite and limestone can also be found to the north-east of Cape Naturaliste.

Beyond the ridge, the eastern margin of the Leeuwin Naturaliste Coast is characterised by an almost completely flat to gently undulating plain, with slight gravelly rises or knolls and occasional granitic outcropping.

Vegetation

The remaining native vegetation of the Leeuwin Naturaliste Coast is predominantly low, impenetrable heath and tall, open forest, highlighted in small patches to the south by the imposing Karri trees. Its pattern across this Character Type is both complex and rapidly changing, controlled by soils and exposure to the prevailing winds. Land use has had a more marked effect on the fertile land to the east of the prominent central ridge, and large scale clearing for agriculture and timber has, in some areas, resulted in an open landscape with a colourful patchwork of exotic crops, grasses, and regrowth forest, with roads often shaded cool by overhanging Eucalypts and pale green Peppermints (*Agonis flexuosa*) .

Throughout the western half, exposure to extreme wind conditions and salt spray makes the vegetation of the foredunes and seaward slopes highly susceptible to disturbance and erosion. Owing to their infertile soils these slopes have remained largely uncleared and a high proportion of the coastal margin is now retained within the Leeuwin-Naturaliste National Park.

Primary colonisers such as the bristly Hairy Spinifex (*Spinifex hirsutus*) and soft clumps of the introduced Marram Grass (*Ammophila arenaria*) appear on the low dunes, with the scrubby pale grey Coastal Daisy (*Olearia axillaris*) occurring in protected dune depressions. In areas of coastal limestone, soft Chenille Honeymyrtle (*Melaleuca heugelii*) and spiky Parrot Bush (*Dryandra sessilis*) feature among the heath, notably at Canal Rocks and Yallingup, and Rottnest Tea Tree (*Melaleuca lanceolata*) is scattered in woodlands on the sheltered limestone slopes to the north-west of Bunkers Bay.

On the exposed western slopes of the ridge, the vegetation pattern is low, scrubby heath. Wind pruned Acacia and Jacksonia are common, with an understorey of bright yellow Hibbertia, the glossy dark leaves of the twining Sarsaparilla (*Hardenbergia comptoniana*), and the soft blue flowers of Thick-leaved Fan Flower (*Scaevola crassifolia*) occur throughout, with Prickly Moses (*Acacia pulchella*), and Dwarf Sheoak (*Allocasuarina humilis*) occurring more regularly to the north.

Weeping Peppermint and rough-barked Banksia dominate a range of structural remnant vegetation types, including low forest, woodlands and open forest. These are interspersed with Bullich (*Eucalyptus megacarpa*), Melaleucas and Blackboys (*Xanthorrhoea spp.*). Jarrah (*Eucalyptus marginata*), and Marri (*E. calophylla*) occur as tall shrubs throughout, only reaching their full height as Jarrah-Marri forest on the deeper soils of the leeward side of the limestone ridge and on the eastern margin.

Brown sandy loams, located in protected depressions and gullies on the sheltered side of the main ridge, support the most westerly occurrence of the towering, smooth, creamy yellow and grey trunks of the Karri (*E. diversicolor*). Where the ridge is particularly steep, low heath dominates and the transition to tall forest occurring in protected depressions is often abrupt. The

cool, isolated pockets of Karri occurring in the south of this area are the most extensive at Boranup, and the soft, sun dappled understorey often contain the serrated leaves of Banksia trees, Karri Oak (*Allocasuarina decussata*), and Peppermints with a shrub layer of Karri Wattle (*Acacia pentadenia*), bright purple Hovea (*Hovea elliptica*), yellow Hibbertia, Karri Hazel (*Trymalium spathulatum*), and the pale green Soft Leaved Lasiopetalum (*Lasiopetalum molle*).

The vegetation pattern on the gentler leeward slopes of the eastern margin is largely dictated by land use. Within the cleared rural areas, large tracts are utilised for agriculture and these present a colourfully contrasting patchwork of exotic trees, plants and grasses, which are dissected by drainage channels and often continuous roadside vegetation corridors, linked to uncleared remnant vegetation, timber reserves and State forest. The open forests of this area are dominated by tall grey barked Jarrah trees and the rough barked Marri with the understorey featuring Blackboys (*Xanthorrhoea preissii*), Banksia and weeping Peppermint. Noticeably widespread among the understorey in many areas, as a low continuous layer of bright green, is Bracken Fern (*Pteridium esculentum*), commonly seen along roadside verges. Flooded Gums (*Eucalyptus rudis*) shade many drainage lines with Forest Blackbutt (*E. patens*), and spiky rushes occurring in damp areas.

Waterform

Margaret River is the major drainage feature of the Leeuwin-Naturaliste Coast Character Type. It cuts through the ridge near Prevelly Park in a deeply incised east-west valley before it flows over the shallow sandbar to the ocean. Its tributaries form the main catchment of the Character Type.

The ridge is also cut by a series of westerly flowing brooks. These are often short in length, intermittent, with well-defined valleys. The most southern of these, Turner Brook cuts the ridge in a spectacular limestone gorge at Deepdene, and a gushing waterfall is a feature at Quininup.

Freshwater is also available on the coast at springs such as Contos and Sugarloaf and at Cape Leeuwin where early settlers integrated the use of a water wheel. Lakes impounded by narrow barrier dunes are isolated in areas, the largest of which can be seen at Bunkers Bay.

Poor drainage caused by a geology of shallow soils over clay and high rainfall result in the seasonal swamps and soaks that are scattered throughout the eastern half. Some deeper depressions remain wet throughout the year due to groundwater seepage.

Land Use

The major land uses that dominate the Leeuwin-Naturaliste Coast Landscape Character Type are agriculture, timber production, residential and more recently, tourism and recreation.

Physical evidence of the former Noongar Aboriginal inhabitants of this area has been found in the rough limestone caves and along the coast. The clearing of much of the forest for farming land prevented the Aboriginal people from continuing their traditional activities and many were sent to Aboriginal settlements at Moore River or Carrolup near Katanning while farm homes and an orphanage were set up for a short while at Margaret River.

Historically, the timber industry was a major land use within the area and mainstay of the economy. This is still maintained today through State forest, share farming, exotic tree plantations and shelter belts, windbreaks and agroforestry, producing both softwood and hardwood.

Much of the land to the east of the ridge is cleared of its native vegetation and today, large tracts are occupied by farms. The traditional pursuit is grazing, with sheep and cattle dominant in the north, and dairy cattle to the south.

Diversification in farming practices has seen the rise of alternative produce and crops throughout the region. Acres of geometrically aligned grapevines denote the increasing interest in viticulture, and the production of fine quality table wines for local consumption and export. Specialisation in orcharding, fruit, vegetables,

nuts and flowers, and also in the farming of exotic animals, particularly deer, is becoming widespread.

Both agriculture and forest industries support tourism and recreation as the most rapidly expanding land use. Industries created from timber production, such as furniture and fine wood crafts (turning and sculpture) are widespread and specialised agriculture is a feature here, with the farming of trout, marron, deer, exotic fruits, as well as wine and cheese production.

The coastal settlements of Gracetown and Augusta, and service centres like Margaret River and Cowaramup provide a variety of residential and visitor accommodation, freehold land for rural living, hobby farms and bush blocks, and many are centres for thriving craft industries. A district architecture style of local rammed earth and mud brick is rapidly developing throughout the area, embodied in private dwellings, commercial facilities and public buildings. Water related activities from beaches such as Hamelin Bay and Yallingup include fishing, swimming, windsurfing and diving, and the world class surf which occurs near Margaret River, attracting many visitors.

Land use for extractive industries is minimal within the area. Known minerals include mineral sands and coal.

Conservation values and the scenic attractions of the Leeuwin-Naturaliste Coast are protected by the Leeuwin-Naturaliste National Park. The extensive lands of the park run the length of the coast from Cape Naturaliste to Cape Leeuwin, each defined by a stark white lighthouse. Within the park and adjacent State forest, particularly Boranup, are the most westerly occurrence of the Karri, the limestone ridge cave system, world-class beaches and surf, and an almost continuous coastal heath ecosystem.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Irregular coastline edges emphasized by distinctive rock outcroppings, bays, inlets and cliffs e.g. Canal Rocks. * Limestone features, caves, doelines and fault lines e.g. Mammoth Cave. * Primary dunes which display areas of active weathering, steep slopes or sand blown edges e.g. Boranup Sand Sheet. * Ridges and dune formations of distinctive height, configuration or combinations which provide obvious contrast to landform pattern common in the surrounding areas e.g. Central Ridge.	* Distinctive vegetation patterns due to strongly defined variation in species density, age, growth habit, colour or texture e.g. abrupt transition from heath to woodland. * Pockets of specimen vegetation which become focal points due to isolation, unusual form, position in the landscape or canopy variation e.g. karri. * Plant groups displaying seasonal colour which distinguishes them from their surroundings e.g. coastal daisy. * Wind-shaped, gnarled or dwarfed vegetation unusual in form, colour or texture e.g. coastal heath.	* Major permanent rivers and streams with changing flow characteristics and features such as waterfalls e.g. Quininup Falls. * Wetlands and waterholes in intermittent watercourses.
MODERATE	* Rounded hills and ridges with some dissection but generally similar to the surrounding landforms. * Dune formations evident but of uniform height and configuration. * Regular coast edges without bays, inlets, promontories, stacks or cliffs. * Areas of gently sloping land with less distinct drainage patterns.	* Patterns evident in land cover but lacking uniqueness or distinction relative to surrounding vegetation. * Transition from coastal vegetation to forest vegetation lacking distinction.	* Intermittent watercourses with unchanging flow characteristics.
LOW	* Extensive areas of very gently inclined topography with little dissections, undulations or other features of visual interest. * Coastal landscapes in which natural elements remain dominant are of special visual significance and therefore rate no lower than moderate scenic quality.	* Extensive areas of similar vegetation cover without evident patterns due to species variation, age, class, texture, colour or spacing.	* Waterforms absent.

Aesthetic Character Summary

LANDFORM

Form:	rugged granitic headlands; conical dunes; rounded, undulating hillslopes; parabolic dunes; towering sea cliffs; wind sculpted foredunes.
Line:	central ridgeline; undulating slopes; shorelines; asymmetrical beaches; vertical sea cliffs and valleys; horizontal wave-cut platforms; horizontal offshore reefs; narrow sandbar; U-shaped valleys.
Colour:	white sand; pale cream to grey limestone; brown sands.
Texture:	rugged limestone; rocky cliffs; sandy dunes.
Scale:	slightly undulating landform in eastern region of the Character Type offers moderately open views to midground; the central ridge and coastal dunes often restrict and enclose the depth of view to the foreground.

VEGETATION

Form:	wind pruned heath; isolated pockets; weeping peppermints; towering Karri; stunted Jarrah Marri forest.
Line:	horizontal canopy line of low heath vegetation; strong vertical Karri trunks; twining vines; horizontal line of bracken.
Colour:	pale green Spinifex; bright yellow Hibbertias; glossy dark green leaves; blue flowers; mottled creamy yellow and grey Karri trunks; sun dappled understorey; bright green bracken; creamy Karri wattle; bright purple Hovea; glistening green leaves.
Texture:	bristly Spinifex; soft grasses; scrubby daisies; spiky parrot bush; prickly wattles; soft peppermints; smooth Karri trunks; spiky reeds and rushes; rough, Marri bark; fibrous Jarrah bark.
Scale:	uncleared vegetation - taller vegetation encloses and channels views with canopy often meeting overhead; lower heath scrub permits broader views over landscape, and dune landscape encloses views; depth of view into vegetation is minimal; vegetation cleared - permits longer views over landscape with foreground to midground views enclosed by landform.

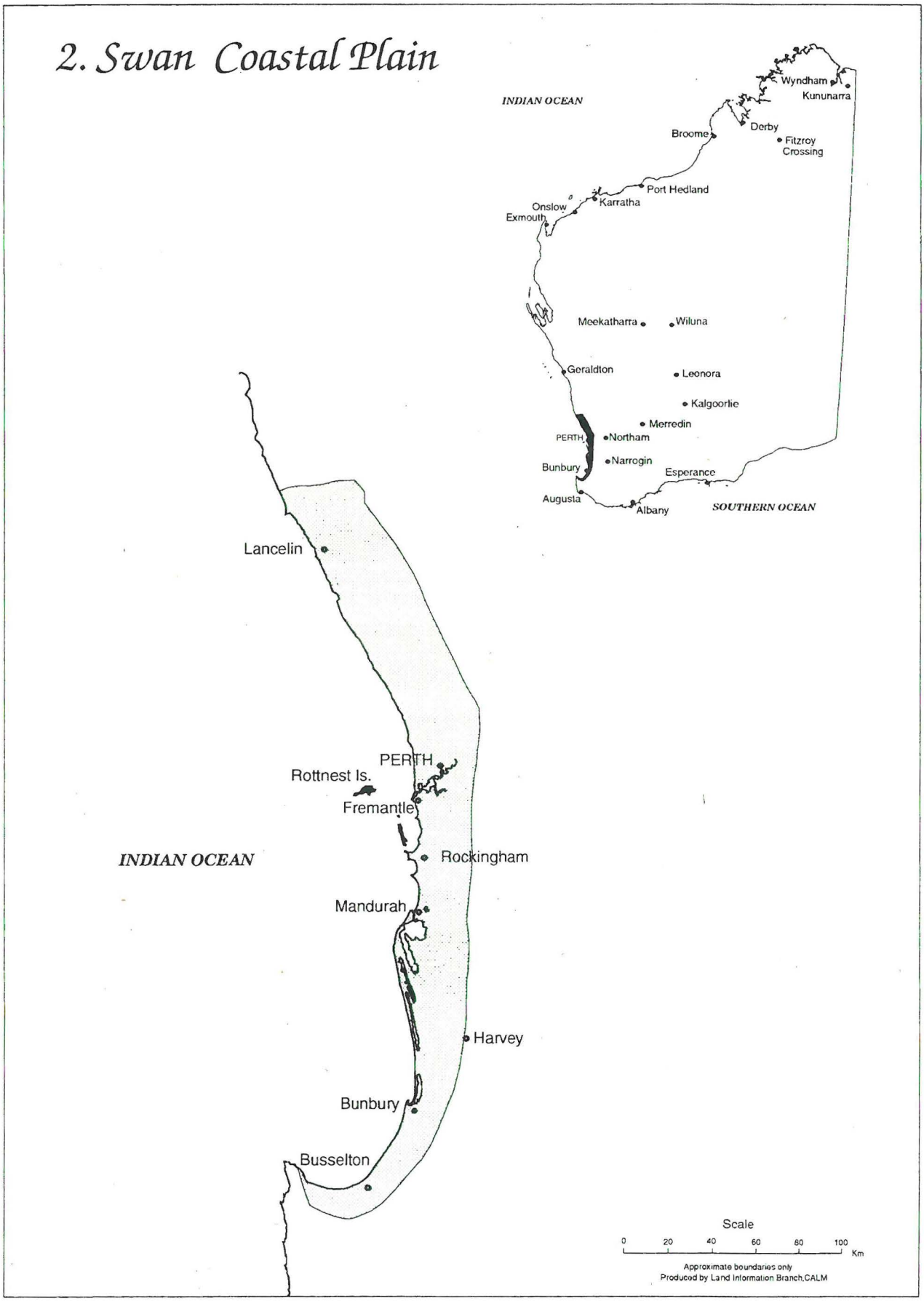
WATERFORM

Form:	pools; shallow swamps.
Line:	elongated and round lakes; gentle meandering rivers; vertical waterfalls.
Colour:	transparent; blue.
Texture:	foaming surf; smooth lakes; rushing waterfalls.

LAND USE

Form:	geometric housing and semi-rural land subdivisions; cylindrical lighthouses;
Line:	hectares of parallel vines; fencelines; geometric and meandering roads and lane ways; vertical light houses;
Colour:	bright green grape vines; muddy browns of rammed earth, pale cream to grey limestone; white lighthouses
Texture:	texture of roofing and building materials;

2. Swan Coastal Plain

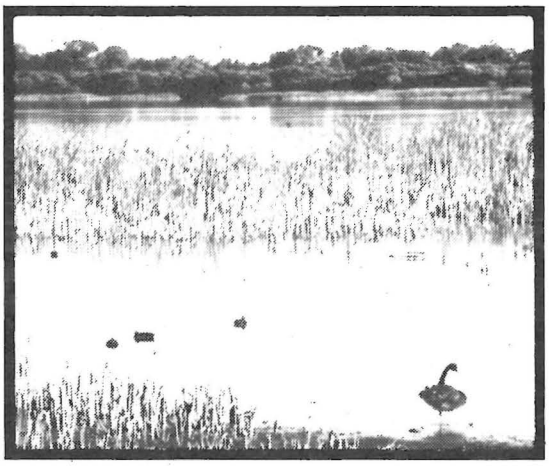


Swan Coastal Plain Landscape Character Type

General Description

The Swan Coastal Plain Landscape Character Type is a narrow strip of land situated on the lower western coastline of the State, abutting the western edge of the Darling Plateau, and slopes gently westward to the Indian Ocean where it terminates in a system of well-defined coastal dunes.

This low-lying sandy plain extends to the region north of the Moore River and follows the long, stretching coastline south to Geographe Bay. Three distinct land systems occur that are characteristic of this area: foothills, alluvial plains and successive coastal dune systems.



The northern half of the Swan Coastal Plain is subject to hotter summers and drier, warmer winters than the landscape to the south. Owing to this climatic difference, the vegetation in the south appears more lush and of increased height than that to the north where there are fewer trees of a decreased stature.

Waterforms are a major characteristic of this region. Over its length are numerous swamps and wetland lakes as well as meandering rivers and streams. Estuaries and inlets feature on the coast.

This Landscape Character Type has the State's highest population concentration. Perth is situated in the central region of the Swan Coastal Plain, and other major centres include Fremantle, Bunbury and Mandurah.

Climate

Classified as temperate, the climate of the Swan Coastal Plain can generally be characterised by clear skies and fine weather.

Rainfall increases toward the south where it becomes more reliable, with a low annual variability. It ranges from 1200mm - 800mm per annum. The northern section, with a lower rainfall of 600mm - 400mm per annum or less has a higher daily maximum temperature with an average of 26°C. The temperature decreases to the south, falling to a July minimum of 11°C in Busselton.

The influence of the prevailing winds is seasonal. Moist winter winds are southwesterly, changing to east-south-east in summer with a regular westerly afternoon sea breeze.

Landform

Abutting the abrupt Darling Scarp at the eastern margin of the Swan Coastal Plain are the gently inclined foothills which are remnants of an ancient geological feature known as the Ridge Hill Shelf. Once a continuous feature, the foothills appear today as a series of gently sloping flattened spurs and are seen from Bullsbrook in the north, to the Collie River in the south, at areas such as Harvey and Armadale.

A gently inclined alluvial plain with long open views has developed to the west of the Darling Scarp and north of the Whicher Scarp which forms the southern border, as well as abutting the foothills, and along river courses. This low-lying area is constructed largely of riverine material, with pale soils dominated by grey sands, with gravels, loams and clay. This often level

plain has developed more extensively in the high rainfall zone around Busselton to the south of this Character Type where increased runoff has resulted in the watercourses depositing more sediment from the uplands onto the plain.

To the west of the plain lie three successive dune deposits occurring in bands which generally run parallel to the Darling Scarp and the present coastline.

The Bassendean Dune System abuts the low-lying plain to the west and the foothills to the east, and is an accumulation of beach sands along an ancient shoreline. Formed into low, rounded hills of pale grey quartz sand, these dunes are most extensively seen in the northern region of the Character Type such as at Bayswater.

The Spearwood Dune System occurs to the west of the Bassendean dunes and are younger, steep hills of increased height, with soils of soft yellow to rich toffee coloured sand. Underlying the sand is a belt of pale, rough limestone which is exposed in many places, and can be seen in the cliffs at Blackwall Reach on the Swan River and in the deeper caves at Yanchep.

Quindalup, the third and most recent Dune System, consists of low, elongated windswept dunes of pale sand which are forming along the Indian Ocean coastline today. From their narrowest point at Fremantle, they develop into successive beach ridges, the widest occurring near Busselton and from Rockingham to Becher Point.

The coastal margin of the Swan Coastal Plain features long, gently curved beaches of bleached sand and low dunes, such as at Geographe Bay, which are broken by coarse, pale, limestone cliffs, jutting headlands and wavecut platforms. Synonymous with the onshore coastal characteristics of this region are the off-shore elements of the coastal landscape. Rottnest Island is a distinctive focal point in the offshore landscape to the west of Fremantle, appearing as an elongated rise on the horizon, fringed by glistening white beaches. Garden, Wedge, and Penguin Islands all offer the same appealing coastal landscape features, as do the foaming and gurgling limestone nearshore reefs which are scattered along the coast, such as at Trigg and elsewhere within Marmion Marine Park.

Vegetation

Of all the factors affecting the vegetation of the Swan Coastal Plain, the climate has the most marked influence. From the north to the south, the vegetation associated with the landforms of the area changes from low scrubby Banksia woodlands with stunted Eucalypts in the north, to lush, towering forested areas in the south.

Beginning at the southern margin near Dunsborough, the influence of European settlement is obvious, as it is over the entire Character Type. Much land has been cleared of native vegetation for agricultural, urban and industrial purposes, revealing long views over the landscape. On this southern plain there are remnants of an open, rough-barked Marri *(Eucalyptus calophylla)* forest scattered over grazing land, with isolated tall Jarrah *(E. marginata)* occasionally on higher ground. Marri and the dark trunk of the Blackbutt *(E. patens)* are seen near rivers and streams, and following the meandering watercourses are spreading Flooded Gum *(E. rudis)*, white peeling bark of Swamp Paperbarks *(Melaleuca raphiophylla)*, and pale green Peppermint *(Agonis flexuosa)* closer to the coast. Where there is poorer drainage on the plain, scattered clumps of Paperbark woodland are seen with isolated specimens of the seasonally splendid WA Christmas Tree *(Nuytsia floribunda)* which features conspicuously bright tangerine blooms in the summertime. Rough, olive green Banksia with Paperbark and Christmas Tree are also present in more sandy positions on the plain.

The vegetation associated with the low, rounded Bassendean Dune System, which begins as a narrow belt near Busselton, includes scattered tall Jarrah with Paperbark and Banksia. To the north-west of the Sabina River, Tuart *(Eucalyptus gomphocephala)* make their first appearance. These unique tall trees with erect, solid trunks of rough, mottled grey once occurred in pure stands throughout much of the limestone ridges of the Spearwood Dune System, and today, protected remnants exist in the Ludlow Tuart Forest National

Park. A lower storey of lush Peppermint is often associated with these trees, or they appear in an open parkland setting in a combination with Jarrah. Other understorey species here are Banksia, Sheoak *(Allocasuarina fraseriana)*, with Blackboy *(Xanthorrhoea preissii)*, Black Gin *(Kingia australis)* and Zamia Palms *(Macrozamia reidlii)*. The willow-like Peppermint is the dominant understorey species in this southern zone, while Banksia and Sheoaks become more dominant to the north.

On the protected and low-lying coastal areas of this southern zone is a scrubby mixture with a low, open Paperbark forest. Further north the mobile foredunes are scattered with bristly, blonde Spinifex and other tenacious grasses. On the protected sides, a low shrubby heath appears, with heights varying with protection from the wind, and a dense, impenetrable thicket has occurred in some areas. Where the dunes become more stable, and more protection is offered, a tall thicket appears and in some areas this is seen as a low forest featuring Peppermints.

Between the solid Tuart occurring on the limestone ridges and the low, green Peppermint forest on the coast are the Vasse and Wonnerup estuaries where salt tolerant Samphire (*Arthrocnemum spp.*), forms a low, open heath. This is fringed by Saltbush *(Rhagodia spp.)* with a surrounding margin of scrubby Salt Water Paperbark *(Melaleuca cuticularis)*.

Moving further north on the Swan Coastal Plain, the vegetation begins to change. Very little original vegetation remains on the plain as the relative richness of the soil has encouraged widespread clearing for agriculture and pine plantations, such as at Wanneroo, as well as urban and residential expansion. The timber tree of Jarrah has virtually disappeared from this region, along with the once richly diverse shrub flora and ground covers, and the remnant trees appear as an area of parkland over wide, open pastoral expanses. The original vegetation was an open Marri forest on better drained areas with Wandoo and Jarrah, and serrated-leaved Banksia dominant in the understorey, with Christmas Tree, Blackboy and Zamia Palm. Watercourses and areas of poor drainage again featured Paperbark with fringing woodlands of Flooded Gum.

The narrow area of the Bassendean Dune System becomes broader to the north of the Swan River and the water table appears to be the factor controlling the vegetation cover there. On higher ground, the Jarrah-Marri open woodland occurs as remnants with Banksia and a soft Sheoak understorey. To the north of Perth, Banksia woodland becomes the dominant remnant vegetation, with Bull Banksia (*B. grandis*), Slender Banksia (*B. attenuata*), Swamp Banksia (*B. littoralis*) and Firewood Banksia (*B. menziesii*) predominant with Sheoak, Christmas Tree, and a richly diverse shrubby undergrowth. Jarrah is not at its peak here and becomes short and branchy. In the vicinity of Lake Gnangara, rough, peeling Pricklybark *(Eucalyptus todtiana)* appears and eventually replaces Jarrah as the dominant Eucalypt.

The freshwater lakes, swamps and other low-lying areas have skirting sedge communities extending to the low water-line, and pale Paperbark, combined with Flooded Gum dominating the fringes. The introduced strappy-leaved Bullrush (*Typha orientalis*) has also become a common sight, invading many of the wetlands of the Swan Coastal Plain.

The northern region of the Swan Coastal Plain supports similar plant communities as are found to the south. A few isolated remnants of Rottnest Cypress *(Callitris preissii)* occur, such as at Point Walter, but the area is generally dominated by a mixture of wind buffeted Acacias, Melaleucas, Clematis and Hardenbergia. Peppermint reaches its northern limit near Mandurah and occur commonly in the sheltered areas of stable dunes. The coastal belt near Rockingham has remnants of what was a distinctive closed scrub heath community. The vegetation is open now, disturbed by fire and grazing, and is dominated by Acacias and Blackboys. The salt lakes along the coast here are similar to those further south, and are fringed by Samphire, Saltbush and Paperbark.

The landscape to the north of this Character Type features a predominance of small scattered trees, generally being Pricklybark, scrubby Sheoak, clumped

Paperbark, Banksia and occasionally an isolated Marri. This vegetation regularly encloses the long views across the level plain to the isolated wetlands and elevated dune systems in the western distance, most notably at the Moore River National Park. Associated with these is an open layer of tall shrubs and a thick, dusty layer of smaller heath shrubs, including an abundance of soft Grey Smokebush (*Conospermum spp.*), bushy, grey green Acacias, Christmas Trees, scrubby Tea Trees (*Leptospermum ellipticum*), brittle, scratchy Parrot Bush (*Dryandra sessilis*) and Blackboys.

In the vicinity of Yanchep, low Banksia woodland and scrub heath become the dominant vegetation overlying the limestone ridges of the Spearwood Dune System. The Eucalypt woodlands which occurred further south become less dominant, smaller and more isolated. The stands of Tuarts, familiar to the south occasionally appear in small patches over limestone ridges and are apparent in depressions.

Deep swamps and wetlands are surrounded by tree cover generally of Paperbark, Banksia, isolated Sheoak and Flooded Gum. A large number of these occur in the vicinity of the Moore River and further south. Near the Gingin River, scattered low Marri appear in an area dominated by Banksia woodland, and Paperbark, Tea Tree and reed swamps are again numerous.

Waterform

Meandering watercourses dissect the Swan Coastal Plain along its length, but the area to the north of Perth is more poorly drained than the south. While many streams enter this area after descending the abrupt escarpments, very few reach the Ocean. They are either diverted north or south on encountering the linear dune systems, they link up with larger watercourses such as the Murray or the Swan, or terminate altogether.

Estuaries are a highlight on the coastline and are more extensive to the south of the Swan Estuary at Fremantle. Major inlets, seen as wide expanses of shimmering blue waterways, include the Vasse Estuary near Busselton, Leschenault Inlet at Bunbury, and the Peel Harvey Inlet, the largest estuary in the south-west, at Mandurah.

Wetland lakes such as Lake Joondalup and Lake Preston, and swamps such as Beanup and Benger are a major visual characteristic of the Swan Coastal Plain and are found scattered throughout. They are often circular in shape but may also occur as linear chains which are sub-parallel to today's coastline. These linked wetlands drain in a southerly direction into rivers or the stark geometrically constructed drains and canals which occur south of the Swan River. Many of these wetlands are associated with the dune formations, either situated inter-dunally or where the dune systems abut.

Land Use

The major land uses on the Swan Coastal Plain have been influenced mainly by agricultural, as well as urban and industrial activities.

The Noongar Aboriginies who originally inhabited the Swan Coastal Plain felt the brunt of European settlement, and as it spread, their traditional way of life soon became very difficult. Many town reserves were established for their use and others were sent to Aboriginal settlements such as at Moore River. Today, little evidence of their original habitation remains, and small communities have been established in various areas of the Character Type, their current and future activities centred on maintaining their cultural heritage and their strong relationship with the land.

The urban development of this Character Type is a very dominant visual feature throughout, and is rapidly expanding in the Perth region particularly to the north and south of the city, at areas such as Joondalup. Bunbury and Mandurah are the major population centres to the south of Perth, with many small towns dotted over the landscape at regular intervals, including Lancelin, Rockingham, Pinjarra, Brunswick Junction and Busselton.

The alluviates of the Pinjarra Plain at the easterly margin of the Character Type comprise the most arable soils of the Swan Coastal Plain for pastoral development.

Due to the reliable rainfall, combined with groundwater resources for irrigation and regular fertilization, the area is quite productive. Extensive areas of cleared green pastoral land indicates the widespread grazing of sheep, beef and dairy herds upon the plain, while the geometrically distinct white wooden fences which cut across the landscape are generally evidence of thoroughbred horse studs.

Bright patchwork rows of lush, contrasting greens indicate irrigated market gardens which occur on the outskirts of many towns, including Perth. Orchards, most commonly of round, shiny-leaved citrus trees, occur in the vicinity of Harvey and other smaller centres, and the green parallel lines of Western Australia's oldest established vineyards are dominant in the region of the upper Swan Valley. The relatively rich soils of the plain also support large areas of State Forest with the contrasting dark green of pine plantations, particularly near Wanneroo, and more recently Tasmanian Bluegums (*Eucalyptus globulus*) have become established in plantations to the south of Perth.

Extractive industries are a highly visible activity along the coastal plain. Heavy mineral sands are mined today in areas associated with both the present day coast and the established beach sands of ancient shorelines. Concentrated deposits are being removed in areas including Waroona, Capel, Bunbury and Dardanup.

Limestone quarries occur in many locations for road making and building, and lime for agricultural and industrial areas is extracted from the coastal sands. The fine textured clays of the alluvial plain are also removed from long established pits for brick making, most notably at Cardup and Waterloo.

Recreation and tourism is widespread on the Swan Coastal Plain. Many leisure time activities are water oriented, especially in the summer months. Fishing, diving, surfing, boating, windsurfing and swimming are all popular, especially in the coastal towns to the south of Bunbury, particularly Busselton and Dunsborough.

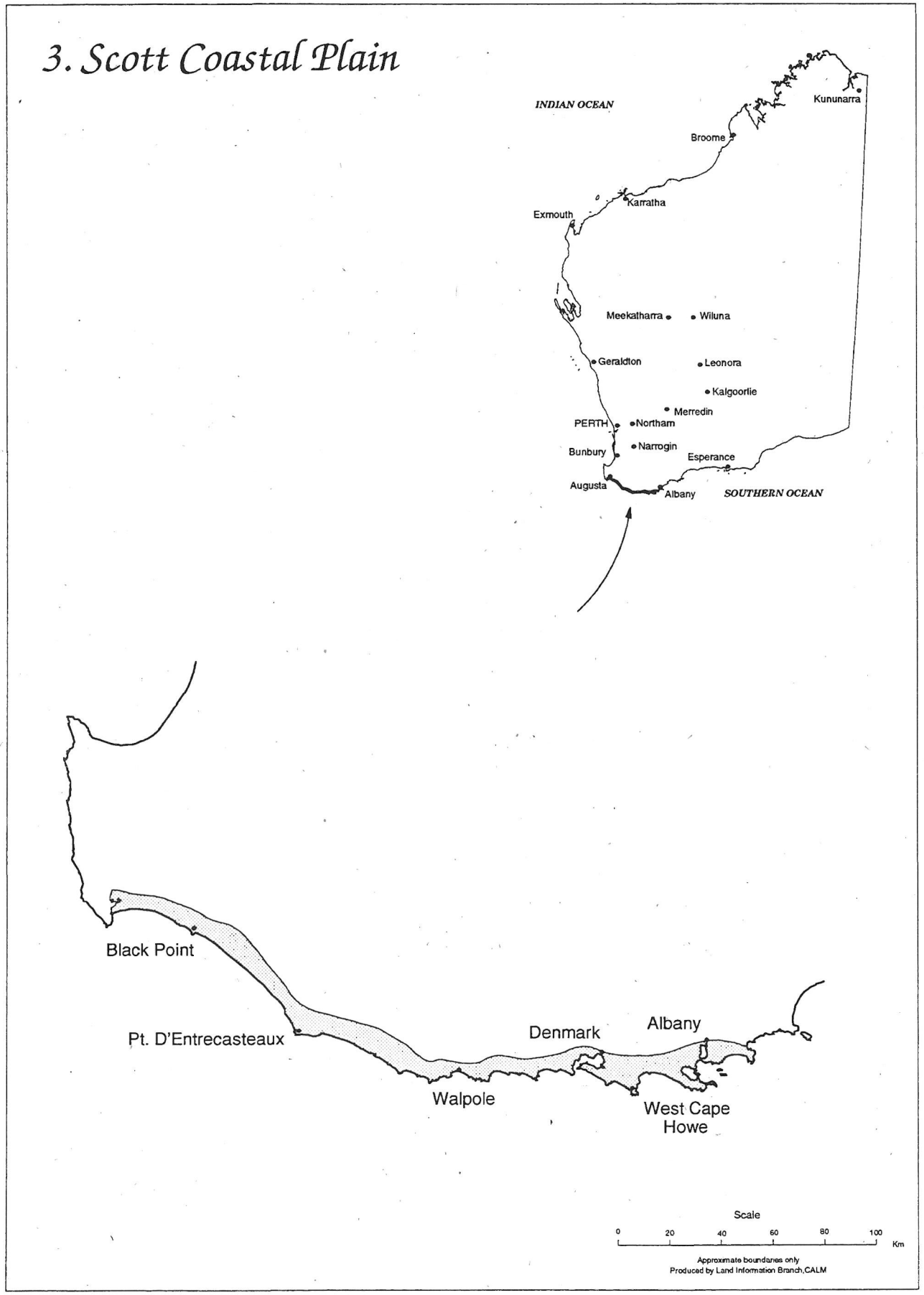
Several conservation areas have been established in this Character Type, to protect unique landscapes and natural ecosystems. These include National Parks such as Yanchep, Yalgorup, Moore River and Ludlow Tuart Forest and also many areas of special reserves such as Ellen Brook Reserve for the protection of endangered or rare native fauna and flora. Pockets of native State forest are also scattered along the coast for water, wildlife, amenity and scientific research values.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Rounded foothills with steep slopes e.g. Kelmscott. * Dunal formations of distinctive height, configuration or combination which provide obvious contrast to the landform patterns common in the character type e.g. Spearwood dunes. * Dissected calcareous dunes featuring rugged limestone cliffs, caves and outcrops e.g. Blackwall Reach. * Gently inclined or level areas with distinctive drainage patterns e.g. Pinjarra Plain. * Large stretches of coastal landscape free of disturbance. * Coastal dunes which display areas of active weathering, steep and irregular slopes and ridges e.g. Lancelin. * Prominent limestone cliffs and headlands e.g. Cape Peron. * Off-shore and estuarine sandbars and reefs and islands e.g. Garden Island.	* Scattered remnant vegetation forming an open parkland. * Remnant or other areas of native vegetation exhibiting an unusual diversity of colour, height or species e.g. Tuart forest. * Distinctive displays of seasonal colour e.g. W A Christmas Tree. * Wind-shaped, gnarled or dwarfed vegetation unusual in form, colour or texture e.g. coastal heath. * Strongly defined patterns of woodland, dune and wetland vegetation e.g. Lake Cooloongup.	* All estuaries, wetlands and swamps e.g. Lake Joondalup. * Watercourses of permanent or intermittent flow with continually changing flow character e.g. Serpentine River. * Reservoirs with dominant natural characteristics.
MODERATE	* Expanses of beach with uniform width and colour. * Regular coastal edges without bays, inlets or cliffs. * Areas of plains with common patterns of dissection evident but not distinctive. * Areas of uniform undulation with less distinct drainage. * Dunal formations of uniform height and configuration.	* Less diversity in vegetation with regular patterns in height, colour and texture evident. * Vegetation patterns found commonly in the surrounding landscape.	* Intermittent watercourses with long stretches of unchanging flow characteristics. * Reservoirs with some natural characteristics.
LOW	* Areas of uniform indistinctly dissected plains with few features of visual interest. * Coastal landscapes in which natural elements remain dominant are of special visual significance and therefore rate no lower than moderate scenic quality.	* Extensive areas of vegetation with repetitive patterns or showing little variations or diversity.	* Waterbodies with little evident natural characteristics. * Irrigation and drainage canals.

Aesthetic Character Summary

LANDFORM	
Form:	steep dunes; rounded foothills; flat to gently inclined plains; elongated dunes; gently sloping, flattered spurs of foothills; low, rounded hills; jutting headlands; low islands.
Line:	horizontal plains; parallel bands of coastal dunes; curved beaches; successive beach ridges; horizontal wave-cut platforms.
Colour:	grey to soft yellow to rich toffee sands; pale cream/grey limestone; bleached blonde beach sands; glistening white dunes.
Texture:	coarse, rough limestone; dusty sands.
Scale:	long, open views over the level plain; interrupted views from midground to foreground in dune systems.
VEGETATION	
Form:	low Banksias; stunted Eucalypts; towering Tuarts; tall Jarrah; spreading Flooded Gums; clumps of Paperbarks; solid Tuart trunks; willow-like peppermints; shrubby woodland; short, branchy Jarrah.
Line:	vertical Tuart trunks; horizontal layer of low heaths; horizontal line of canopy.
Colour:	green/grey Banksia woodland; olives green Banksia; dull green shrubs; vivid yellows of Wattles and Hibbertias; glossy dark greens of Blackboys; dark Blackboy stumps; orange and yellow green of Banksia flowers; rich green Peppermints; bright tangerine of Christmas Trees; soft creams of Marri blossoms; grey tree trunks; blonde Spinifex; creamy yellow barked Wandoo; white trunked Paperbarks; soft grey Smokebush; grey-green Wattles.
Texture:	scrubby Banksia woodland; rough barks of Marri, Pricklybark and Tuarts; peeling Paperbarks; rough Banksia trunks; bristly, spiky Spinifex; spiky sedges and reeds; soft Smokebush; brittle, scratchy Parrotbush; dusty low heaths.
Scale:	uncleared vegetation - tall Tuarts enclosing views; low coastal shrub reveals open views and big skies; Banksia woodland partially encloses and channels views; shallow depth of view; Cleared/thinned vegetation - views extensive, dictated by landform.
WATERFORM	
Form:	shallow swamps; quiet waters; surging ocean swells.
Line:	geometric drains and canals; elongated and circular lakes; linear chains of linked lakes; meandering/sinuous rivers.
Colour:	shimmering blue; turquoise; transparent; muddy; white, foaming breakers.
Texture:	foaming breakers; rough; smooth; glassy.
LAND USE	
Form:	rounded citrus trees; rectangular built structures; conical pine trees.
Line:	geometric fence lines; power lines, power corridors and pylons; regular, uniform and parallel rows of vegetables, vines and pine trees; vertical pine trunks; grid patterned streets and sub-divisions; vertical stacks at industrial sites; light poles and flag poles.
Colour:	green paddocks; white wooden fences; lush contrasting greens of irrigated market gardens, vines and orchards; blue-green Bluegums; grey asbestos fences; dark green pine plantations; roofing and building materials.
Texture:	roofing and building materials; rough asbestos fencing; smooth, reflective glass and metals.

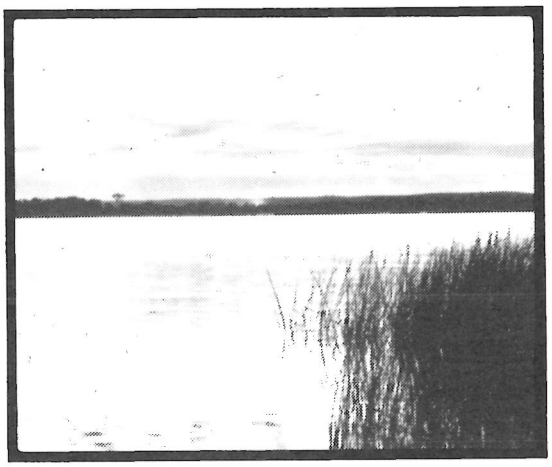
3. Scott Coastal Plain



Scott Coastal Plain Landscape Character Type

General Description

The Scott Coastal Plain is the State's most southerly Landscape Character Type, sandwiched between the Darling Plateau and the Southern Ocean. It is a low-lying, swampy plain featuring windswept parabolic dunes, and impressive limestone and granite cliffs and headlands. Between the rugged headlands lie stretches of protected beaches and the mouths of the many rivers and estuaries which are characteristic of the southern coastline.



Better drained areas in this high rainfall zone highlight isolated pockets of the lofty Karri, with Jarrah and Marri forest, while much of the remaining vegetation is limited to low stunted growth, shaped by the prevailing winds.

The major centres of Albany, Walpole and Denmark are rewarded with many tourists as this Landscape Character Type provides several popular recreational and scenic attractions.

Climate

The climate of the Scott Coastal Plain is temperate, with mild warm summers and long, cool, wet winters.

Reliable rainfall of between 160 and 260 days per annum are recorded between April and November and the area receives only 3-4 dry months per year. The annual rainfall varies only slightly along the length of the coast, from 1324mm at Walpole, and 1000mm at Hardy Inlet and Denmark in the west, to 950mm at Albany. Inland, south of Northcliffe, the State's highest rainfall zone occurs, where recordings in excess of 1400mm are taken. The wettest months are June and July.

The plain extends 350km, west to east, but generally less than 25km north to south, resulting in a low variance of temperatures. Denmark and Albany both experience a mild 24°C in summertime and the hottest months are January and February. The cool, wet winters see an average minimum temperature along the coast of 7°C.

The prevailing winds dominant throughout the Character Type tend east-south-east in summer and south-westerly in winter.

Landform

The Scott Coastal Plain, buffeted by the prevailing winds of the Southern Ocean, is the most southerly of the Character Types. It lies between the hills marking the southern margin of the Darling Plateau and the ocean, and to the west by the Hardy Inlet. Continuing eastward along the coast, it tapers in width to terminate at the towering granite cliffs of Cape Vancouver, east of Albany.

The region is comprised of a series of windswept dunes and sandy shoreline deposits fronting a low-lying wetland corridor, though no clear boundary divides the two. To the north, low, rounded hills and scattered ridges descend gradually to the gently inclined sandy plains below. Remnants of sub-coastal linear dunes occur inland, parallel to the coast, and are most concentrated west of Broke Inlet. The presence of granite monadnocks and hills appear as large domes,

often dominating the surrounding landscape, and occur as groups of bulbous outcrops or as isolated formations.

The sandy plains, particularly to the south-west, are often subject to inundation, with the winter water table on or near the surface. The swampy deposits and low-lying water have resulted from the infilling of coastal lagoons and estuaries which were blocked by the gradual movement of dunes. Diffuse drainage patterns and high rainfall contribute to the permanent and seasonal swamps that form along the wetland corridor. Numerous rivers and tributaries traverse the region, and the dissections which these rivers create varies from broad, shallow channels to steep sided valleys with exposed rocky slopes such as the lower Donnelly River. Many watercourses terminate on the plains, while others flow into the peaceful inlets and estuaries that feature regularly along the coast.

The swampy lowlands and estuaries are separated from the coast by an often broad belt of solidified and active dunes. Unconsolidated dune blowouts and extensive, bright pale cream sand sheets such as at Yeagerup and Meerup, overlie much of the coastal limestone and granite, and though stabilised in some areas by the dense vegetation, they are highly susceptible to disturbance and erosion.

The coastline of sweeping white sand beaches as seen at Windy Harbour is interrupted by exposed, foaming nearshore reefs and rugged cliffs. The cliffs at Point D'Entrecasteaux and between West Cliff Point and Cliffy Head, and those at the mouth of the Donnelly River and Nullaki Peninsula are some of the more prominent. Rocky outcrops, wave-cut platforms and granitic headlands which guard gently curving beaches and inlets also feature on this coast.

In the upper reaches of the Donnelly River, and exhibited as rugged columnar outcroppings at Black Point, unique examples of dark Bunbury Basalt can be found. The occurrence of lunettes, or crescent-shaped dunes, such as on the eastern margins of Nornalup and Wilson's Inlet, is also a notable feature along this coast.

Vegetation

The vegetation in this area is diverse in composition and structure, ranging from sedges to low heath, woodlands and forests.

On the hills and slopes above the swampy corridors, the vegetation is determined by soil type and exposure. Inland areas dominated by granite outcrops support scattered Bullich (*Eucalyptus megacarpa*) and a thin shrub community of Peppermint (*Agonis flexuosa*), soft feather flowers (*Verticordia spp.*), Wattles (*Acacia spp.*), and the cushion-like *Andersonia sprengeliodes*. Ferns, mosses, liverworts and lichens form the lush, green ground cover.

The extensive taller forests in this Character Type include the grey, fibrous barked Jarrah (*Eucalyptus marginata*) and mottled, rough barked Marri (*E. calophylla*) which occur in a mixed patchwork pattern with the imposing Karri trees (*E. diversicolor*) with tall, smooth silver, cream and peach variegated trunks. The Karri occurs, often abruptly, in various areas in this landscape, from shallow gullies to hill slopes, to low plains abutting granite outcrops, to the summit of low hills, reflecting the occurrence of red to yellow-brown loamy soils it favours.

The soft, lush understorey includes a variety of Wattles with bright yellow blooms, Hazels (*Chorilaena spp.*), Water Bush (*Bossiaea aquifolia*), Bull Banksia (*B. grandis*) with rough bark and long, deeply serrated leaves, Snottygobble (*Persoonia longifolia*) and a dense shrub layer of cool Peppermints and a diversity of sinuous, twining creepers.

The lower, poorly drained slopes have a low open woodland of stunted Jarrah-Marri forest occurring with a dense, low shrub layer of Hibbertia spp., Peppermints, Paperbarks (*Melaleuca thymoides*), Isopogon spp., Blackboys (*Xanthorrhoea preissii*), and graceful Native Willows (*Oxylobium lanceolatum*).

In the lower areas of the plain, the variability of the water table effects the vegetation cover surrounding the swamps and lakes, and often heath and sedge will

merge without distinct definition. The heaths are mainly of Swamp Bottlebrush (*Beaufortia sparsa*), Pea Bushes (*Pultenaea reticulata*), Myrtle (*Astartea fascicularis*), Black Gin (*Kingia australis*), Mountain Kunzea (*K. recurvata*) and Tea Tree (*Leptospermum sp.*). Sedgelands of Gahnia, Anarthria, and rushes occur with scattered Christmas Tree (*Nuytsia floribunda*), and thickets of Paperbarks. Adjacent to the estuaries are thickets of Wattie (*Agonis juniperina*), Oxylobium, Samphires, Sedges and Paperbarks.

The inland dunes and hummocks have woodlands of Banksia, Sheoaks, and Bullich, with a dense understorey of Jacksonia, Blackboy and Zamia Palms (*Macrozamia reidlii*).

The plains feature some unique examples of endemic plant species, notably the Albany Pitcher Plant (*Cephalotus follicularis*), the vivid Red Flowering Gum (*Eucalyptus ficifolia*), the glossy red blooms of Swamp Bottlebrush and the familiar fragrance from the Scented Boronia (*B. megastima*). The area is also renown for its unique and diverse array of delicate native orchids.

The coastal zone exposed to salt spray and high winds supports woodlands of Bullich, Bushy Yate (*Eucalyptus lehmanii*), Peppermint, Banksia and Sheoak, yellow spots from the blossoms of the shrubby Prickly Moses (*Acacia pulchella*), Jacksonia, Zamia Palms, Tea Tree and Hakea with Hairy Spinifex (*S. hirsutus*) and the introduced Marram Grass (*Ammophila arenaria*) common along the dunes.

Much of the native vegetation characteristic of the Scott Coastal Plain is protected and conserved by National Parks, including Scott, D'Entrecasteaux, Walpole-Nornalup, William Bay, West Cape Howe and Torndirrup.

Waterform

Numerous watercourses drain the Scott Coastal Plain, often terminating in the estuaries and inlets that occur at regular intervals along its length. The major rivers include the Blackwood, Scott, Donnelly, Warren, Gardner, Shannon, Deep, Frankland, Kent, Denmark, Hay, King, and Kalgan. Many minor rivers, streams and springs also occur.

The inlets of the south coast like Wilsons Inlet at Denmark are often seasonally closed by long, pale sandbars throughout the summer, forming lagoons running parallel to the coast. Earlier coastal dune movements have resulted in the establishment of several large sedge fringed lakes, including some freshwater, such as Lake Jasper, numerous swamps and wetlands, which are significant for migrating waterfowl.

The swampy lowlands that lie inland which back the coastal dunes are largely fed by the meandering rivers before they pass through the dunes to the Southern Ocean. The dissections which these rivers create through the plain varies from shallow valleys to steep eroded cliffs.

Land Use

A large percentage of the privately owned land of the Scott Coastal Plain has been cleared for a variety of uses. Multi-purpose farming is dominant with pastoral land for sheep, pigs, cattle and dairy farming, and land cultivation for vegetable production is prevalent.

Aboriginies were employed for their excellent bush skills and knowledge of the area by early settlers of the southern coastline. However, after the land was cleared, their traditional way of life was constricted and many were moved to Aboriginal settlements such as Carrolup near Katanning or Moore River, while others remained as labourers. Small communities remaining in the area today continue, where possible, traditional activities such as hunting, gathering and camping, maintaining close ties with the land and their cultural identity.

Extraction of limestone near Point D'Entrecasteaux has been long-standing in this region and the removal of low grade peat has occurred in isolated areas. Currently, several selected sites in the Scott Coastal Plain are being considered for the further development

SCOTT COASTAL PLAIN

of heavy mineral sands mining ventures. Logging of both hardwood and softwood resources takes place in State forests as well as in Pine and Bluegum (*Eucalyptus globulus*) plantations .

The bays and estuaries along this coastline provide a perfect situation for a large fishing industry which takes good advantage of the schooling and breeding grounds for various species of commercial fish found abundantly along the southern coast.

Fishing, at spots such as Black Point, is also just one of the attractions along this scenic coastline for the considerable population of tourists and holiday-makers who flock to this area annually. Quiet shores such as Mandalay Beach and Peaceful Bay entice swimmers and sunbathers alike, as well as other water sport enthusiasts. Towns like Walpole and Denmark have become other popular holiday destinations, as has the tiny fishing settlement of Windy Harbour.

Conservation of the unique south coast fauna, flora and landscapes is a significant land use on the Scott Coastal Plain. Heavily vegetated, they encompass much of the coastline here in uninterrupted lengths, for the protection of its unique vegetation, water, wildlife, leisure and scientific research values.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Hills, ridges, peaks and remnant dunes of distinctive form which become focal points e.g. Mt Hallowell. * Distinctive deep valleys with unusual shape and colour e.g. Donnelly River. * Rock outcroppings e.g. Dog Rock. * Cliffs and headlands e.g Black Point. * Irregular coastline edges e.g. The Gap. * Offshore and estuarine sandbars, reefs and islands e.g. Michelmas Is. * Coastal dunes which display areas of active weathering, steep and irregular slopes and ridges, and abrupt edge transition to low-lying areas e.g. Yeagerup Dunes. * Long stretches of coastline free of disturbance.	* Strongly defined patterns of vegetation such as combinations of eucalypt forest, woodlands and sedgeland species e.g. around Wilson Inlet. * Unique stands of vegetation such as karri which may create unusual, colour or texture in comparison to surrounding vegetation. * Windshaped, gnarled or dwarfed vegetation unusual in form, colour or texture e.g. coastal heath. * Strongly defined and contrasting patterns of coastal heaths, peppermint/paperbark woodlands and dune vegetation e.g. Torndirrup National Park.	* Watercourses of permanent or intermittent flow continually changing in flow character e.g. Shannon River. * Unusual ocean shoreline and motion characteristics. * All estuaries, tidal lakes, inlets, swamps and seasonal wetlands e.g. Broke Inlet.
MODERATE	* Regular coast edges without bays, inlets or cliffs. * Expanses of beach with uniform width and colour.	* Expanses of uniform vegetation cover with some variation in colour, texture or pattern.	* Watercourses of permanent or intermittent flow with long stretches of similar flow character.
LOW	* Flat indistinctly dissected plains with limited topographical features of specific visual interest.	* Extensive areas of uniform cover with very limited contrast in texture and colour.	

Aesthetic Character Summary

LANDFORM

Form:	windswept parabolic dunes; granite & limestone headlands; granite domes as bulbous outcrops or isolated inselbergs; prominent cliffs; columnar outcroppings of Bunbury Basalt; crescent shaped dunes/lunettes; rounded hills; sandy plains.
Line:	vertical cliffs; horizontal sandy plain; shoreline; parallel series of dune ridges; horizontal wave cut platforms; horizontal reefs; gently curving beaches; swampy corridors; U-shaped valleys; wetland corridor.
Colour:	white sand beaches; dark basalt; red to yellow-brown loamy soils; mottled grey, pink, green, black granites; pale grey limestone.
Texture:	rugged headlands; swampy lowlands.
Scale:	swampy low-lying plain offers long views over landscape; coastal dune system constricts views to foreground and midground; extensive views from high points

VEGETATION

Form:	lofty Karri; low stunted heath; wind pruned vegetation; cushion-like herbs; stunted Jarrah Marri forest.
Line:	vertical Karri trunks; horizontal layers of upper and lower canopies; sinuous and twining creepers; white vertical Paperbark trunks.
Colour:	variegated silver and peach Karri trunks; lush green Peppermints; white trunked Paperbarks; vivid Red Flowering Gum; bright red Swamp Bottlebrush.
Texture:	dense thickets; peeling Paperbark; spiky reeds and sedges; green groundcover; grey barked Jarrah; mottled Marri trunks; rough barked Banksias; serrated Banksia leaves; cool Peppermints; prickly Wattles.
Scale:	views over low coastal heath restricted only by dune landform; taller uncleared sandplain vegetation encloses long views, and visual penetration into vegetation is minimal.

WATERFORM

Form:	swampy lowlands; shallow; bulbous estuaries and inlets; arching waves.
Line:	horizontal line of water table often visible on surface; sinuous rivers; level surface of lakes and estuaries; line of incoming waves.
Colour:	blue; grey; transparent; tannin stained.
Texture:	foaming surf; smooth, still, reflective waters.

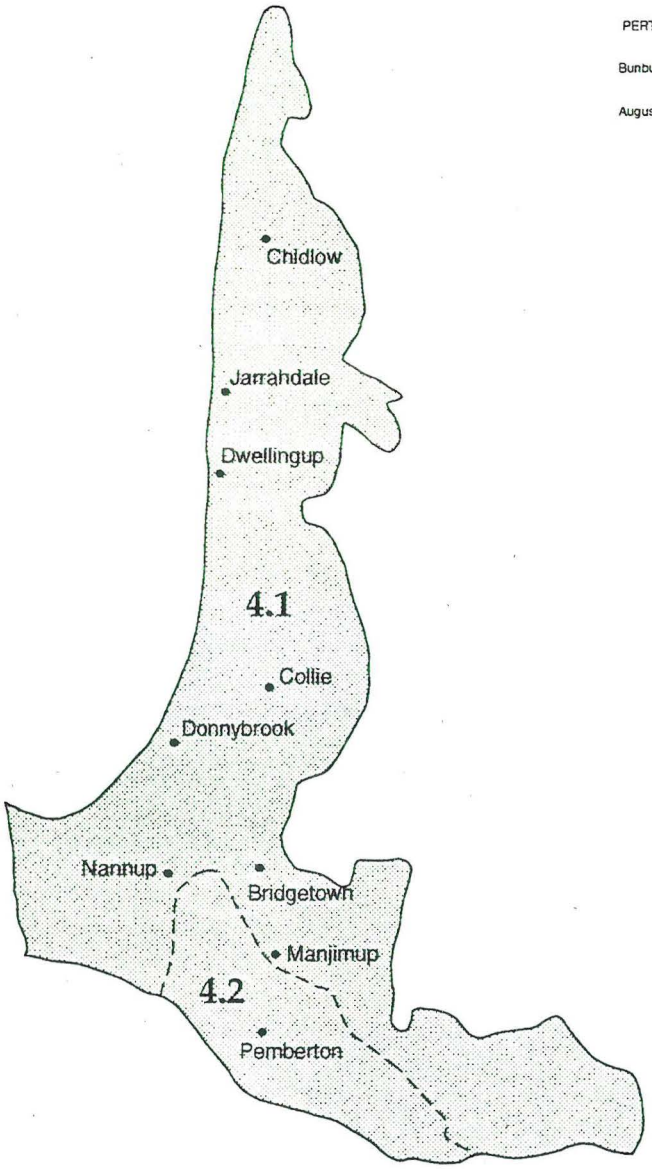
LAND USE

Form:	regular, geometric built forms; concave quarries.
Line:	parallel rows of vegetables; angular jetties.
Colour:	temporal green blue of blue gums; pastoral land with a patchwork of green shades; pale grey contrasting limestone quarries.
Texture:	rough wooden jetties; rough limestone quarries.

4. Darling Plateau

4.1 Darling Uplands
4.2 Pemberton Slopes





Scale
0 20 40 60 80 100 Km

Approximate boundaries only
Produced by Land Information Branch, CALM

Darling Plateau Landscape Character Type

The Darling Plateau Landscape Character Type occurs in the south-west of the State, bordered to the west by the steep Darling Scarp and the Swan Coastal Plain Character Type, to the north and east by the extensive, open Wheatbelt Plateau Character Type and by the low-lying Scott Coastal Plain Character Type to the south. It features two distinct Sub Types within its forested borders: the Darling Uplands and the Pemberton Slopes.



Distinguishing Features

The Darling Plateau is a deeply dissected, rolling landscape with an ancient laterized land surface cleaved by major V-shaped river valleys and studded by rough granitic outcrops.

Extensive areas of tall, dense forest dominated by Jarrah, Marri and the towering Karri, form framed and enclosed views. This, combined with the rolling landscape, is the dominant visual characteristic of this region. Numerous watercourses carve their mark through the forested landscape, and many broad reservoirs are found in the deep valleys.

The Aboriginal tribes formerly residing in this Character Type were constricted by the clearing of much of the forested land for farming and the increasing activities of the timber industry. Many Aboriginies went to settlements such as Carrolup near Katanning and also Moore River, while others remained in small scattered communities. Today's Aboriginal communities are preserving their cultural identity by retaining their traditional land use activities such as hunting, craftwork and camping.

The use of these forests for timber is a major activity of this region, with farming, tourism, recreation, and mining also widespread. Apart from the "hills" suburbs of Perth such as Kalamunda and Lesmurdie, many other towns are scattered over the Character Type including Dwellingup, Collie, Donnybrook, Nannup, Manjimup and Pemberton.

Climate

The Darling Scarp landform has a significant effect on the precipitation levels of this Character Type as its presence results in a rainfall peak about 10km east of the Scarp and decreases progressively north-east. Average annual rainfall recordings in this area range from 1279mm in Dwellingup, 1002mm in Donnybrook, and 896mm at Jarrahwood on the western perimeter, to 970mm in Collie, and 843mm at Bridgetown on the eastern perimeter. Reliable falls of rain can be expected over the entire area between May and August with the average number of rainy days received per year ranging between 114 at Kalamunda to 131 at Dwellingup, to 143 at Jarrahwood and Collie.

The southern region of the Character Type generally receives a higher amount of rain over a longer period than those areas further north. Over an average 156 rainy days per year, Manjimup receives 1039mm, and Pemberton receives an average fall of 1213mm over 168 rainy days.

The cold, wet winters of this region see a fairly similar temperature range overall. Kalamunda receives a 15°C maximum to an 8°C minimum, Dwellingup varies from a 14°C maximum to a 5°C minimum, Collie has a 15°C to 5°C range, Jarrahwood ranges from 16°C to

6°C, Manjimup receives 14°C to 6°C and Pemberton ranges from 15°C to 7°C.

The hot, dry summertime temperatures experienced here vary from being generally moderate at the Scarp, increasing slightly further inland. Kalamunda receives a maximum of 28°C with a minimum of 15°C, and Collie ranges from 29°C to 13°C. The southern portion of this Character Type receives a slightly cooler range of summer temperatures, with Manjimup receiving a 26°C maximum and a 13°C minimum, and at Pemberton, the temperatures range from 25°C to 12°C.

Darling Uplands Landscape Character Sub Type

The Darling Uplands Sub Type is an undulating, dissected land surface with the rubbly, pale orange lateritic soils and pea gravels cloaked by extensive areas of tall forest. It is an ancient erosional plateau cut by deep, steeply sided valleys, and studded with impressive domed granite outcrops (monadnocks) and boulders which protrude from the surrounding landscape, most notably at Monadnock National Park. Many small hills which rise above the general elevation include Mt Saddleback, Mt Keats and Mt Lindesay.

The Darling Uplands is bordered to the west by the Darling Scarp which is the surface expression of the Darling Fault. This rugged and rocky landscape rises abruptly from the Swan Coastal Plain Landscape Character Type to a height of approximately 300m ASL and is clearly revealed between Muchea and Dardanup. The major proportion of its surface is made up of shallow soils and exposed extrusions of granitic caprocks, such as east of Serpentine, covered by remnants of scrubby vegetation in many areas.

The eastern region of the Darling Uplands develops into a landscape of gentler slopes with fewer distinct dissections. Similarly, the Collie region is in a depressed basin where the undulations become more shallow with some broad, sandy flats and swamps, surrounded by a fringing ring of low hills.

Linking to the Darling Scarp in the vicinity of Boyanup is the Whicher Scarp, an often abrupt landform feature, such as west of Jarrahwood, which forms the gentle 'J' curve of the south-west of the Sub Type abutting the Swan Coastal Plain. This region of the Darling Uplands extends to the Leeuwin-Naturaliste Coast Character Type, and is sandwiched between the two coastal plains - the Swan to the north and the Scott to the south. This area has a more subdued topography with a gently undulating plateau strewn with pale orange, gravelly laterite and sand, sloping downwards from north to south and from east to west.

To the east of this region, the landscape of the Darling Uplands becomes more distinctly rolling, occasionally studded by domed granitic outcrops and low hills, and dissected by deeply eroded, steep-sided valleys, influenced by the winding course of the Blackwood River and the numerous watercourses to the south.

This Sub Type is dominated by forests of the gnarled trees of the tall, grey fibrous barked Jarrah (*Eucalyptus marginata*) which have developed on the pale orange lateritic soils as one of the finest hardwood forests in the world. Subsequent invasion into the Jarrah forest by disease has left many stark openings, exhibiting clumps of yellowing Banksia and Blackboy as well as the emergent bare grey tortuous limbs of Jarrah, silhouetted above the surrounding green canopy and severely impacting the visual quality of the forest. Interspersed with areas of cleared pastoral and farming land, the broad tracts of the tall trees are still the dominant characteristic of this region.

The rough, grey, red-stained trunks of Marri (*E. calophylla*) are associated with the Jarrah forest, and become conspicuous in the late summertime by the bright dusting of the contrasting cream blossoms amongst the forest. Marri is more common, even dominant on the loamy soils of the lower valley slopes and gullies and towards the eastern and northern perimeters of the Sub Type. The valley floors of the Darling Uplands offer a diverse mixture of mottled, dark Blackbutt (*E. patens*), creamy, smooth barked Wandoo (*E. wandoo*), and more notably in the southern parts, pale Bullich (*E. megacarpa*).

Forming the often dense understorey beneath these trees are smaller shrubs and trees including soft Sheoak (*Allocasuarina fraseriana*), the deeply serrated olive-green leaves of the Bull Banksia (*B. grandis*), Zamia Palm (*Macrozamia reidlii*), dark green sprays of Blackboy (*Xanthorrhoea preissii*), the upright Prickly Bitter-Pea (*Daviesia decurrens*), scratchy Parrot Bush (*Dryandra sessilis*) and the low Couch Honeypot (*D. nivea*), with the bushy Snail Hakea (*H. cristata*) and Two-leaf Hakea (*H. trifurcata*).

The Jarrah forest south of Collie receives a slightly higher rainfall, and the composition of understorey shrubs is slightly different. Growing with the large serrated leaves of Bull Banksia and the soft, tall Sheoak are the narrow-leaved Snottygobble (*Persoonia longifolia*), and the pale green leaves of the Woody Pear (*Xylomelum occidentale*). The lush undergrowth spreading beneath the understorey consists of spiky Zamia Palm, the scratchy spines of the Prickly Moses (*Acacia pulchella*), the shiny, dark green leaves of the bright purple flowering Tree Hovea (*Hovea elliptica*), grassy sprays of Black Gin (*Kingia australis*) and the strappy-leaved Pineapple Bush (*Dasypogon hookeri*). The swampy regions in the upper reaches of the Margaret and Mowen Rivers feature sedgeland surrounded by Paperbark (*Melaleuca preissiana*), River Banksia (*B. seminuda*) and a thick cover of graceful Peppermint (*Agonis parviceps*). Occasional isolated patches of the towering pale yellow and grey variegated trunks of the Karri (*Eucalyptus diversicolor*) appear in this southern region, rising distinctly above the surrounding vegetation.

The vegetation of the Darling Scarp depends on soil depth and rainfall, creating a variable growth pattern for many species, and has created specialised and characteristic flora. The upper slopes with areas of shallow soils and scattered granite outcrops support the yellow trunked Butter Gum (*E. laeliae*) and the scrubby Rock Sheoak (*Allocasuarina huegeliana*). Lower slopes of the scarp and areas of deeper clay soils feature Wandoos with Marri, and where the slopes of the scarp are less acute, Jarrah becomes more dominant. Flooded Gum (*E. rudis*) and peeling white trunks of Paperbarks occur in some areas of the river valleys as they dissect the scarp to reach the Swan Coastal Plain.

Heath and herblands occur on the rough granite outcrops and domed monadnocks. Trapped water in eroded depressions over their rough surface feature a lush, green patchwork of liverworts, mosses, algae and lichens, and they are often fringed by Rock Sheoak, Oval-leaf Hakea (*H. elliptica*), Wavy-leaved Hakea (*H. undulata*), and red flowers of the sprawling Fuschia Grevillea (*G. bipinnatifida*).

Many smaller shrubs, climbers and herbaceous species are scattered amongst the undergrowth of the Jarrah forest. Sinuous vines with glossy leaves are seen twining over the lower branches of bushes and trees, decorated by splashes of bright red or vivid blue flowers. In the springtime, wildflowers appear in profusion. Red and green Kangaroo Paws (*Anigozanthus manglesii*), bright yellow Hibbertia (*H. hypericoides*), the sky blue Leschenaultia (*L. biloba*) and carpets of vivid yellow Wattles (*Acacia spp.*) are commonly seen amongst the undergrowth and scattered along roadsides.

Several watercourses deeply dissect the surface of the Darling Uplands and scarp with diverse valleys and irregular slopes, and contribute to the extensive weathering which is evident over its surface. Major rivers which drain the area from the north to the south include the Avon, Serpentine, Murray, Collie, and Harvey. The Capel, Ludlow, Abba, Margaret, and Mowen Rivers drain the south-west corner of the Sub Type in broader U-shaped valleys, while the long, sinuous Blackwood River which, with its tributaries including Balingup Brook, St. John's Brook and St Paul's Brook, as well as the Perup, Frankland, Kent, Denmark and Hay Rivers, drains much of the southern area. Associated with these rivers are major dams including Mundaring, Serpentine, Wellington, Logue Brook and South Dandalup. These reservoirs supply water for the Perth and metropolitan area, and benefit the populations of the Swan Coastal Plain and Darling Plateau, as well as the Goldfields and part of the Wheatbelt.

Many low, swampy depressions, often shaded by

Flooded Gum (*Eucalyptus Rudis*), are scattered over the Darling Uplands. These are generally the springs or headwaters of the creeks and tributaries which weave over the ancient land surface, such as across the open and more gently inclined landscape around the Collie region.

Extensive tracts of laterized soil on the Darling Uplands which have remained uncleared for agriculture have been designated as State Forest. As well as being used for timber production, these forested regions are managed as water catchments for the large reservoirs, for honey production and for conservation and recreation.

Many formerly forested areas which have been cleared for agriculture or were badly effected by the dieback disease have been replanted with exotic Pines (*Pinus spp.*) and Tasmanian Bluegums (*Eucalyptus globulus*). Large, uniform areas of the dark green Pine are visually dominant in the Blackwood Valley landscape between Bridgetown and Nannup, often exhibiting sharp, geometrical edges, contrasting with the surrounding landscape.

The Jarrah forest is also highly popular for tourism and recreational activities, providing many areas for picnics and barbecues, scenic drives and panoramic views, with many small towns such as Nannup featuring galleries which display artworks and fine woodcraft. Numerous walk tracks thread their way across this forested landscape, most notably the Bibbulmun Track. The larger rivers provide many leisurely or exciting pastimes and host major boating events such as the Avon Descent and the Blackwood Classic.

Clearing for agriculture in this Sub Type has been concentrated mostly on the red alluvial soils of the valleys and slopes. Grazing of sheep and cattle are widespread in several areas of the Darling Uplands. A patchwork of greens results from irrigated orchards dotting hillsides, notably in the vicinities of Hacketts Gully, Donnybrook, Balingup and Bridgetown, with linear grape vines and vegetable crops such as the potatoes and peas near Manjimup where an extensive tobacco industry was once predominant.

The Darling Uplands Sub Type is rich in several major mineral resources. Bauxite leases cover large areas to the east of the Darling Scarp around Dwellingup and Jarrahdale. Tin and tantalite have been mined in the low hills around Greenbushes since the turn of the century, and a major coal mining industry exists in the valleys of the Collie and Wilga basins. Large quarries for the extraction of blue metal occur along the Darling Scarp and its vicinity, and lateritic gravel is excavated from numerous shallow pits scattered over the region.

National Parks within this Sub Type are currently concentrated within the northern region. These include John Forrest National Park, Walyunga and Avon Valley National Parks, Serpentine National Park and The Hill's Forest which encompasses several smaller National Parks near the Perth Metropolitan area. Future conservation areas are proposed in several areas over the Darling Uplands, including National Parks near Collie and Kirup as well as smaller Conservation Parks such as the Blackwood Conservation Park and St John's Brook Conservation Park near Nannup.

Collie and Manjimup are the largest population centres of the Darling Uplands Sub Type outside the "hills" suburbs of Perth. Smaller towns including Chidlow, Jarrahdale, Dwellingup, Donnybrook, Jarrahwood, Nannup, Greenbushes and Bridgetown, occur at regular intervals along its length, many of which exhibit signs of the region's timber heritage. Small timber cottages arranged in linear rows along narrow laneways are typical of these towns, often huddled in the vicinity of the local timber mill. The abandoned remnants of towns such as Grimwade and the railways that once linked them are a reminder of how prolific the timber industry once was.

Darling Uplands Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Isolated peaks or hills with distinctive form and visual dominance that become focal points e.g. Mt Lindesay. * Granite domes, outcrops or groups of boulders e.g. Boulder Rock. * Undulating and steeply sloping terrain of distinctive shape and abrupt appearance e.g. Whicher Scarp. * Well defined V-shaped or U-shaped valleys, heavily dissected steep slopes and/or number and configuration of lateral irregular tributaries e.g. Blackwood Valley.	* Distinctive stands of vegetation creating unusual forms or striking displays of seasonal colour e.g. Kangaroo Paws. * Strongly defined patterns in areas of native vegetation, with openings of a natural appearance, associated with wetlands and rock forms, and unbroken stream vegetation e.g. Canning River valley. * Areas of remnant native vegetation of a natural appearance exhibiting an attractive diversity of colour, height and species. * Gradual and naturally appearing transitions between agriculture and other land uses, with forested land.	* Permanent watercourses with continually changing flow characteristics and features such as rapids or waterfalls e.g. Avon River. * Reservoirs, lakes and wetlands with dominant natural characteristics (e.g. retained fringing vegetation, design utilised existing natural features) e.g. Lake Leschenaultia. * Permanent river pools e.g. Cambray Pool.
MODERATE	* Broad or shallow valleys and tributaries. * Rounded hills surrounded by more landform of a similar nature. * Minor rock outcroppings. * Broad slopes or extended valleys that are not distinctively defined by adjacent landforms.	* Open forest and woodland combined with natural openings and species mix in patterns that offer some visual diversity. * Vegetation pattern evident but of regular pattern relative to the surrounding landscape character. * Remnant areas of naturally appearing streamline and roadside vegetation exhibiting some structural diversity and colour.	* Seasonal wetlands, intermittent streams and creeklines. * Reservoirs with some natural characteristics.
LOW	* Large expanses of indistinctly dissected landform with limited topographic features of specific visual interest.	* Extensive areas of similar vegetation with limited variation in diversity, texture and colour.	* Waterforms absent.

Darling Uplands Sub Type - Aesthetic Character Summary

LANDFORM

Form:	bulbous and domed granitic outcrops; rounded pea gravel; escarpments; depressed basins; gullies and valleys; undulating land; rolling hills; deeply dissected terrain; low, rounded hills;
Line:	V-shaped river valleys; U-shaped river valleys; rolling landscape; strong diagonals from steep sided valleys; vertical escarpments; horizontal sandy flats; N-S line of Darling Scarp; 'J' curve of south-west of Sub Type;
Colour:	pale orange lateritic soils; mottled grey granites; red alluvial valley soils.
Texture:	rough and sandy granites; rocky outcrops; rubbly pea gravel; rugged valleys and scarp; sandy flats;
Scale:	undulating and rolling landform with deep valleys generally restricts views to foreground and midground.

VEGETATION

Form:	towering Eucalypts; pockets of undisturbed forest; skeletonised trees; rounded Woody Pears; cathedral-like towering Karri; low heath; shrubby herblands; Oval-leaf Hakea; sprawling Fuschia Grevillea;
Line:	dominant vertical line from tree trunks; horizontal forest canopy - upper and lower storeys; sinuous twining vines; upright Banksia blooms; vertical fibrous Jarrah bark; silhouetted disease and fire damaged limbs; Wavy-leaved Hakea; strappy leaved Pineapple Bush;
Colour:	grey Jarrah and Marri trunks; red stained Marri trunks; mottled dark Blackbutt trunks; glossy green Blackboys with dark stumps; yellowing Banksia; bare grey limbs of diseased Jarrah; rich green canopy; creamy Wandoo trunks; pale Bullich; olive leaved Banksia; dark green Zamia Palms; pale green Woody Pear; glossy green leaves; reds, vivid blues, bright yellows of wildflowers; yellow trunked Butter Gum; white trunked Paperbarks; pale green lichens; bright green mosses; pale yellow and grey variegated Karri trunks; dark green leaves and bright purple flowering Tree Hovea; red Fuschia Grevillea; red and green Kangaroo Paws; yellow Hibbertia; sky blue Leschenaultia;
Texture:	spiky Blackboys; rough Marri trunks; smooth barked Wandoo; soft Sheoaks; spiky Zamia palms; scrubby Rock Sheoaks; peeling Paperbarks; crusty lichens; smooth Karri bark; soft leaved shrubs; serrated Banksia leaves; fibrous Jarrah bark; deeply serrated Bull Banksia leaves; scratchy spines of Prickly Moses; glossy leaved vines;
Scale:	uncleared tall forests enclose and channel views and visual penetration into forest is moderate; views are enclosed by landform in areas of partially or totally cleared vegetation.

WATERFORM

Form:	swampy depressions; cascading waterfalls; springs and headwaters;
Line:	wide meandering rivers; vertical waterfalls.
Colour:	transparent; blue; muddied.
Texture:	boiling; smooth; glassy pools;

LAND USE

Form:	cavities resulting from mining activities; shape of roofing and building materials;
Line:	walk tracks; concave dam walls; parallel rows of pine plantations; vertical stacks and chimneys of industrial sites; geometric fencelines and pastoral land; linear and meandering bitumen roads; linear, cleared power corridors; linear, geometric pine plantations; roofing and building materials;
Colour:	dark green pine trees; large patches of pale orange in gravel pits and mines; colours of roofing and construction material;
Texture:	rough, rocky mine sites and gravel pits; tumbled piles of sawn timber and discarded offcut thinnings in plantations and forest sites; roofing and construction material.

Pemberton Slopes Landscape Character Sub Type

The Pemberton Slopes Landscape Character Sub Type is situated at the southern margin of the Darling Plateau Landscape Character Type, abutting the low-lying Scott Coastal Plain.

The Pemberton Slopes is a landscape of great variety, but is dominated by the concentration of Western Australia's tallest tree, the Karri (*Eucalyptus diversicolor*). Combined with this towering, lush forest are a mosaic of tall Tingles, Jarrah and Marri forests, interrupted by low, broad swampy valleys and huge granite domes or monadnocks.

The shape of the land beneath the tall forests which are dominant here, is gently undulating with rolling hills dissected by several winding rivers in valleys varying from deep and steeply sided to broad and shallow.

Many higher areas feature grey sandy soils mixed with orange pea-gravel laterite. The red brown and yellow brown loamy soils which coincide with the best areas of the tall, pale trunked Karri, varies in occurrence from the west to east across the Sub Type. In the vicinity of the Donnelly River on the western perimeter, it occurs in the broad and incised valleys. Further to the east, the tall Karri is interspersed with Marri (*Eucalyptus calophylla*) over the loamy soils on the mid to upper slopes of the gently undulating hillsides with the ridges dominated by tortuous Jarrah trees (*E. marginata*). In the south-east of the region, the loamy soils appear with a covering of tall Karri on low hills, as well as surrounding domed granite outcrops, remnants of an ancient, eroded plateau surface. These rises change abruptly into the meandering, swampy, treeless flats below, creating an obvious mosaic of vegetation, especially when viewed from high points such as Mt Frankland.

The eroded remnants of older land surfaces protrude above the surrounding landscape as large, prominent granite domes. Mt Chudalup is the most westerly occurrence of these conspicuous outcrops, which become more common in the eastern region of the Pemberton Slopes, culminating with Mt Frankland on the eastern fringe. Many of these outcrops appear to have blocked former watercourses, resulting in extensive areas of low, swampy flats. These occur to the north of Mt Burnside, Mt Mitchell, Mt Roe and Mt Frankland, and a large area north of the Beardmore Ridge. Near Northcliffe, the Chudalup Plains and further east, the Pingerup Plains are sandy and swampy areas north of the granite domes of the same names.

The vertical, creamy yellow and grey variegated trunks of the Karri appears at its densest concentration in this Sub Type. Its occurrence is determined by suitable soils and rainfall, not growing as an extensive continuous forest, but is interspersed with, or surrounded by clumps of tall, fibrous barked Jarrah trees and the rough, red stained trunks of Marri trees, with the transition from one species to another often appearing abrupt and patchy.

The cathedral-like towering Karri stand out like pale sentinels above the rich green forest canopy below. These trees occur in scattered pockets at the northern limit of the Sub Type and become more concentrated in the cool, ethereal gullies near Pemberton and at Beedelup and Warren National Parks. In the Valley of the Giants at the south-east corner of the Pemberton Slopes Sub Type, the pale Karri grows with a unique patch of tall Tingle forest which grows only in this region. The tall trees of the Red Tingle (*Eucalyptus jacksonii*) are generally immensely broad at their base, featuring an often hollow, splayed trunk. Interspersed with these giants are Yellow Tingles (*E. guilfoylei*), a slightly smaller tree with a narrow, pale trunk.

The upright Karri provide shade for the lush green undergrowth, growing way below the tall, smooth trunks and open canopy. Smaller trees dwarfed by the towering giants, include the needle-like leaves of the Karri Oak (*Allocasuarina decussata*), the weeping Peppermint (*Agonis flexuosa*) and the deeply serrated leaves of the rough-barked Bull Banksia (*B. grandis*). Areas of taller dense, soft leaved shrubs grow amongst the trees are dominated by the blue-green of Karri Hazel (*Trimalium spathulatum*) and the glossy green

leaves of Karri Wattle (*Acacia pentadenia*). The tall, bushy Netic (*Bossia laidlawiana*) and pale green Wattie (*Agonis juniperina*) are common along watercourses and in damp depressions.

The understorey beneath the taller, dense shrubs feature the rich green and pale pink star flowers of Crowea (*C. angustifolia*), the bright pink flowers of the fuzzy leaved Karri Boronia (*B. gracileps*), the dark green of the bright purple flowering Tree Hovea (*H. elliptica*), the prickly leaved Chorilaena (*C. quercifolia*), and the soft, fan-shaped leaves of the Waterbushes (*Bossiaea aquifolium and B. webbi*).

Twining over the dense green shrubs of the understorey are sinuous creepers which add to the tangled growth, splashing brightly shaded blooms through the forest in spring. The vivid red spots of the Coral Vine (*Kennedia coccinea*), the bright purple tassels of Sarsaparilla (*Hardenbergia comptoniana*), and the bright white star-shaped flowers of Clematis (*C. pubescens*) all contrast brightly with the cool greens in the undergrowth.

Scattered amongst the undergrowth and softening the damp litter of bark, leaves and fallen logs, as well as protected depressions in the eroded granite domes, are bright patches of mosses, ferns and lichens. The pale green Bracken Fern (*Pteridium esculentum*) is very common through the forest and lining roadsides, with the delicate Maidenhair Fern (*Adantium aethiopicum*) and Screw Fern (*Lindsaea linearis*) growing in sun dappled patches near water, and the Soft Necklace Fern (*Asplenium flabellifolium*) is common on small niches in rough granite outcrops.

The low, reedy sedgelands occurring in the broad shallow valleys are interrupted by low hills of taller Karri, Jarrah and Marri. Dark green grassy sprays of Blackboys (*Xanthorrhoea preissii*) are dotted conspicuously across the low-lying swampy terrain, with low, shrubby Paperbarks and Teatree (*Melaleuca spp.*). The dense cover of wispy reeds is dominated by the Slender Twine Rush (*Leptocarpus tenax*) with the Spreading Sword Sedge (*Lepidosperma effusa*) common as well.

The Pemberton Slopes Sub Type is dissected by many cool, winding rivers which flow beneath the towering lush forests in damp, misty valleys. The Donnelly, Warren, Gardiner, Shannon, Weld, Deep and Frankland Rivers are the major watercourses here, which vary from broad, shallow swampy drainages to deep, sluggish channels with tranquil, mirrored pools.

The forests of the Pemberton Slopes are managed by the State for a variety of uses including timber production, which is a major activity in this Sub Type. Regrowth Karri forests are a common sight in many areas as broad patches of trees which appear uniform in height and often made distinctive by the bright, glossy growth of the new leaves. The '100 Year Forest' near the small timber town of Pemberton is a long-standing example of this, and old, abandoned settlements such as Donnelly Mill are intrinsic reminders of the timber industry's lengthy history in this region.

This is a major area for recreation and tourism as many people are attracted here to experience the unique, tall forests and the rolling green countryside. Popular activities include camping, bushwalking, with the long Bibbulmun Track winding through the area, drives along forested roads, especially to areas such as the Valley of the Giants, climbing the tall Gloucester Tree, and visiting many galleries which display the fine woodcraft and artefacts for which the area is renown.

The many conservation areas in this Sub Type also attract many visitors. These include the Beedelup National Park, the Warren National Park, the Shannon National Park and Mt Frankland National Park.

The areas cleared for farming and pastoral land amongst the forest of the Pemberton Slopes sees a diversity of practices ranging from fruit and vegetables, wool and dairy products to marron, trout and deer farming, and commercial wildflower production.

Pemberton is the largest town in the Sub Type, with Northcliffe being the only other major centre.

Pemberton Slopes Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Distinctly dissected slopes and deeply defined valleys e.g. Warren River Valley. *Isolated hills, granite domes, outcrops or groups of boulders which provide obvious contrast to the landform pattern in the surrounding landscape e.g. Mt Chudalup.	* Single plants, trees or patches of forest which become focal points due to contrasting or conspicuous shapes, colour, isolation or position in the surrounding landscape e.g. Karri trees. * Strongly defined patterns of vegetation associated with granite outcrops, unforested swampy low-lands and forested higher ground e.g. in the vicinity of Mt Frankland. * Vegetation showing distinctive displays of seasonal colour e.g. Tree Hovea.	* Watercourses with continually changing flow characteristics and features such as rapids or waterfalls e.g. Beedelup Brook. * Reservoirs, river pools and swamps with dominant natural characteristics.
MODERATE	* Broad slopes and low, rounded hills which do not appear prominent or distinctive in the surrounding landscape. * Broad, shallow valleys.	* Some structural, textural and seasonal colour patterns evident in vegetation, but lacking in uniqueness or distinction relative to the surrounding vegetation or landform.	* Watercourses with long stretches of unchanging flow characteristics. * Watercourses, reservoirs or swamps with some natural characteristics remaining.
LOW	* Extensive areas of gently inclined topography, poorly dissected with few distinctive visual features.	* Extensive stretches of vegetation with little or no structural, colour or textural diversity.	* Waterform with few evident natural characteristics.

Pemberton Slopes Sub Type - Aesthetic Character Summary

LANDFORM

Form:	low, broad, swampy valleys; huge granite domes; rolling hills; deep, steeply sided valleys; eroded land surface; gullies;
Line:	gently undulating terrain; Beardmore Ridge;
Colour:	grey sandy soils; red brown and yellow brown soils; orange laterite;
Texture:	sandy soils; loamy soils; pea gravel laterite; swampy flats; cool gullies; damp depressions; eroded granite domes; rough granite outcrops; damp, misty valleys;
Scale:	rolling, undulating terrain encloses views to mid ground; long panoramic views from high points;

VEGETATION

Form:	cathedral-like towering Karri trees; broad, hollow, splayed trunks of Red Tingle; open forest canopy; weeping Peppermints; dense shrubs; bushy Netic; tassel flowers of Sarsparilla; star-shaped Clematis flowers; low, shrubby Paperbarks and Teatree;
Line:	tall Karri; vertical Karri trunks; tall Jarrah trees; tall Tingle trees; narrow trunked Yellow Tingle; sinuous creepers twining over undergrowth; reedy sedgelands; wispy reeds;
Colour:	pale trunked Karri; creamy-yellow and grey variegated trunks of Karri; grey Jarrah bark; red stained Marri trunks; rich green forest canopy; pale trunk of Yellow Tingle; blue-green Karri Hazel; pale green Wattie; rich green leaves and pale pink flowers of Crowea; bright pink Karri Boronia flowers; dark green leaves and bright purple flowers of Sarsparilla; bright white Clematis flowers; vivid red spots of Coral Vine; bright purple of Tree Hovea flowers; pale green Bracken Fern; dark green Blackboys;
Texture:	lush forests; mosaic of tall Eucalypt species; fibrous barked Jarrah; rough Marri trunks; smooth trunks of Karri; needle-like leaves of Karri Oak; deeply serrated leaves and rough bark of Bull Banksia; soft leaved shrubs; glossy leaved Karri Wattle; fuzzy leaved Karri Boronia; damp litter of bark, leaves and fallen logs; delicate Maidenhair Fern and Screw Fern; soft Necklace Fern; grassy sprays of Blackboys;
Scale:	tall forests and dense undergrowth generally dominate and enclose views; penetration into forest generally restricted to foreground; landform encloses views to midground in cleared areas; longer views across broad, swampy flats;

WATERFORM

Form:	broad, shallow swampy drainages; deep sluggish channels; cascading waterfalls;
Line:	winding rivers;
Colour:	mirrored pools;
Texture:	cool rivers; tranquil, mirrored pools;

LAND USE

Form:	shape of roofing and building materials;
Line:	walk tracks; geometric fencelines and farmland boundaries; tumbled piles of sawn timber and discarded offcut thinnings in forest sites; geometric line of roofing and building materials;
Colour:	green farmland; colours of roofing and construction material;
Texture:	tumbled piles of sawn timber and discarded offcut thinnings in forest sites; textures of roofing and construction material;

5. Wheatbelt Plateau

5.1 Geraldton Plains

5.2 Dryandra Uplands

5.3 Merredin Plateau

5.4 Esperance Plains





Wheatbelt Plateau Landscape Character Type

The Wheatbelt Plateau Landscape Character Type occurs in the south to south west of the State, bounded to the west by the rich forests of the Darling Plateau, to the east and north by the extent of the vermin proof fences and the base is formed by the vast Southern Ocean. There are four distinct Landscape Character Sub Types occurring within its boundaries: the Geraldton Plains, the Dryandra Uplands, the Merredin Plateau and the Esperance Plains.



Distinguishing Features

This wide, open landscape of long views is dominated by its agricultural land use. The natural vegetation has been extensively cleared from this area which openly displays the almost level to gently undulating topography. Scattered remnant vegetation stand sentinel at the periphery of the broad fields or are clustered in groups surrounding granite outcrops and on the low laterite hills, as well as extensive reserves on the north and south coastal plains. These surviving remnants provide not only a refuge for wildlife, but in their scattered solitude become, in areas, dominant landscape features.

The seasonal cycle of the cereal crops varies the colours of this landscape, from ploughed hectares of rich terracotta soils to rippling vivid green shoots contrasting brightly against the sky, to a swaying golden carpet of ripened grain, or a greying spiky stubble after the harvest.

This region is part of the Great Plateau of Western Australia, a very ancient landmass which has been worn down by natural erosion. The underlying granitic basement rock is visible in several areas in this Landscape Character Type as lichen encrusted outcrops, tumbled piles of boulders or as immense, dominating features.

The drainage patterns throughout this Landscape Character Type are unique to each Sub Type. The Geraldton Plains features westward drainage of several rivers into the Indian Ocean and the Dryandra Uplands exhibits westward drainage which flows into the deeply incised valleys of the adjacent forest. The watercourses of the Esperance Plains drain south into the Southern Ocean, while the Merredin Plateau is characterised by a linked chain of low-lying saline wetlands and salt lakes which only flow after exposure to extremely heavy winter rains.

Aboriginal communities scattered over the Wheatbelt Plateau today focus their current and future land use activities on the maintenance of their cultural identity and their close links with the natural environment. In various areas over the Character Type they continue traditional activities including hunting, gathering, camping and wood collection for fires and crafts, ensuring their cultural knowledge is passed on to future generations.

Climate

The Wheatbelt Plateau Landscape Character Type is dominated by a dry to extra dry mediterranean climate which infers warm to hot sunny days with cool nights in the summertime, to very cool, wet winters with a reliable rainfall.

The levels of precipitation in this region are highest along the Southern and Indian Ocean coastlines, tending

to decrease to the north and interior of the Character Type. Average annual rainfall amounts vary from 469mm at Geraldton and 560mm at Jurien, to 389mm at Wongan Hills, 623mm at Wandering, 618mm at Esperance, and 281mm at Southern Cross. The useful rainfall for the dominant agricultural land use occurs generally over winter and spring, between May and October, with occasional summer storms bringing heavy rain.

The Wheatbelt Plateau has approximately seven to eight dry months per year. Temperatures tend to increase to the north and further inland in association with the decreasing rainfall. Geraldton experiences an average summer maximum of 31°C and a winter minimum of 9°C. The same range in Narrogin is from 29°C to 6°C, at Southern Cross from 33°C to 5°C and at Esperance from 25°C to 8°C, and many areas regularly feature temperatures over 30°C.

Geraldton Plains Landscape Character Sub Type

The Geraldton Plains is the most northerly Sub Type of the Wheatbelt Plateau Landscape Character Type. Sandwiched between the Indian Ocean on its western border and the Meekatharra Plateau Character Type to the east, it extends south to the Swan Coastal Plain and Dryandra Uplands and north to the Kalbarri Sandplain.

The landscape of the Geraldton Plains is made up of distinct landform elements which are linked by the dominant agricultural land use and the remnants of the unique sandplain vegetation which are common to the whole area, blending into the wind pruned coastal heath which cloaks the dunes on the western fringe of the region.

The long western coastline which abuts the deep blue of the Indian Ocean features quiet, gently curved bays such as Dynamite Bay at Green Head, and long stretches of white, shimmering sand interrupted occasionally by rough, grey limestone cliffs and headlands such as the steep rock face of White Cliffs, north of Horrocks.

This stretch of coastline is known as the Batavia Coast. These treacherous waters harbour hidden groups of menacing coral reefs and low-lying limestone islands. They have been responsible for unexpectedly interrupting many ocean journeys, leaving numerous historic wrecks along the coast today. This includes the infamous ship the Batavia, which ran aground on the notorious Houtman Abrolhos group of islands, 80 km west of Geraldton, in 1629. Closer to the coast, rough limestone reefs commonly interrupt the smooth surface of shallow nearshore waters such as North Bank near Dongara, and small islands, such as Boullanger Island at Jurien, are scattered along the length of the coast.

A system of windswept coastal dunes form the western fringe of this Sub Type, sending long fingers of white sand and parallel ridges of dunes to encroach the level to gently undulating plains beyond. In many areas along the coast, the dunes feature quite prominently in the landscape, reaching up to 200m. Large dunal blowouts, such as South Gates to the north of the Greenough River and other areas of bright, mobile sand, display their susceptibility to erosion due to the constant buffeting of this coast by strong winds.

Behind the pale, windswept sands of the domed frontal dunes, a band of rough pitted grey limestone occurs, seen as misshapen weathered outcrops, or as low, sand covered linear ridges emerging above the gently inclined terrain. Awesome erosional features which occur as part of this limestone belt are the Pinnacles and Tombstone Rocks. These upright and often disfigured and pock marked grey forms stand as silent, isolated pillars in a sea of wind rippled yellow sand, seeming like eerie remnants of an ancient forest which once towered over the dunes. Today the Pinnacles and Tombstone Rocks are encompassed by Nambung National Park near Cervantes at the southern region of this Sub Type.

Many sunless caverns have also been formed in this region of limestone, such as Weelwadgi Cave and Drovers Cave, channelling underground watercourses.

In some areas these caves have collapsed to form deep, rocky gullies bordered by steep, rough limestone cliffs.

Overlying part of the limestone belt and extending eastward over sandy plains are wide, open alluvial flats and flood plains, such as at Greenough. Broad, encompassing views over the subdued terrain are revealed here due to the widespread agricultural land use. This is interrupted in a few areas by scattered remnants of bushy sandplain shrubs and low, isolated trees. These often follow watercourses and edge paddocks as well as form the geometrical linear roadside reserves, trapped between roads and fences. These scattered remnants contrast darkly against the rippling fields of bleached gold wheat and carpets of bright green lupins.

The open, subdued plains become more undulating, even rolling, with occasional low hills closer toward Geraldton, betraying the presence of the granite bedrock in this area. Further south, the alluvial plains are more gently inclined, with a conspicuous limestone ridge dividing it in two giving the areas known as the front flats and back flats near Greenough their name.

Meeting the alluvial plain abruptly at the eastern region of this Sub Type, and forming a conspicuous backdrop as an elongated ridge, is a series of steep-sided flat-topped low ranges, capped by a resistant, compacted layer of rust coloured, cemented pea gravel. These are the exposed, eroded edges of an ancient lateritic plateau, leaving flat-topped hills and near circular mesas, such as Mt Lesueur, in prominent isolation as remaining evidence of its former extent before being reduced by the relentless forces of erosion. These ranges include the Herschel Range north of Badgingarra, the Gairdner Range east of Jurien, and the Moresby Range near Geraldton.

The remnant sandplain flora (also known as Kwongan) remaining in this Sub Type is a botanist's delight, as one of the richest collections of diverse and unique species in the world, concentrated especially between Mt Lesueur, Badgingarra and Dongara. Many of these areas of residual heath were left uncleared only because the rugged and steep nature of the topography on the eroding plateau remnants as well as the steeper terrain of the coastal dunes to the south of Dongara which were unsuitable for agriculture.

Appearing overall as a smooth, mosaic of green, the dense heath is interrupted at intervals by contrasting shapes and colours of plants including the glossy green spray of Blackboys (*Xanthorrhoea preissii*), tall Zamia Palms (*Macrozamia reidlei*) of a venerable age, and the long arching canes of the White Plume Grevillea (*G. leucopteris*) decorated with large tangled tufts of pungent cream blooms.

Banksia is the most dominant species here, often forming low woodlands amongst the heath, favouring areas of deeper soils. They vary from the unique and very rare Pine Banksia (*B. tricuspis*) which grows only in the vicinity of Mt Lesueur, to the more widespread Sawtooth Banksia (*B. prionotes*), Firewood Banksia (*B. menziesii*), and Candle Banksia (*B. attenuata*).

Bushy Grevilleas are also common amongst the dense heath. As well as the prominent blooms of the White Plume Grevillea, the Prickly Plume Grevillea (*G. annulifera*) is also a showy, straggly bush with tangled cream flowers. The spreading leaves of the Fan Hakea (*H. baxteri*) and Fan-leaved Hakea (*H. flabellifolia*) are other emergents. The unusual Needles and Corks Hakea (*H. obliqua*) with straggling, needle-like leaves and clusters of white flowers contrasts with other surrounding vegetation such as the candle-like flowering spikes of the Ribbed Hakea (*H. costata*), often conspicuous above the low canopy of the surrounding vegetation.

Scattered pockets of taller woodland occur amongst the heath, often over clay soils and along incised valleys. The rough grey bark of the spreading York Gum (*Eucalyptus loxophleba*) and mottled creamy yellow to grey trunks of Wandoo (*E. wandoo*), rough Pricklybark (*E. todtiana*) and Powderbark Wandoo (*E. accedens*) are often seen in isolated groves with bushy Jams (*Acacia acuminata*), Candle Banksia, Firewood Banksia and other low shrubs in the dense

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undergrowth. The bushy Sandplain Woody Pear (*Xylomelum angustifolium*) with its large, pendulous, pear-shaped fruit is scattered over the region, displaying large clusters of creamy blooms in summer. Salmon-White Gum (*Eucalyptus lane-poolei*) occurs in patches at Badgingarra, and the pale leaved Tallerack (*E. tetragona*), with the pale pink and shedding grey bark of the Mallalie (*E. eudesmioides*), are other prominent emergents scattered over the southern region of the Sub Type. Many other Eucalypts are seen amongst the heath here, blending into the dense thicket in the form of shrub mallees. This includes the Jarrah tree (*E. marginata*) which here, at its northern limit, only reaches a metre in height.

Against a background mass of bright yellow provided by the dense thickets of Wattle, the normal patchwork of green carpeting heath erupts in a spectacle of colour from the many bushy shrubs, herbs and wildflowers which bloom in the springtime after the rains. The contrasting shades of the soft, velvety grey Smokebush (*Conospermum stoechadis*) and Plume Smokebush (*C. incurvum*) are conspicuously scattered over the heath. Bushy shrubs such as Couch Honeypot (*Dryandra nivea*), Shaggy Dryandra (*D. speciosa*), and Chenille Honeymyrtle (*Melaleuca huegelii*) are mixed amongst the numerous brilliant coloured feather flowers (*Verticordia sp.*) which show flashes of wispy edged blooms of scarlet to bright yellow, including the vivid orange Morrison (*V. nitens*). Other bright spots of colour come from the dark orange blooms of Coppercups (*Pileanthus peduncularis*), deep blue and bright red Leschenaultias, purple-blue of Summer Dampiera (*D. carinata*), as well as the slender, swaying stems of Kangaroo Paws including the Yellow (*Anigozanthus pulcherrimus*), the curious Black Kangaroo Paw (*Macropidia fuliginosa*), and the popular red and green Mangles Kangaroo Paw (*Anigozanthus manglesii*).

Along the coastline, the dense, low, heath which cloaks the bright dunes appears similar to the sandplain vegetation further inland, but is formed of a different group of plants and is pruned by the perpetual force of the prevailing wind. The tenacious low scrubby plants on the foredunes which are holding the sand in its place despite the constant buffeting, include the pale green wispy Beach Spinifex (*S. longifolius*) and Hairy Spinifex (*S. hirsutus*), with Coastal Saltbush (*Atriplex isatidea*) and low plants of blue-grey Coastal Daisybush (*Olearia axillaris*) and Tangling Melaleuca (*M. cardiophylla*), underlain by the bright green succulent Angular Pigface (*Carpobrotus aequilaterus*) which creeps over the dunes.

Behind the exposed frontal dunes is a dense coastal thicket which grows taller in the more protected dune depressions. This thicket is dominated by Wattles including the Summer-scented Wattle (*Acacia rostellifera*), the White-stemmed Wattle (*Acacia xanthina*) and the Spoon-leaved Wattle (*A. spathufolia*) which transform the dune thicket into a golden blanket in spring. Amongst these dense plants are Coastal Daisybush, Berry Saltbush (*Rhagodia baccata*), Thick-leaved Fan Flower (*Scaevola crassifolia*), Chenille Honeymyrtle, Coastal Honeymyrtle (*Melaleuca acerosa*) and Tea-tree (*M. thyoides*). Edges of these taller thickets are often cloaked by a choking tangled mass of fine, olive coloured stems of the parasitic Dodder Laurel (*Cassytha sp.*).

Rocky areas of rough, grey limestone outcrops beyond the pale dunes are often cloaked by dense remnants of scrubby heath. The creamy yellow flowers of the Scratchy Parrot Bush (*Dryandra sessilis*) with are common here, with Summer-scented Wattle, and wispy bushes of Geraldton Wax (*Chamelaucium uncinatum*) appear in sandy hollows amongst the limestone, with pale pink springtime flowers. A bright feature of the limestone vegetation, particularly between Cervantes and Dongara, is the vivid scarlet bud caps of the Illyarrie (*Eucalyptus erythrocorys*) which burst into large, bright yellow blooms in late summer.

Tall, elegant, white trunked River Gums (*E. camaldulensis*) fringe water courses and edges of limestone gullies to the north of the Sub Type, and spreading Flooded Gums (*E. rudis*) are more dominant in these areas to the south. Where the water is fresh along the rivers the white, peeling trunks of the Swamp Paperbark (*Melaleuca raphiophylla*) appear beneath the taller trees, and in more saline areas, they are

replaced by Swamp Oaks (*Casuarina obesa*). Areas of bushy mallee shrubland with Jam, York Gum and the spiky Needlebush (*Hakea recurvata*) are scattered on valley floors with occasional isolated WA Christmas Trees (*Nuytsia floribunda*) which feature seasonally splendid vivid tangerine blooms in summertime. Zamia palms, with Geraldton Wax and other low shrubby bushes form the undergrowth.

The strong south-west winds which are characteristic in this region have created a plant form which has become synonymous with this area, most notably at Greenough. Isolated River Gums growing on the cleared flats have responded to the prevailing gusts by distorting their normal shape and appear to be bent over away from the wind till they are parallel with the ground.

The moderate rainfall which this Sub Type receives, coupled with the gentle landform and porous, sandy soils, results in only a small number of significant waterforms in this area which are constantly eroding and shaping the plateau remnants. Flowing only in the winter-time, the major water courses which meander over this region are the Hutt, Arrowsmith, Lockier, Namban, Greenough, Hill, Irwin, Chapman, and Bowes Rivers. Only the latter five rivers actually reach the sparkling blue waters of the Indian Ocean, having carved channels through the coastal limestone and windswept dune barriers before reaching their destination. The others become either tributaries to the larger rivers, or more commonly, terminate in the seasonally wet or inundated interdunal depressions, swamps or lakes which are scattered along the coastline, generally oriented in a north-south direction, parallel to the beach front. The best example of this is the Hutt Lagoon which is barred from the sea by high domed wind-formed dunes and beach deposits. This extensive waterbody receives the winter flow from the Hutt River and varies seasonally from a pale, glistening dry salt lake to a pink inland sea. Other smaller lakes and swamps include Lake Indoon near Eneabba, Diamond of the Desert Swamp north of Cockleshell Gully and White Lake north of Stockyard Gully.

Most of the watercourses flowing through this Sub Type also find their headwaters here as well. In the upper reaches of many rivers, abrupt breakaway scarps are common at their periphery, most notably at Coalseam Park, north of Mingenew, which appears in areas as a spectacular miniature Grand Canyon which has been carved by the relentless force of the Irwin River.

A sinuous chain of linked salt lakes fringed by overhanging York Gums occurs at the eastern margin of the Sub Type. The extensive shimmering surface of the Yarra Yarra Lakes as well as Lake Eganu and Pinjarrega Lake link after good falls of rain to form the Coonderoo River which flows south out of the Sub Type.

The major population centre of this Sub Type is Geraldton, situated on the coast at Point Moore. Smaller coastal centres include Dongara, Leeman, Jurien and Cervantes, and inland, the towns consist of Northampton, Mullewa, Morawa, Mingenew, Three Springs, and Eneabba.

Due to the favourable soils and climate, as well as the available water, this Sub Type has been used for agriculture since the middle of the last century. Historic farming settlements such as at Greenough and ruins, such as Heelans Chimney near Walkaway, remain as silent and crumbling reminders of the long farming history. Today the extensive areas of cleared farm land supply a wide range of agricultural products including wheat, barley and other grains, as well as fruit and vegetables, dairy products and wool.

Crayfishing is a major primary industry along the coastline, supporting many small coastal towns such as Cervantes and Leeman, as well as employing a large percentage of the population in the larger centres of Geraldton and Dongara. The Houtman Abrolhos group of islands off Geraldton comes alive in the crayfishing season. While there are no permanent residents on the islands, at the height of the season they support several hundred fishermen and their families.

The unique sandplain vegetation offers an income for apiarists and commercial wildflower pickers. The

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dried and fresh flowers, most notably Banksias, are very popular in the local market as well as interstate and overseas.

Tourism and recreation are widespread in this area due to the many attractions it offers. Many people are drawn to this region by the spectacular springtime displays of wildflowers amidst the heath, and on the eastern margin of the Sub Type between Mullewa and Mingenew, enjoying the extensive colourful carpets of nodding blooms.

The coastline is utilized for several watersports such as fishing and wind surfing. The numerous historic wrecks off the coast, such as the 'Xantho', wrecked in 1872 south of Gregory, and the unique coral reefs surrounding the Houtman Abrolhos Islands are very popular attractions for Scuba diving and snorkelling enthusiasts.

Nature conservation in the form of Nature Reserves and National Parks encompasses a significant portion of this Sub Type, emphasising the uniqueness offered by many of the areas natural features, such as at the newly gazetted Mt Lesueur National Park. Other National Parks here include Badgingarra, Alexander Morrison, Tathra, Watheroo, Nambung, and Drovers Cave.

Various mining ventures are scattered over this Sub Type, principally in the eastern half. Lead, copper, zinc and silver have been mined for many years in the northern portion of the region, such as at Northampton, and heavy mineral sands is extracted near Eneabba. A large mine at Three Springs produces high quality talc, and oil and gas fields occur at Dongara, Yardarino and Mandarra. Sandstone quarries for a popular golden to warm red building stone occur in the Greenough area, and bricking clay is extracted near Bootenal.

Geraldton Plains Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*High rounded hills or ridges with steep slopes e.g. Mt Fairfax. *Mesas, ranges and escarpments with sharp breakaways e.g. Mt Lesueur. *Steep-sided and strongly dissected valleys e.g. Stockyard Gully. *Cliffs and headlands e.g. White Cliffs. *Islands and reefs e.g. Houtman Abrolhos Islands. *Irregular coastline edges often emphasised by distinctive rock outcropping, bays or inlets e.g. Dynamite Bay. *Primary dunes which display areas of active weathering, steep slopes and/or sandblown edges e.g. South Gates.	* Windshaped, gnarled or dwarfed vegetation unusual in form, colour or texture e.g. Greenough River Gums. * Areas of high plant diversity which display distinctive textural and colour patterns. * Single trees, shrubs or vegetation patches which become focal points due to isolation or position in landscape. * Dramatic displays of seasonal colour e.g. Illyarrie.	* All estuaries, inlets, lakes and swamps e.g. Hutt Lagoon. * Unusual ocean shoreline motion due to islands, reefs and shoreline configuration. * River pools and other permanent water features e.g. Noondamurra Pool. * Steep sided valleys associated with major river drainages e.g. Irwin River.
MODERATE	* Expanses of beach of uniform width and colour without rock outcroppings, cliffs or headlands. * Gently undulating plains and rounded hills similar in gradient to surrounding landforms which are not visually distinctive or prominent	* Some structural, textural and seasonal colour patterns evident in vegetation but lacking in uniqueness or distinction relative to surrounding vegetation.	* Seasonal wetlands, intermittent streams and creeklines. * Uniform ocean shoreline and motion characteristics with little diversity.
LOW	* Expanses of indistinctly dissected landform.	* Extensive areas of similar vegetation cover with little or no structural or textural diversity or colour changes.	* Waterforms absent.

Geraldton Plains Sub Type - Aesthetic Character Summary

LANDFORM

Form:	limestone cliffs and headlands; steep rock face; low-lying coastal dunes; fingers of sand; gently undulating plain; blowouts; domed frontal dunes; misshapen, weathered limestone outcrops; disfigured pinnacles; isolated pillars; deep gullies; wide, open alluvial flats; subdued to rolling plains; low hills; conspicuous backdrop; steep-sided flat-topped low ranges; flat-topped hills and near circular mesas; incised valleys; abrupt breakaway scarps;
Line:	western coastline; gently curved bays; parallel ridges of dunes; band of limestone ridges; vertical pinnacles and tombstone rocks; wind rippled sand; elongated ridges; horizontal, flat-topped plateau; vertical cliffs;
Colour:	white, shimmering sand; grey limestone; pale sand; yellow sand; rust coloured pea gravel; clay soils; bright dunes;
Texture:	sandy beaches; rough limestone cliffs, headlands and reefs; pitted limestone; pock-marked pinnacles; rocky gullies; sandy plains; cemented, compacted pea gravel; rugged topography;
Scale:	Plains offer long, open view N-S, often enclosed to the west by the dune systems and to the east by the plateau remnants; from plateau edge, long views to ocean interrupted by isolated mesas and low hills.

VEGETATION

Form:	wind pruned coastal heath; scattered vegetation remnants; low, isolated trees; bushy sandplain shrubs; spray of Blackboys; tall Zamia Palms; low woodlands; bushy Grevilleas; spreading leaves; clusters of flowers; candle-like flowering spikes; isolated groves; bushy Jams; dense undergrowth; pendulous, pear-shaped fruit; prominent emergents; shrub mallees; dense thickets, low, scrubby plants; spreading Flooded Gums; distorted River Gums;
Line:	vegetation remnants fringing paddocks; geometrical, linear roadside reserves; arching canes of White Plume Grevilleas; vertical flowering spikes of Hakeas and Banksias; slender, swaying stems of Kangaroo Paws; angular Pigface; tall, elegant River Gums; River Gums bent over parallel with ground;
Colour:	dark olive heath; glossy green Blackboys; cream blooms; clusters of white flowers; grey barked York Gum; mottled creamy yellow to grey trunks of Wandoos; pale-leaved Tallerack; pale pink and shedding grey bark of Mallalie; mass of bright yellow Wattles; grey Smokebush; scarlet and bright yellow Featherflowers; vivid orange Morrison; dark orange Coppercups; deep blue and bright red Leschenaultias; purple-blue Dampiera; yellow, black, and red and green Kangaroo Paws; pale green Spinifex; bright green Pigface; golden blanket of heath; olive coloured stems of Dodder Laurel; creamy yellow Parrot Bush flowers; vivid scarlet bud caps and bright yellow flowers of Illyarrie; white trunked River Gums; white peeling paperbark trunks; vivid tangerine WA Christmas trees; pale pink Geraldton Wax blooms;
Texture:	smooth carpet of heath; tangled tufts of White Plume Grevillea blooms; straggly Grevilleas; needle-like leaves; rough bark of York Gum; rough Pricklybark; velvet-leaved Tallerack; soft Smokebush; wispy edged blooms of Featherflowers; wispy Spinifex; hairy Spinifex; succulent Pigface; tangled mass of Dodder Laurel stems; scratchy Parrotbush; peeling Paperbark trunks; carpets of nodding blooms;
Scale:	Remaining sandplain and coastal heath vegetation is generally low enough to reveal long, open, encompassing views only enclosed by landform and scattered pockets of taller woodland.

WATERFORM

Form:	treacherous waters; shallow lakes and swamps;
Line:	channelled underground watercourses; meandering rivers; N-S oriented inundated dunal depressions and swamps; sinuous chain of linked salt lakes;
Colour:	deep blue Indian Ocean; pale, glistening dry salt lakes; pink inland sea;
Texture:	sparkling ocean waters; shimmering lakes;

LAND USE

Form:	historic shipwrecks; rippling fields of wheat; historic ruins and settlements; urban and agricultural built forms;
Line:	angular grid patterns formed by roads and fencelines; geometric built forms;
Colour:	bleached gold wheat; carpets of bright green lupins; gold to warm red building stone; roofing and building materials;
Texture:	crumbling ruins; bricking clay; roofing and building materials;

Dryandra Uplands Landscape Character Sub Type

This Sub Type extends easterly from the green forests which cloak the Darling Plateau Character Type to the division which marks the westerly limit of the wide shallow valleys of the Merredin Plateau Sub Type. This area is an agricultural landscape featuring extensive open bleached blonde paddocks, occasionally punctuated by dams and windmills, with long views across the undulating terrain

The valley systems in this Sub Type have dissected the terrain more distinctly than those further east, and the head-waters of many westward flowing watercourses originate here including the Williams-Murray system. The extensive catchment areas of the Avon and the Blackwood Rivers have a widespread influence over the topography and the eastern margin of the Sub Type marks the limit of their constant westward flow.

The vegetation of the Dryandra Uplands is dominated by cereal crops and pasture, which have pushed the native remnants to the periphery of their extent. Patches are common along fence lines, enclosing and shading roads as well as marking the meandering watercourses dissecting the gently undulating landscape. York Gums (*Eucalyptus loxophleba*) regularly feature along the drainage lines and roadsides or as scattered clumps in cleared fields. This straggly tree with rough grey bark is often seen growing in combination with the low bushy Jam Tree (*Acacia acuminata*) which dominate in shrubby remnant vegetation patches where the taller trees are not prevalent. The pale silver grey or mottled creamy yellow of Wandoos (*Eucalyptus wandoo*) are also seen along the roadside as part of the mixed low woodland and as isolated shade trees in cleared fields. Larger areas of remnant vegetation often belie outcroppings of granite. They appear as tumbled piles of lichen encrusted boulders, as horizontal sheets of rock peppered with low tenacious plants such as Pincushions (*Borya sphaerocephala*), and as large domes which dominate the surrounding landscape, e.g. Boyagin Rock.

Low pale terracotta coloured hills of lateritic gravel are scattered over this terrain appearing as isolated islands surrounded by crops and pastoral land. These eroding hills, are bound by small escarpments known as breakaways. These exposed, pale clay slopes are made more apparent by the patchy remnant vegetation decorating their slopes, often consisting of Powderbark Wandoo (*Eucalyptus accedens*) and Brown Mallet (*E. astringens*).

The Dryandra State Forest is a distinctive highlight of this Sub Type as it is a reminder and impression of part of the natural landscape which existed before the extensive clearing for farming was undertaken. This large area features a remnant Wandoo and Powderbark Wandoo woodland forest which is quite distinct from the expanse of agricultural land which surrounds it. The strong line created by the smooth mottled creamy yellow bark of these trees contrasts with the green grey of the sparse low herbaceous undergrowth and patches of soft Sheoak and prickly Dryandra thicket. Dense areas of young Wandoo trees with thin brown and silver grey whippy trunks occur in patches, with the glossy leaved Brown Mallet, which has also been established in plantations, seen scattered amongst the older Wandoos.

The major river valley systems, such as the U-shaped Hotham River valley, were the first areas to be cleared by early settlers for agriculture. Extensive areas of pastoral land dissected by split post fences, dotted with numerous herds of sheep and occasionally cattle, intermingle with broad fields of cereal crops.

The visual attributes of the long, low grey-white storage silos and the occasional abandoned farmhouses built from local materials, are as much of this altered landscape as natural features. Farming communities and towns form a major part of the cultural character of this landscape, featuring many well known historic sites and associated structures. Two of these historic sites include the Spanish style Benedictine Monastery and community at New Norcia, and the Aboriginal settlement at Moore River near Mogumber, which were originally established here to look after Aboriginies

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of the south-west who were displaced by European settlement.

Northam is the largest population centre of the area, closely followed by Narrogin, and smaller communities include York, Kojonup, Toodyay, and Brookton.

Dryandra Uplands Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Isolated peaks or hills with distinctive form that become focal points e.g. Wongan Hills. *Rock outcrops or jumbles of large boulders e.g. Boyagin Rock. *Distinctive U-shaped valleys e.g. Hotham River Valley.	* Strongly defined patterns of vegetation of some diversity of species, colour, height and density. * Vegetation which shows distinct form, line, colour and texture contrasts with the surrounding landscape e.g. Wandoo at Dryandra National Park.	* Rivers and streams of a permanent nature e.g. Blackwood River at Boyup Brook. * Wetlands, swamps and lakes e.g. Lake Ninan.
MODERATE	* Undulating country which is not visually dominant but is surrounded by similar landforms. * Broad shallow valleys.	* Vegetative patterns evident but with little diversity. * Moderate contrasts with surrounding landscape.	* Intermittent streams.
LOW	* Large expanses of indistinctly dissected landform that provide few landmarks with which to orient.	* Extensive areas of similar vegetation such as grassland with very limited variation in texture and colour.	* Waterforms absent.

Dryandra Uplands Sub Type - Aesthetic Character Summary

LANDFORM

Form:	granite domes; tumbled piles of boulders; isolated islands of breakaways;
Line:	gentle undulations.
Colour:	pale terracotta coloured hills; pale clay.
Texture:	lichen encrusted boulders; rocks peppered with plants; lateritic gravel.
Scale:	long open views to midground and often beyond, interrupted by gently undulating landform.

VEGETATION

Form:	clustered groups of trees; straggly trees; bushy Jams; low woodlands; Dryandra thickets; slim, whippy trees.
Line:	vertical and diagonal line of trunks; remnants in lines mirroring fences; strong vertical line of Wandoo trunks.
Colour:	grey bark of York Gums; pale silver grey or mottled creamy yellow Wandoos; green grey undergrowth.
Texture:	rough York Gum bark; soft Sheoak; prickly Dryandra; dusty undergrowth.
Scale:	scattered patches of uncleared vegetation occasionally encloses views but generally remnants only interrupts long views which are enclosed by landform.

WATERFORM

Form:	shallow valleys.
Line:	U-shaped valleys; meandering ribbons.
Colour:	transparent; blue; muddied.
Texture:	foaming.

LAND USE

Form:	geometric wheat silos and other built forms.
Line:	fencelines dominant; vertical post-harvest stubble; angular wheat silos; parallel curved, diagonal or straight harvest patterns; geometric lines of roofing and building materials used in local historic architecture.
Colour:	golden carpets of ripened wheat; bleached blonde grass; bright green shoots (winter, spring); grey stubble of harvested crop; white or grey wheat silos; warm shades of local stone; roofing and building materials.
Texture:	spiky stubble; soft shoots of new wheat growth; roofing and building materials.

Merredin Plateau Landscape Character Sub Type

Pastoral fields, expanses of cereal crops and wide, open views are the dominant characteristics of this Sub Type, extending from the Dryandra Uplands Sub Type to the western edge of the Kalgoorlie Plain Character Type, and north to the Meekatharra Plateau Character Type.

The sweeping views over the wide, shallow valleys of the ancient drainage channels and distant low cresting hills are often unobstructed by remnant vegetation. The valley systems of this Sub Type are almost indistinguishable, no longer exhibiting the constant flow of watercourses as they once did. The waterbodies are present in the form of a series of linked saline wetlands such as Lake Dumbleyung and as expanses of shallow, shimmering salt lakes such as Lake Grace and Lake King. The periphery of the wetland areas are generally fringed by the soft green grey Swamp Sheoaks (*Casuarina obesa*) and pale trunked Saltwater Paperbarks (*Melaleuca cuticularis*) with the succulent low red Samphires (*Halosarcia sp.*) growing on moist salt flats. Many of these wetland areas reflect the growing salinity problems widespread in this region. Skeletonised trees with bleached fingers reaching skyward are often a common sight in patches adjacent to, or in some cases almost encompassing, the wetland area.

The tall, flat topped Salmon Gum (*Eucalyptus salmonophloia*) appears as the dominant tree amongst the small patches of remnant woodland vegetation and denotes the location of the richer pale pink loamy clay soils. The smooth, glowing bark of the delicate trunks reflect silver greys with creams, pinks and peaches, a subtle presence amongst the grey greens of the lower surrounding mallees (multi-stemmed Eucalypts) and other shrubby growth. The sturdy mottled silver and pale orange trunk of the Inland Wandoo (*E. capillosa*) occur as isolated specimens glimpsed occasionally in the landscape or with other trees in small huddled groups, including Redwoods (*E. transcontinentalis*), Red Morrels (*E. longicornis*), and further toward the eastern border, are glossy, copper barked Gimlets (*E. salubris*). Low shrubby Sheoaks and Acacias are commonly dispersed in the sparse understorey, occasionally with olive Slender Banksia (*B. attenuata*), Flat-Topped Yate (*Eucalyptus occidentalis*), and the bushy Roadside Tea Tree (*Leptospermum erubescens*).

A mallee-heath combination, often dominated by low bushy Acacias, black and grey Tamma's (*Allocasuarina spp.*), Broombush and Honeymyrtles (*Melaleuca spp.*), is common in remnant patches where soils are predominantly the pale apricot to soft yellow of the sandy loams (known locally as the sandplains). These remaining low vegetation fragments occasionally follow roads as linear reserves, enclosing the long views to encompass the rich diversity and colour of the sandplain heath. Spectacular colourful displays of wildflowers are produced by this richly diverse carpeting heath in the springtime, producing splashes of vivid colour amongst the ashy grey foliage.

Glimpses of the landscape beyond the sandplain heath reserves denotes what is more commonly visible in their absence. Often long, uninterrupted panoramas over the low-lying, gently undulating landscape are checked only by long lines of fences scored across the agricultural landscape. Distant linear silhouettes of remnant vegetation generally denote the location of a field boundary, a property entrance, or a narrow drainage line. Any area of even modest elevation in this gently undulating landscape becomes a landmark for several kilometres around. Small hills are often visible on distant horizons and isolated granite outcrops become a very distinct visual highlight, contrasting with the surrounding topography. Wave Rock at Hyden, an unusual granitic formation, marked with dark vertical streaks and surrounded by a soft whispering woodland of Rock Oaks (*Allocasuarina huegeliana*) is an impressive example of this.

Appearing faintly on the horizon at the southern margin of the Sub Type as a series of small pyramid formations are the highlight of the Merredin Plateau - the Stirling Ranges, and further to the south, the Porongorup Ranges. These seemingly insignificant, distant rises quickly grow to form the abrupt rugged ranges of unexpected

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unexpected proportions, standing out starkly from the surrounding topography. The ranges are blanketed by a dense, richly diverse heath, exhibiting a patchwork of muted colours and forms, interrupted by rugged, rocky bluffs and crags which are very occasionally topped with a dazzling dusting of snow.

Human settlements within this Sub Type are sparse, with many small isolated communities scattered over long distances. Old buildings of soft red brick with timber boarding and corrugated iron are scattered throughout the towns and act as a reminder of the long farming history associated with the area. The long, white, geometric wheat silos again make their mark on the landscape, with only the quiet sidings and the long, parallel railway line for company, are often the only noticeable feature of the railway sidings. The largest rural centre here is Merredin and other small communities include Gnowangerup, Hyden, Mukinbudin, Lake Grace and Kondinin.

Merredin Plateau Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Isolated peaks or ranges with a distinctive form rising starkly from the surrounding landscape e.g. Stirling Ranges. *Major rock outcroppings e.g. Wave Rock.	* Trees with some diversity of species, height and density e.g. wetland fringes. * Strong form, line, colour and texture contrasts with surrounding landscape e.g. clumped remnant vegetation. * Distinctive stands of vegetation with strongly defined growth habits, texture and colour e.g. Salmon gums. * Dramatic displays of seasonal colour e.g. spring wildflowers.	* All lakes, rivers, streams and wetlands, permanent or intermittent e.g. Lake Dumbleyung.
MODERATE	* Naturally established stream associated dissections. * Broad slopes and shallow valleys with low ridges which are not visually dominant but are surrounded by similar landforms.	* Vegetation size, shape and colour with little diversity. * Vegetation patterns found commonly in the surrounding landscape.	* Waterforms absent.
LOW	* Expanses of indistinctly dissected landform that provides little illusion of spatial definition with which to orient.	* Extensive areas of similar vegetation such as grassland with very limited variation in texture and colour.	* Waterforms absent.

Merredin Plateau Sub Type - Aesthetic Character Summary

LANDFORM

Form:	low cresting hills; pyramid forms; isolated granite domes; abrupt rugged ranges.
Line:	horizontal plain; level horizon; dark vertical streaks on Wave Rock.
Colour:	pale pink clays; pale apricot to soft yellow sands.
Texture:	clay and sandy soils; rough granite outcrops.
Scale:	generally open and flat with long views often uninterrupted by landform.

VEGETATION

Form:	flat topped trees; skeletonised tree forms; sturdy Inland Wandoo trunks; slender Banksias; bushy heaths.
Line:	linear roadside reserves; linear silhouettes of remnant vegetation; strong diagonal lines from mallee trunks.
Colour:	grey green Swamp Oaks; pale trunked Paperbarks; bleached branches; silver greys with creams, pinks and peaches of Salmon Gums; grey green mallees; mottled silver and pale orange Inland Wandoo trunks; glossy copper barked Gimlets; olive Banksia leaves; splashes of vivid colours from wildflowers amongst ashy green foliage.
Texture:	soft swamp oaks; peeling Paperbarks; thick blanket of diverse heath; rough Banksia bark.
Scale:	remnant heath vegetation channels but doesn't enclose long views, and visual penetration is minimal; taller remnant mallee vegetation encloses and channels views, and depth of view into woodlands is extensive; areas of patchy and cleared vegetation offer distant views uninterrupted by landform.

WATERFORM

Form:	shallow lakes.
Line:	linked chain of saline wetlands.
Colour:	shimmering; milky; blue; dazzling white snow on the Stirling Ranges.
Texture:	moist salt flats; dusting of snow on the Stirling Ranges.

LAND USE

Form:	corrugated iron; timber boards; geometric wheat silos and other built forms.
Line:	dominant fence lines; geometric wheat silos; parallel curved, diagonal or straight harvest and plough patterns; roofing and building materials used in local historic architecture.
Colour:	soft red brick, white grey wheat silos; local building stone; roofing and building materials.
Texture:	spiky stubble; roofing and building materials; soft shoots of new wheat growth.

Esperance Plains Landscape Character Sub Type

The Esperance Plains Sub Type forms the southern fringe of the Wheatbelt Plateau Character Type and is located south of the Merredin Plateau Sub Type between Albany and Israelite Bay, meeting the Southern Ocean in a majestic coastline.

These low-lying, level to gently inclined sand plains are again dominated by the agricultural land use which has become widespread here in just a handful of decades. Long, open views across the expansive fields of swaying crops and grazing livestock are only interrupted by silhouetted horizontal lines of trees or huddled clumps of remnant vegetation, or long linear roadside reserves, such as the Hassell National Park.

The remnant vegetation forms a small but definite part of the sand plains landscape and is generally made up of a low but richly diverse heath interspersed with bushy mallees. Enclosing the long views for a brief time, near Ravensthorpe is an isolated pocket of taller, pale Salmon Gum (*Eucalyptus salmonophloia*) woodland, offering a surprising contrast to the big skies of the surrounding agricultural landscape and remnant low mallee heath. The heath displays subtle impressions of muted colours amongst the diverse vegetation. Soft green-golds and russets of new leaves combine with olive greens, greys and browns amongst the dense growth, and in the springtime, the wildflowers offer a spectacular show with splashes of cerise, soft pinks, vibrant reds, purples and oranges. The pale grey-green oval leaves of the Tallerack (*E. tetragona*) are a common sight amongst the heath, often appearing as a straggly emergent slightly above the heath, and is in company with other mallees such as Bushy Yate (*E. lehmanni*), Hakeas such as the robust Ashy Hakea (*H. cinerea*), dense Melaleuca, sprawling Grevillea, bushy Banksia and prickly Dryandra.

Dissecting this landscape with broad, shallow floodwash plains or as deeply incised, U-shaped valleys are numerous intermittent watercourses including the Young, Lort, Fitzgerald, Gairdner and Pallinup Rivers, winding their way south, via inlets and estuaries, to terminate in the cold waters of the Southern Ocean. The broad floors of the incised valleys feature a more undulating, dissected topography, and closer to the coast, some feature caramel coloured slopes and cliffs of horizontally bedded spongilite (soft depositional rock of clays and sands), e.g. at Beaufort Inlet. The shallow floodways and the valleys are generally well vegetated with a taller dense heath, dominated by Melaleuca species, with small patches of Flooded Gum (*Eucalyptus rudis*) and Swamp Sheoak (*Casuarina obesa*), offering a stark line of remnant vegetation meandering across the gentle topography.

The largely uncleared coastal landscape at the southern fringe of the Esperance Plains Sub Type offers a picturesque combination of long, low, curving white beaches often backed by tall windswept solidified limestone dunes cloaked in a dense green coastal heath. These beaches and sweeping bays are protected by hard rounded rocky headlands formed by large stippled granite outcrops which protrude into the turquoise near shore waters of the Southern Ocean.

Interrupting this striking coastline at various intervals are the waters of the coastal estuaries and inlets, including the Oldfield, Beaufort, Torradup, Gordon, Fitzgerald, Culham, Barker, and the uniquely deep Stokes Inlet, which are closed to the ocean for most of the year by low ribbons of narrow white sandbars.

The mottled and striated pinks and greys of the large, rounded, rocky granitic headlands and islands are a visual delight along this coastline, with the best to be seen in the vicinity of Esperance, Cape Arid and Cape Le Grand. Outcrops of this attractive rugged granite stud the many deep meandering riverbeds and is visible again in the rugged form of Mt Manypeaks. This abrupt, low range, like the Barrens in the Fitzgerald River National Park and the granite hills at Esperance, contrast with the coastline and the surrounding gently inclined sandplains, appear as small pyramid shapes on the distant horizon.

Backing the windswept dunes, the coastal hinterland

WHEATBELT PLATEAU

features areas of trapped saline lakes and swamps, such as Pink Lake, which no longer have a connection with the sea. The salt flats of these shallow water bodies are fringed by the red shades of the low succulent Samphires (*Halosarcia spp.*) and are generally surrounded by dense stands of the scrubby pale Salt Water Paperbark (*Melaleuca cuticularis*).

Coastal vegetation has stabilized the fragile shifting frontal dunes, but is inundated in many areas by the stark fingers of dunal blowouts of varying sizes, appearing as slashes of glimmering white against the carpet of grey green heath vegetation. Forming the low dense scrubby heath along the coast are a diverse combination including bushy Wattles (*Acacia spp.*), Tea Tree thickets (*Leptospermum spinescens*), Broom Honeymyrtle (*Melaleuca uncinata*), bushy Banksia and in more protected areas, dense, low Peppermint (*Agonis flexuosa*) woodlands with some taller trees including Redheart Mallee (*Eucalyptus decipiens*), Redwood (*E. transcontinentalis*) and Flat-topped Yate (*E. occidentalis*).

Enclosing the sweeping ocean views of the bay at Esperance are a series of low stark granite islands which form part of the Recherche Archipelago, earning the area the whimsical title of the 'Bay of Isles'. These islands, as well as others scattered along the coastline, such as Bald Island and the Doubtful Island Peninsula, combined with the foaming and crashing of the nearshore limestone reefs and platforms, add an exciting offshore aspect to the coastal views.

Extensive areas cloaked by a velvety cover of diverse heaths and mallees, undisturbed panoramic vistas across a rugged coastal range, deeply dissected V-shaped valleys, stark spongilite cliffs, and smooth, gentle waters of rivers and inlets bespeak of the Fitzgerald River National Park, one of the highlights of this Sub Type. This is the largest area of uncleared land in the Esperance Plains Sub Type and is an expansive representation of the natural landscape which existed before large areas were cleared for agriculture. The steep, ragged Barren Range captures the focal point of many views over the park, starkly contrasting with the low-lying heath covered sand plains and shimmering blue of the Southern Ocean and Inlets.

Scattered along the length of this Sub Type are isolated towns which reflect the region's agricultural heritage with Esperance as the largest population centre. It expanded historically due to its proximity to the goldfields, and more recently by the growth of agriculture and its attraction as a tourist destination. Featuring as an alternative energy source on the coastline at Twilight Beach near Esperance, are the upright windmills, large vertical structures with slowly rotating twin blades which form part of the recently established wind farm.

Ravensthorpe and Jerramungup are two smaller communities situated inland to the west amongst fields of pastoral land and crops. Coastal townships such as Bremer Bay and Hopetoun reflect the fishing industry which has been in place here for several decades and is evidenced by small colourful fishing boats, often seen bobbing at anchor in the sheltered bays along the coastline.

Esperance Plains Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Isolated peaks and ranges with distinctive form which become focal points e.g. Barren Ranges. *U-shaped valleys and well defined steep-sided drainages e.g. Pallinup River. *Dunal formations of distinctive height or shape which are obvious in contrast to the surrounding landscape e.g. dunes at Dillon Bay. *Cliffs, headlands, all islands, offshore reefs and sandbars e.g. Recherche Archipelago. *Dunes which display areas of active weathering, steep slopes or sand-blown areas e.g. Cape Arid. *Irregular coastline edges often emphasised by distinctive rock outcrops, bays and inlets e.g. Hellfire Bay.	* Strongly defined vegetation patterns including eucalypt forest, dune vegetation and heath, with barren rock e.g. coastal vegetation. * Windshaped, gnarled or dwarfed vegetation e.g. coastal heath. * Unique specimen stands of vegetation displaying unusual form and distinctive colour e.g. Royal Hakeas. * Dramatic displays of seasonal colour e.g. spring wildflowers.	* All inlets, estuaries, swamps and lakes e.g. Stokes Inlet. * Unusual ocean shoreline motion associated with islands, reefs, surf zones and shoreline configuration e.g. Doubtful Island Bay. *. Streams with permanent flow characteristics e.g. Lort River.
MODERATE	* Slightly undulating country which is not distinctive or prominent. * Shallow stream associated dissections and depressions. * Regular coast edges without bays, inlets, headlands or cliffs.	* Heath vegetation with little diversity or moderately defined patterns. * Vegetation which exhibits the range of size, form, colour, texture and spacing found in the surrounding landscape.	* Intermittent streams. * Common ocean shoreline character and motion characteristics.
LOW	* Expanses of virtually flat terrain which provides few landmarks with which to orient.	* Extensive areas of similar vegetation such as grassland with few if any trees.	* Waterforms absent.

Esperance Plains Sub Type - Aesthetic Character Summary

LANDFORM

Form:	tall, rounded windswept dunes; rounded headlands; rugged pyramid ranges; gently inclined sandplain; rounded islands; steep ranges.
Line:	vertical cliffs with horizontal bedding; coastline; sweeping bays; narrow sandbars; horizontal plain; horizontal reefs.
Colour:	caramel coloured slopes and cliffs; white sands; peach coloured sandy soils; mottled and striated pinks and greys of granite.
Texture:	sandy soils; soft clays; rocky headlands; stippled granite; studded outcrops; ragged ranges.
Scale:	extensive open views with big skies over the plain; coastal dunes constricts long views to midground.

VEGETATION

Form:	huddled clumps of remnant vegetation; bushy mallees; dense heath.
Line:	silhouetted horizontal lines of trees along fences; long linear roadside reserves; diagonal line of branches and bushes; meandering lines of vegetation following watercourses.
Colour:	green gold and russet of new leaves; olive greens, greys and browns of mature vegetation; soft pinks, cerise, vibrant reds, purples and oranges of wildflowers; pale green Tallerack leaves; grey green coastal heath; red Samphires; pale Paperbarks.
Texture:	soft leaves of Tallerack; peeling Paperbarks; bushy heath;
Scale:	in areas where sand heath vegetation is dominant along roadside reserves, views are channelled but not enclosed and visual penetration into heath is minimal; where vegetation remains in scattered patches, long uninterrupted views open to horizon with big skies.

WATERFORM

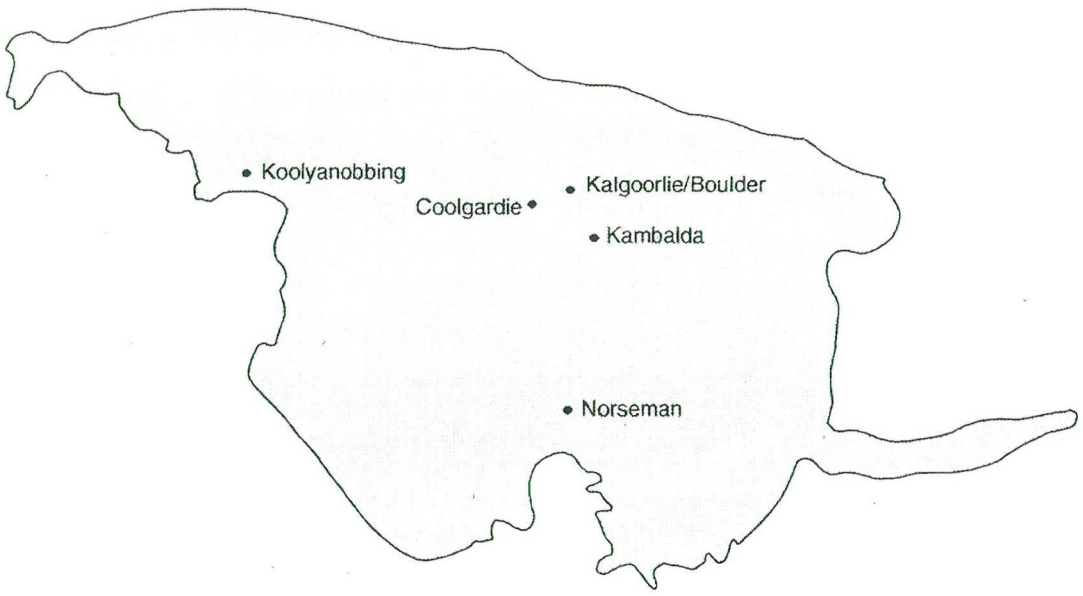
Form:	shallow floodwashes; deeply incised valleys; bulbous inlets and estuaries; rolling waves.
Line:	U-shaped valleys; meandering ribbons; parallel wave crests.
Colour:	pink lakes; turquoise; blue; milky saline lakes; transparent.
Texture:	foaming; smooth.

LAND USE

Form:	angular wooden jetties; geometric built forms.
Line:	long, straight lines of fences; parallel curved or straight harvest patterns; long geometric jetties; vertical, rotating windmills at coastal windfarm; geometric lines of roofing and building materials.
Colour:	grey and white wooden jetties; bleached blonde wheat and grasses dominant; bright green young crops; white windmills; various shades of roofing and building materials.
Texture:	rough wooden jetties; spiky wheat stubble; soft shoots of new wheat growth; roofing and building materials.

6. Kalgoorlie Plain





Scale

0 50 100 150 200 250 Km

Approximate boundaries only
Produced by Land Information Branch,CALM

Kalgoorlie Plain Landscape Character Type

General Description

The Kalgoorlie Plain Landscape Character Type occurs to the north of the Esperance Plains, between the Wheatbelt Plateau and The Nullarbor Character Types, and is bordered on the northern perimeter by the extensive Mulga country of the Meekatharra Plateau.

A very gentle topography is characteristic here, and the terrain is interrupted by many long shallow salt lakes and conspicuous hills and low ranges.



Open Salmon Gum woodlands dominate extensive areas, with low mallees and scrubby heath over richly shaded soils, all featuring colours as bold and vibrant as the Goldfields history which has shaped much of this landscape.

The major cities and towns of this area include Kalgoorlie/Boulder, Coolgardie, Kambalda and Norseman, names which are synonymous with the rich gold mining history of this State.

Climate

Classified as an arid climate, the Kalgoorlie Plain Character Type is generally typified by clear days of uninterrupted sunshine, with temperatures increasing and rainfall becoming less seasonally reliable from the south-west to the north-east.

A period of very hot, dry weather occurs over the summer season, which extends from December through until about March, with temperatures commonly rising above 30°C. Kalgoorlie has a minimum average summer temperature of 17°C, reaching an average maximum of 32°C, with Norseman and Coolgardie offering similar ranges.

The winter months feature cold weather with temperatures often dropping below 2°C, and chilling frosts are common. Kalgoorlie's average winter temperatures range from 5°C to 17°C.

Regular winter rainfall generally occurs from May to August, but its unreliability and variability are characteristic. Kalgoorlie has an average fall of 257mm, but it varies between 488mm to 123mm. Norseman's annual average precipitation is 276mm, but it has a variance from 613mm to 152mm. Echoing summer thunderstorms also produce erratic falls of rain from bruised blue skies, a sombre backdrop for the richly coloured soils.

Landform

The Kalgoorlie Plain Character Type is typified by an expansive, gently inclined landform which appears level in many areas. Views over this landscape are often enclosed and interrupted by the dominant woodland vegetation, but in patches of cleared land featuring low herbaceous growth, and from high points such as Mt Charlotte in Kalgoorlie or the craggy summit of Peak Charles, the broad, far-reaching views over the landscape extend to the distant, hazy, blue-grey horizon.

Interrupting these encompassing views are scattered low stony hills with rock peppered surfaces, abrupt rough granite or burnt red ironstone outcrops, and low dissected ranges. From a distance, these protruding

KALGOORLIE PLAIN

forms appear as dominant focal points in the almost level panorama, and when viewed at close proximity, they command the landscape. The rugged peaks include the rust and blue-grey streaked granite of Peak Charles and Peak Eleanora (at Peak Charles National Park), Kangaroo Hills, Toonarrie Rock, Victoria Rock near Coolgardie, Mt Hunt near Kalgoorlie, Jimberlana Hill near Norseman, and the extensive Fraser Range on the eastern perimeter of the Character Type.

Dissecting this subdued terrain are a series of shallow to almost imperceptible depressions which act as floodways, linking the extensive scattered chains of salt lakes after heavy rains. These shallow lakes are found in broad, indistinct valleys with the eastern and southern peripheral margins occasionally fringed by low-lying dunes.

The colours of the soft sandy soils of the Kalgoorlie Plain are a characteristic feature amongst the sparse, scrubby woodland undergrowth. The variable shades appear from hues of soft peach to warm, rosy pink-reds, to vivid, rich copper, colours which are matched by the smooth, glossy trunks of the woodland trees.

A layer of pale, stony rubble is often seen scattered over the surface of these shaded soils, and appearing occasionally are small rocky piles and rough mullock heaps. These remain today as physical reminders of the extent to which gold mining has impacted upon this Landscape Character Type.

Vegetation

The vegetation of the Kalgoorlie Plain is one of the intrinsic visual ingredients of this landscape, often enclosing and channelling long views, or opening up to reveal sweeping views of wide azure skies over the gently inclined landscape.

Tall woodland Eucalypts are the predominant vegetation type in this region, most notably the slender, flat topped Salmon Gum (*Eucalyptus salmonophloia*). Supporting shimmering, glossy leaves, the sleek, lustrous trunk of this tree displays variegated shades from silver grey and cream to pale salmon pink and warm peach.

Interspersed with Salmon gums are other tall, slender mallees. These include the fluid line of the burnished olive bronze to copper trunks of Gimlet (*E. salubris*) decorated by glistening leaves, the rough, dark stumped Cleland's Blackbutt (*E. clelandii*), Goldfield's Blackbutt (*E. lesouefi*) with flaking bark revealing a smooth, light silvery brown trunk, rough barked Dundas Blackbutt (*E. dundasii*), Woodline Mallee (*E. cylindrocarpa*), the Red Morrel (*E. longicornis*) and the Redwood (*E. transcontinentalis*).

Views which penetrate deeply into the scattered woodland are obstructed only by a predominance of slender, whippy trunks. Two definite layers are often conspicuous in the understorey beneath the tall woodland trees. The upper layer consists of small, slender, dark-leaved mallees mingled with rough looking rounded broombush Boree (*Melaleuca sheathiana* and *M. pauperiflora*).

The lower layer appears as a patchwork of colours from the rich copper to pale peach shades of soils in open clearings occurring between the dull, dusty greens and furry greys of the shrubby vegetation including Grey Bush (*Cratystylis conocephala*) and Pearl Bluebush (*Maireana sedifolia*). Sheaths of tattered pale grey bark with twigs and discarded limbs are littered across the whole area.

After heavy falls of rain, soft grasses appear, covering the bare earth between the low shrubby plants, offering contrasting shades of soft silver and pale gold, with flashes of dull red. New growth on trees and bushes is distinct from the dark olive of mature growth, with dusted fringes showing fresh yellow and golden greens.

Toward the western perimeter of the Kalgoorlie Plain, the Salmon Gum woodlands become interspersed with broad patches of a low bushy heath. This heath, which is extensive in areas over sandy plains allows broader views over this gently undulating landscape. It is renown for its rich and colourful diversity and consists of low mallee-form Eucalypts with many shrubby Acacias, Grevilleas and Sheoaks.

In the springtime, a profusion of vividly coloured

wildflowers appear amongst the green-grey heath, filling the air with the sweet scent of nectar. Wattles, sprinkled with bright yellow blossoms appear everywhere, mixed with red toothbrush blooms on Grevilleas, soft lacy grey Smokebush (*Conospermum stoechadis*), and profuse Red Bead Hopbush (*Dodonea lobulata*).

A wealth of smaller wildflowers abound between larger bushes, displaying splashes of bright blues, stark whites, yellow buttons and vivid purples. Delicate blooms of everlasting daisies perched on long wiry stalks are widespread, most notably the bright candy pink Schoenia (*S. cassiniana*) which blankets the ground extensively beneath the taller vegetation. A highlight of the heath vegetation in spring is the Flame Grevillea (*G. eriostachya*), a wispy bush emerging above the height of the surrounding heath, erupting in a blaze of tangerine blooms.

Fringing the edges of the shallow salt lakes are a collection of hardy salt tolerant shrubs including Samphires (*Halosarcia spp.*) which extend down onto the floor of the saline lakes, scrubby Saltbush (*Atriplex vesicaria*) and Bluebush. These lakes are generally surrounded by isolated dense thickets of shrubs and mallees, including the rough Poverty Bush (*Eremophila spp.*), rounded, bushy Wattles, Sheoaks, and low woodlands of the lustrous-leaved Boorabbin Mallee (*Eucalyptus platycorys*), often occurring on low dunes at the lakes edge.

Softening the abrupt rocky edges of the prominent granite peaks and outcrops are dense, low woodlands and thickets of rounded, broombush shrubs. Often pure stands of the soft, dark olive Rock Oak (*Allocasuarina huegeliana*) huddle around the base with dense thickets of Wilyurwur (*Acacia lasiocalyx*) and bushy Jams (*A. acuminata*), with spiky, yellow-flowering Broom Honeymyrtle (*Melaleuca uncinata*), soft Tamma (*Allocasuarina campestris*) and the thick, Coarse-leaved Mallee (*Eucalyptus grossa*).

Waterform

The extensive, ancient drainage lines which have been reduced to tortuous linear strings of saline lakes are the characteristic waterform of the Kalgoorlie Plain. These often extensive lakes offer mirror image views over their smooth surfaces to low wind-formed dunes on opposite shores. Lake Lefroy and Lake Cowan are two well-known broad saline lakes seen between Norseman and Kambalda.

Scattered, glistening white salt flats often form part of a salt lake chain, and after periods of heavy rain, the saline water bodies flow into one another by linked drainage channels, appearing almost as inland seas. In dry periods, distant shimmering mirages offer false hopes of water in flat, desiccated lake beds.

The scarcity of freshwater in this region caused many problems for early pioneers and settlers until the advent of the Goldfields Water Supply. Apart from a few dams on grazing properties, fresh surface water is limited to shallow claypans which fill after heavy rains and retain water for some months. Small shallow reflective pools of water form on, or at the base of numerous granite outcrops which effectively provide run off to the pools, even after small showers of rain.

Lake Cronin, a small circular body of water in the western region of the Kalgoorlie Plain is unique in being an almost permanent source of fresh water, only drying up after years of low rainfall.

Land Use

Synonymous with the Kalgoorlie Plain landscape is the rich cultural history of the Goldfields. The discovery of gold in 1892 at Coolgardie and in 1893 at Kalgoorlie, and the subsequent colourful history of mining for the precious metal, has been a major influence on this landscape. It is in evidence almost everywhere, from the cars and trucks covered in rich red dust to the angular poppet heads and headframes rising above the landscape which stand guard over the entrances to underground shafts.

Large, steep-sided, flat topped mullock hills demonstrate the extensiveness of some of the open cut gold mines in this area. Nickel is the other major

mineral which is being mined in this region at Kambalda, where the nickel smelter displays a tall slender funnel stretching above the woodland trees.

A cultural legacy remains from the boom times of the Goldfields in its grand buildings and architecture, protected from decay by the harsh and drying climate. The Kalgoorlie Mint, Boulder Town Hall, and the Coolgardie Warden's Court are evidence of the mineral richness of the area and the accumulated wealth of the lucky few. A testimony and epitaph for those not so fortunate reads in the names of Broad Arrow, Ora Banda, Kookynie and Kanowna, just a few of the bustling communities that serviced the 'diggings' to be silenced with the last sighs of gold fever.

The ingenuity of the engineer, C. Y. O'Connor, solved the major water problems experienced in the Goldfields by piping water all the way from Mundaring Weir, on the outskirts of Perth, to Mt Charlotte Reservoir in Kalgoorlie in 1904. Today, the water pipe is seen as a continual cylinder of silver grey, paralleling the Great Eastern Highway to Perth.

The woodlands surrounding Kalgoorlie today generally consist of regrowth trees. During the initial fever of goldrush, most serviceable timber within an extensive radius of the diggings was clearfelled for use in the mines as pitprops, for construction and railway lines. Any other timber was used for fuelling steam trains as well as the immense water condensers, and vast amounts were supplied to gain income by those not so lucky on the fields to fuel domestic and commercial fires. This once avid desire for the timber resource has been reduced greatly and today, the main dependency on wood is for domestic heating and the few licenced cutters generally need to travel considerable distances to attain their product.

Sandalwood trees (*Santalum spicatum*) have also been a desirable resource from this area for many years as an export product. Among the early pioneers were Sandalwood cutters who forged their way through this inhospitable landscape, forming many of the early travel routes. Today, the tree is becoming increasingly scarce and trial plantation plots are now being established in reserves to ensure the industry's future. Sandalwood and other local trees such as the dark, lustrous Myall (*Acacia papyrocarpa*), the pale gold of the Native Pine (*Callitris columellaris*) and the pale Weeping Pittosporum (*Pittosporum phylliraeoides*) are also appealing and attractive timbers for the local fine wood and craft industries.

Extensive pastoral leases are situated on lands generally to the north and east of Norseman and Kalgoorlie. They mainly feature herds of sheep, with an increasing number of cattle.

The largest population centre of the area is the City of Kalgoorlie-Boulder, with nearby Coolgardie, once containing a large population of more than 16 000 people is almost regarded as a ghost town today. The other major towns of the Character Type are Kambalda and Norseman.

The original inhabitants of this land are a facet of the character of the Kalgoorlie Plain. Since mining activities commenced in 1893 in Kalgoorlie the Aboriginies have suffered social and territorial disruption and fragmentation associated with their relocation onto missions such as Cundelee, fringe settlements and reserves. Today, making up 7% of the population of Kalgoorlie, the Aboriginal people still retain strong emotional and spiritual ties with the area, even if they live great distances from their home 'country'.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Rock outcrops or piles of large boulders. *Isolated peaks or low ranges which become focal points by contrasting with the surrounding landscape e.g. Peak Charles.	* Stands of vegetation which create distinctive forms, colours or spacing in comparison to surrounding vegetation e.g. Gimlet trees. * Strongly defined patterns of vegetation resulting from combinations of tall woodland, heath and treeless areas e.g. heath and woodland combinations. * Dramatic displays of seasonal colour e.g. Flame Grevillea.	* All lakes, clay pans and rock pools e.g. Lake Hope.
MODERATE	* Broad, shallow valleys and drainage associated depressions. * Slightly undulating country which are not visually dominant but surrounded by similar landforms.	* Vegetation stands that exhibit the range of size, form, colour, texture and spacing found commonly in the surrounding landscape.	* Waterforms absent.
LOW	* Expanses of virtually flat landforms which provides few landmarks with which to orient.	* Extensive areas of similar vegetation with limited variation in colour and texture.	* Waterforms absent.

Aesthetic Character Summary

LANDFORM

Form:	level to gently inclined landform; conspicuous low hills and ranges; low windformed dunes; block and conical mullock hills.
Line:	level horizon.
Colour:	blue grey horizon; rust and blue grey streaked granite; soils from soft peach to warm rosy pink reds to vivid coppers; burnt red ironstone.
Texture:	craggy summits; stony hills with rock peppered surfaces; rugged peaks; rocky edges.
Scale:	long, mostly uninterrupted views under big skies over the almost level terrain.

VEGETATION

Form:	slender, whippy trunks; flat topped trees; rounded broombushes; sheaths of discarded bark; low bushy heath.
Line:	strong diagonal linr of mallees and salmon gum trunks and branches; strong horizontal layer from three definite vegetation layers; fluid lines of trunks.
Colour:	shimmering, glossy leaves; silver grey, cream to pale salmon pink and warm peach of salmon gum trunks; olive bronze to copper trunks; dark stumps; light silvery brown; dark leaved mallees; dull greens; grey discarded twigs and branches; soft silver and gold grasses; dull red; profusion of vividly coloured wildflowers; bright yellow wattle blossoms; pale grey Smokebush; bright tangerine Grevilleas.
Texture:	scrubby undergrowth; smooth glossy trunks; flaking bark; dusty and furry leaves; soft grasses and Smokebush; spiky Honeymyrtle.
Scale:	mallee and salmon gum woodland encloses and channels long views, and depth of view into woodland extensive; heath vegetation channels views and visual penetration into heath is minimal.

WATERFORM

Form:	shallow depressions and floodways; rock pools; salt flats.
Line:	tortuous linear chains of salt lakes.
Colour:	silver; blue; milky; transparent.
Texture:	smooth mirrored surface.

LAND USE

Form:	pyramid mullock heaps; corrugated iron; form of historical buildings.
Line:	horizontal flat-topped man-made hills; angular poppetheads and headframes; tall slender funnels of nickel smelter; waterpipe; geometric line of roofing and building materials.
Colour:	red dust; silver grey waterpipe; rusting metal; shades of roofing and building materials; greying fence posts; iron railings.
Texture:	rough, scaly, rusting metal; mullock heaps and rubble strewn ground; roofing and building materials; flaking paint.

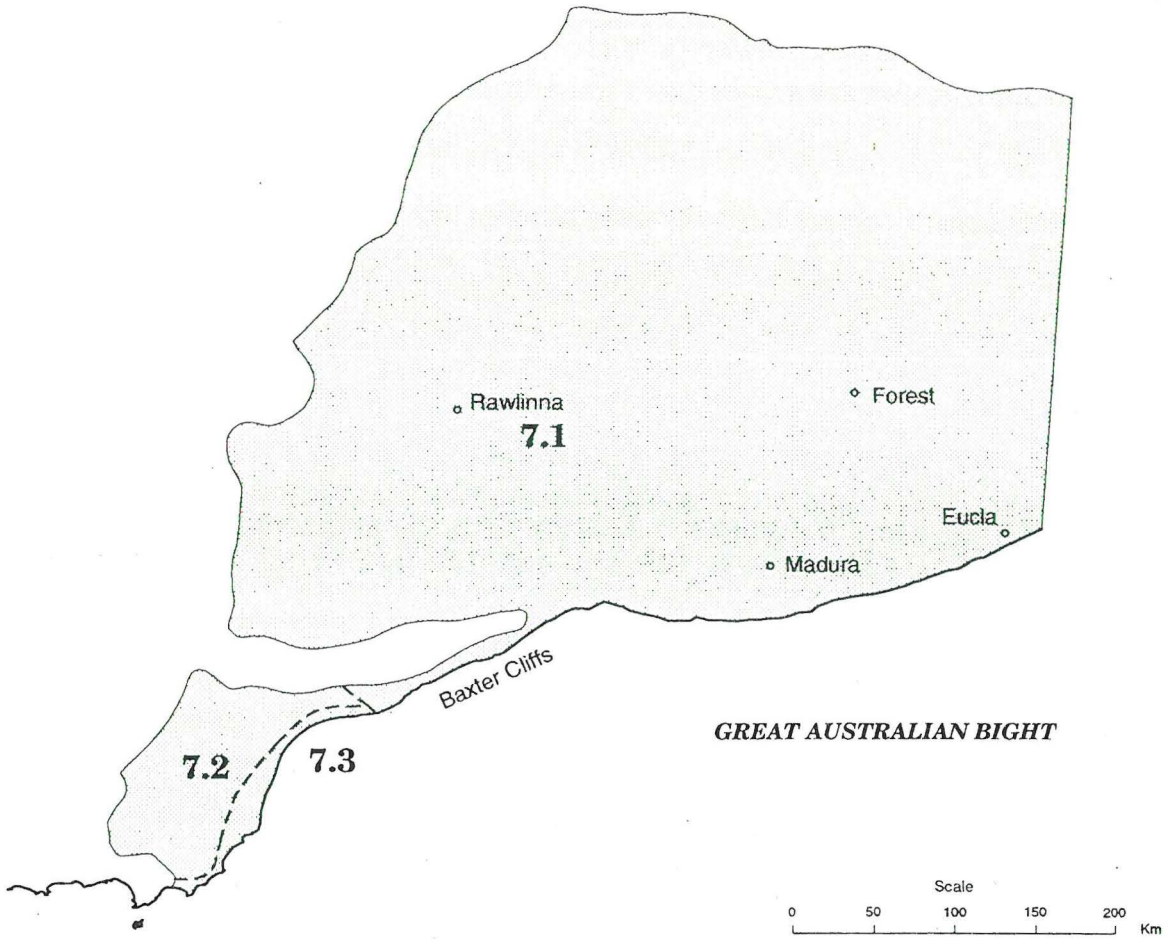
7. The Nullarbor

7.1 Nullarbor Plain Sub Type

7.2 Mardabilla Plain Sub Type

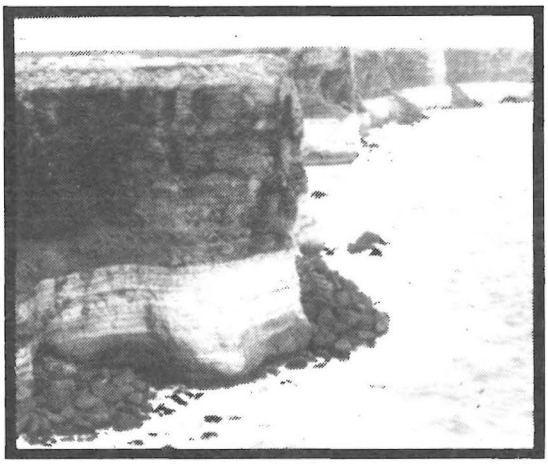
7.3 Israelite Plain Sub Type





The Nullarbor Landscape Character Type

The Nullarbor Landscape Character Type occurs at the very south eastern corner of the State, abutting the WA/SA border. To the south it meets the Great Australian Bight abruptly with striking vertical sea cliffs and coastal plains, and the red sand dunes of the Great Victoria Desert encroach its northern borders. Three distinct Sub Types occur within its boundaries - the Nullarbor Plain, the Mardabilla Plain and the coastal Israelite Plain.



Distinguishing Features

Images of the vast, open, treeless plain and the endless skies which emphasise the flat, arid topography, are the lasting impressions of this region. The extensive expanse of the Nullarbor Plain proper, occurs mostly at the central part of this area, and the periphery is fringed by open Mulga, Myall, Sheoak and Mallee woodlands.

Rugged, stark coastal cliffs form part of the southern margin and are linked by wave-cut escarpments which are backdrops to the low-lying coastal plains and wind-swept dunes.

Below the intrusive narrow finger of the Kalgoorlie Plain Landscape Character Type is an extension of the Nullarbor. This area features rocky granite outcrops and low ranges emerging from the level topography which project above the surrounding landscape.

There are no existing watercourses over the entire area due to the nature of the arid limestone plain forming the landscape. Scattered saline lakes occur to the north, and chains of elongated lagoons are associated with the extensive coastal dune systems.

The visual landscape qualities of the Nullarbor Landscape Character Type are unique to Western Australia. They stand alone from other Character Types which display greater variety and visual interest of such attributes as topographic and vegetative form, line, pattern, colour and texture. However, the Nullarbor's landscape monotony is of special visual interest and rates no lower than Moderate Scenic Quality.

Climate

The climate of the Nullarbor is classified as arid to semi-arid, with the open landscape providing relentless exposure to the desiccating heat of summer and the chilling winter winds, emphasising the sensation of remoteness and isolation experienced on the open plain.

Over the summer months, the temperatures are regularly influenced by the inland climate, often resulting in several very hot days. This pattern is generally followed by many cooler days derived from the moist air flow of the Southern Ocean. It is possible for temperatures to exceed 50°C in summer time here, but the general average summer maximum temperatures experienced include 26°C in Eucla, 33°C in Forrest, 32°C in Rawlinna and 25°C at Point Malcolm.

The cold winter weather is a result of the influence of the prevailing south-westerly winds from the Southern Ocean, and further inland, cloudless winter nights regularly result in bitter frosts.

Rainfall has a seasonal pattern along the coast, but the arid interior has a uniform distribution over the year.

The precipitation overall can generally be characterised as both variable and unreliable. Along the coast, the seasonal rainfall occurs generally in winter as sporadic showers and the average annual levels include 257 mm at Eucla, 300 mm at Eyre and 400 mm at Pt Malcolm.

The rainfall levels decline further northwards and falls are evenly distributed throughout the year. Forrest receives 187 mm, Rawlinna 188 mm and Jubilee is recorded as low at 150 mm annually. Summer rainfall and occasional thunderstorms which create booming echoes across the subdued terrain sometimes bring heavy but unreliable showers in localised areas.

Nullarbor Plain Landscape Character Sub Type

The Nullarbor Plain Landscape Character Sub Type is an extensive area of land occurring to the immediate north of the sweeping blue embayment of the Great Australian Bight, to the south of the invading wind-formed dunes of the Great Victoria Desert, and continues eastward beyond the State border. It is stamped as a unique landscape with the pale floury soil and thin veneer of clay disguising one of the largest limestone areas in the world. This wide, open landscape is a near horizontal plain, tilting imperceptibly toward the sea.

The extensive treeless region at its heart is responsible for most of the characteristic images formed, with gentle undulations barely texturing its surface under a limitless sky with astonishing, virtually uninterrupted views over the vast terrain. Derived from the immense area of subterranean limestone, subdued landforms interrupt the open panorama at distant intervals. Over much of the plain and extensively in the southern region, round, shallow, clay-filled indentations, more commonly known as dongas, pockmark the surface. In some areas, these indentations merge to form linear, loamy clay filled corridor flats. These shallow depressions are separated by low, elongated, rubbly limestone strewn crests which occasionally run in a parallel pattern.

Much of the rough limestone beneath the level surface of the plain has been dissolved away leaving hollow cavernous formations such as Roaches Rest Cave and the extensive Cocklebiddy Cave. These subterranean features occasionally interrupt the level surface of the plain to reveal themselves in the form of roughly circular holes in the ground which are generally littered with stony, flat limestone rubble, often with sheer vertical or overhanging edges protecting the entrance to a sunless cavern beneath. Toward the northern perimeter of the plain, extensive, deep, enclosed depressions are scattered over the limestone surface. These flat floored cavities often exhibit rough, rocky walls and edges with sharp, abrupt rims following the circumference with pale, broken limestone protruding through the surface.

Emphasising the level topography of the Nullarbor Plain is a low carpet of Bluebush (*Maireana sedifolia*), the dominant vegetation. Rarely growing taller than waist height, this twiggy grey blue shrub appears in the foreground as a scattered cover with many bare peach coloured clay patches between, and in the distance, forms a dense, tufted blanket continuing on into the far, level horizon. Often appearing unrelieved by another species of plants, Bluebush persists over the whole area, whether in the presence or absence of trees. Saltbush, including Bladder Saltbush (*Atriplex vesicaria*), and tufted Bunch Grasses (*Stipa* sp.) are interspersed with Bluebush, and in some areas become more predominant, seen as a soft silver grey carpet.

The position of dongas over the plain is made conspicuous by providing the only areas where taller shrubs will grow on the plain. These shallow depressions pool rainwater and have slightly deeper clay soils than other areas, providing a more hospitable environment for plants such as Myalls (*Acacia papyrocarpa*), bushy Miljee (*Acacia oswaldii*), graceful, Weeping Pittosporum (*Pittosporum phylliraeoides*), and stiff, spiky Kurara (*Acacia tetragonophylla*).

Appearing at the periphery of the Bluebush plain are lonely, isolated specimens of the taller vegetation which is more predominant to the north and the west of

this Sub Type. Tenacious Myall stands as green islands above a sea of Bluebush, and many brittle, skeletonised trees are scattered on the edge of the open plain, as victims of vermin, grazing and drought, which interrupt the long views to the distant, flat horizon. Moving toward the northern perimeter of the Nullarbor Plain, the gradually thickening tree cover over low grasses and Bluebush, is a mixture of tangled Mulga (*Acacia aneura*), huddled groves of tall, wispy Black Oak (*Casuarina cristata*) especially in the vicinity of the shallow saline lakes, with Sugarwood (*Myoporum platycarpum*), sinuous trunked Giant Mallee (*Eucalyptus oleosa*), Pear Fruited Mallee (*E. pyriformis*), spreading Witchetty Bushes (*Acacia kempeana*), spiky Kurara, bushy Sandalwood (*Santalum spicatum*), Quandong (*S. acuminatum*) and a few scrubby Myall. Travelling towards the western perimeter of the Sub Type over the flat loamy clay soils, the views of the open skies are enclosed by the dominant thick Myall scrub with wispy Black Oak, Sugarwood, and a few Mulga over the patchy Bluebush and Saltbush ground cover.

Moving south, the Nullarbor Plain suddenly ceases with a startling abruptness 60-100m above the crashing waves and fringes of surging white froth from the relentless waters of the Great Australian Bight. From Point Culver to Twilight Cove the imposing, precipitous Baxter Cliffs form continual vertical to overhanging rugged walls, emphasised by shaded horizontal layers of rich toffee to pale cream. At Twilight Cove, the Hampton Scarp appears. This wave cut escarpment is an emerged and weathered continuation of the sheer rock face of the Baxter Cliffs, and links it to the corresponding Bunda Cliffs in South Australia.

At the base of the Hampton Scarp, a low-lying coastal plain has developed, dominated by extensive areas of wind-formed dunes. Some of these areas of deep, weathered sand have been piled up against the face of the Hampton Scarp where they have spilled over the rim to form unique clifftop dunes, seen at Toolinna and Eucla.

A low, diverse belt of mallee woodland fringes the summit of the Hampton Scarp and progresses further northwards, gradually thinning toward the extensive treeless plain. Ridge Fruited Mallee (*Eucalyptus angulosa*), Soap Mallee (*E. diversifolia*) and the Giant Mallee are the most prevalent with the canopies becoming reduced closer to the cliff, pruned and buffeted by the prevailing winds. Slightly further inland, the mallee becomes more sparse with patches of soft blonde grasslands with Bluebush, Greybush (*Cratystylis conocephala*), Tea-Tree (*Melaleuca lanceolata*) and broombush under Soap Mallee, Red Mallee (*Eucalyptus socialis*), Giant Mallee and Port Lincoln Mallee (*E. conglobata*). On the wind-formed sandpatches and precarious clifftops, a tenacious heath has established, with Ridge Fruited Mallee, Narrow Leaved Red Mallee (*E. foecunda*), and Soap Mallee, bushy Rigid Wattle (*Acacia cochlearis*), with Southern Plains Banksia (*B. media*) and a low bushy Banksia (*Banksia epica*) being prevalent over the sandpatches.

Sandwiched between the abrupt Hampton Scarp from Twilight Cove to Wilson Bluff, and the curving embayment of the Great Australian Bight is a subdued coastal plain dominated by windformed dunes. Extensive rounded domes of bleached dunal sand occur from the western margin at Twilight Cove and stretch toward the centre of the level plain for several kilometres. Piled up in undulating mounds near Eucla, more smooth, bright silvery-white dunes known as the Delisser Sandhills have collected, spilling over the top of the Hampton Scarp to encroach onto the plain beyond. Meeting the blue waters of the Bight, a fringe of elongated dunes with a rocky limestone shore mark the limit of the coastal margin, sending slender fingers of sand encroaching on the subdued hinterland.

An extensive, open treeless plain with pale rubble scattered over its sandy surface separates these dunes and is dominated by a patchy cover of scrubby Saltbush (*Atriplex vesicaria*), with low Greybush and Bluebush beneath. Patches of succulent scrubby Samphires (*Halosarcia halocnemoides*) predominate in shallow saline depressions scattered over its surface.

Along the foot of the Hampton Scarp and the seaward margin of the plain, a belt of mallees which closely resembles those occurring on the plain inland, beyond

the Scarp, enclose the Saltbush dominated heart. The Saltbush is still present beneath the taller whippy mallees with wavy branches decorated by a flat, lacy canopy, as well as Greybush and the spiky Spear Grass (*Stipa hemipogon*). The scattered dense thickets of mallees include Giant Mallee, Narrow Leaved Red Mallee, with Frog Hakea (*H. nitida*), Cue York Gum (*Eucalyptus striaticalyx*), and dark, bushy Native Cypress (*Callitris preissii*).

The undulating dunes are covered by a low bushy growth which provides a dense patchwork of tufted colours featuring various shades of greens and greys over bare patches of bright, bleached blonde sand. Rounded darker green Broombush (*Melaleuca* sp.), with blue-grey Coastal Daisy Bushes (*Olearia axillaris*) and the sharp, spiky leaves softened by the feathery, wheat-like flowers of Spinifex (*Triodia scariosa*) are common, with other wind pruned heaths.

The response of the vegetation to good rains, and the change it makes to the appearance of the landscape is astounding. The scattered openings of bare ground beneath the trees and amongst the almost boundless Bluebush plains are overwhelmed by a dense carpet of pale green and soft golden grasses, with sprinkled dots of bright colour from ephemeral plants such as the flame-like glossy red and black Sturt Pea (*Clianthus formosus*), stark white spots of White Everlastings (*Helipterum floribundum*), bright pink Sticky Everlastings (*Helichrysum davenportii*), the soft pink pom-pom blooms of Hairy Mulla-Mulla (*Ptilotus helipteroides*) and the large, creamy yellow Splendid Everlastings (*Helipterum splendidum*).

Waterbodies play a very subtle role in the landscape of the Nullarbor. Other than the wide blue expanse of the Great Australian Bight, very few sources of permanent water are available. To the northern region of the plain, the extensive enclosed rocky depressions generally feature a centralised claypan where rain waters pond after gushing down gullies formed in the steep walls.

The extensive, shallow salt lakes at the northern and western margins are only filled after rains with a few inches of saline water. Rare, ancient drainage lines are also apparent at the northern perimeter of this Sub Type, but today they show no obvious relation to rivercourses at all.

Further south on the extensive, open plain, the dongas collect water after rains, as well as the numerous rock holes scattered over the surface of the plain, providing unexpected sources of fresh water.

On the coastal plain below the Hampton Scarp, elongated inter-dunal lakes and claypans have developed, providing a vital source of fresh water to many early explorers and settlers before the numerous wells and bores were sunk to sustain the activities which take place on the Nullarbor Plain today.

The dominant activity over the lower half of this Sub Type is pastoral grazing, dominated by sheep which benefit from the Bluebush, Saltbush and ephemeral grasses as fodder, and are more tolerant to the levels of salinity in the Nullarbor Plain water. The importance of the bores and wells to the sustenance of this activity can be surmised by the numerous tracks and the area of dusty bare ground surrounding each precious water source.

Rabbit shooters patrol areas on both sides of the border attempting to control the alarming populations which this pest has reached. The effect which rabbits have had on the Nullarbor Plain landscape is marked, stripping many areas of vegetation completely and leaving a devastated encompassing view of scattered, small black twigs over pale rubble which were once part of the Bluebush plain.

Nature reserves encompass extensive areas of this Sub Type. Most notably, the Great Victoria Desert Nature Reserve is almost totally enclosed in this region, at the north-eastern corner. The Nuytsland Nature Reserve incorporates the Baxter Cliffs and part of the coastal plain, and a portion of the Plumridge Lakes Nature Reserve is situated on the north west perimeter. At the south-eastern corner of this area is the Eucla National Park, protecting the extensive area of the undulating Delisser Sandhills.

The indigenous people of this region once widely inhabited the northern fringe and coastal strip below the Hampton Scarp, occasionally venturing onto the treeless plain after good rains. Today, the activity by Aboriginies in the region includes rabbit shooting and more traditional hunting, especially on the Great Victoria Desert fringe which abuts the Maralinga Tjaruta Lands in South Australia.

The abundance of extensive subterranean caverns has attracted many adventure enthusiasts to the area for underground explorations, but other than historical ruins and the abandoned telegraph lines, major tourist attractions are sparse. It is generally a region through which most people travel, enduring its incredibly straight roads to reach their destination, it is rarely a destination in itself. Aside from the scattered pastoral stations, the other sparse settlements are concentrated around the roadhouses, hotels and petrol stations on the Eyre Highway and the isolated railway stations along the route of the Indian Pacific.

Nullarbor Plain Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Rounded clay filled depressions or dongas. *Distinctive low elongated parallel crests and corridor depressions. *Irregular cave entrances and enclosed depressions e.g. Cocklebiddy Cave. *Irregular coastline edges and steep vertical cliffs e.g. Baxter Cliffs. *Steeply sloping terrain of distinctive shape and abrupt appearance e.g. Hampton Scarp. *Windformed dunes of distinctive form which become focal points e.g. Eucla National Park. *Coastal dunes which display areas of active weathering and abrupt edge transition to adjacent low-lying areas e.g. Twilight Bay.	* Windshaped, gnarled or dwarfed vegetation which create unique forms, colours or textures e.g. Banksia epica. * Stands of vegetation which display unusual form, colour or texture in comparison to surrounding vegetation and contrasting with the adjacent landscape e.g. taller vegetation in dongas. * Ephemerals showing striking displays of colours, shapes and textures e.g. Sturt Desert Peas.	* Any evidence of lakes, claypans or pooled water, filled or dry e.g. Forrest Lakes.
MODERATE	* Dunal formation of uniform height and shape. * Features which are not visually dominant and are surrounded by similar landforms. * Regular coastline edges with little contrast in form, texture and colour.	* Vegetation which displays the size, form, colour, texture and spacing found commonly in the surrounding landscape.	* Waterforms where present, rate no lower than high in this LCT.
The extensive, expansive and monotonous topographic and vegetative visual attributes of this Visual Landscape Character Sub Type is of special scenic interest and rate no lower than Moderate Scenic Quality.			

Nullarbor Plain Sub Type - Aesthetic Character Summary

LANDFORM

Form:	dongas; low crests; enclosed depressions; windformed dunes; caverns; craters.
Line:	horizontal plain; vertical sea cliffs & scarps; low parallel crests; linear corridor flats; diagonal overhanging walls; wavecut escarpment; horizontal bedding in cliffs.
Colour:	grey limestone; silver sand; cream to peach coloured clay; rich toffee to pale cream cliff bedding; bleached dunal sand.
Texture:	floury soils; smooth clay; rocky remnants; desiccated plains; rubbly crests; rocky walls; sharp rims; broken limestone.
Scale:	often wide open, uninterrupted vistas with few features with which to orient; big skies; coastal dune formations restrict views to foreground and midground.

VEGETATION

Form:	skeletonised trees; windpruned heath; flat canopies; rounded broombush; flame-like Sturt Peas.
Line:	low horizontal carpet of Bluebush dominant; graceful Weeping Pittosporum; tangled Mulgas; wispy Black Oaks; sinuous trunks; whippy trunks; wavy branches.
Colour:	silvery grey Bluebush ; green islands surrounded by a sea of Bluebush; pale green and soft gold grasses; glossy red and black Sturt Peas; bright pink, creamy yellow and stark white everlastings; soft pink Mulla Mulla.
Texture:	rough; dry; dusty; tufted blanket; soft carpet; bushy Miljees; stiff spiky Kuraras; brittle; scratchy; Ridge Fruited Mallees; lacy canopies; spiky spear grasses; feathery, wheat-like Spinifex flowers; hairy Mulla Mullas.
Scale:	long open views uninhibited by low Bluebush and Saltbush plain vegetation; taller mallee and Acacia vegetation channels views and the visual penetration into vegetation is extensive; dune vegetation only moderately interferes with views, and long views are interrupted by the dune landforms.

WATERFORM

Form:	pools in shallow depressions; shallow salt lakes.
Line:	waves; elongated interdunal lakes and lagoons.
Colour:	white fringes of surging white froth; blue; turquoise.
Texture:	foaming white froth.

LAND USE

Form:	circular wells and bores.
Line:	worn stock tracks; abandoned telegraph line; geometric built forms; parallel tracks of straight railway line.
Colour:	grey wooden poles of telegraph line; local stone and roofing materials; reflective silver parallel railway tracks.
Texture:	local stone and roofing materials; smooth, reflective silver metal tracks; dusty tracks; rusting iron windmills.

Mardabilla Plain Landscape Character Sub Type

The Mardabilla Plain is the most southerly Landscape Character Sub Type of the Nullarbor. It is a flat landscape like many other parts of this Landscape Character Type but its individuality stems from the occurrence of rough granite outcrops which stud its subdued surface. These outcrops present an imposing landform contrasting abruptly with the surrounding landscape and dominating the long views to the distant horizon. Mt Ragged (592m), occurs as part of the Russell Range, with other discerning peaks including Diamonds Hill and Mt Buraminya. Many smaller rough, rocky domes and rounded boulders protrude above the surface and include Mardabilla Rock, the Pups and Rays Rock.

The shaded pale peach clays cover the surface of the Mardabilla Plain disguising the characteristic limestone of the Nullarbor which is never far below the surface. This feature is more apparent towards the eastern border of this sub type where parts of the underlying rock have collapsed into craters and shallow caves such as Gecko Cave, breaking the smooth clay veneer of the plain and exposing rough, pale grey limestone rubble amongst the depressions.

Creating an abrupt edge on the eastern margin of the Mardabilla Plain is the Wylie Scarp. This steep landform once appeared as a continuation of the precipitous sea cliffs featuring along parts of the Nullarbor coastline, but it is seen today as a weathered backdrop to the narrow Israelite Plain Sub Type, and stretches from Point Malcolm to Point Culver.

Enclosing the long views over the level terrain, widespread clumps of the distinct white-stemmed Many Flowered Mallee (*Eucalyptus cooperiana*) are an attractive and striking feature of this plain. The smooth white bark of this low multi-stemmed tree contrasts brightly against the deep green lustrous leaves, with glimpse of purple on new branches. Interspersed with these conspicuous trees are isolated Salmon Gum (*E. salmonophloia*) with glossy variegated trunks of peach and silver, Alexander River Mallee (*E. micranthera*), Hook-Leaf Mallee (*E. uncinata*), and Giant Mallee (*E. oleosa*) which become more dominant to the north of Mt Ragged over a patchy Bluebush and Saltbush understorey.

The low shrubs forming the understorey beneath these trees often don't appear taller than knee height. Many of the stunted bushes leave gaps between the huddling clumps, revealing the smooth peach coloured clay soils with some scattered pale limestone rubble strewn over the subdued surface. Understorey plants include Cockies Tongue (*Templetonia retusa*) with bright red and pink flowers, Pink Bottlebrush (*Beaufortia schaueri*), splashes of red amongst the rich green foliage of the Few-flowered Grevillea (*G. pauciflora*), scratchy olive green Dryandra (*D. longifolia*) and low shrubs with silvery, scaly leaves and creamy flowers (*Microcybe* sp.).

The steep slopes and gravel strewn bases surrounding the abrupt peaks of the Russell Range feature vegetation slightly distinct from that of the surrounding plain. They are dominated by a diverse, thick sand heath scrub which features low mallees, the dark olive serrated leaves of the Showy Banksia (*B. speciosa*) emerging above the heath, the tall, robust Southern Plains Banksia (*B. media*), and the prickly foliage of the Oak-leaved Dryandra (*D. quercifolia*). On the lower slopes of the range, the mallees and Banksia disappear, and in their place the vegetation includes the soft grey green Scrub Sheoak (*Allocasuarina humilis*), interspersed with plants such as the One-Sided Bottlebrush (*Calothamnus quadrifidus*) and Needle Leaved Broombush (*Melaleuca pentagona*). Moving toward the summit of the abrupt range, low, pale green Peppermint (*Agonis linearifolia*), bushy Baxter's Kunzea with soft, glossy red bottlebrush blooms (*Kunzea baxteri*), and low, bushy Cypress (*Callitris preissii*) are predominant, especially close to the exposed ridges.

There are no permanent waterbodies existing throughout this Sub Type. The only drainage lines present are very ancient remnants which have no directional flow. To the west and north west of the Russell Range, numerous small salt lakes occur in concentrated clusters, and are

filled by good falls of rain. These are surrounded by narrow glistening sandsheets and low wind-formed dunes. Fresh water is collected in rock holes which are filled by runoff resulting from good falls of rain. These, however, are intermittent and very unreliable.

There are no settlements whatsoever occurring in this Sub Type, presumably due to the harsh conditions and lack of reliable fresh water. The level of success of past attempts at settlement are exhibited by homestead ruins at Balbinya and Deralinya.

The major land use of the Mardabilla Plain is conservation. Cape Arid National Park extends from the coast northwards into this area, including the Russell Range and other prominent peaks nearby. Abutting the National Park's eastern boundary is the Nuytsland Nature Reserve which narrows as it reaches the coast, encompassing the Israelite Plain Sub Type and beyond.

Mardabilla Plain Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Isolated peaks or ranges with distinctive form contrasting with the surrounding landscape (e.g. Mt Ragged). * Rock outcrops or jumbles of large boulders e.g. The Pups. * Irregular limestone cave entrances and enclosed depressions e.g. Gecko Cave. * Steeply sloping terrain of distinctive shape and abrupt appearance e.g. Wylie Scarp. * Lunettes of distinctive height or shape which contrasts with the adjacent landform patterns.	* Strongly defined patterns of vegetation resulting from a combination of mallee woodlands, heaths, barren rock or outcrops, and naturally appearing openings e.g. vegetation surrounding Russell Range. * Distinctive stands of vegetation which create unusual forms, colours or textures in comparison to the surrounding vegetation e.g. white stemmed many flowered mallee. * Striking displays of seasonal colour e.g. ephemeral wildflowers.	* Any evidence of salt lakes, rock holes and pools, filled or dry e.g. salt lakes on western margin.
MODERATE	* Landform features which are not visually dominant and are surrounded by similar landforms.	* Vegetation which displays the range of size, form, colour, texture commonly found in the surrounding landscape.	* Waterforms where present, rate no lower than high in this LCT.
LOW	* Large expanses of indistinctly dissected landform that provide few landmarks with which to orient.	* Extensive areas of similar vegetation with little contrast in colour, texture and spacing.	* Waterforms where present, rate no lower than high in this LCT.

Mardabilla Plain Sub Type - Aesthetic Character Summary

LANDFORM

Form:	rounded domes; abrupt pyramid ranges; craters; shallow caves; sandsheets and low windformed dunes.
Line:	horizontal plain; vertical scarp.
Colour:	pale peach to ochre clay; glistening sand; mottled granite.
Texture:	rough, rocky granite outcrops; rough limestone rubble; smooth clay veneer; rocky scarp; gravel and sandy soils.
Scale:	wide open landscape with big skies and virtually uninhibited views.

VEGETATION

Form:	thick heath scrub; robust shrubs; oak-leaved Dryandra.
Line:	strong irregular diagonal lines of mallee trunks; horizontal line of understorey canopy.
Colour:	white stemmed mallees; deep green leaves; purple stems; peach and silver Salmon Gums; bright red and pink flowers; pink Bottlebrush; silvery leaves; creamy flowers dark olive Banksia leaves; grey green Sheoaks; pale green Peppermints.
Texture:	lustrous leaves; glossy trunks; scratchy Dryandra; scaly leaves; serrated leaves; prickly leaves; soft Sheoaks; needle leaved Broombush; glossy Bottlebrush.
Scale:	vegetation channels views and depth of view into mallees is extensive.

WATERFORM

Form:	shallow salt lakes; rounded rock holes.
Line:	horizontal lake surfaces.
Colour:	blue; shimmering; milky.
Texture:	smooth; reflective.

LAND USE

Form:	
Line:	
Colour:	
Texture:	

Israelite Plain Landscape Character Sub Type

The Israelite Plain Landscape Character Sub Type is a low-lying coastal plain sandwiched between blue waters at the western edge of the Great Australian Bight and the abrupt Wylie Scarp.

Windswept coastal dunes dominate this narrow plain. Bleached blonde mobile dunes line the coast and reach into the sea, while further inland, extensive rounded dunal hills, such as the Bilbunya Dunes, are a highlight at the northern region. The shapes and patterns of the dunes forming here are slightly distinct from those in other regions of the Nullarbor Character Type. This is due to the north-east trend of the plain below the scarp, which protects it from prevailing winds, resulting in more rounded rather than elongated dunal shapes.

Projecting through the pale dunes at scattered intervals in the southern region of the plain are low, rocky granite hills. These rough, solid forms contrast distinctly with the surrounding fluid lines of the wind-formed sand.

The Wylie Scarp, which appears as a backdrop to the plain, emerges in the area adjacent to Point Malcolm. Rising from sea level, this rocky, weathered escarpment reaches a height of 100m at its northernmost location at Point Culver. Here the Israelite Plain peters out and the scarp becomes part of the sheer Baxter Cliffs which continue eastward around the Bight.

At the base of the scarp, along its length and rising a small distance up the face, a scree of loose rubble has formed. Pieces of pale red clay and fragments of rough, grey limestone are scattered amongst the sand, pebbles and small boulders which have fallen away from the escarpment to rest at its foundations. This accumulation of rubble inclines gently down to the plain to meet the softer lines of the encroaching pale sandy dunes.

Rugged granite headlands including Gegelup Point, Cape Pasley and Point Dempster, occur at the southern coastal margin of this Sub Type, resisting the tumbling surf and strong persistent tides, protecting the narrow elongated plain beyond.

Adding contrast to the long views over the blue waters of the Great Australian Bight are nearshore limestone reefs evidenced by gurgling and foaming waters, and rocky granite islands such as Daw Island, Pasley Island, Bellinger Island, and the Eastern Group of the Recherche Archipelago.

The domed dunes forming along the coastline of the plain are partially blanketed by a low, dense scrubby heath, contrasting with the bright areas of bleached mobile sand occurring at intervening patches. Some of the bushy shrubs occurring here and also over the deep sands of the stable dunes further inland, include Showy Banksia (*B. speciosa*) which emerges conspicuously above the general level of the rich heath, Coastal Wattles (*Acacia cyclops*), weeping Native Willows (*A. salicina*), Native Junipers (*Myoporum insulare*), the bushy One-Sided Bottlebrush (*Calothamnus quadrifidus*), and the spreading Granite Bottlebrush (*Melaleuca elliptica*). Much of the area over the stable inland dunes is also covered by a dense mallee scrub dominated by Ridge-Fruited Mallees (*Eucalyptus angulosa*).

Small shallow swamps and elongated chains of coastal lagoons are frequently impounded in depressions behind the dunal systems. These often dry waterbodies are filled by good falls of rain in winter and also by the few shallow intermittent watercourses which descend the scarp.

The major land use of this Sub Type today is conservation. The entire area is part of the Nuytsland Nature Reserve which continues eastward around the Great Australian Bight.

Settlement here in the past has been unsuccessful and relicts of those attempts are shown by the abandoned homesteads at Wattle Camp and Glencoe, where there is also the ruins of an old jetty. Striding down the entire length of the coastline of this Sub Type is the old abandoned telegraph line which was once a vital communications link to many areas, now long superseded by modern technology.

Israelite Plain Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Dune formations of distinct height, colour and shape e.g. Bilbunya Dunes. *Headlands and other irregular coastline edges e.g. Point Dempster. *Offshore reefs and islands e.g. Daw Island. *Rock outcrops or jumbles of large boulders e.g. Israelite Hill.	*Strongly defined patterns of vegetation resulting from mallees and heath, mobile dunes and rocky outcrops. *Distinctive stands of vegetation which create unusual forms, lines, colours and textures in comparison to the surrounding landscape e.g. Showy Banksia	*Interdunal lagoons, claypans, swamps. Any evidence of lagoons, claypans or swamps, filled or dry e.g. Daringdella Lake. *Unusual ocean shoreline motion associated with headlands or islands.
MODERATE	*Dune formations which are not visually dominant and are surrounded by similar landforms. *Regular coastline edges which show little contrast in form and line.	*Vegetation patterns which exhibit the range of size, form, line colour, texture and spacing found commonly in the surrounding landscape.	*Waterforms where present, rate no lower than high in this LCT.
LOW	*Landform lacking in the visual variety common to the surrounding landscape.	*Extensive areas of similar vegetation with very limited variation in colour or texture.	*Waterforms where present, rate no lower than high in this LCT.

Israelite Plain Sub Type - Aesthetic Character Summary

LANDFORM

Form:	windswept coastal dunes; rounded dunal hills; low granite hills; rugged headlands; domed islands.
Line:	parallel dune ridges; elongated plain; horizontal limestone reefs.
Colour:	bleached blonde dunes; pale sand; pale red clay and grey limestone fragments.
Texture:	rocky granite hills; scree of loose rubble; fragments of clay and limestone with sand and pebbles; rough rocky granite headlands; rocky islands.
Scale:	dunes and scarp confining views from foreground to midground; big skies.

VEGETATION

Form:	dense heath.
Line:	vertical emergent Banksia; graceful native willows.
Colour:	grey green wattles.
Texture:	scrubby heath; ridge fruited mallees.
Scale:	views over heath confined by landform; taller mallees slightly enclose views and depth of view into vegetation is moderate.

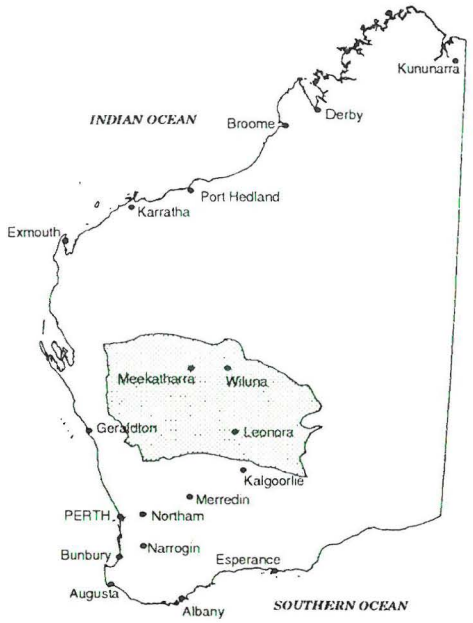
WATERFORM

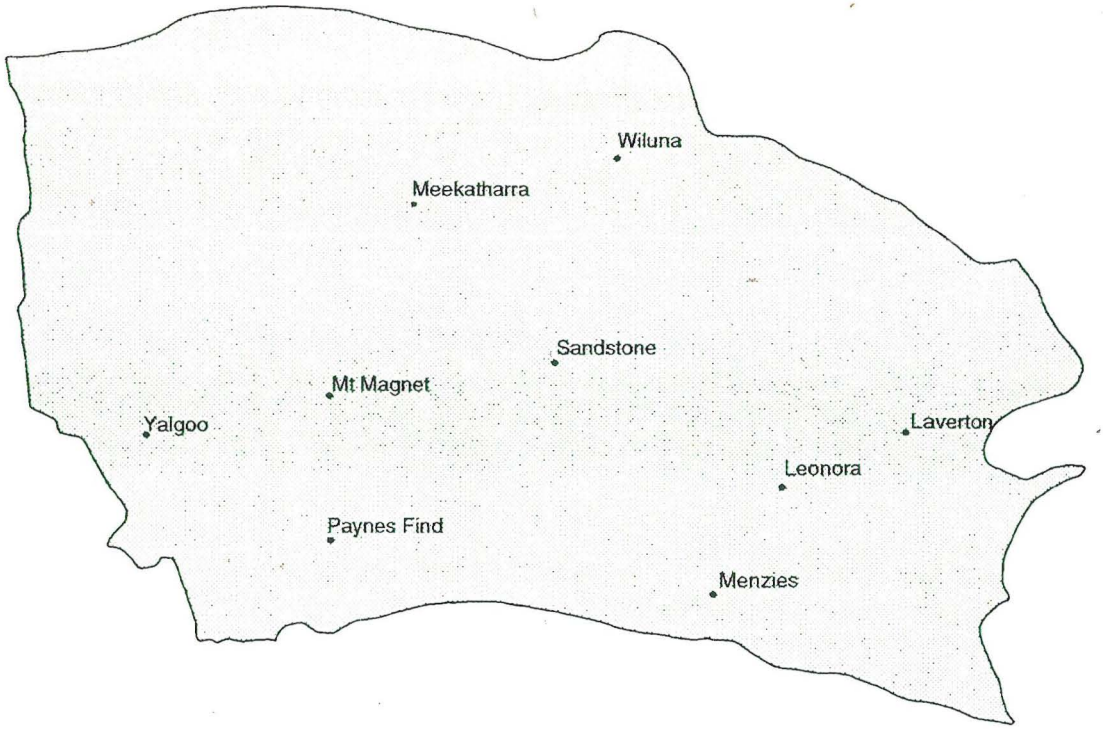
Form:	shallow lagoons.
Line:	elongated chains of coastal lagoons.
Colour:	turquoise; blue; transparent.
Texture:	foaming surf.

LAND USE

Form:	abandoned structures and local materials.
Line:	geometrical abandoned jetty; vertical poles of abandoned telegraph line.
Colour:	grey aged wood of jetty and telegraph line; local stone building materials.
Texture:	rough wood and local stone; dusty remains of abandoned structures.

8. Meekatharra Plateau





Scale
0 50 100 150 200 Km

Approximate boundaries only
Produced by Land Information Branch, CALM

Meekatharra Plateau Landscape Character Type

General Description

The Meekatharra Plateau Landscape Character Type is situated to the north of the Wheatbelt Plateau and Kalgoorlie Plain Character Types, to the west of the vast Great Victoria Desert, and inland to the east of Shark Bay.

This is an ancient, eroded landscape typified by gently undulating plains, with rough, rounded rock outcrops and low, rugged ranges and hills appearing conspicuously on its surface. Small erosional scarps or breakaways and flat-topped mesas are remaining evidence of a former plateau landscape which once overlay this area.



Covering this region almost unbrokenly with enduring tenacity is the Mulga tree, a stunted form of Acacia. This is the principal vegetation of the Meekatharra Plateau Character Type and its predominance here makes this the most significant Mulga region of the State.

The western portion of this Character Type features shallow drainage lines and upstream flow of westward flowing watercourses including the head-waters of the renown Murchison River which partially fringes the northern margin. Further to the east, extensive salt lakes, saline playas and clay pans are scattered over the subdued surface.

There are many small townships dispersed over this Character Type including Leonora, Laverton, Sandstone, Mt Magnet and Yalgoo. Other isolated communities in the area are associated with the extensive pastoral industry which is the dominant land use here, as well as several mining centres. Many more bustling townships once graced this region, their inhabitants attracted by the lure of gold, but today most remain only as vague place names on old dated maps.

Climate

The Meekatharra Plateau Character Type receives a semi-arid to arid climate. The low, often unreliable rainfall, the high evaporation rate, and the temperatures which regularly reach past 40°C all contribute to the dusty, parched impression of this landscape under broad azure skies.

Essentially, this is a dry region where droughts are as much a part of the climate as localised, short-term flooding. From the south western border to the north east, the seasonality of the precipitation varies from a partially reliable winter rainfall to moderately unreliable summer falls.

Yalgoo has an average rainfall of 262mm mostly from March to August. Meekatharra receives an average fall of 220mm annually, with a variability of 441mm - 66mm, and Laverton's average rainfall is 221mm which can very annually between 452mm and 66mm. Widespread, erratic falls of rain are also received from remnants of tropical cyclones from the northern region, from winter frontal systems of the south-west, and from scattered thunderstorms which roll over the landscape in summer.

The Meekatharra Plateau Character Type generally experiences long, hot summers with virtually cloudless skies. The winters are cool and mild. Laverton experiences summer temperatures from the average

maximum of 35°C to an average minimum of 20°C, and in winter the temperatures range from 18°C to 6°C. Meekatharra's summer temperatures range from a maximum average of 37°C, to a 23°C minimum, with a 19°C maximum and an 8°C minimum experienced in winter. Occasional winter frosts occur over most of the area, associated with clear, starry nights and chilling temperatures.

Landform

Distinguishing the gently inclined plains under big skies which are dominant in the Meekatharra Plateau Landscape Character Type, are the warm terracotta to rich maroon shades which colour the soils and rocks in this region, creating a stark contrast with the rounded, olive Mulga, green-blonde Spinifex tussocks, and the wide azure sky.

Sandplains of deep, burnt red shades form a notable part of this landscape. Generally appearing as a level to gently undulating land surface interrupted by a few long, scattered, wind-formed dunes, these sandy plains often occur on higher ground and are the remnants of the ancient, eroding plateau surface.

Fringing many of the sandplain regions as a sudden edge are abrupt, steep, rust shaded cliffs of rugged breakaways, such as the Barr Smith Range south of Wiluna, with irregular, rubble strewn concave slopes often gouged by vertical furrows. A horizontal layer of contrasting creamy grey clay is commonly seen leaching down the lower slopes of the scarps onto the stony, pale plain at the foot of the breakaway. This generally appears parallel with the flat-topped lip at the rim of the scarp, which is decorated by a fringing line of silhouetted trees.

Other areas of extensive plains occurring in this landscape are often strewn with irregular pale quartz rubble or orange-red pea gravel, contrasting sharply with the maroon to burnt red soils. Earthy red soil plains which are free of rubble generally denote the location of the deep, compact hardpan, known as 'Murchison Cement', which is occasionally revealed fringing broad, shallow gullies.

Alluvial and floodwash plains with broad saline plains form an extensive part of this landscape, generally defined by the low, shrubby plants scattered across their level, often stony surfaces, and are occasionally fringed by low, red sandy mounds. More defined watercourses occur closer to the major river networks, such as the Murchison River, graduating from mud flats to shallow floodways, to large creeks which strongly dissect the plains toward the western perimeter of the Character Type, often apparent only by the concentration of vegetation following their meandering courses. Occasionally fringing some of the drainage areas are irregular, broken limestone platforms which appear a stark near-white against the contrasting deep red earth surrounding the rough outcrops.

Extensive areas of long, shimmering salt lakes, such as Lake Austin, were once part of an ancient river system over this area, joined by the broad, shallow valleys in the aged plateau surface. Many of these considerable waterbodies show active weathering on their western shores by the presence of more rugged, rust shaded breakaway scarps and low rocky hills, littering gravelly debris down the gentle slopes to the lake edges. The low eastern margins of the lakes are often hemmed by rounded crescent dunes of deep red wind-formed sand and rubbly mounds of paler kopi (gypsum) dunes.

Disturbing the open, far reaching views over the gently inclined plains and interrupting the long horizontal skyline are isolated flat-topped, mesas and vertical buttes, rounded whaleback hills and low elongated, irregular ranges, which are often spaced horizons apart, appearing as low, dark, wavy mounds in the hazy distance. The gentle, maroon rubble covered slopes of these elongated ranges are generally softened by a contrasting thin cloak of dull green vegetation disguising the rough surface, and lending to their appearance as an undulating hazy blue shaded form in the distance with concave crescent shadows on the gentle slopes revealing shallow gullies.

The low, solitary hills with rounded rubbly peaks and the extensive ranges are visually prominent in this landscape from every direction, such as Warramboo Hill near Mt Magnet, due to the accentuated contrast

with the surrounding plain, revealing an almost full circle view of the gently undulating, windswept terrain. Other rocky mounds of eroded granite are scattered over the area at various localities, occasionally appearing as mottled rubbly horizontal sheets, such as Cockatoo Rocks near Goongarrie National Park, or as upright tors such as Mt Boreas near Laverton.

Vegetation

The vivid colours of the landscape in the Meekatharra Plateau Character Type are cloaked by a diverse, contrasting mixture of vegetation dominated by Acacias, most notably the hardy Mulga (*Acacia aneura*).

Mulga is prevalent over much of this wide, open landscape and is a primary facet of many vistas, especially the extensive burnt red granite plains strewn with broken pieces of pale quartz gravel, and the copper shaded "Murchison Cement" hardpan. Appearing generally as a low broombush shape or as a wispy, rounded tree on slender black trunks, the Mulga huddles in scattered groves with irregular, open areas revealed between them, exposing the richly coloured gravel littered soils and sparse, low undergrowth. They are also seen strewn across the plains in wide, almost evenly spaced intervals, contrasting as rounded dots of pale, dusty olive grey scattered over the burnt red soils, leaving long dark shadows in the golden light of early morning and evening.

Scattered amongst the scrubby Mulga are other Acacias, their presence often localised, denoting a change in the underlying soil structure or local topography. Mulga with the stiff Kurara (*A. tetragonophylla*) often occurs fringing drainage lines, and with the Hop Mulga (*A. craspedocarpa*) are seen in deep red soils within drainage lines. Limestone Wattle (*A. sclerosperma*) are seen around pale rough limestone platforms and the spreading Bowgada Bush (*A. linophylla*) often grows on rocky hills.

Other taller vegetation dispersed amongst the low, open woodland of Acacias includes the stark, smooth white bark of the River Gum (*Eucalyptus camaldulensis*) and the crooked, pale barked Rough Leaf Range Gum (*E. aspera*) which form part of an open fringe along less saline water courses. Coolibahs (*E. coolibah*) with distinct smooth silvery bark, Giant Mallees (*E. oleosa*) and Barlee Box trees (*E. lucasii*) are sometimes seen bordering limestone platforms, and pale, rubble strewn granite hills are generally covered with scattered trees of the curly barked Miniritchie (*Acacia grasbyi*) and needle leaved Cork Trees (*Hakea subera*) as well as Mulga. The open, rough, grey barked Kingsmill's Mallee (*Eucalyptus kingsmillii*) is often seen with Mulga on deep red sandplains and the rubble strewn slopes and sheltered bases of breakaways sometimes feature bushy, dark green Native Cypress Pines (*Callitris huegelii*).

Toward the western and southern borders of the Meekatharra Plateau Character Type, Mulga begins to lose it dominance over the landscape due to the increase of both the seasonality and levels of winter rains. The wispy Horse Mulga (*Acacia ramulosa*) begins to be more prominent in these areas.

The low rough shrubs which form the sparse rounded shapes out in the wide open landscape or as an understorey beneath the taller Mulga woodland are principally Poverty Bushes (*Eremophila* spp.) and Broom Bushes (*Cassia* spp.). The pale leaves of Wilcox Bush (*Eremophila leucophylla*), the dense, dark green glossy leaved Burra (*E. fraseri*), narrow leaved Warty Poverty Bush (*E. latrobei*) and the pale yellow-green leaves of the Turpentine Bush (*E. clarkei*) all contrast vividly with the dark red, often rubbly soils surrounding them.

Soft, silvery Grey Cassia (*C. desolata*), furry White Cassia (*C. luerssenii*), with pale grey Cotton Bushes (*Ptilotus obovatus*), are starkly distinct against the shaded soils. Other bushy shrubs seen in the Meekatharra Plateau Character Type include the smooth Native Senna (*Cassia pleurocarpa*), the broad Grass Leaved Hakea (*H. multilineata*), and the stiff, curved, needle-like leaves of the Djarnokmurd (*Hakea recurvata*).

Beneath these low bushes are stunted, rough herbaceous plants which are sparsely scattered over the burnt red

soils. Many of the low herbs in this area are ephemeral, appearing and growing vigorously after good falls of rain. These plants exhibit an astounding variety of diverse colours in a massed display when flowering, from candy pink to mauve daisies with yellow hearts, to bright yellow and stark white everlastings, all seen generally as carpets of nodding blooms extending into the far distance. Included amongst these colourful flowers are the soft pink Narrowleaf Mulla Mulla (*Ptilotus drummondii*), vivid yellow and white Pompom Head (*Cephalipterum drummondii*), flaming clusters of glossy black and red Sturt Peas (*Clianthus formosus*), large creamy yellow Splendid Everlastings (*Helipterum splendidum*) balanced on long, delicate stalks, candy pink carpets of Shoenia (*S. cassiniana*), pale Pink Velleia (*V. rosea*) and vivid yellow Bright Podolepis (*P. canescens*).

Rains also stimulate the vigorous growth of many types of grasses which are scattered over much of this region. Spinifex (*Triodia* and *Plectrachne* spp.) forms the only extensive areas of grasslands, seen over the burnt red sandplains as bleached blonde and pale green tussocky domes or rings with needle-like leaves projecting in all directions. After rains these spiky domes are softened by wheat-like flowers, rippling and swaying in the wind.

Banks of tenacious perennial tussock grasses occurring on the burnt red sand plains and sandy banks are known as Wanderri grasses, generally appearing under bushy shrubs such as Bowgada Bush, Wilcox Bush and the rounded, grey Sandbank Poverty Bush (*Eremophila margarethae*). These grasses are under pressure from the widespread pastoral industry and their regularity over the ground varies from a fairly dense ground cover of spiky grasses with small, regular gaps revealing orange red soils, to sparse, isolated tufts and stubble amidst large areas of exposed bare earth. Broad-leaved Wanderrie Grass (*Monochather paradoxa*) and Creeping Wanderrie (*Eragrostis lanipes*) are two of the perennial Wanderrie grasses occurring here and Mulga Grass (*Aristida arenaria*) is one of the many short annual grasses which proliferate after rain, carpeting the ground with a thin veneer of wispy pale green to blonde blades.

The low lying areas in this region such as floodwash plains, salt lakes and their margins, are generally dominated by characteristic salt tolerant plants. These areas are distinguished by extensive regions of low, bushy blue-grey, pale olive and maroon shrubs which are often lower than knee height, with taller growth such as Mulga being generally sparse and conspicuous.

One of the dominant plant types on these low-lying areas is Saltbush (*Atriplex* spp.) including the blue-green River Saltbush (*A. amnicola*), grey Bladder Saltbush (*A. vesicaria*) and the fuzzy, pale orange Spongebush (*A. spongiosa*). Other plants tolerant to these saline conditions are Bluebushes (*Maireana* spp.) including stiff, compact Sagobush (*M. pyramidata*), Satiny Bluebush (*M. georgei*), and the glossy leaved succulent Bronze Bluebush (*M. atkinsinia*). The rough, hairy Gee (*Dissocarpus paradoxus*) covered in round, spiky prickles, the dense, grey, thorny Sage (*Cratystylis subspinescens*) and the mat-like Seaheath (*Frankenia pauciflora*) are also widespread. Lake floors and margins are often dominated by the steadfast Samphires (*Halosarcia* spp.) which increase in density simultaneously with rises in soil salinity.

Salt lakes such as Lake Annean, are fringed by low dunes of kopi (gypsum) and dark red sands. The sandy mounds occasionally feature the slender Cue York Gums (*Eucalyptus striaticalyx*), or a few wispy Black Oaks (*Casuarina cristata*), but are mostly covered by a few scattered shrubs such as the erect Wheel Grevillea (*G. spinescens*), the stout, densely-leaved Kopi Poverty Bush (*Eremophila miniata*), and the unusual, upright, candelabrum shaped Dunna Dunna (*Lawrencia helmsii*).

Slightly away from the edges of salt lakes, more vividly colourful annuals display their nodding blooms, such as the pea flowered Purple Vetch (*Swainsona pterostylis*), which form extensive bright carpets, marking the lakes outer margins.

Waterform

The presence of water in the Meekatharra Plateau Character Type is very much dependant upon the

rainfall. Periods of extended dry weather are common, creating a different landscape image from that experienced after good rainfalls.

In drought or dry periods, the vast, sinuous salt lakes of the eastern half of the Character Type, such as Lake Austin, Lake Way and Lake Barlee, appear as extensive, empty parched flats with glistening patches of white salt crystals fringing areas of higher ground. After periods of good rainfall, these lakes can become filled to the extent of appearing almost as inland seas. Linking along ancient, shallow watercourses, they are interrupted by low, rounded islands and peninsulas fringed by low, sparse shrubs and isolated trees.

Toward the western region of the Meekatharra Plateau Character Type, the waterforms appear as tributary creeks and as headwaters of major rivers including the Greenough River, and the Roderick and Sanford Rivers which eventually merge into the extensive Murchison River. In drier periods, these watercourses often appear as flat beds of water sculpted sand with small, isolated blue pools of glassy water scattered along their length. After good falls of rain, the parched creeks and rivers can become muddied torrents, collecting and channelling water from the alluvial and floodwash plains. When the torrent has calmed, the water flows gently past broad tree fringed banks with small, isolated terracotta coloured sandy beaches. In some areas, the rivers broaden into stretches of quiet water such as Yalgar Pool, with steep, burnt red shaded rocky fringes surrounding the still surface which reflects the deep blue skies, the green fringing vegetation and occasionally the stark white trunks of the River Gums.

Shallow claypans and mudflats, such as Geeloo Claypan on the Greenough River, cover extensive ground often in the upper reaches of watercourses, where they spread out over large areas, with shoots of bright green grasses emerging above the smooth surface. Small, limpid pools of mirrored water are seen trapped in shallow depressions on rocky areas after rain, and pits of abandoned mines, such as Big Bell mine near Cue, become sheer-sided, rain filled waterholes.

Land Use

The dominant and widespread land use of the Meekatharra Plateau is the pastoral industry, which sees herds of sheep and occasionally cattle, grazing through the scrubby native vegetation on the extensive pastoral properties situated over the region.

Signs of this activity are present everywhere, from the isolated pastoral homesteads, often appearing as lush green oases, to the familiar whir of the rotating grey metal blades of upright windmills which stand sentinel over the circular water tanks of corrugated iron, warm orange local stone, or smooth grey cement. Extensive lengths of fencing are common in this region, comprised of various materials. Piled, tangled remains of brush fencelines formed into enclosures have been used in the past to yard sheep temporarily, and geometric grey wooden fences form more permanent sheep yards near corrugated iron shearing sheds and other out buildings. Linear expanses of horizontal strand wire fencing interrupted at regular intervals by vertical star pickets or wooden posts form the extensive perimeters to grazing land. Often a stark contrast is obvious on fence boundaries, between land containing stock and areas free from grazing, referred to as the 'fence-line effect'. Areas outside the fences appear to contain a healthy range of diverse vegetation, while the areas inside the fences appear as having considerably reduced diversity with broad, bare red patches of earth common between plants, with sinuous fingers of the black and grey skeletons of former trees and bushes emerging amongst the sparse olive green growth.

The rich history of gold mining in this Character Type brought many areas of settlement to the region. Population centres such as Mt Magnet, Meekatharra and Leinster sprang up resulting from the tempting lure of riches and fame in the Murchison Goldfields, but many more mining settlements such as Nannine and Field's Find, which were once bustling townships, are now only signposts pointing to mounds of dirt with forgotten relicts of houses and other signs of habitation.

Signs of the extensive influence which gold mining once had over this Character Type are apparent in many areas. Deep, gaping holes in the ground from

abandoned mines, such as Big Bell mine near Cue, angular metal poppet heads perched precariously over smaller rubble strewn pits, and scattered piles of broken concrete with other discarded, rusting relicts amongst mounds of sand and rocks, are some of the familiar reminders. More subtle visual influences which gold mining has had on the Character Type include the denuded regions surrounding many older towns such as Sandstone and Meekatharra due to the wood taken for mining timbers and firewood. The pale grey clay slime dumps are also associated with many disused mines, and now wash over the ground in broad, flat grey sheets virtually obliterating all in their path.

Signs of on-going mining here include the immense, flat-topped mounds of spoils around open cut mines which stand in conspicuous isolation in the landscape. Within these deep mounds are rings of spiralling bench roads which descend into the open cut pit, travelled by virtual convoys of red dust covered oversized trucks and giant earth-moving equipment which rumble past the stark, angular mine buildings and grey metal structures. Minerals which are found in this area other than gold are silver, nickel, fuller's earth clay, copper and zinc, and precious stones including emeralds and opals.

Aboriginal occupancy was widespread throughout the region and the occurrence of Ochre pigments, particularly within the Weld Ranges at Wilgie Mia near Meekatharra created a trade which reached far into the eastern part of Australia for thousands of years. Visual evidence of the cultural use and importance of these pigments can still be seen in the pale faded images of rock paintings, such as at Wolganna Rock, near Cue. The utilization of the lands by Europeans for grazing and mining resulted in dispersal and migration of the Aboriginal peoples. Communities have been established for some of the displaced Aboriginals groups such as at Mt Margaret and Cosmo Newberry on the eastern perimeter of the Character Type.

Conservation areas of the Meekatharra Plateau Character Type consist mostly of Nature Reserves which protect and preserve samples of various ecosystems and the resident plants and animals therein. The Goongarrie National Park east of Menzies is the only National Park throughout this Character Type.

Meekatharra is the largest population centre of the Character Type, and smaller townships are Mt Magnet, Leonora, Laverton, Wiluna, Yalgoo, Paynes Find, Cue, Leinster and Menzies. These communities as well as the many pastoral properties are linked by long, straight roads, often unsealed, which support passing traffic, including the immense road trains, leaving the fringing roadside vegetation coated in a pall of red dust.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Rounded hills, ranges, mesas and other steeply sloping terrain of abrupt appearance with distinctive shape and are visually prominent in the surrounding landscape e.g. Weld Range. *Abrupt outcrops, piles of large boulders or horizontal granite sheets e.g Walga Rock. *Elongated sand crests or lunettes which contrast with the surrounding landscape e.g. edging Lake Austin. *Well defined, distinctly dissected terrain e.g. Murchison riverbed. *Landforms of distinctive or contrasting colours e.g. limestone outcrops.	*Specimen vegetation which become focal points due to isolation, unusual form, colour or position in the landscape e.g. River Gum. *Strongly defined patterns of vegetation associated with rock outcrops, salt lakes and watercourses. *Ephemerals or other vegetation showing dramatic displays of colour e.g. carpets of cream Splendid Everlastings. *Vegetation exhibiting diversity of species, heights and densities.	*All salt lakes, rivers, streams and swamps, filled or dry.
MODERATE	*Landforms with common patterns of dissection evident but not distinctive from surrounding landforms. *Broad, shallow valleys and drainage associated dissections and depressions.	*Vegetation pattern, colour and texture contrast evident but of regular pattern relative to surrounding landscape.	*Waterforms, where present, rate no lower than high in this LCT.
LOW	*Expanses of virtually flat landforms which provide few landmarks with which to orientate.	*Extensive areas of similar vegetation with very limited variation in colour, texture or contrast with the surrounding landscape. *Areas of noticeably disturbed or degraded vegetation.	*Waterforms, where present, rate no lower than high in this LCT.

Aesthetic Character Summary

LANDFORM

Form:	limestone platforms; low granite hills; sandplains; abrupt breakaways; exposed, bare soils; floodwash plains; low dunes; sandy mounds; mesaform hills; whaleback hills; gently inclined plains; broad shallow valleys; rounded dunes; shallow gullies; rounded peaks; granite tors and sheets.
Line:	long, dark shadows; drainage lines; horizontal surfaces of mesas and breakaways; irregular ranges; linear dunes; crescent lunettes; elongated ranges and breakaways; horizontal skyline; concave slopes; vertical furrows; horizontal layer of clay; vertical mesas; dark wavy mounds; concave crescent shadows; vertical tors; horizontal granite sheets.
Colour:	vivid burnt red soils and granite plains; copper shaded hardpan; golden morning and evening light; azure skies; stark, near white limestone; pale quartz rubble; deep red sandplains; warm terracotta to rich maroon soils and rocks; pale cream clay soils; rust shaded cliffs; earthy red soils; mottled granite.
Texture:	broken pieces of pale quartz gravel; compact hardpan; rough limestone; rocky hills; rubble strewn slopes; rubbly soils; sandy mounds; smooth skyline; fine sand; coarse grit; stony plains; rugged breakaways; irregular rubble; earthy soils; broken, rough limestone; rough outcrops.
Scale:	wide, open, long views to distant horizons, interrupted but not enclosed by landforms unless proximity denotes.

VEGETATION

Form:	broombush or rounded mulga trees; scattered groves; sparse undergrowth; rounded dots; spreading River Gums; bushy Cypresses; broad Grass-Leaved Hakea; low bushes; stunted plants; carpets of nodding blooms; pom-pom heads; flame-like Sturt Pea; carpets of wildflowers; tussocky domes or rings of Spinifex; isolated tufts; short annual grasses; succulent Bronze Bluebush; mat-like Sea Heath; erect Wheel Grevillea; candelabrum shaped Dunna Dunna.
Line:	verticals and diagonals of Mulga trunks; curved Djarnokmurd leaves; delicate, vertical everlasting daisy stalks; slender trunks of Cue York Gums; vertical Dunna Dunna; horizontal line of silhouetted trees.
Colour:	pale, dusty olive-grey; grey barked Kingsmill's Mallee; silver barked Coolibahs, dark green native Cypresses; pale leaved Wilcox Bush; glossy dark green leaved Burra; pale yellow-green Turpentine Bush leaves; silvery grey and white Cassias; pale grey cotton Bush; candy pink to mauve daisies with yellow hearts; bright yellow, candy pink and stark white everlastings; pink Mulla-Mulla; glossy red and black Sturt Peas; creamy yellow Splendid Everlastings; pale Pink Velleia; vivid yellow Podolepis; bleached blonde grasses; pale green grasses; blue-grey, pale olive and maroon shrubs; pale orange sponge bush; Bronze Bluebush; Purple Vetch; stark white trunks of River Gums.
Texture:	wispy Mulgas; scrubby bushes; stiff Kurara; smooth barked River Gum and Coolibah; needle leaved Cork Trees; rough barked Kingsmill's Mallee; soft Cassia; furry Cassia; smooth Native Senna; stiff, needle-like Djarnokmurd leaves; rough herbs; needle-like Spinifex; wheat-like Spinifex flowers; spiky grasses; stubble; fuzzy spongebush; tough, hairy Gee with round, spiky prickles; wispy Black Oaks.
Scale:	depth of view into sparsley scattered, low, open woodland is generally extensive and constricted only by landforms.

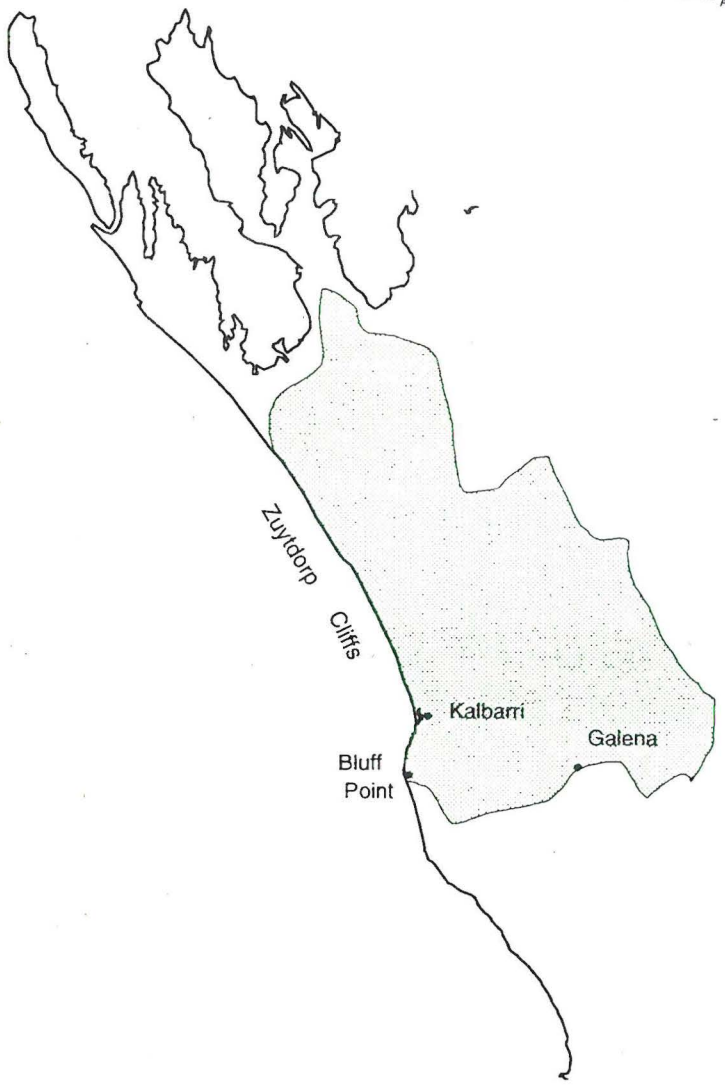
WATERFORM

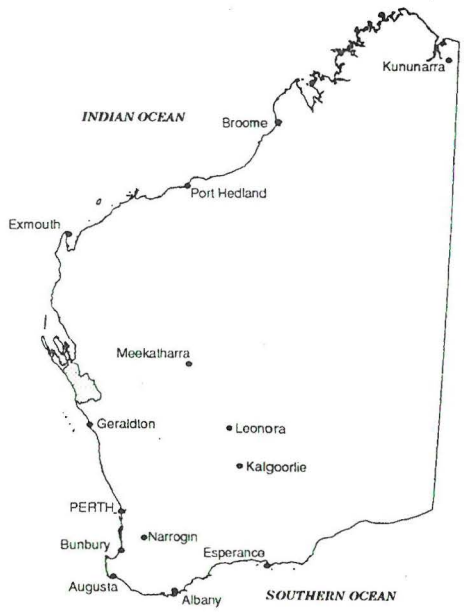
Form:	shallow gullies; mud flats; flat beds; water sculpted sand; quiet water; shallow claypans and mudflats.
Line:	long sinuous salt lakes; horizontal claypans and mudflats; meandering rivers.
Colour:	shimmering salt lakes; glistening patches of white salt crystals; blue pools of glassy water; muddied torrents; mirrored water; limpid pools.
Texture:	parched lake flats; dry sandy beds; still, smooth surfaces.

LAND USE

Form:	circular water tanks; piles of brush; star pickets; skeletonised trees and shrubs; mounds of dirt; deep gaping holes of abandoned pits; flat-topped spoil mounds; oversized trucks and giant earth-moving equipment.
Line:	upright windmills; tangled lines of brush; geometric wooden fences; linear expanses of horizontal strand wire; vertical star pickets and wooden posts; fence-line effect; sinuous fingers of skeletonised trees and bushes; sign posts; angular poppet heads; horizontal clay slime sheets; spiralling bench roads into open cut pits; long straight roads.
Colour:	lush, green oases of homesteads; grey metal; warm orange local stone; grey cement; grey wooden fences; bare red patches of soils; rusting metal; pale grey clay slime dumps; dust covered trucks; grey metal structures; red and yellow ochre; pale, fading images on mottled rock.
Texture:	corrugated iron; smooth cement; rubble strewn pits; rusting metal; mounds of sand and rock; clay slime dumps; red dust; smooth rock surface.

9. Kalbarri Sandplain





Scale
0 10 20 30 40 50 Km

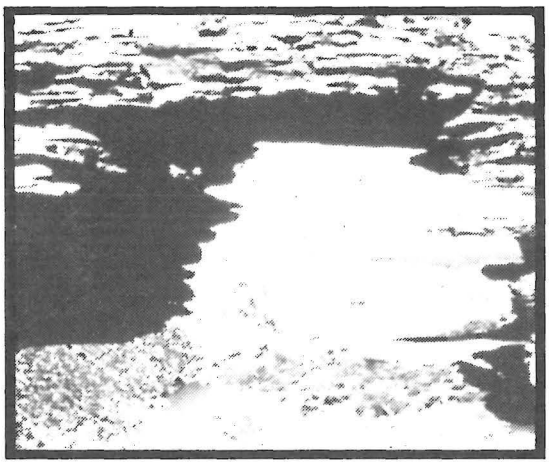
Approximate boundaries only
Produced by Land Information Branch, CALM

Kalbarri Sandplain Landscape Character Type

General Description

The Kalbarri Sandplain Landscape Character Type abuts the coastline with the imposing Zuytdorp Cliffs and the Indian Ocean forming its abrupt western boundary. It is sandwiched between the Geraldton Plains at its southern border and the elongated peninsulas of Shark Bay to the north.

A very gently inclined sandplain with long, open views to the distant horizon forms most of the landscape of this region. Dissecting this with a spectacular display of rugged, colourful sandstone in deep, rocky gorges is the Murchison River which winds a sinuous course through the plain to meet the sparkling blue waters of the Indian Ocean at Kalbarri.



A richly diverse sandplains heath covers this region in a blanketing mosaic of green which erupts into a riot of colourful wildflowers, appearing from late winter until the end of the year.

Situated at the mouth of the Murchison River, Kalbarri is the only major population centre of the entire Character Type and is surrounded by the extensive area of Kalbarri National Park. A small Aboriginal community from the Nanda tribe is situated near Ajana, and a few pastoral stations occur, but this region is considered mostly unsuitable for that purpose.

Climate

Kalbarri's climate is one of its biggest attractions, providing a balmy winter refuge for many people from the southern parts of the State in the colder months.

Mild winters and hot, dry summers are the normal pattern here, with winter temperatures ranging from a 21°C maximum to a 10°C minimum, and in summertime, from 32°C maximum to 18°C minimum. February is the hottest month of the year in this area, with the afternoon heat relieved by the strong, prevailing south-west winds which buffet the coast daily.

Kalbarri experiences less than seventy rainy days a year, offering a welcome respite to many southern visitors. Concentrated between May and September, the average annual precipitation for the area is 381mm, decreasing gradually to the north and north-east.

Landform

The relentless surge of the Indian Ocean has cut an abrupt edge into the desolate, windswept coastal sandstone and limestone hills along the western perimeter of the Kalbarri Sandplain. Known as the Zuytdorp Cliffs (after a Dutch ship of that name which ran aground there in 1711), they are characterised by the sweeping, uninterrupted line of precipitous edges and steep slopes from the mouth of the Murchison River north to Shark Bay. Seamed by watercourses and cascades of pale sand, the horizontal striations of pale toffee, cream and grey visible in the slopes reflect the foaming line of breakers which crash against the boulder strewn bases and the level rock platforms which, in some areas, extend past the edge of the cliffs to meet the oncoming force of the waves.

Reaching rugged heights to 224m at Woomerangee Hill, with many upright limestone outcroppings amongst the windpruned coastal heath along the ridges, the eastern slopes of the domed limestone hills descend gradually to meet the very gently inclined sandplain

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which dominates the entire Character Type. The dense heath covered sandplain stretches from horizon to horizon with almost unbroken views over the vegetation, occasionally interrupted by low, scattered yellow sandridges on the western and northern regions of the area and along the Kalbarri - Balline Road where steep and sharply dissected sand dunes have been swept up by the prevailing winds.

Meandering across the broad, open sandplain, the sinuous course of the Murchison River creates a distinct impression across the near level topography. The region of sandstone basement rocks occurring beneath, and exposed over the plain in the southern part of the Character Type has been deeply carved by the scouring waters of the river to produce an impressive, picturesque gorge. The land surrounding the gorge is deeply dissected by the erosional forces of the river, with rocky hills such as Mt Curious and the deep valleys contrasting abruptly with the encompassing landform of the low-lying sandplain. The uneven erosional effects on the horizontal bedding of the richly shaded sandstone within the gorge is a dominant feature, creating intricate patterns in the rocky gorge walls such as Nature's Window and precarious overhanging precipices such as Hawk's Head.

It is a view of colourful contrasts, from the reflective pools and ribbons of water winding through the islands of tumbled boulders, and fringed by soft olive green River Gums (*Eucalyptus camaldulensis*) with stark white trunks appearing almost fluorescent against the rugged, pale rust and cream walls of the valley gorge.

Narrow, rocky tracks to the floor of the gorge reveal the rough tiers of rich shades within the irregular walls, and with untidy piles of tumbled boulders, form an enclosed view around the limpid pools of water and the beaches of pale, gravelly sand which occur along parts of the river bank. The gorges dissect the sandplain for 80km along the length of the Murchison River, after which it broadens, still enclosed by steep valley walls and pale chalk hills on the northern bank of the river, to reach the quiet, still waters of the estuary where the domed sandhills descend gradually to meet the foaming breakers of the Indian Ocean at the sweeping shores of Gantheaume Bay.

Protecting the entrance of the river estuary are long fingers of white sand which reach into the sparkling blue waters, extending from the curved beaches and low windformed dunes lining the edge of the river and coast, cloaked by the wind-pruned coastal heath vegetation. Extending outward from the beach in scattered areas, meeting the foaming line of breakers are low, flat, rocky platforms and gurgling lines of surf which disguise linear ridges of reefs such as Oyster Reef.

The layered, rocky sandstone appearing in the sinuous gorge of the Murchison River is also a feature on the coastline between Bluff Point and the mouth of the estuary, with a few outcrops also seen to the north of the river. Appearing initially as low, abrupt headlands abutting the Kalbarri beaches, they rise to form a line of richly shaded rugged cliffs with offshore stacks, natural arches and other unusual and intricate formations carved into the warmly shaded sandstone by the relentless sea and wind. In the balmy evenings, the rugged details of the coastal cliffs are highlighted in picturesque beauty when the sunset cloaks them in a mantle of rich, glowing gold, contrasting vividly against the stark white foam of the pounding breakers at their base.

Vegetation

The subdued terrain which dominates the Kalbarri Sandplain Landscape Character Type is blanketed by a dense cover of low, bushy heath vegetation which extends to the distant skyline. Appearing as a textured carpet in a mosaic of shades, the heath is interrupted in many areas by scattered bushes of contrasting shades and conspicuous emergents.

Wattles are one of the major components of the heath, especially the Jam Tree (*Acacia acuminata*) which is widespread. With these are several wispy bushes including the Wiry Honey Myrtle (*Melaleuca filifolia*) which is decorated with pink pom-pom blooms in

spring and Broombush (*M. uncinata*). Scattered amongst these shrubs are the long, leafless flowering stalks of Pink Pokers (*Grevillea petrophiloides*), the linear-leaved Red Pokers (*Hakea bucculenta*) with bright blooms, Claw Flowers (*Calothamnus spp.*), soft blue-grey rounded bushes of Common Smokebush (*Conospermum stoechadis*), vivid orange-red Coppercups (*Pileanthus peduncularis*), orange and yellow flowering Sand Bottlebrush (*Beaufortia squarrosa*), the wiry Leafless Hibbertia (*H. conspicua*) bush with bright yellow flowers, scratchy prickles of Parrot Bush (*Dryandra sessilis*), Scrub Sheoak (*Allocasuarina humilis*), and the domed dark green sprays of Blackboys (*Xanthorrhoea preissii*).

From late winter to the summertime, these areas of low, dense heath erupt into a riot of colourful blooms, with the bright glossy Coppercups and soft blue-grey Smokebush being the most prominent. Many bright spots of colour emerge from the wispy-edged Feather Flowers (*Verticordia Spp.*) scattered over the area, emerging as dense spikes or domes of colour, including the large pink Woolly Feather Flowers (*V. monadelpha*), soft pink Painted Feather Flowers (*V. picta*), bright yellow and red blooms of Claw Feather Flowers (*V. grandiflora*), deep pink Pritzel's Feather Flower (*V. pritzelii*) and the domed cream flowers of the Northern Cauliflower (*V. polytricha*).

Many of the taller bushes and small trees which generally emerge in clumps above the heath are often found on the sand ridges and areas of deeper sand. The darker green pine-like Sandplain Cypress (*Actinostrobus arenarius*) is seen with many low Banksia trees including the large yellow flowering spikes of the Sceptre Banksia (*B. sceptrum*), Ashby's Banksia (*B. ashbyi*) with vivid tangerine blooms, and Acorn Banksia (*B. prionotes*). With these are the spreading Sandplain Pear (*Xylomelum angustifolium*) with large, pendulous seed pods, Gordon's Grevillea (*G. gordoniana*), and the tangled, pungent cream blooms on slender, arching stems of the White Plume Grevillea or Smelly Socks, (*G. leucopteris*) which forms enclosing avenues in some areas, arching over roads and tracks.

Patches of mallees (many-trunked Eucalypts) appear in the conspicuous clumps of taller vegetation, mainly consisting of Malallie (*Eucalyptus eudesmoides*), Oldfield's Gum (*E. oldfieldii*), Giant Mallee (*E. oleosa*), Dongara Mallee (*E. dongarraensis*), and Beard's Mallee (*E. beardiana*) with the prominent yellow blooms of the pine-like Flame Grevillea (*G. eriostachya*), bright Red Pokers and Quandong (*Santalum acuminatum*) scattered amongst them, with pale green clumps of Spinifex (*Triodia Sp.*) forming an edge to the mallee in some areas. Growing to the north of the Murchison River as well as to the south and closer to the coast, the green and brown spreading branches of the York Gum (*Eucalyptus loxophleba*) is seen with the yellow flowering Slender Banksia (*B. attenuata*), the pale red blooms of Firewood Banksia (*B. menziesii*) and the seasonally splendid WA Christmas Tree featuring vivid tangerine blooms in summer, are other conspicuous emergents above the extensive reaches of sandplain heath.

Along the rugged and desolate coastline of the Kalbarri Sandplain, the appearance and presence of the tenacious low coastal heath is influenced by the terrain and the prevailing winds which buffet the rocky cliffs, often sending the desiccating salt spray over the low plants. The steep, exposed slopes forming the Zuytdorp cliffs are not entirely barren, but feature scattered low windpruned cushion plants and bushes, clinging steadfastly to the rocky hillsides. Patches of dense mat formed by the Thick-leaved Fan Flower (*Scaevola crassifolia*) are combined with the fuzzy Southern Diplolaena (*D. dampieri*) with glossy green leaves, and the slender stalks of Beach Spinifex (*S. longifolia*) at the base of the slopes. Further up, a low thicket of Southern Diplolaena merges with the domed Umbrella Bush (*Acacia ligulata*), dense Tangling Melaleuca (*M. cardiophylla*) and blue grey Coastal Daisy Bush (*Olearia axillaris*).

The tops of the coastal limestone hills feature shallow grey sand over the pock-marked grey rock and support a dense, waist-high heath, including Lace Net Grevillea (*G. stenomera*), soft grey of Common Smokebush, Dwarf Sheoak (*Allocasuarina humilis*), upright

Clawflower bushes and the tangled Two-leaf Hakea (*H. trifurcata*). Some isolated taller shrubs conspicuous amongst the hilltop heath are the darker green pine-like Swamp Cypress (*Actinostrobus pyramidalis*) and Umbrella Bush.

In more sheltered areas, taller dense thickets of Tangled Melaleuca and Summer Scented Wattle are apparent, blending with a heath dominated by Spoon-leaved Wattle (*A. spathulata*) which slowly merges with the sandplains heath further east.

The domed limestone hills which descend gradually to Kalbarri at the mouth of the Murchison River are dominated by a heath of Summer Scented Wattle and Jam, acting as an olive backdrop to the bustling community and quiet estuarine waters. This heath terminates on the east facing slopes of the hill, giving way to the predominate sandplains vegetation.

The ribbons and pools of glassy blue water meandering through the gently inclined plain denote the Murchison River. At the eastern end of the Character Type, the river meanders in a broad floodplain which is dominated by Wattles including the bushy Jam, wispy Horse Mulga (*Acacia ramulosa*) and Limestone Wattle (*A. sclerosperma*). Interspersed with the Wattles are white trunked River Gums which form tall woodlands in some areas. The bushy Lesser Bottlebrush (*Callistemon phoeniceus*) featuring its cylindrical scarlet blooms and the Swamp Sheoak (*Casuarina obesa*) are common beneath the taller gums, lining and shading the banks of the river.

On entering the rugged, sinuous gorges, the river is surrounded by a variety of plants, many of which are perched in precarious situations on the gorge walls. Most prominent here are the River Gums which appear as spindly, white trunked trees which contrast vividly against the pale rust rock and olive leaves reflected in the still pools of blue water. Growing alongside these on the river banks and gravelly beaches are Swamp Sheoak and Lesser Bottlebrush in the form of rounded bushy shrubs. The steep rocky gorge slopes are decorated by small shrubs and tufted trees including Jam and Rock Sheoak (*Allocasuarina huegeliana*), sometimes appearing as a cascade of green down the rubbly slopes of the gorge.

The northern sector of the Character Type contains a unique combination of vegetation known as tree heath - an irregular mixture of small trees, shrubs and grasses situated over low sand ridges and shallow depressions which are often featuring small circular Samphire (*Halorsarcia sp.*) filled clay pans. The low trees generally consist of domed Umbrella Bushes (*Acacia ligulata*), Sandplain Wattle (*A. murrayana*), and Horse Mulga as well as Ashby's Banksia, Clawflower, Desert Cassia (*C. nemophila*) and Flame Grevillea. Shark Bay Mallee (*Eucalyptus roycei*) and Rogerson's Grevillea (*G. rogersonia*) are also widespread here, but occur only in this region.

The low scattered bushes forming the understorey in this area include the slender Coastal Hibiscus (*Alyogyne cuneiformis*) which is decorated with red hearted mauve blooms, Yellow Tailflower (*Anthocercis littorea*), soft blue-grey Common Smokebush, the bright purple blooms of Spiked Dampiera (*D. spicigera*) and vivid orange-red Coppercups.

Waterform

Being the single major watercourse in the Character Type, the sinuous course of the Murchison River winding over the southern region of the Kalbarri Sandplain is one of the significant visual characteristics of this area.

As an intermittent river, it often appears as a quiet ribbon of blue amongst the fringing green vegetation decorating the river banks, or as trapped limpid pools of glassy water amongst smooth, rounded boulders and rocks, such as at Woonana Pool. The river can transform from these picturesque blue pools into a torrent of muddied water after heavy falls of rain, generated by localised summer storms, or from rain experienced at the rivers distant headwaters.

On entering the Kalbarri Sandplain at Coolcalalaya, the river valley deepens slightly, in comparison to the braided, twining channels of further east, forming

several quiet pools such as Earabiddy Pool and Ten Mile Pool. This pattern continues past Galena until it enters the rocky Hardabut Pool, where it flows into the deep, winding gorge it has cut into the striated, rugged sandstone. Beyond this area, the Murchison River again broadens gradually until it reaches the quiet estuary at Kalbarri where it flows past the gently curved beaches and into the Indian Ocean at Gantheaume Bay.

Smaller gullies such as Gabba Gabba, and creeks such as Bunjabandi, which contain water only during heavy rain, dissect the sandplain in various areas along the Murchison River, contributing to its flow. Wittecarra Gully dissects the coastal sandstone perpendicular to the Murchison River estuary, winding down to the ocean near Red Bluff.

The Indian Ocean forms the western border of the Character Type. It meets the bright sand of the gently curved beaches at the mouth of the Murchison River, and lines of white flecked foaming waves creating a relentless force against the imposing Zuytdorp Cliffs and the richly shaded, layered sandstone cliffs south of Kalbarri.

Land Use

Before Kalbarri was established, the original inhabitants of this area were the Nanda people, who were spread between Northampton and Shark Bay, and today a small tribal community has been established near Ajana.

The town of Kalbarri owes its origins to the rock lobster industry which has been thriving in this area for many years. Before the town was gazetted in 1951, numerous fishermen's squatter shacks were scattered over the area and today, many professional fishermen operate out of the quiet Murchison River Estuary, dotting the smooth waters with colourful craft and utilizing the launching ramps and slipway situated on its banks.

From its humble beginnings as an informal holiday 'resort' area, tourism has now overtaken fishing as the region's biggest employer. The numerous attractions which are concentrated in this area entice large numbers of visitors. The quiet estuarine waters are popular for swimming, canoeing and fishing; the beaches attract many surfers; the vivid carpet of wildflowers seen along the Kalbarri - Ajana Road and other side tracks are some of the best to be seen; and of course the spectacular Murchison gorge with numerous look-outs featuring spectacular views and intricate features such as Nature's Window carved into the rugged terrain, and Red Bluff and Natural Bridge featured in the rich, striated coastal sandstone cliffs. Historically significant also, this area received Australia's earliest European settlers (albeit enforced) when two sailors were marooned at Wittecarra Gully by Captain Pelsart in 1629 for their part in the mutiny and massacre of the passengers and crew of the 'Batavia', which ran aground at the Houtman Abrolhos Islands.

Encompassing most of the southern part of this Character Type is the extensive area of Kalbarri National Park. This major recreation and conservation zone protects a large tract of the unique sandplains vegetation as well as parts of the Murchison River Gorge and the coastal sandstone cliffs north of Bluff Point. Further up the coast, a Nature Reserve has been established on the abrupt limestone coastal cliffs, encompassing the vicinity of the historic wreckage of the 'Zuytdorp'. Not only is it a significant area historically but also botanically as it is a major transition zone between two botanical provinces, featuring a unique combination of plants at northern and southern limits.

Concentrated mainly in the northern part of the Character Type is a small pastoral community involved predominantly in wool production. This area is generally not favoured for grazing, however, due to the low rainfall and sandy soils making for a poor carrying capacity, and as a result, large areas of this region remain as vacant crown land. Many bores and tanks for the livestock are scattered over the terrain guarded by the rhythmic whirring of the geometrical steel windmills.

Dissecting this region in two almost directly perpendicular lines from the coastline eastward are state barrier or vermin proof fences, installed in an attempt to halt the spread of rabbits and other introduced

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pests into the richer agricultural areas further south.

Also dividing the olive carpet of heath with near geometric accuracy are numerous geophysical cut lines which criss-cross over the whole area. Many of these linear clearings are also used as private access roads to traverse many parts of the extensive area of low-lying heath.

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Lead, copper, zinc and silver have been mined in the vicinity of Mary Springs, north of Galena. South of that area, the upstanding remnants of Warribano Chimney belie the State's earliest smelter, originally built to process lead ore.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Irregular coastline edges with platforms, rocky islands, rock stacks, natural arches and other erosional features of unusual configuration e.g. Natural Bridge. *Steep cliffs and heavily dissected steep slopes e.g. Zuytdorp Cliffs. *Distinctive gorges or deep valleys/gullies with vertical or steep walls with unusual configurations and colours e.g. Murchison River gorge. *Hills, ridges, peaks and dunal formations of distinctive form which become focal points e.g. Womerangee Hill. *Diverse coastal edges with dunes, spits e.g. Mouth of Murchison River.	*Windshaped or dwarfed vegetation unusual in form, colour or texture e.g. clifftop vegetation. *Areas of high plant diversity which displays distinctive textural and colour patterns e.g. Sandplains heath. *Single plants or groups of plants which become focal points due to shape, colour, isolation or position in landscape e.g. White Plume Grevillea. *Dramatic displays of seasonal colour e.g. wildflowers.	*Unusual ocean shoreline motion due to islands, platforms, reefs and other landform configurations e.g. Oyster Reef. *River estuary, pools and other permanent water features e.g. Earabiddy Pool. *River characteristics such as rapids, cascades or still pools with reflective qualities e.g. Hardabut Pool. *Steep sided valleys/gorges associated with major drainages e.g. Wittecarra Gully. *Winter wet depressions, soaks and clay pans.
MODERATE	*Gently undulating country which is not distinctive or prominent in the surrounding topography.	*Vegetation which displays the size, form, line, colour, texture and spacing found commonly in the surrounding landscape.	*Waterforms where present, rate no lower that high in this LCT.
LOW	*Large expanses of indistinctly dissected or unbroken landforms that provide few landmarks with which to orient.	*Extensive areas of similar vegetation cover with little or no structural or textural diversity or colour changes.	*Waterforms where present, rate no lower that high in this LCT.

Aesthetic Character Summary

LANDFORM

Form: imposing Zuytdorp Cliffs; very gently inclined sandplain; deeply dissected gorges; abrupt cliff edges; domed limestone hills; steep and sharply dissected sand dunes; deep valleys; tumbled boulders in untidy piles; steep valley walls; low dunes; low, abrupt headlands; rounded boulders and rocks; shallow floodplains;

Line: sweeping, uninterrupted line of precipitous edges; steep slopes seamed by vertical watercourses and cascades of sand; horizontal striations in cliffs; line of breakers; level rock platforms; upright limestone outcroppings; sand ridges; meandering, sinuous line of Murchison River valley; horizontal bedding of sandstone; sweeping shores of Gantheaume Bay; long fingers of sand; curved beaches; linear ridges of offshore reefs; line of coastal cliffs; offshore stacks; natural arches;

Colour: richly shaded sandstone; pale, bright sand; pale toffee, cream and grey cliffs; yellow sandridges; rust and cream sandstone; pale river sand; white beach sand; rich, glowing gold shade of coastal cliffs in evening light; grey sand;

Texture: rugged sandstone; rocky gorges; boulder strewn cliff bases; rocky hills; rugged gorge walls; irregular gorge walls; gravelly sand beaches; uneven erosional effects; pockmarked grey limestone; smooth boulders and rocks;

Scale: long, open views to the horizon over the broad, near level topography of the sandplain; enclosed views within the valley gorge.

VEGETATION

Form: blanket of low, dense heath; windpruned coastal heath; conspicuous emergents; pom-pom blooms; domed sprays of blackboys; clumps of taller vegetation; pine-like Sandplain Cypress and Flame Grevillea; pendulous Woody Pear seedpods; low cushion plants; dense mats; domed Umbrella Bush; bushy Jam; tall woodlands of River Gum; cylindrical Lesser Bottlebrush blooms; rounded, bushy shrubs; low trees;

Line: wiry Honey Myrtle; linear leaved Red Pokers; dense vertical flower spikes; slender arching stems of White Plume Grevillea; slender stalks of Beach Spinifex; tangling Melaleuca; spindly River Gums; horizontal single storey of heath vegetation;

Colour: olive blanket; riot of colourful wildflowers; soft olive green River Gums with stark white trunks; bushes of contrasting shades; pink Honeymyrtle blooms; blue-grey Smokebush; vivid orange-red Coppercups; orange and yellow Sand Bottlebrush; bright yellow Hibbertia flowers; dark green sprays of Blackboys; domes of colour from flowering Feather Flowers; pink Wooly Feather Flower; soft pink Painted Feather Flower; bright yellow and red Claw Feather Flower; yellow and vivid tangerine Banksias; cream White Plume Grevilleas; bright yellow Flame Grevillea; Red Pokers; pale green Spinifex; glossy green leaves; scarlet Lesser Bottlebrush; red hearted mauve Hibiscus blooms; cascade of green bushes; bright purple Spiked Dampiera;

Texture: textured carpet of heath; wispy bushes; wiry Honey Myrtle; soft Smokebush; scratchy, prickles of Parrot Bush; wispy edged Feather Flowers; Woolly Feather Flowers; woolly buds of Acorn Banksia; fuzzy Southern Diplolaena; wispy Horse Mulga; tufted trees;

Scale: heath vegetation often at waist height or lower allowing encompassing views over landscape; periodically vegetation heights increase to channel views to foreground detail of heath;

WATERFORM

Form: quiet estuarine waters; still pools; torrent of water; deep, winding gorge; shallow claypans;

Line: Coastline; sinuous course of Murchison River; vertical seams of water courses down cliff face; lines of breakers; ribbons of water; gently curved beaches; braided, twining channels;

Colour: sparkling blue waters of the Indian Ocean; sky blue pools; stark white foam; limpid, transparent pools; muddied water; white flecked waves;

Texture: surge of Indian Ocean; foaming breakers; scouring waters; reflective pools; glassy water; rocky pools; smooth waters;

LAND USE

Form: quiet estuarine waters; carpet of wildflowers; cylindrical cement or steel tanks; materials and shapes of built structures

Line: roads and fence lines; geometrical windmills; perpendicular/linear State Barrier fences; geometric grid of geophysical cut lines; vertical remnants of Warribano Chimney; geometric line of roofing and building materials;

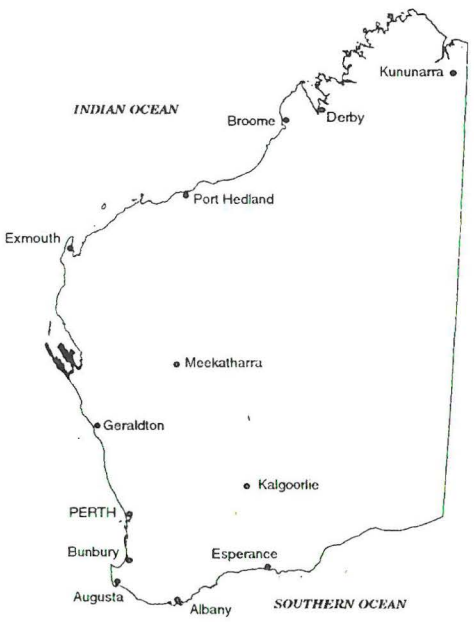
Colour: colourful fishing craft on estuary; vividly colourful wildflowers; grey cement tanks; shades of roofing and building materials;

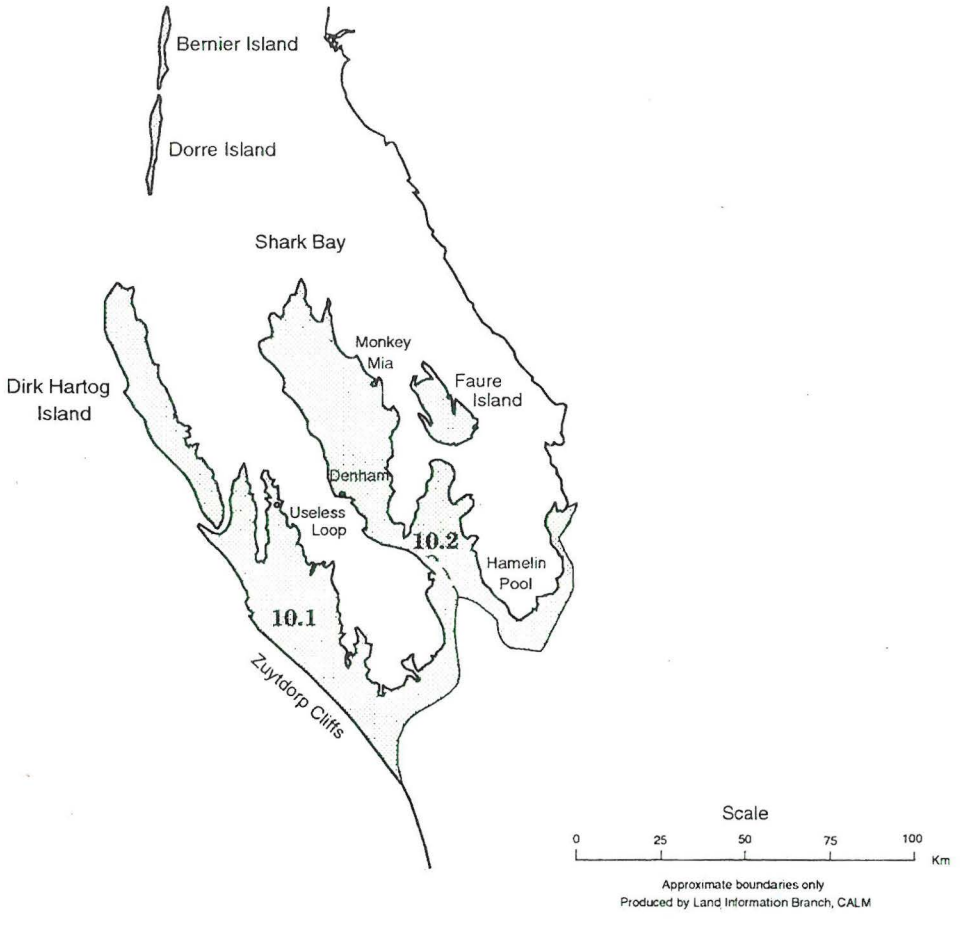
Texture: sandy soils; textural finish of roofing and building materials;

10. Shark Bay Peninsulas

10.1 Edel Sub Type

10.2 Peron Sub Type





Shark Bay Peninsulas Landscape Character Type

To the south of Carnarvon and emerging north of the Kalbarri Sandplain Landscape Character Type, the paired peninsulas and elongated islands which form the Shark Bay Landscape Character Type are an easily identifiable landmark on the western coastline. Two distinct Landscape Character Sub Types occur within the realm of Shark Bay: the Edel Sub Type which consists of the western peninsula, and the Peron Sub Type, the eastern peninsula dividing Shark Bay.



Distinguishing Features

Reaching into the encompassing mosaic of royal blue and turquoise waters of the Bay, the peninsulas feature a very gently inclined, subdued terrain overlain with low domed, windswept dunes of pale cream and rich terracotta shaded sands. The abrupt western coastal fringe of Shark Bay features the northern-most extension of the rugged, pale grey limestone of the Zuytdorp Cliffs.

Covering this low, open terrain in a rich green, olive and pale khaki medley of shades is a low, dense bushy heath, interspersed with many areas of, pale tufted grasses. Contrasting distinctly with this olive blanket are rounded or irregularly shaped salt pans, or birridas as they are known here, surrounded by an enclosure of low, domed dunes, and covered in a patchy cover of red-brown Samphire. A feature of southern fringe of this Character Type is a unique tree heath vegetation, and a predominance of remnant grey twigs and sinuous branches is scattered over the entire area.

Shark Bay is a major transitionary zone, divided both botanically and climatically by a visual demarcation known as the 'Mulga-Eucalypt Line'. The division dissects the area in two, denoting the place where the cooler, moist influences of the south-west of the State meet those of the arid north, and where the Eucalypts give way to the Wattles.

Pastoralism is the dominant land use of this region, with many extensive stations stocking sheep and cattle occurring over the entire area. Tourism is also prevalent, with the many unique natural features such as the Hamelin Pool stromatolites, as well as the wild dolphins at Monkey Mia, attracting a great number of local, interstate and international visitors. A large network of professional fishermen and numerous amateurs, work in and around the precincts of the transparent Shark Bay waters, attracted by a yield which varies from king prawns to marlin.

The Nanda people, the indigenous population of this area, worked with early pioneers and pastoralists, and in the pearling industry which once thrived here. Today they have integrated into the Shark Bay community while maintaining a close bond with the area.

Shark Bay was inscribed into the World Heritage List in 1991, including an area which stretches from the vicinity of the Zuytdorp Nature Reserve to south of Carnarvon, in the recognition of this areas outstanding universal value, and for the protection and conservation of its internationally significant natural heritage.

Climate

The Shark Bay Peninsulas Landscape Character Type is straddled by two climatic zones. The western half of the region reflects the influence of the south-west mediterranean climate, while the eastern half more

closely follows an arid climatic pattern. As a result, the eastern region is marginally warmer and drier.

Overall, however, this area is characterised by a hot, dry climate with the gently inclined, exposed landscape offering little relief or protection from the unrelenting glare of the summertime heat and prevailing southerly sea breezes which help to moderate the warmth. The summertime temperatures in this region range from 36°C maximum to a 20°C minimum at Hamelin Pool, with a 31°C maximum and a 21°C minimum in Denham. The dry, glaring heat of summer is tempered by daily sea breezes and strong southerlies which can prevail for several days, and occasional summer cyclones can generate gale force winds.

Winter in Shark Bay is mildly temperate, attracting an exodus of visitors from cooler parts of the State. Many calm, clear days and cool nights are a feature, interrupted occasionally by brisk north-easterly winds. Hamelin Pool Station and Denham both experience a winter maximum of 21°C and a 10°C minimum.

The fine winter days are interrupted by rain from May to September although less than forty days of rain are generally experienced throughout the year. The annual precipitation levels decrease from west to east across the Character Type, with Carrarang Station receiving 278mm, Denham 225mm, and Hamelin Pool Station 210mm. The annual precipitation levels are deceiving in this region, however, as their benefits are generally counteracted by the evaporation rate which, at 2000mm per annum, is almost ten times greater than the regular rainfall received. Erratic storms and scattered falls of rain also occur in summertime associated with the occasional fierce cyclones which sweep over the area at sporadic intervals.

Edel Landscape Character Sub Type

The elongated Edel Peninsula which forms this Sub Type emerges from the western coastline and stretches north across the blue water to three islands, collectively forming the barrier which protects the calm, clear waters of Shark Bay from the punishing swells of the Indian Ocean. Dirk Hartog Island is separated from the northern tip of the Edel Peninsula by Blind Strait and adjoining South Passage, and from the slender Bernier and Dorre Islands to the north by the broad waters of the Naturaliste Channel.

Influenced by the dominant limestone geology underlying this Sub Type, Edel Peninsula and the islands consist of gently inclined to near level terrain which is overlain in the northern half of the region by a series of pale windswept dunes. Shaped by the prevailing southerly winds into forming semi-parallel ridges, the dunes are generally oriented in a north-south direction. This arrangement is imitated by the tapered Bellefin and Heirisson Prongs and the Cararang Peninsula, the ragged extensions of the Edel Peninsula, which reflect the same orientation as the desolate, windswept dunes.

Occurring in isolated areas over the peninsula and surrounded by an enclosing amphitheatre of domed dunes, are highly saline depressions known locally as birridas. These rounded and elongated gypsum filled pans can vary from a few metres to a few hundred metres in length, and generally feature a low, raised platform which is ringed by a pale, moat-like depression. Birridas are often made conspicuous amongst the olive heath, with the bright gypsum encircling the centre platform and the concentration of the red-brown salt tolerant Samphires (*Halosarcia spp.*) growing over their surface.

Bordered on the western margin by the abrupt, rugged northerly extension of the imposing Zuytdorp Cliffs, the peninsula slopes down gently to the eastern fringe, to meet the smooth, open waters of Henri Freycinet Harbour and quiet turquoise waters enclosed within the loops and inlets. The sheer to steeply angled pale grey rocky slopes of the Zuytdorp Cliffs meet the white foaming breakers of the Indian Ocean which surge around the boulder-strewn cliff base. Continuing north in a near straight unbroken line from the mouth of the Murchison River at Kalbarri, the horizontally striated cliffs are unexpectedly interrupted at Zuytdorp Point.

This prominent headland protects the long, smooth beaches and steeply sloping frontal dunes of Dulverton Bay (or False Entrance), at Epineux (or Crayfish) Bay, and at Thunder Bay, before continuing on northwards to the rocky headland and boulder strewn beaches of Steep Point, the westernmost extension of the Australian mainland.

These rugged grey limestone cliffs also form the western edge of Dirk Hartog Island, gradually increasing in height from north to south. Bernier and Dorre Islands feature the cliffs as low wave-cut platforms fringing the western edge of their shores. A low, abrupt limestone platform also fringes the eastern perimeters of the islands, marking the extent of these low, desolate fragments of land.

The sensitive nature of this wind buffeted, exposed coastline is exhibited by the extensive, elongated blowouts of bright, pale sand which are scattered along the length of the western border of the Sub Type. Again reflecting the characteristic north-south orientation, a large, pale blowout occurs at Dulverton Bay, extending a great distance up Bellefin Prong, and another, which completely dissects Dirk Hartog Island, from the south of Herald Heights reaching north across the island to spill into the clear blue waters of Tetrodon Loop. In some areas, eroding blowouts leave formerly geometric lines of upright wooden fences to subside drunkenly down encroaching dunes, and encourage localised areas of barren, desert-like landscapes with pale, crescent dunes such as near Sand Hill Well on Bellefin Prong and inland from Epineux (Crayfish) Bay.

In scattered places along the eastern margin of the Edel Peninsula Sub Type are isolated patches of burnt terracotta shaded sands, often overlain by large fragments of brightly contrasting angular cream limestone rubble. These areas exhibit tracts of underlying sandstone which have broken through the surface capping of limestone to reveal distinct, warm shades, such as east of Disappointment Loop near Nambathana Well.

Reaching into the smooth waters of Henri Freycinet Harbour and Freycinet Reach are the prongs and peninsulas of the eastern shore of the Edel Peninsula. The elongated extensions of land are separated by long, shallow bodies of calm waters including Useless Inlet, Brown Inlet, Depuch Loop and Disappointment Loop. These inlets are generally bordered by bright, low sandy beaches interrupted by abrupt rough limestone headlands, steeply domed, olive heath cloaked sand dunes such as at Brown Inlet, and prominent horizontal limestone bench platforms which rim many of the inlets above the present shore levels. The southern ends of the inlets feature broad intertidal flats which appear as wide expanses of pale, bright sand exposed at low tide, often moulded into rippled indentations accentuated by discarded, brown strands of seagrass. This pattern continues around the sweeping shores of Henri Freycinet Harbour to the limitations of the Sub Type Boundary.

Once mined for the large deposits of guano, small, low limestone islands including Salutation and Baudin Island are scattered in the southern reaches of the quiet harbour waters, playing host to the thousands of agile seabirds which inhabit this region.

Cloaking this gently inclined, windswept terrain under broad, encompassing, cloud-streaked skies are extensive areas of low heath, dominated by the domed shapes of the dark, rich green Umbrella Bush (*Acacia ligulata*). Almost appearing prostrate in areas over the low-lying terrain, the heath varies in height due to exposure to the buffeting winds. The vegetation varies from the low, dense mats and pincushion-like plants clinging steadfastly to the exposed, rugged cliff faces, to the taller areas of the northern remnants of a unique vegetation formation known as tree heath, occurs along the south eastern fringes of Henri Freycinet Harbour, extending around the sweeping shores to part of the western edge of the Peron Peninsula to Nanga Station.

The low, pale olive vegetation which is scattered over the rubble strewn edge of the abrupt Zuytdorp Cliffs includes the mat-like Seaheath (*Frankenia pauciflora*) and Variable Groundsel (*Senecio lautus*). These small cushion plants merge gradually into a taller, denser area of vegetation occurring in more protected areas away from the cliff face, including the succulent bright

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green creeper Angular Pigface, (*Carpobrotus aequilaterus*), Southern Diplolaena (*D. dampieri*), soft grey Coastal Daisy Bush (*Olearia axillaris*), Thick-leaved Fan Flower (*Scaevola crassifolia*), and Saltbush (*Rhagodia sp.*).

The bright green domed shape of the Umbrella Bush features in many areas over the Sub Type, varying from low dense bushes, to tall thickets which enclose the long views over the gentle terrain. It appears in some areas as a dense, almost homogenous cover over the pale yellow-pink sand, while in others they are conspicuous as isolated domes of bright green with other low shrubs and grasses of pale olive and khaki yellow shades which are also common. Present everywhere is a scattered cover of dead twigs and sinuous grey branches strewn over the pale sandy soils. Bare grey stems beneath bushes tipped with green foliage also add to the grey shades which form part of this landscape.

Other shrubs scattered over the gently inclined land include the fuzzy leaved Sand Hibiscus (*Alyogyne pinonianus*) which is decorated with red hearted mauve blooms over most of the area, except on the islands where they produce bright white flowers. Bushy Coastal Coppercups (*Pileanthus limacis*) with pale pink flowers, and low, dense bushes of Tangling Melaleuca (*M. cardiophylla*), with bushy Jams (*Acacia acuminata*), Horse Mulga (*A. ramulosa*), spreading Kurara (*A. tetragonophylla*), and Summer Scented Wattles (*A. rostellifera*) also found amongst the heath.

Some areas over this Sub Type are quite open and seeming almost bare of vegetation but for a few isolated dark green domed bushes and a cover of brown khaki tufted grasses, and soft, pale yellow-khaki shaded shrubs. Broad areas of introduced grasses such as Wild Oats (*Avena fatua*) occur in scattered locations such as on the western shore of Brown Inlet and encompassing Tamala Station. These occur in large patches and contrast distinctly with the olive heath vegetation on the fringing edges. Other grasses scattered over this area include Buffel Grass (*Cenchrus ciliarus*) and pale green hummocks of Spinifex (*Triodia sp.*).

The windswept areas of pale mobile sands and blowouts feature very little forms of vegetation, mostly seen as isolated islands of growth in a sea of pale sand. Low, rounded bushes, dried grey grasses and small shrubs cling steadfastly to the shifting sands. Bushes on the blowout fringes send out long thin root fingerlings, searching for a stable hold.

The protected coastal fringes of the peninsulas see a continuation of the green domes of Umbrella Bush, mixed with Jam, Silver Saltbush (*Atriplex bunburyana*) and Green Cassia (*C. chatelainiana*). Low, scrubby Saltbush and Samphire are found commonly over the low-lying areas around the heads of inlets and occasionally, stilted, lush White Mangroves (*Avicenna marina*) are seen fringing broad tidal flats.

From east of Tamala Station and extending around the fringing edge of Freycinet Harbour to Nanga Station is a unique form of heath vegetation. In this area, the heath appears taller than elsewhere and is known as tree heath, enclosing the normally open, distant views over the near level terrain. Umbrella Bush is again predominant, seen as dense sprays of grey stems, shaded by the thin canopy of leaves which sprout on their tips. Combined with these are the dark, serrated leaves of the spreading Ashby's Banksia (*B. ashbyi*), Horse Mulga (*Acacia ramulosa*), bushy Chenille Honeymyrtle (*Melaleuca huegelii*), Gordon's Grevillea (*G. gordoniana*) and wispy mallees (many-trunked Eucalypts) which are often dominant on sand hills, including the ribbony trunk of the Dongara Mallee (*E. dongarraensis*), lustrous leaved Mallalie (*E. eudesmoides*), and the Narrow-leaved Red Mallee (*E. foecunda*).

The raised platform in the centre of the depressed birridas scattered over this Sub Type are often dotted with sparse, isolated shrubs and patches of brittle, dead vegetation. Grey Saltbush (*Atriplex cinerea*) and red-brown shaded Samphires (*Halosarcia spp.*) dominate here, with the pale Grey Saltbush featuring around the higher edges with a predominance of bushy Sandalwood trees (*Santalum spicatum*) amongst the olive vegetation on the fringing dunes.

Birridas are the only terrestrial waterform in this region, due to the high porosity of the pale yellow sandy soils and the extreme evaporation rate experienced in this area. Water pools in the birridas after good falls of rain and remain filled for several months.

The marine environment surrounding the ragged, elongated peninsulas and islands is a dominant factor in the landscape, featuring in many views. The tranquil, limpid waters of the protected inlets and harbour reflect a mosaic of rich royal blue and turquoise. Scattered areas of dark shades belie clumps of seagrass concealed in the shallow, clear water. The dynamic, surging swells of the Indian Ocean on the western perimeter send pounding breakers against the rugged, steadfast slopes of the Zuytdorp Cliffs, fringing the boulder-strewn bases with a border of white foam.

The pastoral industry forms the most widespread land use in this Sub Type, including Dirk Hartog Island, predominantly for grazing of sheep for wool production, with only Tamala Station stocking cattle. The stations were established in this region before the turn of the century and today, signs of their activities form a common part of this landscape, from the localised, open patches of exotic grasses to the upright, steel windmills. The geometric windmills are a familiar sight scattered over this region, and are often situated in birridas, standing guard over wells and corrugated iron or stone water tanks. Numerous linear tracks radiate from the wells, often eroding the land in their near vicinity from the trampling of sheep and the many feral goats which have become a problem in the region.

Linear rows of grey wooden posts denote the fence lines which dissect the low-lying terrain. The effect which grazing has had upon the native vegetation in some areas is made obvious along fence lines which divide stocked and unstocked areas of land, leaving a noticeable, linear division known as the fence-line effect.

An extensive solar salt project has been established at the northern region of Heirisson Prong, utilising the calm, highly saline waters of the southern region of Useless Inlet and Useless Loop. The small township at Useless Loop is associated with this industry for the extraction of sea salt by evaporation, leaving vast, flat areas of dazzling white salt crystals remaining in the evaporite pans, separated from the contrasting shimmering blue waters of Freycinet Reach and Useless Inlet by long, linear barrages. A loading facility for the salt occurs at Slope Island, near Useless Loop. It is joined to the mainland by an elongated causeway, featuring a large, domed stockpile of bright white salt which is visible from a great distance. Gypsum, previously mined from birridas near Bibby Giddy, was also stockpiled here.

The calm, clear waters of the protected bay, and the surging swells of the Indian Ocean produce an abundance of fish, and is one of the best prawn fisheries in the state, resulting in a large fishing industry in this area. A large number of amateur fishermen are also attracted to this area, and the well-used track which snakes over the dunes amongst the olive heath to Steep Point exhibits its popularity for good recreational fishing from the rugged limestone headlands and beaches.

The cultural and natural significance of this region is reflected by the amount of conservation zones and reserves occurring within its boundaries. The Edel Sub Type features many special areas within its realms. Encompassing and protecting much of the glassy, turquoise waters of the Freycinet Reach and Henri Freycinet Harbour is the Shark Bay Marine Park, including the eastern shores of Dirk Hartog Island. Several small islands enclosed within Henri Freycinet Harbour, including North and South Guano Islands, Salutation Island and Egg Island are reserves for the conservation of fauna and flora. Guano mining was formerly a widespread activity in this region, including these islands, but today the source is all but depleted.

The residents of Useless Loop have created a special conservation reserve on the tip of Heirisson Prong for the protection of the native animals and plants of this region, dissecting this elongated projection of land with a special anti-vermin fence.

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The historical significance of Cape Inscription at the northern tip of Dirk Hartog Island has been protected within a reserve. It was here in 1616 that Dirk Hartog became the first recorded European to set foot upon Australian soil, noting the occasion with an inscribed platter on a post.

Marking the broad waters of the Naturaliste Channel are two erect lighthouses, one on the southern tip of Dorre Island and the other at Cape Inscription, flanked by the abandoned stone buildings of the keepers' residence. The hospital building remnants which were once the hosts to contagiously diseased Aboriginies early this century still remain on Dorre and Bernier Islands, which are now nature reserves, protecting rare and endangered faunal species.

Edel Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Steep cliffs and dissected slopes e.g. Zuytdorp Cliffs. *Diverse coastline edges with platforms, beaches and headlands e.g. Steep Point. *Primary dunes which display areas of active weathering e.g. Blowout on Dirk Hartog Island. *Islands, sandbars and tidal flats e.g. Egg Island. *Ridges and dune formations of distinctive height configuration or combinations which provide obvious contrast to landform patterns common in surrounding area e.g. Herald Heights.	*Distinctive areas of native vegetation which create unusual forms, lines, colours or textures in comparison to the surrounding landscape e.g. Samphire in salt pans. *Windshaped or dwarfed vegetation e.g. cliff top heath. *Striking displays of seasonal colour e.g. blooming Wattles. *Strongly defined patterns of vegetation due to botanical zone transition e.g. tree heath and arid species.	*All salt pans or birridas, filled or dry. *Unusual shoreline motion due to rocks, islands or platforms e.g. Mushroom Rock. *Areas exhibiting a mosaic of shades due to shallow sandbars, intertidal flats or seagrass banks.
MODERATE	*Dune formations which are not visually dominant and are surrounded by similar landforms. *Gently undulating topography which is not distinctive or prominent.	*Expanses of relatively uniform vegetation cover with some variation in colour, texture and pattern found in the surrounding landscape.	*Waterforms where present, rate no lower that high in this VLCT.
LOW	*Landform lacking in the visual variety common in the surrounding landscape. *Noticeably eroded areas of landscape.	*Specimens or patches of introduced vegetation which appear alien in the surrounding landscape. *Areas of native vegetation which are noticeably degraded. *Areas of vegetation which appear homogenous in form, line, colour or texture.	*Waterforms where present, rate no lower that high in this VLCT.

Edel Sub Type - Aesthetic Character Summary

LANDFORM

Form:	gently inclined, near level terrain; domed dunes; abrupt Zuytdorp Cliffs; tapered Bellefin and Heirisson Prongs; ragged peninsulas; rounded birridas; sheer to steeply angled slopes of cliffs; prominent headland of Zuytdorp Point; steeply sloping frontal dunes; low, wavecut limestone platforms; low fragments of land; abrupt limestone headlands; broad intertidal flats; small, low limestone islands; flat-floored birridas;
Line:	semi-parallel dune ridges and peninsulas oriented north-south; elongated birridas; near straight, unbroken like of Zuytdorp Cliffs; horizontally striated cliffs; long beaches; elongated blowouts; crescent dunes; prominent horizontal limestone bench platforms; sweeping shores of Henri Freycinet Harbour; elongated peninsulas; parallel ripples of sand;
Colour:	pale grey limestone; horizontally striated cliffs; bright, pale sand; burnt terracotta shaded sands; cream limestone rubble; bright beaches; pale yellow-pink sand; pale yellow sandy soils;
Texture:	rugged Zuytdorp Cliffs; rocky slopes; boulder strewn cliff base; smooth beaches; rocky headland of Steep Point; boulder strewn beaches; large fragments of angular limestone rubble; sandy beaches; rippled indentations in intertidal flats;
Scale:	enclosing amphitheatre of dunes surrounding birridas; wide expanses of pale, bright sand of tidal flats; broad, encompassing, cloud-streaked skies; broad, long, open views over landscape sometimes interrupted at mid to background by low domed dunes;

VEGETATION

Form:	low heath; domed Umbrella Bush; low, dense mat plants; pincushion-like plants; tree heath; tall thickets; spreading Kurara; spinifex hummocks; isolated islands of vegetation on mobile dunes; low, rounded bushes; spreading Ashby's Banksia;
Line:	dead twigs and sinuous branches scattered over ground; bare vertical and diagonal sprays of stems; long root fingerlings on blowouts; stilted mangroves; thin canopy of leaves; wispy mallees; ribbony trunk of Dongara Mallees;
Colour:	red-brown Samphires; brown strands of seagrass; dark, rich green Umbrella Bushes; pale olive vegetation; bright green Pigface; soft grey Coastal Daisy Bush; khaki yellow shades; grey stems tipped with green foliage; red hearted mauve or white blooms of Sand Hibiscus; pale pink Coastal Coppercups; brown-khaki shaded shrubs; contrasting shades of introduced grasses and heath; pale green Spinifex hummocks;
Texture:	succulent Pigface; grey twigs and dead branches; fuzzy leaved Sand Hibiscus; tufted grasses; scrubby Saltbush; serrated leaves of Ashby's Banksia; lustrous leaved Mallalie; scattered patches of dead vegetation scattered over birridas;
Scale:	taller thickets and tree heath enclose views in some areas, otherwise views only limited by landform; vegetation in many areas appears prostrate over the gently inclined landform;

WATERFORM

Form:	broad waters of Naturalist Channel; shallow waters of Shark Bay; broad, tidal flats; tranquil waters; dynamic, surging swells; rounded birridas;
Line:	elongated birridas; long shallow fingers of water; border of white foam at base of cliffs;
Colour:	blue waters; clear, turquoise waters of the Bay; white, foaming breakers; turquoise fingers of water; limpid waters; royal blue and turquoise mosaic; shimmering blue waters; dark shades denoting seagrass;
Texture:	calm; punishing swells of Indian Ocean; smooth, open waters of Henri Freycinet Harbour; foaming breakers at base of cliffs; glassy surface of Bay;

LAND USE

Form:	broad, open areas of introduced grasses; corrugated iron tanks; flat evaporite pans; large, domed stockpiles of salt and guano on Slope Island; building remnants on Bernier and Dorre Islands;
Line:	upright windmills; geometric windmills; horizontal line of corrugated iron tanks; linear tracks radiating from wells; linear rows of wooden posts; geometric fencelines; drunkenly subsiding fencelines; fence-line effect; long, linear barrages across evaporation pans; elongated causeway; tracks snaking over dunes; line of anti-vermin fence; erect lighthouses;
Colour:	grey wooden fence posts; dazzling white salt crystals in evaporite pans and stockpiles;
Texture:	wooden fences; steel windmills; corrugated iron tanks; stone water tanks; stone buildings of keepers' residences;

Peron Landscape Character Sub Type

To the east of the Edel Sub Type, dividing the quiet waters of Shark Bay and creating a series of broad, shallow, almost landlocked bodies of water, is the Peron Peninsula which forms this Sub Type. The Peron Peninsula, together with the smaller, tapered Nanga Peninsula, and Faure and Pelican Islands, are dominated by a gentle, subdued sandplain of rich terracotta sandy soils overlain with low, scattered dunes under broad, blue skies with long, open views.

The rich terracotta shaded sandy soils originate from the red sandstone underlying most of this region, becoming slightly paler to the south of the narrow arm of the Taillefer Isthmus below Lharidon Bight. An area of limestone on the western margin stretches from near Nanga Station northwards to Denham, and broadening between Eagle and Goulet Bluffs. This area also features paler, creamy grey to pink soils overlying the subdued terrain, interrupted by a few rough limestone outcrops and pale scattered rubble in isolated patches.

Encircled by an enclosure of terracotta dunes are numerous flat-floored sea-level depressions or birridas which are predominant in this Sub Type. Varying in size from a few metres to a few hundred metres, the large flat-floored salt pans are generally quite irregular in size, such as Lake Montbazin at the northern tip of Peron Peninsula, and the smaller birridas are regularly oval or round. All are surfaced with a hard crust of fine, bright white ring of gypsum which encircles a slightly raised platform in the centre. A few of the elongated birridas feature narrow channels to link with others along the dune depressions, or in the case of Big Lagoon near Cape Lesueur and Little Lagoon near Denham, unite with the extensive waters of Freycinet Reach.

The placid, crystalline waters within Shark Bay reflect rich aqua greens and blues under clear, open skies, often merging as one with the hazy horizon. Contrasting abruptly with the shades of the encompassing marine environment, the terracotta terrestrial land of the peninsulas slopes gently toward the shores of the bay. Fringed in many places by long, low curved beaches of bright, bleached sands, such as at Monkey Mia, the beaches often take on the aspect of a long, thin, horizontal slice of dazzling white which extends to the far distance, sandwiched between mirrored blue waters and wide azure skies.

Sharply distinct from the smooth, pale beaches and the limpid waters are the abrupt horizontally bedded, red sandstone cliffs which fringe parts of the peninsula, such as Red Cliff Bay, adding another element to the definite horizontal layering of colours. Abrupt, rough grey limestone cliffs feature on the western margin of the Peron Peninsula south of Denham, including Eagle Bluff, named for the predominance of these majestic sea birds in this area.

Lining the southern shores of Lharidon Bight is a unique area of beach which is comprised entirely of small, white *Fragum* shells. Known for this reason as Shell Beach, these dazzling shores trace a long, thin horizontal line around the gently curved beach of the embayment.

Shallow, submerged bars of sand known as the Faura Sill extending from Faure Island and Petit Point westward to the mainland, create a hypersaline environment within the quiet, shallow waters of Hamelin Pool. Thriving in these harsh conditions are Stromatolites, ancient life forms which vary in appearance from bulbous grey domes to spongy black streaks to mud-like mats, revealed by the receding water at low tide. These unique structures, formed by colonies of cyanobacteria (species of algae), are an internationally significant collection, also appear as an uneven grey 'rock platforms' dusted with golden brown shades on their upper surfaces.

The shores of Hamelin Pool also feature patches of beaches composed of the same small, bright white *Fragum* shells interspersed with areas of grey, gravelly sand and the mud-like algal mats which often occur in the vicinity of the Stromatolites.

Fringing many areas around the peninsulas are broad

tidal flats with the receding waters of low tide revealing bare expanses of sand. Waterformed ripples of sculpted sand often texture the broad, exposed beaches, littered with brown strands of discarded seagrass and accentuated by the golden light of evening.

Interrupted by the pockmarked indentations of the low-lying gypsum filled birridas, the Peron Sub Type is cloaked in a mantle of a low olive shrublands, dominated by the spreading Horse Mulga (*Acacia ramulosa*) or Wanyu, as it is known locally. These low shrublands blanket the gently undulating terrain almost evenly, with few apparent emergents, but appearing open enough to reveal contrasting shades of the underlying rich terracotta soils. Low, patchy thickets occur in isolated, more protected areas, featuring Wanyu with False Paperbark (*Lamarchea hakeifolia*). Growing amongst the Wanyu are other Wattles, including the darker green low domed shapes of Umbrella Bush (*Acacia ligulata*), stiff, spreading Kurara (*A. tetragonophylla*), with Limestone Wattle (*A. sclerosperma*), and scrambling over these low bushes in a tangled green vine is the bright purple and yellow Shark Bay Daisy (*Brachycombe latisquamea*).

Umbrella Bush is more predominant in the southern region of the Sub Type interspersed with scattered areas of slightly taller shrubland, including Ashby's Banksia (*B. ashbyi*), Beard's Mallee (*Eucalyptus beardiana*), Dongara Mallee (*E. dongarraensis*), and False Paperbarks, all northern remnants of the unique tree heath vegetation formation occurring more predominantly to the south of the Sub Type.

Pale domes of Spinifex hummock grassland (*Triodia plurinervata*) with patches of Buffel Grass (*Cenchrus ciliarus*), and sparse areas of Wanderri (*Eragrostis sp.*), are scattered over the sandy terracotta soils amongst the spreading Wanyu and low, domed Umbrella Bush.

The limestone areas in the southern region of the Peron Sub Type are dominated by Spinifex, interrupted by small, contrasting shrubs scattered over the gentle terrain, including Umbrella Bush, Limestone Wattle and Broom Ballart (*Exocarpus sparteus*).

The bright, gypsum filled birridas scattered over many areas of this Sub Type are highly conspicuous amongst the olive shrubland and sandy terracotta soils. These saline depressions are covered with a brown-red shaded blanket of Samphires (*Halosarcia sp.*) and Sea Heath (*Frankenia pauciflora*), or occasionally appear denuded of vegetation, with a dusty ring of Grey Saltbush (*Atriplex cinerea*) featured around the edges, with bushy olive Sandalwood (*Santalum spicatum*) amongst the low heath on the fringing gypsum dunes.

At Petit Point, the low-lying, broad tip of the Nanga Peninsula, is an isolated area of Bluebush (*Maireana sp.*). More of these salt tolerant vegetation species continue around the coast to cloak the fringes of the hypersaline Hamelin Pool. These low shrubs growing amongst sparse, scattered Samphire flats, include silvery Cotton Bush (*Ptilotus obovatus*), Tall Saltbush (*Rhagodia eremaea*), Currant Bush (*Scaevola spinescens*) and Earlobe Saltbush (*Chenopodium gaudichaudianum*). Many of the regularly inundated tidal flats fringing these shores feature scattered thickets of the spindly, stilt-like White Mangrove (*Avicenna marina*).

Much activity has taken place in this region since the middle of last century when a guano mining industry was established, closely followed by Sandalwood cutters, chasing the valuable aromatic wood for export. When it was discovered that pearl oysters were bountiful in the blue green waters, a small village called Freshwater Point (later to be called Denham) was established to cater for the influx of population to the area. Chinese, Malays and Aboriginies were involved with the hunt for the oysters, often as the divers from the numerous small pearl luggers which proliferated.

With the decline of the pearling industry this century, the professional fishing industry took its place, profiting from the bountiful waters around the peninsulas and the special fish and prawn nursery area amongst the extensive sea grass beds in the Bay. Today, fishing is still one of the largest industries and recreational pastimes of the region, with numerous bright craft dotted over the Bay, leaving long stripes of reflected

colour across the smooth, mirrored waters. Pearling still exists in this Sub Type, in the form of several oyster leases which are scattered over the region, such as in Red Cliff Bay.

All the land in this region, including Faure Island, was taken up for pastoral leases before the end of last century and is still extensive today, mostly stocked with sheep for wool, a few cattle and numerous feral goats, which are utilised for their fleeces. Long, geometric lines of upright grey wooden fence posts delineate paddock and property boundaries. Differences to the native vegetation and land between the stocked and unstocked paddocks are often obvious along the fenced boundary, known as the fence-line effect. Some areas of degradation especially around the watering points are apparent in this Sub Type, such as south-east of Eagle Bluff. These are seen as patches of exposed, trampled sandy soils, generally bare of vegetation except for a few isolated remnant domed shrubs, overshadowed by the geometric steel windmills which stand erect over the corrugated iron and stone water tanks.

Tourism is the most predominant land use in this area, with thousands of visitors arriving annually, drawn by the unique attraction of the opportunity to experience the special interaction with the party of wild dolphins at Monkey Mia.

Several special conservation zones occur over this Sub Type, protecting its unique features. The northern half of Peron Peninsula between Denham and Monkey Mia was formerly grazing land, but is now preserved as the Francois Peron National Park. The unique Stromatolites are protected up to the high water mark inside the Hamelin Pool Marine Nature Reserve, and the royal blue and turquoise mosaic of the waters surrounding the peninsulas are encompassed within the extensive Shark Bay Marine Park.

Denham is the only town in the Sub Type, with many of the original buildings remaining here constructed from a unique rough, creamy grey shell block material taken from a special shell block quarry at Hamelin Pool, where the *Fragum* shells deposited over time have compacted into a solid mass to a depth of up to ten metres. Smaller tourist centres are established at Hamelin Pool and Monkey Mia to cater for the expanding industry.

Peron Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Diverse coastline edges with cliffs, platforms, beaches and headlands e.g. Cape Peron North. *Landforms of unique, distinctive or contrasting colours or forms e.g. Shell Beach. *Dune formations of distinctive height or shape which are visually prominent in the surrounding landscape. *Islands, sandbars and tidal flats e.g. Pelican Island.	*Strongly defined patterns of vegetation due to botanical zone transition e.g. tree heath and arid species. *Distinctive areas of vegetation patterns which result from form, line, colour or textural combination which contrasts with the surrounding vegetation and landscape e.g. vegetation surrounding birridas.	*All salt pans or birridas, filled or dry. *Areas exhibiting a mosaic of shades due to shallow sandbars, intertidal flats or seagrass banks.
MODERATE	*Gently undulating country which is not visually dominant and is surrounded by similar landforms.	*Vegetative patterns evident but common in surrounding landscape.	*Waterforms where present, rate no lower that high in this LCT.
LOW	*Expanses of virtually flat landforms which provide few landmarks with which to orient.	*Extensive areas of similar vegetation with very limited variation in form, line, colour or texture. *Areas of native vegetation which are noticeable degraded. *Specimens or patches of introduced vegetation which appear alien in the surrounding landscape.	*Waterforms where present, rate no lower that high in this LCT.

Peron Sub Type - Aesthetic Character Summary

LANDFORM

Form:	subdued sandplain; low, scattered dunes; limestone outcrops; flat floored depressions; large, irregular birridas; small round or oval birridas; gently sloping land; low beaches; abrupt cliffs; bulbous domes of stromatolites; broad tidal flats;
Line:	narrow arm of Taileffer Isthmus; narrow channels linking some birridas; elongated dune depressions; curved beaches; long, thin horizontal slices of dazzling white beaches extending to far distances; horizontally bedded cliffs; horizontal layering of colours; gently curved embayment of Hamelin Pool; linear sand ripples;
Colour:	rich terracotta; red sandstone; paler, creamy grey to pink soils over limestone; pale rubble; fine, bright white gypsum; bright bleached beach sands; slices of dazzling white beaches; horizontally bedded sandstone cliffs; dominant horizontal layering of colours; grey limestone; dazzling shores of Shell Beach; white *Fragum* shells; grey rock platforms dusted with golden brown;
Texture:	sandy soils; rough limestone outcrops; pale scattered rubble; hard crust of fine gypsum; smooth beaches; sandstone cliffs; rough limestone cliffs; uneven algal 'rock platforms'; gravelly sand; mud-like algal mats; rippled sand of tidal flats;
Scale:	enclosure of birridas by dunes; broad views over low, open, exposed terrain, occasionally interrupted by distant dunes;

VEGETATION

Form:	low shrublands; spreading Wanyu; patchy thickets; low domed Umbrella Bush; spreading Kurara; tree heath; domes of Spinifex; blanket of Samphire; ring of Grey Saltbush; tangled Shark Bay Daisy bush;
Line:	low horizontal canopy with few emergents; spindly stilt-like White Mangroves; tangled vine of Shark Bay Daisy;
Colour:	olive shrublands; darker green Umbrella Bush; pale Spinifex; brown-red Samphires; grey Saltbush; silvery Cotton Bush; bright purple and yellow Shark Bay Daisy;
Texture:	stiff Kurara; dusty ring of Grey Saltbush;
Scale:	scattered taller thickets and tree heath remnants enclose views in some areas, otherwise views generally broad over landscape, limited only by landform;

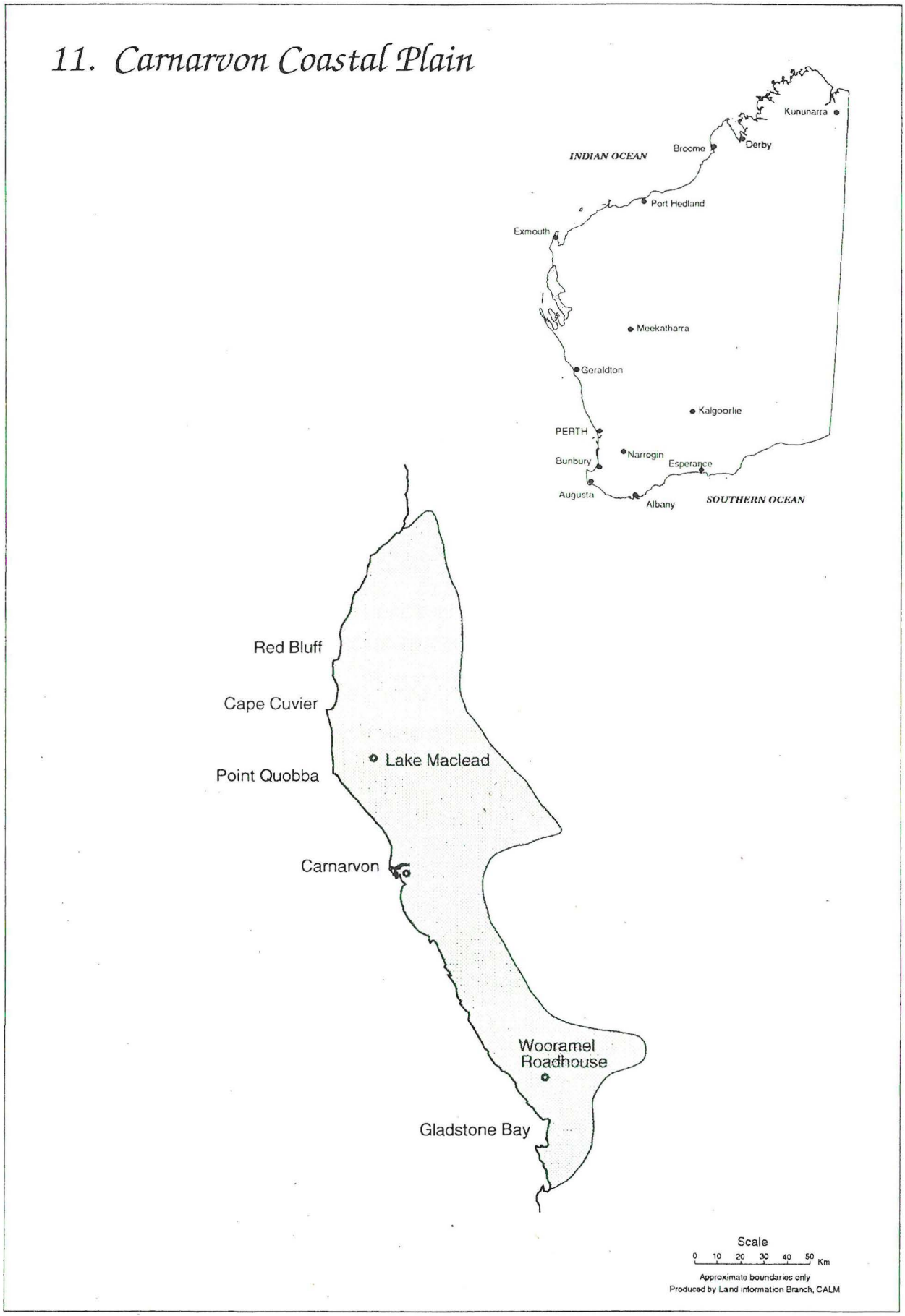
WATERFORM

Form:	broad, shallow, almost landlocked bodies of water; flat-floored saltpans; large, irregularly shaped birridas; small round or oval birridas;
Line:	elongated birridas with narrow linking channels to other depressions or to coast; marine waters merging as one with hazy horizon;
Colour:	crystalline waters; rich aqua greens; limpid blue waters; reflections of colour; royal blue and turquoise mosaic
Texture:	placid waters; mirrored waters; smooth waters;

LAND USE

Form:	compacted shell block material; cylindrical corrugated iron and stone water tanks;
Line:	long reflected stripes of colour across the smooth, mirrored waters; upright wooden fence posts; linear fencelines; geometric windmills; horizontal lines of corrugated iron tanks; fence-line effect; angular wooden jetty;
Colour:	creamy grey shell block buildings; numerous colourful fishing craft; reflected colours on the placid waters; grey wooden jetty and fence posts; steel windmills; corrugated iron;
Texture:	rough shell blocks; fishing boats dotted over smooth waters; trampled, sandy soils; wooden jetty and fence posts; corrugated iron; stone water tanks; steel windmills;

11. Carnarvon Coastal Plain



Carnarvon Coastal Plain Landscape Character Type

General Description

Wedged between the Wooramel Sandplains and the blue waters of Shark Bay and the Indian Ocean, is the low-lying terrain of the Carnarvon Coastal Plain Landscape Character Type.

Stretching from Yaringa Point, south of Gladstone, and northwards to Amherst Point, this area is dominated by a subdued, almost level topography. Richly shaded red-brown sandy plains are interrupted by the broad deltas and alluvial floodplains of the lower reaches of the Wooramel River and the mighty Gascoyne River, leaving extensive flat claypans divided by low, sandy rises. The north of the Character Type is dominated by the broad expanses of the saline Lake McLeod, which is fed by the Lyndon and Minilya Rivers.



The long, curving coastline abuts the Indian Ocean in a series of diverse landforms, varying from rugged limestone cliffs to broad tidal flats, occasionally dotted with isolated clumps of Mangroves.

Bushy Wattles (*Acacia spp.*) predominate over this Character Type. These, with Poverty Bush, Saltbush and Samphire, contrast distinctly against the richly shaded soils, emphasising the arid, exposed impression of this low-lying landscape.

The region is dissected by the twenty-sixth parallel, the dividing line where the State's famed North-West begins. Carnarvon is the major population centre of the Character Type, and the pastoral industry, supporting mainly sheep, is the dominant activity, with fishing, fruit and vegetable growing, and tourism also widespread.

Carnarvon is the major population centre and port for the region, and is involved with the World Heritage Listing of the neighbouring Shark Bay, for the protection and conservation of its internationally significant features.

Climate

The Carnarvon Coastal Plain Landscape Character Type is influenced by a semi-arid climatic pattern, and long, hot summers and mild winters are normally experienced, with many cloudless, sunny days.

The summers encountered in this region are very dry and hot, although the temperatures are eased by the moderately strong, prevailing southerly sea breezes. In the south of the Character Type, Gladstone reaches an average summer maximum of 32°C with a minimum of 21°C, Carnarvon experiences 31°C maximum to a 22°C minimum, and Quobba to the north, receives the same range.

Winter is characterised in this region by long periods of calm, fine weather with mild days and cool nights with light, chilling winds. Gladstone experiences maximum winter temperatures of 20°C with a minimum of 10°C, with both Carnarvon and Quobba featuring 22°C maximum and an 11°C minimum.

The region entailing the Carnarvon Coastal Plain receives about forty days of rain during the year, which occurs mostly between late May and early July. Gladstone receives 211mm of rain annually, Carnarvon has an average of 230mm, and Quobba has 231mm.

Between the months of January to March is the period

when cyclones are more likely to occur along this coast. While often concentrated on more northerly parts of the state, cyclones have wreaked immense havoc in this area, often resulting in severe flooding from the Gascoyne and other rivers. Extended periods of drought are also a facet of this area's climate, leaving the landscape desiccated, when even the parched, sandy bed of the Gascoyne River remains dry all year around.

Landform

The Carnarvon Coastal Plain is a subdued landscape, dominated in the southern region by the broad wash of alluvial and deltaic plains of the extensive Wooramel and Gascoyne Rivers, and to the north by the flat expanse of the dry, shimmering bed of Lake McLeod.

The varied coastline which fringes the Character Type is influenced in the southern region by the clear, sheltered waters of Shark Bay. Northwards from Yaringa Point, broad, pale stretches of bare tidal flats meet the mirrored waters. Scattered with brown strands of discarded seagrass from the extensive offshore beds, the smooth flats, textured by linear, sandy ripples, extend as far north as New Beach, near Carnarvon. Bright, pale cream coastal foredunes are found on the eastern fringe of the tidal flats which in some areas, such as in Gladstone Bay, are comprised of pale grey, shelly sand.

Beyond New Beach, the coast has been influenced by the broad delta of the Gascoyne River and the smaller lateral deltas from the divergent Boodalia Channel to the south and Brown Channel to the north, with small, sandy dunes often separated by dark red Samphire flats and elongated saline depressions. North of Carnarvon at Bejaling Beach, the gentle curve of the coast is replicated by a series of long, parallel dune ridges which extend some distance inland, and are remnants of former shore lines. To the east of the pale sandy frontal dunes and elongated beach ridges are an older set of taller, richly shaded red-brown dunes which create prominent ridges to the east of the current coastline, such as Brown Range, the conspicuous backdrop to Carnarvon.

The northern coastline of this Character Type is exposed to the full force of the surging swells of the Indian Ocean, resulting in a discontinuous line of abrupt, horizontally striated cliffs and headlands along its length. Vertical cliffs above the clear blue waters of Cape Cuvier continue around the gentle curve of the natural embayment it protects, occasionally interrupted by tumbling cascades of pale sand down the steep face. Low, flat-topped limestone hills meet the sea at Red Bluff, where they have eroded into rubbly concave slopes by the relentless, surging waters. Smooth, bright sandy beaches interrupt the cliffs in protected areas, such as south of Point Quobba, where the offshore intrusion of the Fitzroy and Darwin Reefs result in calm, quiet waters.

Extending beyond the cliff bases in scattered areas along the coastline are deeply pock-marked grey limestone platforms, often cloaked in a glistening sheen of green algae. The broad, rough platform at Quobba features blowhole crevices through which booming columns of foaming water are forced high into the air by strong swells.

Beyond the broad tidal flats, the pale, windswept dunes and the abrupt cliffs of the coastline, the richly shaded red-brown sandy terrain of the Carnarvon Coastal Plain often appears to be as level as the distant horizon, with far-reaching, open views beneath wide, cloudless skies.

Red-brown sandy dunes, elongated ridges and gently undulating rises are often conspicuous in the landscape, separating a scattered succession of bare, flat claypans. These regions generally denote the moulded banks surrounding the broad, shallow, water-carved channels of the floodplains and deltas of the rivers which are continually shaping this landscape, and also fringe the extensive stretch of Lake McLeod, enclosing the distant views.

Outcroppings of pale grey limestone are noticeable in isolated areas over the Character Type, contrasting with the red-brown sandy plains. They appear as angular grey rubble littered over the flat terrain, as rough horizontal rock platforms, and as low dissected

plateau remnants. A region in the vicinity of the Wooramel River delta, near Gladstone, features small, isolated hills and low, flat-topped limestone breakaway scarps with pale grey rubble strewn down the gentle slopes. Exposed horizontal sheets of rough grey limestone and low rubbly hills are also scattered around the margins of Lake McLeod.

Vegetation

The varied western coastline of this Character Type displays a mixture of vegetation reflecting the harsh, saline conditions of this exposed, windswept terrain. The western-most fringes of the broad, flat intertidal zones occurring in more protected areas along the coastline, such as the Boodalia Delta south of Carnarvon, and lining the mouth of the Gascoyne River, are isolated clumps of lush green Mangroves (*Avicenna marina*) surrounded by tiny forests of small vertical root fingerlings. Beyond these distinct green islands are broad bare stretches of pale cream sand and tidal flats, which are occasionally interrupted by low sandy rises dotted with prostrate mat plants of Sea Heath (*Frankenia pauciflora*), pale yellow tufts of Beach Spinifex (*S. longifolius*), grassy clumps of Marine Couch (*Sporobolus virginicus*) and small bushes of Coast Bonefruit (*Threlkeldia diffusa*), all interspersed with broad, flat stretches of brown-red Samphire marshes (*Halosarcia sp.*).

The low, salt tolerant shrubs gradually merge into a sparse, pale olive scrub on higher ground, scattered over the pale, bare sand. This foredune scrub is dominated by the grey green foliage of Wirewood (*Acacia coriacea*), with Lantern Bush (*Abulitonfraseri*) featuring bright yellow maroon-hearted flowers, and the spreading Coastal Coppercups bush (*Pileanthus limacis*), dotted with pale pink blooms. In more saline areas amongst the dunes, shrublands of Swamp Saltbush (*Atriplex amnicola*) and Gascoyne Bluebush (*Maireana polypterygia*) are seen amongst the Wirewood coastal scrub.

The remainder of the Character Type is dominated by a low, scrubby cover of bushy Wattles, with Horse Mulga (*Acacia ramulosa*) being the most prevalent. Other diverse wattles amongst the vegetation present an array of muted shades ranging from grey, twiggy shrubs to pale gold and khaki, and vary from low sparse, ankle height bushes to dense, tall thickets which enclose the long views over the gently inclined terrain. These include Limestone Wattle (*A. sclerosperma*), the stiff, spreading Kurara (*A. tetragonophylla*), and the dense, pale green Bramble Wattle (*A. victoriae*). Growing amongst these shrubs are the pale grey leaves of the Silver Poverty Bush (*Eremophila pterocarpa*) sharply etched against the rich red-brown sandy soils, the Shrubby Riceflower (*Pimelia microcephala*), Bullock Bush (*Heterodendrum oleifolium*) and the spiky Needle Tree (*Hakea preissii*).

Closer to the winding river course and flood plains, the terrain becomes marshy and scattered with broad, flat claypans separated by low sandy rises. The pink-white feathery blooms of Gascoyne Mulla Mulla (*Ptilotus polaki*) are often seen scattered over the claypans, or fringing the edges of the more saline flats with small, rounded shrubs of Silver Poverty Bush. Other claypans of higher salinity feature a sprinkled cover of shrubs over the deeply shaded red brown soils, appearing occasionally as a homogenous blanket of low, round, pale khaki shrubs of Gascoyne Bluebush, to a mixture of shrubs dotted over the surface displaying a variety of shades from brown to silver, and bright green. The low sandy rises edging the flat claypans include an olive cover of bushy Limestone Wattle, Kurara, the spreading Mimosa Bush (*Acacia farnesiana*) and an occasional, isolated specimen of bushy Sandalwood (*Santalum spicatum*).

The main watercourses dissecting the Character Type are emphasised by the dense concentration of taller vegetation which fringe the banks. Prominent amongst the surrounding foliage are the smooth, white trunks of River Gums (*Eucalyptus camaldulensis*), shading the banks of the often dry, sinuous river beds, amongst a dense tangle of growth consisting of Black Mulga (*Acacia citrinovirdis*) with Coolibahs (*Eucalyptus coolibah*), and Wirewood. Heavily scoured paperbarks or Cadjeputs (*Melaleuca leucadendron*) in some areas along the banks are a reminder of the destructive force which the deceivingly quiet pools of water can attain

after heavy falls of rain.

The northern region of the Character Type is dominated by the broad, shimmering expanse of Lake McLeod. Shrubby broombush-shaped Wattles are again dominant over the areas, as dense thickets or as isolated domed shrubs. Extensive areas of Bluebush and Saltbush plains are scattered around the margins of this saline lake, with broad, open flats dotted with distinctly contrasting, isolated blue grey bushes. Large stretches of rust-brown Samphire-filled pans fringe the edges of the Lake, surrounded by low, sandy mounds. Sprinkled over the ground amongst the bushy shrubs of the sparsely vegetated claypans is an increasing cover of scattered grasses amongst the undergrowth. Buffel grass (*Cenchrus ciliarus*) is widespread over the area, said to be introduced by Afghan camel drivers for feeding their herds. Other scattered clumps of grey-gold wispy grasses include the pale green Feathertop Spinifex (*Plectrachne schinzii*), Lobed Spinifex (*Triodia basedowii*), Soft Spinifex (*T. pungens*), and spiky clumps of erect Kerosene Grass (*Aristida browniana*).

In the springtime and after good falls of rain, the region is transformed by a kaleidoscope of colourful wildflowers, extending into the distance beneath the scattered bushy green-grey scrub. Large stretches of land, with the exception of a few Saltbush claypans, are cloaked with a vivid carpet of nodding blooms which spread over the rich red-brown terrain. The large pale creamy yellow blooms of Splendid Everlasting (*Helipterum splendidum*) perched on delicate, wiry stems are mixed with carpets of bright, candy pink Schoenia (*S. cassiniana*), vivid yellow Wrinkled Podolepis (*P. auriculata*), Many-Stemmed Burr Daisy (*Calotis multicaulis*), and the globular blooms of Pompom Head (*Cephalipterum drummondii*).

Other bright splashes of colour seen amongst this vegetation after rains includes the rich blue flowers of Camel Bush (*Trichodesma zeylanicum*), dull red blooms of Prince of Wales Feather (*Ptilotis polystachyus*), the large, wispy, bright pink blooms of Forrests Featherflower (*Verticordia forresti*), the upright bush of Marsh Stemodia (*S. grossa*) with mauve flowers, and glossy red flowers of Native Fuschia (*Eremophila maculata*).

A common characteristic evident amongst the scrubby vegetation which mantles this gentle terrain is the presence of ashy grey twigs and sinuous, twisted wood of dead branches. Strewn over broad areas of bare ground and spread below the taller, bushy vegetation, this scattered cover contrasts distinctly with the richly shaded soils beneath.

Waterform

Much of the subdued landscape of the Carnarvon Coastal Plain has been shaped and carved by the broad, sinuous watercourses which dissect this terrain.

Although generally appearing as a chain of isolated, quiet, glassy pools such as Rocky Pool and Chinaman's Pool, the Gascoyne River is the second largest watercourse in the State. Its irregular pattern is characteristic, and where it flows generally once every year, it can occasionally remain dry. Alternatively it has a long history of serious flooding, evidenced by the vast floodplains which fan out broadly to the north and south of its mouth at Carnarvon. Tidal flats and mangroves dominate the Gascoyne delta, with broad sandy islands such as Babbage Island left isolated at its mouth, before it flows into the calm, turquoise waters of Shark Bay.

The Wooramel River appears as a broad, shallow trench which meanders lazily across the southern region of the Character Type, where it enters the limpid waters of Hamelin Pool, to the north of Gladstone. Its perimeters are often defined by wide stretches of bare, flat claypans scattered along its length, separated by low sandy mounds.

The extensive, shallow reaches of the saline Lake McLeod at the north of the Character Type was formed as a result of sea water leaching up through the sand, and it is fed by the in-flowing waters of the Lyndon and Minilya Rivers. Many extensive permanent pools are scattered across its smooth, far-reaching surface, often featuring flocks of pelicans bobbing over the sparkling

waters. A large tract of the southern region of the lake is utilised for salt extraction, with a geometric network of evaporation ponds separating the tranquil, glassy waters.

Many flat claypans skirt the edge of Lake McLeod, as well as the along length of the Gascoyne and Wooramel Rivers and their marshy floodplains. After good falls of rain these claypans fill and hold water for several weeks.

Land Use

Situated on the mouth of the Gascoyne River, Carnarvon is the major population centre of the Character Type, its residents displaying a wide multi-cultural cross section of backgrounds ranging from Afghans to Chinese.

Although the traditional lifestyle of the original inhabitants of the region has altered significantly since European settlement, Aboriginies still form a prominent facet of the community. They originally formed a long association with pastoral stations in the region, and today many have links with a community within Carnarvon, contributing to the region's social character, while still retaining distinct ties with their traditional culture.

Small working communities are concentrated at the extensive pastoral stations which are scattered across the Carnarvon Coastal Plain. The grazing of sheep for wool production has a long association with this region, and some cattle are also stocked. The linear, protruding mile long wooden jetty at Carnarvon and the smaller wooden jetty at Gladstone were originally built to load wool onto ships for export. In the early days of settlement, this was brought into the ports by camel trains, led by their Afghan drivers.

The deep bores and cylindrical stone wells beneath the whirring blades of towering geometric steel windmills are familiar signs of the pastoral industry scattered over the Character Type Some areas over-utilised for grazing show signs of degradation, such as to the south of Carnarvon and to the east of the airport, which can be seen as a reduction in the diversity of native vegetation used as fodder, to large patches of sheet erosion and gullying.

Agriculture is also a major land use in the near vicinity of Carnarvon in the form of irrigated market gardens and plantations which line the lower reaches of the Gascoyne River. Taking advantage of the rich alluvial soils abutting the river, the plantations generally appear as lush, rectangular blocks of green which contrast distinctly with the rich, red brown soils and muted green grey foliage of the fringing native vegetation. Synonymous with Carnarvon are the banana plantations which are widespread, as well as a variety of other fruit and vegetables, providing a large percentage of fresh produce for the state.

A large fishing industry is centred at Carnarvon, which is the home port for numerous scallop and prawn trawlers, who take advantage of the abundant waters of Shark Bay, as well as a large fleet of professional and recreational fishermen. Many boats are seen bobbing about at their moorings near the mouth of the Gascoyne River, and several hopeful fishermen can regularly be seen trying their luck along the length of the long, angular grey wooden jetty.

A whaling industry was once operated from Carnarvon, and the factory which was established on Babbage Island at the mouth of the Gascoyne River for processing the immense catch, is today utilised by the prawning industry.

The broad, saline bed of Lake McLeod is home to the world's second largest solar salt industry, with numerous geometric salt evaporators on the southern part of the lake, which is extracted and trucked to a large glistening white stock pile at Cape Cuvier, where it is shipped for export.

The tourism industry is quite prominent in Carnarvon, with the excellent fishing being the major attraction, along with the balmy winter temperatures attracting many southern visitors seeking a respite from the cold. One of the many interesting built features of the area is the prominent, white, semi-spherical tracking station dish situated on Brown Range. This conspicuous dish

CARNARVON COASTAL PLAIN

was installed for tracking the lunar landings, but since then has gradually become obsolete with the progress of technology, and is currently unused.

Conservation in this Character Type is exclusively marine, dominated by the near vicinity of the unique Shark Bay region. The blue waters south of Carnarvon are encompassed within both the Shark Bay Marine Park and also the World Heritage boundaries of Shark Bay. South of Kopke Point is the Hamelin Pool Marine Reserve, created for the conservation of the unique Stromatolites which occur within these quiet, turquoise waters.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Landform features of distinctive or contrasting shades e.g. Limestone outcrops. * Abrupt coastline edges with cliffs, platforms and prominent headlands e.g. Point Quobba. * Islands, reefs and other offshore features which become focal points e.g. Fitzroy Reef. * Ridges and dune formations of distinctive height, configuration or combinations which provide obvious contrast to landform patterns common in the surrounding area e.g. Brown Range. * Sandy beaches, tidal flats and deltas showing distinctive variations in form, colour and texture e.g. New Beach * Distinctly defined river courses or channels e.g. Gascoyne River.	* Distinctive displays of seasonal colour e.g. spring wildflowers. * Stands of vegetation which display unusual or distinctive form, colour or texture in comparison to surrounding vegetation and contrasting with the adjacent landscape e.g. Mangroves. * Strongly defined patterns of vegetation associated with claypans, saltpans and watercourses e.g. fringing Lake McLeod.	* Unusual ocean and shoreline characteristics such as islands, reefs or blowholes which become focal points e.g. blowholes at Quobba. * River estuaries, rock pools and other permanent water features e.g. Chinaman's Pool. * Intermittent watercourses, claypans, salt lakes or saltpans which become a focal point due to contrast with associated terrestrial and vegetation features e.g. Lake McLeod.
MODERATE	* Beaches, tidal flats and deltas showing little variation in form, colour or texture. * Undulating areas of low dunes and ridges with patterns which are not distinctive or prominent.	* Vegetative patterns which display the height, colour and spacing which is found commonly in the character type.	* Intermittent watercourses, salt lakes, saltpans or claypans lacking distinction relative to the surrounding landscape. * Common ocean and shoreline characteristics.
LOW	* Expanses of virtually flat landforms which provide few landmarks with which to orient. * Areas of land which show evidence of degradation.	* Extensive areas of similar vegetation with little contrast in colour, height, texture and spacing. * Areas of vegetation which show signs of disturbance or degradation.	* Waterforms absent.

Aesthetic Character Summary

LANDFORM

Form:	subdued, almost level terrain; broad floodplains and deltas; low, sandy rises; tidal flats; sandy dunes; abrupt cliffs; steep slopes; flat-topped limestone hills; Fitzroy and Darwin reefs; broad limestone platforms; windswept dunes; prominent dune ridges; gently undulating rises; flat claypans; moulded river banks; broad, shallow, water-carved channels; low, dissected limestone plateau remnants; gentle slopes; broad islands;
Line:	long, curving coastline; linear sandy ripples; elongated depressions; long, parallel dune ridges; shore lines; horizontally striated cliffs; vertical cliffs; gentle curve of the Cape Cuvier embayment; tumbling cascades of pale sand; concave slopes; limestone platforms; elongated ridges; water-carved channels; horizontal sheets of limestone;
Colour:	richly shaded red-brown sand; pale stretches of tidal flats; bright, pale cream coastal foredunes; pale grey shelly sand; Red Bluff; grey limestone platforms; pale grey limestone;
Texture:	sandy plains; rugged limestone cliffs; bare tidal flats; smooth flats; sandy ripples; shelly sand; sandy dunes; rubbly slopes; smooth, sandy beaches; deeply pockmarked limestone platforms; rough platform; blow hole crevices; angular limestone rubble;
Scale:	arid, exposed impression of the low-lying landscape; terrain often appears as level as the distant horizon, with far-reaching, open views beneath wide, cloudless skies; low domed dunes occasionally restrict long views;

VEGETATION

Form:	isolated clumps of Mangroves; Samphire flats; tiny forests of Mangrove root fingerlings; conspicuous green islands; mat plants of Sea Heath; tufts of Beach Spinifex; clumps of Marine Couch; small Coast Bonefruit bushes; flat stretches of Samphire; sparse scrub; spreading Coastal Coppercups; bushy Wattles; low, sparse ankle height bushes; dense, tall thickets; spreading Kurara; round shrubs of Silver Poverty Bush; bushy Sandalwood; broombush-shaped Wattles; clumps of Kerosene Grass; globular blooms of Pompom Head;
Line:	strands of seagrass; vertical Mangrove root fingerlings; prostrate mat plants of Sea Heath; tall thickets; tangle of growth; wispy grasses; erect Kerosene Grass; delicate, wiry flower stems; upright Marsh Stemodia; twigs and sinuous, twisted wood of dead branches;
Colour:	discarded brown seagrass; dark red Samphire; glistening green algae; lush green Mangroves; conspicuous green islands; pale yellow Beach Spinifex; brown-red Samphire; pale olive scrub; grey-green Wirewood; bright yellow maroon-hearted flowers of Lantern Bush; pink flowers of Coastal Coppercups; grey, pale gold and khaki bushes; pale green Bramble Wattle; pale grey Silver Poverty Bush; pink-white Gascoyne Mulla Mulla; homogenous blanket of pale khaki shrubs of Gascoyne Bluebush; mixture of shrubs of brown to silver to bright green; white trunks of River Gums; blue grey bushes; rust brown Samphire; grey-gold grasses; pale green Spinifex; kaleidoscope of colourful wildflowers; pale creamy yellow Splendid Everlastings; candy pink Schoenia; vivid yellow Wrinkled Podolepis; rich blue Camel Bush flowers; dull red Prince of Wales Feather; bright pink Forrest's Featherflower; mauve flowers of Marsh Stemodia; glossy red Native Fuschia; grey twigs;
Texture:	bushy wattles; sheen of algae; low sandy rises dotted with plants; Wirewood foliage; scrubby cover of Wattles; twiggy bushes; stiff Kurara; spiky needle tree; sprinkled cover of shrubs on claypans; smooth trunked River Gums; scoured Paperbarks; feathery Gascoyne Mulla Mulla; Feathertop Spinifex; soft Spinifex; spiky Kerosene Grass; carpet of nodding blooms; Prince of Wales Feather; wispy Forrest's Featherflower;
Scale:	vegetation sometimes encloses the long views over gently inclined terrain, otherwise, views limited by landform only;

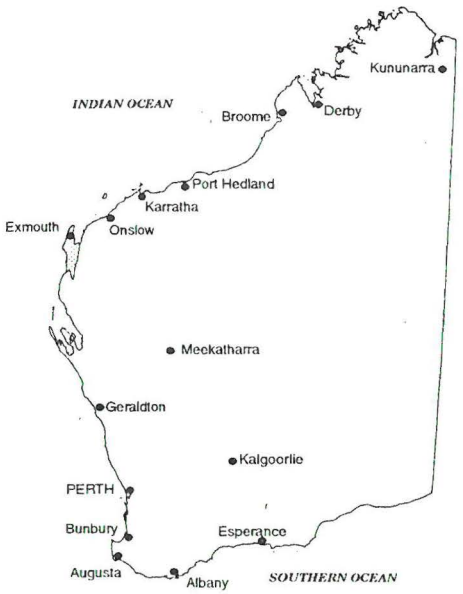
WATERFORM

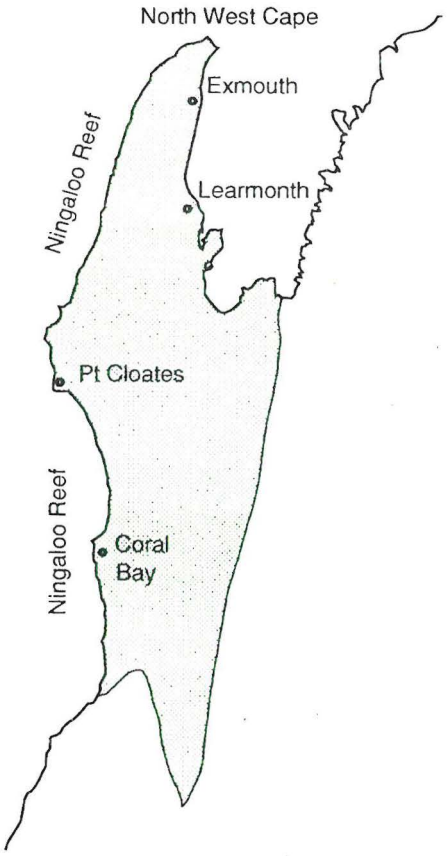
Form:	flat claypans; flat expanse of Lake McLeod; sheltered waters of Shark Bay; calm, quiet waters; columns of water; quiet pools; vast floodplains; broad, shallow trench; tranquil waters;
Line:	divergent Boodalia and Brown Channels; columns of water; winding river courses; sinuous river beds; snaking river bed; lazy meanders;
Colour:	blue waters of Shark Bay and the Indian Ocean; clear waters of Shark Bay; clear blue waters of Cape Cuvier; foaming water; shimmering bed of Lake McLeod; limpid waters of Hamelin Pool; turquoise waters; crystalline waters;
Texture:	mirrored waters of Shark Bay; marshy floodplains; glassy pools; dry, sandy bed; sparkling waters;

LAND USE

Form:	bores and round stone wells; sheet erosion and gullying from degradation; salt stock pile; prominent, semi-spherical tracking station; materials and shape of built structures;
Line:	geometric network of evaporation ponds; linear, protruding, mile long jetty; towering, geometric windmills; stumps; rectangular plantation blocks; angular jetty; white tracking station; geometric shape of built structures;
Colour:	steel windmills; grey stumps; rectangular blocks of green plantations; red-brown alluvial soils; colourful boats; grey wooden jetty; glistening white salt stock pile; colours of materials incorporated into built structures e.g. red tile roofs;
Texture:	wooden jetty; stone wells; steel windmills; bare stumps; lush plantations; texture of materials incorporated into built structures, eg corrugated iron;

12. North-West Cape Ranges





Scale

0 25 50 75 100 Km

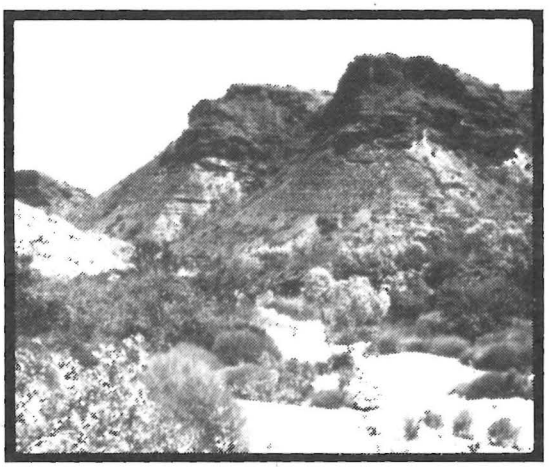
Approximate boundaries only
Produced by Land Information Branch, CALM

North-West Cape Ranges Landscape Character Type

General Description

Emerging from the north-west corner of the state is the tapered peninsula of the North-West Cape Ranges Landscape Character Type, separating the rich blue waters of the Indian Ocean from the sheltered embayment of Exmouth Gulf.

Rising gradually from the gently inclined southern region of the Character Type, the North-West Cape develops into a heavily dissected, uplifted region of limestone that forms the rugged Cape Range. Narrow coastal plains fringe the furrowed ranges which create the backbone of the peninsula.



The distinct boundary of Ningaloo Reef featured along the western coastline of the Character Type forms a skirting band of richly shaded turquoise waters defined by a bright foaming edge.

The hardy vegetation that cloaks the rugged, dry terrain is dominated by an open blanket of pale, bleached grasses with scattered taller groves of Eucalypts in a diverse mixture with bushy Wattles, and shrubby Cassias.

Encompassed by the broad expanses of the crystalline blue Indian Ocean and Exmouth Gulf, the Character Type exhibits only scattered pools of permanent water, such as the lower reaches of Yardie Creek. The high evaporation rate dispels the effects of rainfall, emphasising the arid, parched impression of this landscape.

Exmouth is the largest settlement of the Character Type, with smaller townships situated at Learmonth and Coral Bay. The pastoral industry is the dominant land use of the region, with professional prawning and fishing also prevalent. The unique attractions of Ningaloo Reef, Cape Range and big game fishing have resulted in a rapidly expanding tourist industry.

Climate

The North West Cape Ranges Character Type is dissected by the Tropic of Capricorn, and experiences a varied climate, ranging from the hot and often inhospitable extremes experienced in the summertime to the balmy, pleasant temperatures of winter.

The summer temperatures experienced in this Character Type can be very uncomfortable as little protection from the heat or prevailing winds is offered by the arid terrain or the sparse vegetation. The average maximum summer temperature experienced in this region is 37°C with a minimum of 23°C. Prevailing south-westerly sea breezes which buffet the shores in the afternoons have a slight cooling effect on the western coast of the Cape, but the eastern side is protected from the cooling breezes, and this often results in higher temperatures.

The winter temperatures at the North-West Cape are generally pleasant and comfortable, attracting many visitors to retreat here from the cooler southern regions of the State. The very mild average winter temperatures range from a 14°C minimum, to a balmy maximum of 24°C.

Winter rainfall, which occurs mainly over May and June, is generally fairly light and regular. Summer rain, experienced from February to March, is often

irregular and very heavy due to the influence of storms and cyclones. An average of only 28 rainy days per year are experienced in this very sunny region, with an average annual precipitation ranging between 250-300mm with the benefits offset by the high evaporation rate.

Landform

The North-West Cape Ranges Character Type is dominated by a rugged landscape of deeply dissected limestone ranges and low rocky hills, contrasting abruptly with the gentle topography of the narrow fringing coastal plains.

The southern region of the Character Type is a gently inclined, deeply shaded red-brown sand plain with a sparse scattering of low, elongated linear dunes. Interrupting this low-lying landscape are rocky mounds of eroded limestone hills, such as the Gnargoo Range, rough horizontal limestone platforms and patches of strewn pale grey rubbly limestone, contrasting vividly against the red-brown sandy soils.

Tapered cylindrical columns of termite mounds appear in some areas over the gently undulating plains, sometimes seen as the only interruption in a sea of pale green waving grasses.

Moving further north in the Character Type, the distinct elevated ridgeline of the ranges appear as a silhouetted backdrop to the plain. Giralia Range, Rough Range and Cape Range are flat-topped plateaus of uplifted limestone through the centre and east of the character-type which have been carved into the spectacular steep, rugged canyons and deeply dissected gullies seen today.

The rugged nature of the ranges is emphasised by belts of coarse limestone along the cliffed ridges. Creamy grey outcrops and exposed areas of horizontally bedded rock, are conspicuous against the pale rust shades high up on the rubbled, steeply angled slopes. Low windformed dunes of red sandy soil appear in scattered areas over the flat-topped ranges, mixed with tumbled piles of rough boulders and a thin veneer of richly shaded red-brown soils over the exposed pale grey rocky terrain.

The base of the canyons are formed by narrow sinuous, dry creeks such as Shothole Canyon, their scouring waters responsible for shaping the pattern of the towering canyon walls, enclosing the open landscape and channelling views between the steep, diagonally angled rugged slopes.

Numerous gullies and creeklines dissect the western side of the range. Yardie Creek is an intermittent watercourse which winds between soaring, deeply seamed, vertical cliffs and overhanging ledges, reflecting rich, horizontally striated shades of pale rust, cream and dark grey above the quiet pool of clear water. The imposing cliffs sheltering the broad pool in Yardie Creek decrease in height toward its mouth where it is generally separated from the glittering waters of the Indian Ocean by a narrow bar of bright, smooth sand.

The dramatic visual contrast between the richly shaded ranges and the narrow coastal plain is pronounced from many panoramic viewpoints, such as along Charles Knife Road. The narrow western coastal plain is a gently inclined landscape lying between the abrupt backdrop of Cape Range and the rich mosaic of deep blue and turquoise of the Indian Ocean and Ningaloo Reef. Shallow channels which descend from the Range in a series of short, parallel flow lines, dissect the plain, fanning sediment across the low-lying terrain which has been swept down from the higher ground after heavy showers.

Defining the western edge of the coastal plain are a series of low, domed dunes, which line the long, bright beaches that mark the shores. Accentuating the fragility of this wind buffeted coast are broad dunal blowouts and windswept sand sheets which occur sporadically along the coast such as at Jurabi Point. Higher dunes forming more prominent hills, as at Maud Hill near Point Maud and Doublet Hill near Bruboodjoo Point, occur scattered along the edges of the gentle arc of Coral Bay, offering slight protection from the prevailing sea breezes.

Headlands formed of low, rocky limestone platforms interrupt the smooth line of the pale beaches. Exposed, rough banks of fossilised coral are found scattered along the coastline, and discarded fragments of coral are often present in the pale cream sandy dunes.

Many areas such as Coral Bay exhibit broad saline mudflats scattered along the length of the coastal plain in the protected lee of the windswept dunes.

The rugged range descends gradually at its northern extremity to the tip of the North-West Cape, with a high, rocky ridge at Vlaming Head. The coastal plain extends around the Cape, featuring a low-lying area where the windswept fringe of dunes backs scattered saline mudflats, such as at Point Murat.

Cape Range dips rapidly to the coast on the eastern margin, with many limestone outcrops scattered at its base. The coastal plain fringing the eastern side of the range is generally wider than the western shore, its long white beaches protected from the buffeting of the prevailing sea-breezes, face the broad, clear waters of Exmouth Gulf. Saline flats are scattered in lower areas of the coastal plain, especially in the vicinity of the Bay of Rest, Gales Bay and the western shores of Sandalwood Peninsula, abutting Gales Bay. Many of these areas are regularly inundated tidal flats, emphasised by isolated clumps of lush green Mangroves fringing their edges.

Low islands become focal points dotted around the coastline of the Character Type. In Exmouth Gulf are Doole Island, Roberts Island and Whitmore Island, while off the northern tip of the Cape are the low, rocky, windswept Murion Islands, while alone to the south of Norwegian Bay is Fraser Island, is a low sandy patch amongst the turquoise waters of the reef.

Vegetation

The rugged terrain of the North West Cape Ranges Character Type is softened by an open cover of diverse vegetation, the bleached gold, green, silver and grey mosaic contrasting sharply with the intensely shaded red-brown soils the tangle of the sinuous, dead twigs and wood, and the rough, rocky slopes.

Scattered pale domes of Soft Spinifex (*Triodia pungens*) with a protruding crown of needle-like spikes and wispy, feather-like blooms is predominant over the entire area, with Limestone Spinifex (*T. wiseana*) and Lobed Spinifex (*T. basedowii*) spreading beneath the scattered, open cover of taller bushy shrubs. *-+ Buffel Grass (*Cenchrus ciliaris*), believed to be introduced by Afghan camel drivers, is also widespread over various areas of the Character Type, transforming the landscape into a sea of rippling green after good rains. Cloaking the edges of the windswept beaches fringing the Cape are pale green wispy tufts of Beach Spinifex (*S. longifolius*), with stunted, low bushes scattered over the dunes including Marpoo (*Acacia bivenosa*), Wirewood (*A. coriacea*), and Kurara (*A. tetragonophylla*), which extend beyond the sandhills over the coastal plain.

The scattered areas of saline flats beyond the dunes are made conspicuous by the salt tolerant red Samphires (*Halosarcia sp.*) concentrated on their surfaces. Surrounding and extending beyond the salt flats are a scattered shrubby cover of diverse olive-green bushes. Wattles are prevalent in the entire area and are combined with the needle-like leaves of the Cork Tree (*Hakea suberea*), the black trunk of the Snakewood (*Acacia xiophylla*), Bullock Bush (*Heterodendrum oleafolium*), low, spreading bushes of Ashby's Banksia (*Banksia ashbyi*), and the scattered, thick-trunked individuals of the deciduous Kurrajong (*Brachychyton australae*), which feature large, bright green leaves and vivid red flowers. White blooms of the Hairy Pepperflower (*Diplopeltis eriocarpa*), Grey Cassia (*C. desolata*), Slender Peppercress (*Lepidium platipetalum*), Low Bluebush (*Maireana planifolia*) are also scattered over the grasses.

Dense green clumps of Mangroves are scattered features along the coastline of this Character Type. They can be seen edging the banks in areas along the low reaches of the broad blue pool at Yardie Creek as well as Mangrove Bay and Mosquito Creek and marking the western shores of the Sandalwood Peninsula. Dominating these lush groves are the White Mangrove (*Avicenna*

marina), surrounded by vertical root fingerlings, with scattered specimens of Spotted-leaved Red Mangrove (*Rhizophora stylosa*) with its tangled, diagonal prop roots reaching into the water, and a few individuals of the Ribbed-fruit Orange Mangrove (*Bruguiera exaristata*). Samphires with Seaheath (*Frankenia pauciflora*) and Seablite (*Suaeda australis*) fringe the Mangroves in the low-lying regularly inundated flats.

Dispersed clumps of taller vegetation contrast with the bleached gold Spinifex domes, the rocky boulders, and richly shaded red soils. Specimens of variegated pale pink, white and red trunks of the Variable Barked Bloodwood (*Eucalyptus dicromophloia*) emerge above the general height of the vegetation, combined with Kurrajongs and numerous shrubby, broombush-shaped Wattles. Scattered individuals of Giant Mallee (*E. oleosa*) are sprinkled over the rough terrain with distinct bushes of dark green, waxy leaves of Native Figs (*Ficus platypodia*), and small clumps of the smooth, white trunked Coolibahs (*Eucalyptus coolibah*) seen in sheltered valleys of the deep canyons. Smaller shrubs scattered over the rough terrain include Gregory's Wattle (*Acacia gregorii*), the pale mauve flower of Coastal Hibiscus (*Alyogyne cuneiformis*), numerous shrubby Bloodbush (*Cassia oligophylla*), the pale, slender White Cassia (*C. pruinosa*), the small, silver-grey leaves of the Cape Range Grevillea (*G. variifolia*), Yulbah (*Erythrina vespertilio*) featuring bright red flowers, and Tangling Melaleuca (*M. cardiophylla*). A dense concentration of shrubby vegetation along the sinuous creeklines in the floor of the canyons and steep-walled gullies emphasises the line of the watercourses which flow intermittently between the high, enclosing walls. Dark green leaved Native Fig are common along here as well as low specimens of Coolibahs, with spreading Yulbah trees, over a more dense cover of pale grasses and Spinifex.

The gently undulating red-brown terrain to the south of the Character Type is also dominated by a mixture of pale olive to bleached gold grasses. Soft Spinifex in scattered hummocks over the landscape is combined with dense patches of Lobed Spinifex, wispy tufts of Kangaroo Grass (*Themeda australis*) and pale green patches of encroaching Buffel Grass. Taller grey-green shrubs appear at sparse intervals, occasionally forming dense thickets above the open layer of grasses, consisting of Rattle Bush (*Grevillea stenobotrya*) which dissipates further north, Wirewood, Kurara and Corky Bark (*Gyrostemon ramulosus*). Smaller bushes appearing regularly include many wattles such as Marpoo, Gregory's Wattle, and Spoon-leaved Wattle (*Acacia spathulata*), with the tangled, climbing bush of the Shark Bay Daisy (*Brachycombe latisquamea*) dotted with yellow hearted mauve flowers, Clawflower (*Calothamnus crysantherus*), Flannel Bush (*Solanum lasiophyllum*) and Grey Cassia (*C. desolata*).

Splashes of bright colour appear over the Character Type from many bushes, dominated by the spots of glowing yellow Wattle blossoms sprinkled amongst the olive green foliage in the winter and spring. The ranges feature numerous flowering plants including a plethora of bright pink and occasionally white Morning Glories. This includes the hairy Yardie Morning Glory (*Ipomoea yardiensis*), the shrubby Rock Morning Glory (*I. costata*), a creeping Morning Glory (*Polymeria ambigua*) is common in the canyons, and trailing stems of Beach Morning Glory (*Ipomoea brasiliensis*) are found along the coast. Other bright spots of colour emerge from the slender bush of Sturt's Desert Rose (*Gossypium sturtianum*), the bright pink wispy blooms of Forrest's Featherflower (*Verticordia forrestii*), with the deep orange flowers of Coppercups (*Pileanthus peduncularis*).

After good rains, the pale pink fuzzy blooms of Mulla Mullas appear, including the Hairy Mulla Mulla (*Ptilotus helipteroides*), the Tall Mulla Mulla (*P. exaltus*), and the pompom flowers of the Mat Mulla Mulla (*P. axillaris*). Mixed with these are the startling glossy red blooms of Sturt Pea (*Clianthus formosus*) with a red bulbous centre rather than the usual black, the richly shaded Camel Bush (*Trichodesma zeylanicum*), the pale yellow and red flowers of the Slender Petalostylis (*P. labicheoides*), and the white to mauve blooms of the low, Wide Branching Leschenaultia (*L. subcymosa*).

Waterform

The relentless force of water has been responsible for scouring and shaping the rugged, dissected landscape of this Character Type, leaving the spectacular topography of hills, canyons, gullies, cliffs and coastal plains over its surface.

The watercourses carved into this terrain are intermittent, generally appearing as dry, rubble filled creek beds, such as Shothole Canyon, or as broad, trapped pools of blue water, such as at Yardie Creek. Heavy rainfall flushes out many of the gullies and creeks, especially after the passing of a cyclone. The short, parallel drainage lines on the western slopes of the range fan out broadly and lose their distinction on reaching the coastal plain, and only a few watercourses actually reach the encompassing waters of the Indian Ocean or Exmouth Gulf.

A narrow sandbar separates the clear, gentle pooled waters of Yardie Creek from the Indian Ocean, with the sinuous watercourses forming Qualing Pool and Mosquito Creek also dammed into Mangrove lined pools by the encroachment of windswept coastal dunes.

Adjacent to the dunes on the coastal plain are broad areas of saline mudflats which are filled with water for short periods after rains. The high evaporation rate in this region allays the shallow waters from remaining for long periods over this arid landscape.

The rich deep blue and turquoise mosaic of the shaded marine environment encompassing the Character Type is enhanced by the presence of the unique and diverse Ningaloo coral reef. The reef which fringes the western coastline, extends around the tip of the Cape to Bundegi Reef, within Exmouth Gulf. The stark line of foaming white breakers defining the outer-most limits of the coral is sandwiched between the rich, deep blue of the Indian Ocean and the gentle turquoise waters of the near shore lagoon. Displaying a unique proximity to the shoreline, the discontinuous reef wall forms a barrier to the quiet lagoon waters, absorbing the pounding of the relentless Indian Ocean, leaving a white, foaming stream of surge waves to dissipate in the quiet, turquoise waters of the lagoon.

Off the eastern shore of the North West Cape is Exmouth Gulf, a broad, shallow body of water sheltered by the tapered protective arm of the Cape Peninsula.

Land Use

Established as recently as the late 1960's, Exmouth has bloomed into the largest population centre of the Character Type. The town was founded originally as a support base for the joint Australian/US Naval Communications Base situated on the North West Cape at Point Murat. Previously, the only major settlement in this region consisted of an Allied Base and airstrip at Learmonth, utilised during World War II. A domestic airport has been established in Learmonth today, along with conspicuous white buildings and parabolic antennae dish which form part of a Solar Observatory.

Coral Bay is another small community on the western shores of the North West Cape, adjacent to Ningaloo Reef, catering mainly to the numerous fishermen and tourists which flock there annually.

Aboriginal settlement in this region has had a long history. Evidence of shell middens, artefacts and engravings which have been found in various caves amongst the ranges are of archaeological significance, including Bunburi Cave and Mandu Mandu Cave, but today, however, none of the former inhabitants remain.

The major activity in the Character Type is the pastoral industry, mainly involved in wool production. The angular fenceline divisions with scattered geometric steel windmills whirring rhythmically above bores and tanks are a common site over much of the region.

Fishing is widespread here with numerous professional and recreational enthusiasts. An abundant prawn fishery in the protected, clear waters of Exmouth Gulf sees staggered alignments of colourful trawlers cruising in procession over the broad embayment. Two processing factories occur on the coast and a linear, rocky groyne with an angular grey wooden jetty protrudes into the water at Learmonth for refuelling.

The unique proximity to the edge of the continental shelf in this region is attracting a growing number of game fishing enthusiasts to the area. With the deep, clear waters harbouring many desirable specimens such as Sailfish and Marlin, a charterboat industry is now thriving to cater for the market.

The abandoned remains of a processing factory at Norwegian Bay and a few protruding stumps at Point Cloats which are the signs of a former jetty, are the reminders of the whaling industry which once flourished along this coastline until 1957 when the factory finally ceased production.

The crystalline blue waters in and around the Ningaloo Reef abound with fish which attracts a flotilla of colourful craft dotted across the water. Many divers and snorkellers explore the vibrant display of colourful undersea coral jewels which abound amongst the reef, and the quiet, shallow turquoise lagoon attracts many waterbased activities.

The lines of shuffled tracks across the long beaches in the summer are evidence of the nesting sites of the Green Turtle. This event, along with the mass coral spawning, the arrival of the gentle giants - the Whale Sharks, and the migration of the Humpback Whales are all annual events along this coast which arouse much interest to residents, tourists and scientists alike.

The extensive reef has claimed many shipping victims in the past, and several wrecks remain visible today, such as the "Mildura" off North West Cape. Many of the ships were lost before the installation of the tall, cylindrical stone lighthouses at Vlaming Head and also at Point Cloats, where today an automatic navigation beacon has taken over the role.

The Harold E. Holt Naval Communication Base at Point Murat is characterised by the thirteen soaring red and white steel lattice towers, secured with diagonal metal guys which radiate from the tall, vertical structures. These "needles of steel" are some of the tallest structures in the Southern Hemisphere.

A marine park encompasses the unique reef at Ningaloo, extending from Amherst Point around the tip of the Cape to Bundegi Reef, north of Exmouth, for the protection and preservation of this significant marine feature. An extensive terrestrial conservation zone covers much of the Character Type . The Cape Range National Park incorporates much of the rugged terrain and spectacular scenery for which this area is renowned.

The first oil discovered in Australia was found at Rough Range in 1953. As a legacy of this early intensive mineral exploration, many geometric seismic lines are still visible today, some of which have been rehabilitated, such as in the National Park, and others have been utilised as station tracks and access routes across the pastoral land. The oil found here was only a small, unusable reserve, and today, much mineral exploration is still ongoing both on land and offshore.

To the south of the National Park on the west coast of the Cape, is a weapons testing range used occasionally by the RAAF for bombing practice, targeting old rusting car bodies as their 'enemies'.

Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Deeply eroded canyons and well defined V shaped valleys with heavily dissected steep slopes and/ or a number and configuration of irregular lateral tributaries e.g. Shothole Canyon *Exposed ridges, major rock outcrops and vertically cliffed or overhanging rock walls e.g. Yardie Creek. *Areas of dissected and steeply sloping terrain which forms an abrupt contrast with adjoining landforms e.g. Cape Range and Coastal Plains. *Hills, blowouts and dune formations of distinctive height, configuration or texture which are visually prominent in the landscape e.g. Gnargoo Range. *Islands, reefs and other offshore features which become focal points e.g. Ningaloo Reef. *Diverse coastline edges with low headlands, sandy points and tidal flats e.g. Mangrove Bay.	*Single plants or groups of plants which become focal points due to shape, colour, isolation, or position in landscape e.g. Variable Barked Bloodwood. *Strongly defined patterns of vegetation associated with rock outcrops, watercourses, tidal flats and mudflats e.g. Mangroves. *Ephemerals or other vegetation showing vivid displays of colour e.g. Sturt Pea.	*Unusual ocean shoreline motion and colour due to islands, reefs and shoreline configuration e.g. Ningaloo Reef. *Rock pools and other permanent water features e.g. Yardie Creek. *Intermittent watercourses, saline mudflats or inundated tidal zones which become focal points due to contrast with associated terrestrial and vegetation features e.g. Mangrove Bay.
MODERATE	*Gently undulating terrain which is not distinctive or prominent in the surrounding topography. *Regular coastline edges which show little contrast in form, line and colour.	*Some structural, textural and seasonal colour patterns evident in vegetation, but lacking in uniqueness or distinction relative to the surrounding vegetation.	*Intermittent watercourses, saline mudflats which lack distinction relative to the surrounding landscape. *Common shoreline character and motion characteristics.
LOW	*Landform lacking in the visual variety common to the surrounding landscape.	*Extensive areas of vegetation with little variation or diversity.	*Waterforms absent.

Aesthetic Character Summary

LANDFORM

Form: tapered peninsula; gently inclined southern region; heavily dissected, uplifted limestone; narrow coastal plain; ranges forming backbone of the peninsula; gentle topography of coastal plain; low dunes; low hills; limestone platforms; tapered cylindrical columns of termite mounds; silhouetted backdrops; flat-topped plateaus and ranges; steep canyons; deeply dissected gullies; piled boulders; thin veneer of soils over rock; overhanging ledges; abrupt backdrop of ranges to coastal plain; domed dunes; broad dune blowouts; sand sheets; prominent sand hills; subdued headlands; banks of fossilised coral; low islands;

Line: furrowed ranges; elongated linear dunes; horizontal limestone platforms; ridgelines; vertically cliffed ridges; horizontal outcrops of rock; steeply angled slopes; towering canyon walls; diagonally angled slopes; soaring cliffs; vertical cliffs; horizontally striated cliffs; narrow sandbar; shoreline; long beaches;

Colour: red-brown sand plain; pale grey limestone; creamy-grey outcrops; pale rust shades of rock; bright beach sand; richly shaded ranges; rich mosaic of deep blue and turquoise of the coastal waters; pale cream sand dunes; white beaches;

Texture: rugged Cape Range; rocky mounds; rough limestone platforms; limestone rubble; sandy soils; rugged canyons; bare limestone; rubbly slopes; limestone boulders; deeply seamed cliffs; smooth sand; rough banks of fossilized coral; coral fragments in sand; scattered limestone outcrops; rocky Murion Islands; sandy Fraser Island;

Scale: unrelenting exposure to elements; canyon walls enclose and channel views; panoramic viewpoints show dramatic contrast between ranges and coastal plain; long views across subdued terrain of southern region of the character type and coastal plain;

VEGETATION

Form: tall groves of Eucalypts; bushy Wattles; shrubby Cassias; sparse blanket of grasses; sparse vegetation; isolated clumps of Mangroves; open cover of vegetation; domes of Spinifex; taller bushy shrubs; wispy tufts of Beach Spinifex; stunted, low bushes; spreading bushes of Ashby's Banksia; thick trunked Kurrajongs; broombush-shaped Wattles; spreading Yulbah trees; dense thickets; pompom blooms of Mat Mulla Mulla;

Line: Slender Peppercress; vertical root fingerlings surrounding Mangroves; tangled, diagonal prop roots of Spotted-leaved Red Mangrove; slender White Cassia; tangled Shark Bay Daisy bush; trailing stems of Beach Morning Glory;

Colour: pale, bleached grasses; pale olive and green grasses; lush green Mangroves; bleached gold, green, silver and grey mosaic; sharp colour contrast with soils; pale Spinifex; pale green Beach Spinifex; red Samphires; olive-green bushes; black trunks of Snakewood; bright green Kurrajong leaves and red flowers; white blooms of Hairy Pepperflower; Grey Cassia; variegated pale pink, white and red Bloodwood trunks; dark green Native Figs; white trunked Coolibahs; pale mauve Coastal Hibiscus flower; bright red flowers of Yulbah and Cape Range Grevillea; yellow hearted mauve Shark Bay Daisies; spots of glowing yellow wattle blossoms; bright pink and white Morning Glories; bright pink Forrest's Featherflower; deep orange Coppercups; pale pink Mulla Mullas; startling glossy red blooms of Sturt Peas; Rough Bluebell; pale yellow and red of Slender Petalostylis; white to mauve flowers of Wide Branching Leschenaultia;

Texture: sea of waving, rippling grasses; protruding crown of needle-like spikes of Spinifex; needle-like leaves of Cork Tree; Hairy Pepperflower; waxy leaves of Native Fig; smooth trunked Coolibahs; wispy Forrest's Featherflower; fuzzy Mulla Mulla blooms;

Scale: vegetation often sparse and low, revealing long views to be enclosed by landform only; occasional taller thickets of vegetation enclose views;

WATERFORM

Form: sheltered embayment of Exmouth Gulf; narrow creeks; quiet pools; broad pool of Yardie Creek; shallow channels; fanned sediments; broad saline mudflats; broad waters of Exmouth Gulf; tidal flats; trapped pools of water; shallow water;

Line: foaming line of reef boundary; sinuous, dry creeks; short parallel flow lines; gentle arc of Coral Bay;

Colour: rich, blue water; turquoise lagoon; bright white foaming edge of reef; crystalline blue Indian Ocean; clear water; glittering silver-blue water of Indian Ocean; clear waters of Exmouth Gulf; pool of blue water at Yardie Creek; rich deep blue and turquoise mosaic of the shaded marine environment;

Texture: foaming edge of reef; scouring waters; dry, rubble-filled creek beds;

LAND USE

Form: parabolic dish antennae at solar observatory; abandoned remains of whale processing factory; shipwrecks; cylindrical lighthouses; needles of steel communication towers; materials and shape of built structures;

Line: airstrip at Learmonth; angular fenceline divisions; geometric steel windmills; staggered alignments of fishing trawlers across Exmouth Gulf; linear groyne; angular wooden jetty; protruding wooden stumps; lines of shuffled tracks of Green Turtles; tall lighthouses; steel lattice towers; diagonal metal guys; tall, vertical structures; geometric seismic lines; geometric shape of built structures;

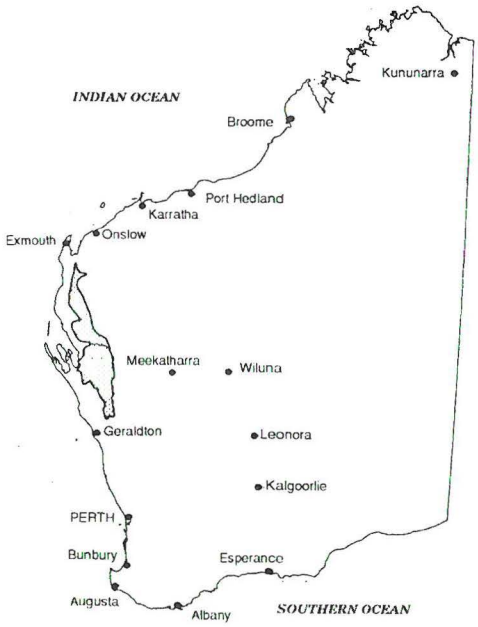
Colour: conspicuous white buildings of solar observatory; colourful trawlers; grey wooden jetty; flotilla of colourful craft; vibrant display of undersea coral jewels; red and white towers; grey stone lighthouses; colours of materials incorporated into built structures eg red tile roofs;

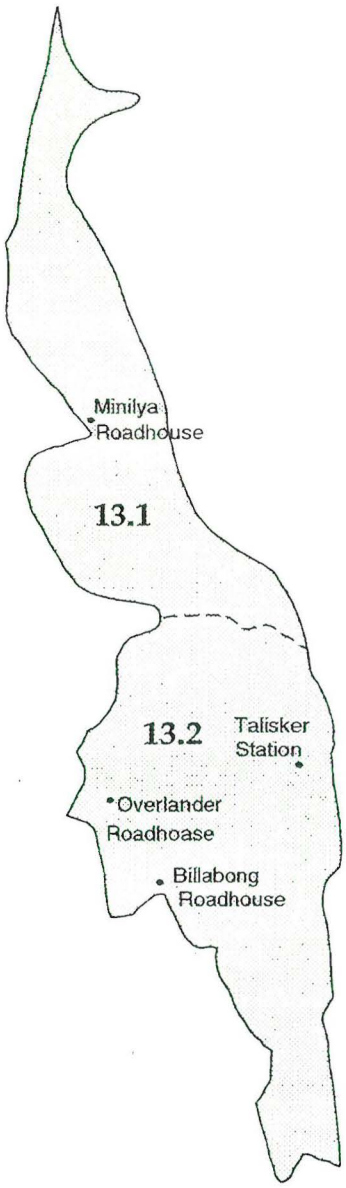
Texture: wooden jetty; rocky groyne; wooden stumps; craft dotted across the water; stone lighthouses; texture of materials incorporated into built structures, eg corrugated iron;

13. Wooramel Plains

13.1 Minilya Dunes

13.2 Talisker Plain





Scale

0 50 100 150 200 Km

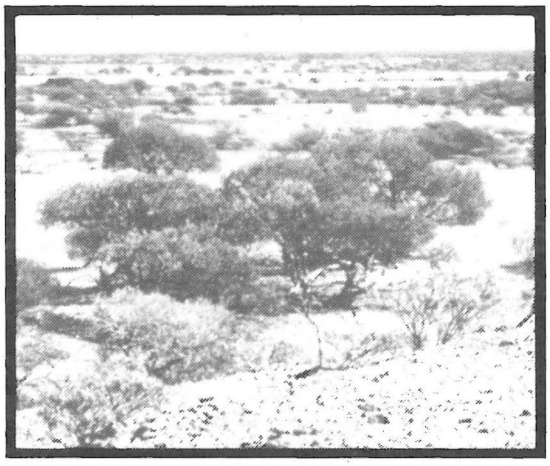
Approximate boundarys only.
Produced by Land Information Branch,CALM

Wooramel Plains Landscape Character Type

Sandwiched between the north-western coastal landscapes and the rocky terrain of the Pilbara, is the elongated Wooramel Plains Landscape Character Type. Occurring within its boundaries are two distinct Sub Types: the Talisker Plain and the Minilya Dunes.

Distinguishing Features

The Wooramel Plains Character Type is a transitional landscape, separating the coast from the arid, red interior. The plains and linear dunes of this Character Type are dominated by a dense scrub of tall Wattles which extends over the region, enclosing views of the gently inclined terrain.



The Wooramel River which meanders almost midway through the Character Type is the line which separates the two areas. The northern half, the Minilya Dunes Sub Type, is dominated by elongated, linear sand dunes, largely arranged in a north-west to south-east alignment. To the south of the Wooramel River is the flat to very gently inclined region of the Talisker Plain Sub Type.

Several major watercourses dissect this Character Type, including the Lyndon River, the Minilya River, and the extensive Gascoyne and Murchison Rivers. Numerous minor tributaries and broad claypans are also scattered across the terrain, with other shallow depressions remaining as evidence of former drainage lines.

European settlement and the utilisation of land for grazing has resulted in the dispersal and migration of the former Aboriginal inhabitants of this area. Today, many have become established in nearby coastal regions with Aboriginal communities such as at Carnarvon.

The pastoral industry is the predominant land use in the region, mainly for the production of wool. No towns or population centres occur in the Character Type, but numerous communities are associated with pastoral stations, and a few road houses are scattered on the major travel routes.

Climate

The Wooramel Plains receives a hot, dry climate, characterised by sunny days under a broad, cloudless sky.

Very hot, dry summers, emphasised by a high evaporation rate, are balanced by winters of calm, fine weather with balmy days and cold nights. Summer temperatures range from a 34°C maximum to a 22°C minimum, with temperatures occasionally reaching higher than 40°C. The cooler winter temperatures vary from a 10°C average minimum to a maximum of 22°C.

The annual rainfall experienced over the Wooramel Plains ranges between 200-300mm, falling mainly between May and July. The long, clear days of mid-summer and autumn are occasionally interrupted by sudden showers from localised thunderstorms.

Minilya Dunes Landscape Character Sub Type

The Minilya Dunes Sub Type is a long, narrow landscape sandwiched between the low-lying Carnarvon Coastal Plain with the rugged North-West Cape Ranges on its western perimeter, and the arid Pilbara region to its east.

Forming the northern half of the Wooramel Plains Character Type, the Minilya Dunes is typified as a broad sandbelt with elongated, linear red sand ridges and inter-dunal corridors oriented in a north-south to a north-west to south-east direction. These dunes are a dominant feature across much of this area, curving around to form an east-west orientation at its southern fringe.

Winding through this undulating landscape are broad watercourses including the Minilya River, the Lyndon River and the extensive Gascoyne River. These are seen as wide, shallow floodplains with dry, gravelly beds carved into braided channels, and lined by undulating, mounded banks.

Some areas of limestone outcropping are conspicuous amongst the shallow red sand of the broad interdune depressions. Irregular, rough exposures of pale grey pockmarked rock emerge above the sand, and low mounded hills are occasionally seen along the eastern fringe.

Generally cloaked by a dense vegetation of broom-bush shaped Wattles, the views over the Minilya Dunes Sub Type are often enclosed, and only across the open Saltbush flats is the gently undulating topography revealed beneath wide blue skies.

The pale olive, spreading Horse Mulga or Wanyu (*Acacia ramulosa*) is dominant over the dune ridges of the Sub Type, with the tall Sandplain Gidgee tree (*A. anastema*) reaching above the surrounding canopy, with the tall, white flowering Rattle Bush (*Grevillea stenobotrya*). Rounded shrubs of Star Flower (*Calytrix muricata*), brightly orange flowering Coppercups (*Pileanthus peduncularis*) and small shrubs of Forrest's Featherflower (*Verticordia forrestii*) which display bright, fuzzy pink blooms in springtime, are scattered beneath the taller shrubs over the elongated sand ridges.

The dune flats between the linear ridges feature a different group of vegetation. More common here are Spreading Gidgee (*Acacia subtessaragona*), the dark green, needle-like foliage of the tall, rounded shrubs of Kurara (*A. tetragonophylla*), dark trunked Snakewood (*A. xiphophylla*), Corkybark (*Gyrostemon ramulosus*), and the olive, bushy Northern Sandalwood trees (*Santalum lanceolatum*). Scattered, bushy shrubs beneath the taller canopy include the sparse Green Cassia (*C. chatelainiana*), the pale green, bushy Grey Cassia (*C. desolata*), the taller, rounded Silver Poverty Bush (*Eremophila pterocarpa*), the straggly Shrubby Rice Flower (*Pimelia microcephala*), wiry looking Currant Bush (*Scaevola spinescens*), and the fuzzy, grey leaved Flannel Bush (*Solanum lasiophyllum*).

The dense cover of shrubby Wattles opens up gradually further north in the Sub Type. Thick, patchy groves of Spreading Gidgee are scattered over the topography interspersed with open terrain, dotted with a sparse cover of low, wiry bushes and pale gold grassy tufts. Treeless flats fringe some of the watercourses, as at the Lyndon River. The low, pale grey Dwarf Saltbush (*Atriplex codonocarpa*) is sparsely scattered over these areas, with the glossy yellow flowers of the Satiny Bluebush (*Maireana georgei*) and the dark green Native Fuschia (*Eremophila maculata*). After rains the Saltbush flats are sprinkled with bright white nodding blooms of Splendid Everlasting (*Helipterum splendidum*).

The rocky areas of exposed limestone which occur sporadically amongst the richly shaded red dunes are softened by clumps of Marpoo (*Acacia bivenosa*), tall shrubs of Limestone Wattle (*A. sclerosperma*), and the thin, straggly White Cassia (*C. pruinosa*), with pale green hummocky domes of Soft Spinifex (*Triodia pungens*).

Grasses become a more noticeable component of the understorey in the northern section of the Minilya Dunes, where they are also seen mixed with low, sparse shrubs on open Saltbush plains, as gold tussocky clumps, or rounded, pale green to straw coloured spiky domes.

The broad watercourses that wind with braided channels across the Sub Type are accentuated by a dense concentration of taller vegetation. Spreading shrublands of Horse Mulga with Limestone Wattle, Kurara and Bramble Wattle are common in the drainage depressions. Emerging above the canopy of shrubs are

the slender white trunks and dark green leaves of River Gums (*Eucalyptus camaldulensis*), which grow along the major river channels.

The high evaporation rate and the low rainfall results in dry, rubble-filled watercourses for most of the year. Isolated, quiet pools along the major rivers, such as Cathada Pool on the Gascoyne River, and the Woordt Pool in the Lyndon River, remain for long periods beneath the shaded banks. Heavy falls of rain from late summer storms can cause localised flash flooding in areas, sending torrents of surging water to spread over the parched beds.

The entire Sub Type is utilised by pastoral leases which feature scattered communities at the stations. These, with the road house at Minilya Bridge are the major population centres of the region.

Numerous bores and wells are scattered across the Minilya Dunes Sub Type for watering the pastoral stock, often marked by steel lattice windmills which tower over cylindrical tanks and narrow troughs.

A geometric grid of fencelines and red, dusty station tracks mark paddock and pastoral property boundaries across the landscape. The fenceline effect (a noticeable difference between grazed and ungrazed paddocks along a fenceline) is distinct in many areas of the Sub Type, with eroded gullies and bare, degraded patches seen periodically in the vicinity of watering points.

Minilya Dunes Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Dune ridge formations of distinctive height or configuration which are visually prominent or creating a contrast in the surrounding landscape. *Topographic features which provide obvious contrast to landform patterns common in the surrounding area e.g. Wandagee Hill. *Distinctly defined watercourses or drainage channels e.g. Gascoyne River.	*Vegetation displaying a diversity of species, height, colours and density. *Strongly defined patterns of vegetation associated with waterforms or landform features e.g. River Gums along watercourses. *Distinctive display of seasonally flowering plants e.g. Everlasting Daisies.	*Permanent to semi-permanent pools of water e.g. Cathada Pool. *Watercourses or claypans which become distinctive in the landscape relative to their association with landform or vegetation features e.g. Gascoyne River.
MODERATE	*Dune formations and gently undulating topography which is not visually dominant and is surrounded by similar landforms. *Drainage depressions which are not visually prominent in the surrounding topography.	*Patterns in vegetation evident but lacking distinctiveness or uniqueness relative to the surrounding vegetation.	*Watercourses and claypans which lack distinction relative to surrounding landform or vegetation features.
LOW	*Landform lacking in the visual variety common to the surrounding landscape. *Areas of land which display signs of degradation such as erosion or gullying.	*Extensive areas of similar vegetation with low variation in height, colour, density or contrast with the surrounding landscape. *Areas of vegetation displaying signs of degradation.	*Waterforms absent.

Minilya Dunes Sub Type - Aesthetic Character Summary

LANDFORM

Form:	broad sand belt; undulating, mounded banks; low, mounded hills; undulating topography; dune flats between ridges;
Line:	elongated, linear sand dunes; inter-dunal corridors; north-south to a north-west/south-east orientation;
Colour:	red sand dunes; pale grey limestone;
Texture:	linear sand dunes; rough, pockmarked limestone outcrops;
Scale:	long views enclosed partially by linear sand dunes; many areas of broad, open terrain, such as Saltbush flats;

VEGETATION

Form:	broombush-shaped Wattles; open Saltbush flats; rounded shrubs of Star Flower; sparse Green Cassia; straggly Shrubby Rice Flower; thick patchy groves of Spreading Gidgee; tufted grasses; treeless flats; straggly White Cassia; hummocky domes of Soft Spinifex; tussocky clumps of grasses; spreading shrublands;
Line:	wiry Currant Bush; tall Limestone Wattle; tall Sandplain Gidgee; thin White Cassia; concentration of taller, denser vegetation following line of major drainage channels; slender River Gum trunks;
Colour:	pale olive Horse Mulga; white flowering Rattle Bush; bright orange Coppercups; bright pink Forrest's Featherflowers; dark green Kurara; dark trunked Snakewood; olive Northern Sandalwood; grey leaved Flannel Bush; pale gold grasses; pale grey Dwarf Saltbush; yellow flowers of Satiny Bluebush; dark green Native Fuschia; bright White Everlastings; pale green to straw coloured Soft Spinifex; gold tussocky clumps of grasses; dark green leaves and white trunks of River Gum;
Texture:	fuzzy Forrest's Featherflowers; needle-like foliage of Kurara; fuzzy Flannel Bush; glossy flowers of Satiny Bluebush; sprinkling of White Everlastings on Saltbush flats; spiky domes of grasses;
Scale:	tall, shrubby vegetation encloses and channels views in many areas; long views in areas of low, sparse vegetation such as over Saltbush flats;

WATERFORM

Form:	broad watercourses; wide, shallow floodplains; isolated, quiet pools; torrents of surging water;
Line:	braided channels;
Colour:	glassy pools;
Texture:	dry, gravelly beds; rubble filled watercourses; parched beds;

LAND USE

Form:	cylindrical tanks; eroded gullies; shapes of built structures;
Line:	steel lattice windmills; narrow troughs; geometric grid of fencelines and station tracks; fenceline grazing effect; geometric line of roofing and building materials;
Colour:	red station tracks; shades of roofing and building materials;
Texture:	dusty station tracks; bare, degraded patches of land; textural finish of roofing and building materials;

Talisker Plain
Landscape Character Sub Type

The Talisker Plain is the southerly Sub Type of the Wooramel Plain Landscape Character Type. It is wedged between the diverse heaths of the Kalbarri Sandplain Character Type, the Mulga covered Meekatharra Plateau Character Type, and the southern corner of the low-lying Carnarvon Coastal Plain.

This region is characterised by a very gently inclined to flat area of extensive, red sandy plains. With views generally restricted by the dense thickets of bushy Wattles, glimpses through gaps in the vegetation, such as over claypans, reveal a broad, expansive view with the landscape appearing as level as the long horizon.

Dividing this tapered Sub Type is the broad course of the Murchison River. While more spectacular towards its mouth, in this region the red sandplains slope gently towards the banks where it stretches out into a wide, shallow floodplain of twining, braided channels. Eroded areas of limestone are seen in patches along the floodplain , contrasting brightly against the red sandy soil.

The elongated Lake Nerramyne on the eastern border below the Murchison River and the numerous small claypans to the north of the watercourse, including Mungawolagudi Claypan and Billilly Claypan, occur in a major depression to the east of the Sub Type and are traces of the former tributaries of the Murchison River. Other broad depressions occur sporadically across the terrain, edged by slightly elevated boundaries.

In the southern part of the Sub Type are small areas of gently sloping stony plains and low limestone rises which, when occurring in an area of sparse vegetation, are quite distinct against the surrounding landscape. These areas are often typified by patches of bright, pale grey rubble strewn over the richly shaded red sandy ground.

The Wooramel River at the northern perimeter is a highlight of the Talisker Plain. Much of its periphery is characterised by broad claypans with crusted, glazed and cracked mud surfaces. Towards the eastern half of the Sub Type, it flows through a region of low, rocky, flat-topped breakaways and deeply dissected scarps which look over the undulating, gravelly domes accentuated within the braided channels of the floodplain below.

This area is dominated by a cover of very dense broombush-shaped Wattle scrub. These tall, bright green to olive thickets are a prevailing characteristic in this region, enclosing and channelling views over the plain. Occurring most frequently amongst the scrub is Horse Mulga or Wanyu (*Acacia ramulosa*) with many other bushy Wattles including the sharp, needle-like foliage of the bright green Limestone Wattle (*A. sclerosperma*), and the tall, shrubby grey-green Sandplain Wattle (*A. murrayana*).

Low trees become the occasional focus above the almost level canopy of shrubby Wattles. These generally consist of the grey-green of the White Cypress Pine (*Callitris comellaris*), with patches of Eucalypts such as Giant Mallee (*Eucalyptus Oleosa*), the pale yellow-pink and dark grey trunked Mallalie (*E. eudesmoides*) and Oldfield's Mallee (*E. oldfieldii*).

Along the sinuous floodplains, drainage depressions and claypans, the vegetation thins out slightly, allowing for a more extensive view of the gently inclined, richly shaded red sandplain. Along the floodplain are a scattered cover of bushy Wattles including Jam (*Acacia acuminata*), Horse Mulga and Limestone Wattle, with the prickly, straggly low trees of Bramble Wattle (*A. victoriae*), the dark trunked Snakewood (*A. eremaea*), with rounded clumps of Broombush (*Melaleuca uncinata*).

The main channels of the major rivers throughout this Sub Type are made conspicuous by the concentration of taller, dense vegetation which marks their course. Emerging above the thickly wooded banks are the smooth, white trunks of River Gum (*Eucalyptus camaldulensis*), with the dark green bushy shrubs of Lesser Bottlebrush (*Callistemon phoeniceus*) below, which are decorated by stark red cylindrical flowers in spring.

Patches of bare, red soil are seen occasionally amongst the dense scrub. These areas are strewn with grey, twisted branches and dead wood, with occasional pale tufts of straw coloured grasses and sparsely scattered low, grey-green wiry bushes such as Sago Bush (*Maireana pyramidata*), surrounded by taller thickets of Mulga (*Acacia aneura*) and other Wattles.

The winter rains stimulate a spectacular exhibition of brightly coloured wildflowers and flowering shrubs to decorate this gently inclined landscape. Erect stems of conical cream flowers of Featherheads (*Ptilotus macrocephalus*) are common, with the bright purple flowers decorating the small, compact bush of Wild Tomato (*Solanum orbiculatum*). Nodding blooms of bright Yellow Everlastings (*Cephalipterum drummondii*) are mixed with stark White Everlastings (*Helipterum floribundum*), delicately perched on wiry stems, with abundant masses of candy pink Schoenia (*S. cassiniana*) and yellow Bright Podolepis (*P. auriculata*). Forming a background to this colourful spring-time kaleidoscope are the creams, bright yellows and silver grey flowering tufts of blossoms sprinkled amongst the taller shrubs.

The red sandplains absorb the winter rains with little run-off into the broad, shallow drainage depressions. Surface water often collects after rains in the numerous claypans which are scattered across the area, especially in the vicinity of the Wooramel River, and also Lake Nerramyne on the eastern fringe. These glassy pools of water only remain for a short period of time due to the high evaporation rate experienced in this region.

The winding channels of the Wooramel and Murchison Rivers are seen as dry and gravelly for most of the year, carrying little water. Localised summer thunderstorms can, however, result in flash-flood run-off, with torrents of muddied water spreading over the floodplains.

The lack of potable surface water coupled with very dense vegetation in many areas of the Talisker Plain have resulted in large areas of Vacant Crown Land, particularly from the centre of the Sub Type to the south-west. Fringing these areas are extensive pastoral leases concentrating on wool production. Bores, cylindrical tanks and earth dams are scattered across the area with vertical windmills emerging occasionally above the Wattle scrub to mark a water point.

Long, straight, dusty red tracks criss-cross the landscape, following long paddock boundaries across the pastoral stations marked by linear rows of upright fencelines. In some areas, paddocks display the fenceline effect where an obvious visual difference between grazed and ungrazed land is apparent. Areas of degradation are also distinctive around watering points, resulting in patches of erosion and gullying, most noticeably around claypans of the Wooramel River.

Other land uses in the Talisker Plain are minimal, and include a small clay mine at Lake Nerramyne, and the linear silver-grey Natural Gas pipeline which dissects the eastern fringe of the Sub Type. Isolated roadhouses are situated like oases along the linear North-West Highway, to serve travellers and the sparsely populated pastoral stations of this region.

Talisker Plain Sub Type Visual Quality Classification - Frame of Reference			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	*Landform features which display distinctive or contrasting colours or forms e.g. Limestone outcropping. *Distinctly defined river courses, drainage channels or water bodies e.g. Murchison River. *Areas of abrupt, dissected slopes and breakaway scarps e.g. Upper reaches of Wooramel River.	*Strongly defined patterns of vegetation associated with waterform or landform features e.g. fringing Lake Nerramyne. *Distinctive displays of seasonal colour e.g. Spring wildflowers. *Vegetation which displays distinctive patterns and diversity in height, shape, colour and texture e.g. emergent Eucalypts.	*Intermittent watercourses, claypans and saline lakes which become a focal point due to contrast with associated landform and vegetation features. *Long standing to permanent water features e.g. Callytharra Pool.
MODERATE	*Broad shallow valleys and drainage associated dissections which are less distinctly defined. *Slightly undulating topography which is not visually prominent and is surrounded by similar landforms.	*Vegetation patterns which display the height, colour, texture and spacing found commonly in the surrounding landscape.	*Intermittent watercourses or claypans lacking distinction relative to the surrounding landscape.
LOW	*Large expanses of virtually flat topography. *Areas of land which show signs of degradation such as erosion or gullying.	*Areas of native vegetation which are noticeably degraded. *Extensive areas of similar vegetation with little contrast in colour, texture, height and spacing.	*Waterforms absent.

Talisker Plain Sub Type - Aesthetic Character Summary

LANDFORM

Form:	flat to gently inclined topography; broad depressions; gently sloping plains; low limestone rises; low breakaways; deeply dissected scarps; undulating domes;
Line:	landscape as level as the long horizon; flat-topped breakaways;
Colour:	red plains; pale grey limestone;
Texture:	sandy plains; eroded limestone; stony plains; limestone rubble; gravelly domes; rocky breakaways; bare soil;
Scale:	landform is almost level, with broad, open, expansive views; dense vegetation cover generally prevents long views over Sub Type;

VEGETATION

Form:	dense thickets of bushy Wattles; broombush-shaped Wattle scrub; tall thickets; low trees; patches of taller Eucalypts; rounded clumps of Broombush; thickly wooded river banks; cylindrical Lesser Bottlebrush flowers; tufts of grasses; conical Featherhead flowers; small, compact bush of Wild Tomato; flowering tufts of blossoms;
Line:	level canopy of shrubby wattles; emergent trees above general canopy; straggly Bramble Wattle; dense line of vegetation following major river channels; twisted forms of dead wood; erect flowering stems; wiry Everlasting Daisy stems;
Colour:	bright green to olive Wattle thickets; bright green Limestone Wattle; grey-green Sandplain Wattle; grey-green White Cypress Pine; pale yellow-pink and dark grey trunk of Mallalie; dark trunked Snakewood; white River Gum trunks; dark green Lesser Bottlebrush shrubs with bright red flowers; grey branches and dead wood; pale straw coloured grasses; cream Featherhead flowers; bright purple Wild Tomato flowers; Yellow Everlastings; stark White Everlastings; candy pink Schoenia; yellow Bright Podolepis; cream, bright yellow and silver grey flowers amongst shrubs;
Texture:	sharp, needle-like foliage of Limestone Wattle; prickly Bramble Wattle; smooth River Gum trunks; wiry Sago Bush;
Scale:	tall, dense scrubby thickets act to enclose and channel views over landscape; where vegetation is low, such as in claypans, long views to horizon unhindered;

WATERFORM

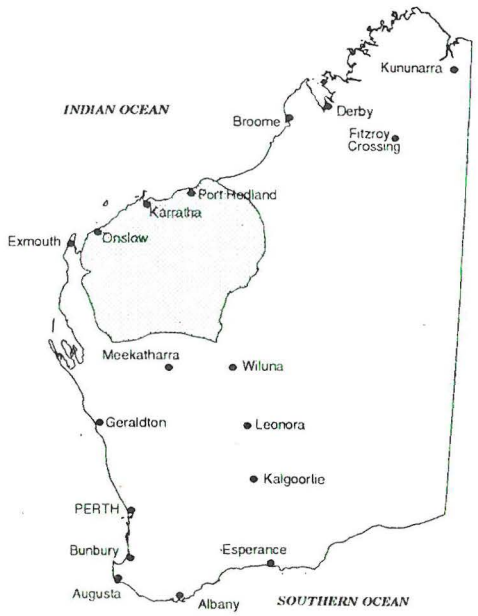
Form:	broad claypans; shallow drainage depressions; broad course of Murchison River; wide, shallow floodplains; small claypans; torrents of water;
Line:	twining, braided floodplain channels; elongated Lake Nerramyne; winding channels;
Colour:	crusted, glazed and cracked mud of claypans; muddied water;
Texture:	glassy pools; dry, gravelly channel beds;

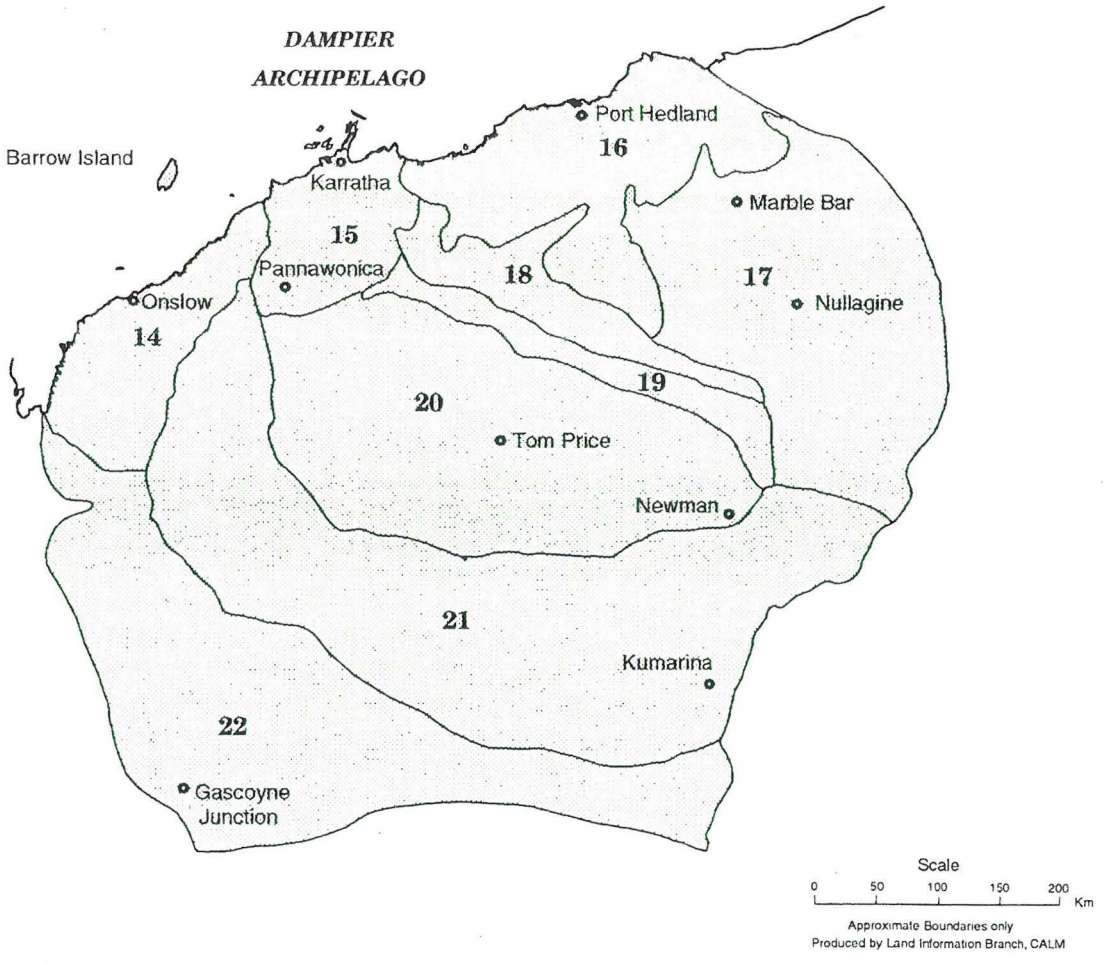
LAND USE

Form:	cylindrical tanks; earth dams; degradation seen as erosion and gullying; shapes of built structures;
Line:	vertical windmills; long, straight tracks criss-crossing landscape; long paddock boundaries; linear rows of upright fencelines; fenceline grazing effect; Natural Gas pipeline; linear highway; geometric line of roofing and building materials;
Colour:	red tracks; silver-grey gas pipeline; shades of roofing and building materials;
Texture:	dusty tracks; textural finish of roofing and building materials;

The North-West

14. Ashburton Plains
15. Karratha Coastal Plain
16. Degray Lowland
17. Nullagine Hills
18. Chichester Ranges
19. Fortescue Valley
20. Hamersley Ranges
21. Gascoyne Ranges
22. Murchison Plateau



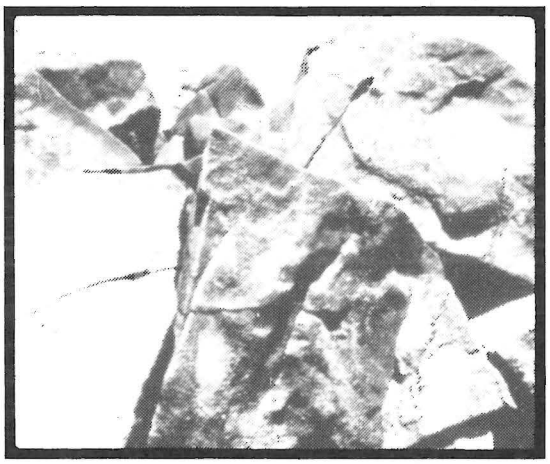


Summaries
The North West

14. Ashburton Plains

Landform
Extensive sandplain with red dunes and low rocky hills further inland. The coastal dunes are interrupted by salt flats and tidal swamps, with offshore islands.

Vegetation
Mangroves are extensive on the inter tidal zone, succeeded inland by samphire scattered on bare mudflats giving way to low grassland. Other areas covered by sparsely scattered trees and shrubs over mixed low grasses.



Waterform
Deltaic features occur on the coast with inundated mudflats, and swampy areas, where large rivers such as the Ashburton and Cane meet the Indian Ocean.

Land Use Patterns
Grazing of sheep and beef cattle predominant with mining occurring in some areas.

Significant Features
Ashburton River pools, Mangroves, Tidal flats.

15. Karratha Coastal Plain

Landform
Very gently undulating coastal plain with low rocky hills inland. On the coastline, rugged headlands and cliffs separate small beaches and some areas of tidal mudflats and swamps.

Vegetation
Sparse grassland and shrubs with heath, and isolated low trees. Mangroves occur on tidal mudflats.

Waterform
Some large rivers such as the Fortescue form estuaries and floodplains on the coast. Tidal mudflats are susceptible to inundation by the Indian Ocean.

Land Use Patterns
Sheep and cattle grazing, mining and salt evaporation is undertaken.

Significant Features
The Burrup Peninsula and Dampier Archipelago.

16. De-Grey Lowlands

Landform
A low-lying coastal plain which slopes gently toward the sea with substantial delta and floodplain features, including wide and braided sandy riverbeds. Low coastal limestone ridges appear in some areas. Inland small stony hills and elongated ridges occur.

Vegetation
Inland, the plain has sparse hummock grasslands and low scattered shrubs, with many areas appearing treeless except along watercourses which are better wooded. Along the coastal margins, dwarf shrubs and a mosaic of grasslands give way to samphire and low shrubby mangroves.

SUMMARIES

Waterform
These lowlands are traversed by many seasonally dry north flowing rivers and streams forming extensive deltas and floodplains with occasional permanent pools. Tidal lagoons and mudflats occur as many areas on the Indian Ocean coastline are subject to seasonal inundation.

Land Use Patterns
Widespread sheep and beef cattle grazing.

17. Nullagine Hills

Landform
Steep ranges and dissected flat topped hills which rise abruptly from the surrounding plain. Several rivers travel through the landscape creating narrow gorges and valley plains.

Vegetation
Scattered low eucalypt savanna and acacia shrubland with mulga, and mixed grasses. Sparse in some areas.

Waterform
The hills are traversed by several rivers including the Nullagine, Oakover and Shaw.

Land Use Patterns
Beef cattle grazing is predominant, with some areas of sheep grazing. Mining and exploration drilling occur widely over this region.

Significant Features
Oakover River and Carrawine Gorge.

18. Chichester Ranges

Landform
A long, narrow range with a gently undulating plain forming a plateau. The northern, western and eastern perimeters become rugged with escarpments to the plains below. The southern margin is a gradual but rough descent to the Fortescue Valley.

Vegetation
Wide spread spinifex and mixed grasses on rocky slopes with medium shrubs, scattered trees including Snappy Gums and taller shrubs. Vegetation is sparse in many areas.

Waterform
These ranges are a division between two drainage basins. Several rivers flow from the northern side of the Ranges. Fortescue River drainage occurring to the south.

Land Use Patterns
Mining is predominant, with beef and sheep grazing. Conservation reserves also occur.

Significant Features
Deep gorges and pools at western end.

19. Fortescue Valley

Landform
Long, broad U-shaped valley with wide open sandy plains.

Vegetation
At the western end of the valley thick hummock grasses underlie scattered tall eucalypts and acacias. The central valley area features low woodland with mulga groves, on the eastern plains savannah and scattered shrubs are common. Saltbush and samphire are associated with salt marsh which occur on the eastern plains where drainage is ill-defined and sluggish.

Waterform
The Fortescue River is the dominant waterform in this area. The river remains intermittent until it reaches Millstream at the western edge of the valley. Here, powerful springs convert the river into a permanent watercourse with several large pools. An extensive salt marsh occurs at the eastern end of this valley where the floodplains become narrow.

Land Use Patterns
Sheep and cattle grazing are predominant, but tourism is significant. Mining occurs in some areas and large conservation reserves exist.

Significant Features
The Millstream Oasis, Fortescue Marsh, gorges, deep permanent pools such as Deep Reach and unusual flora such as the palm tree *Livistona alfredii*.

20. Hamersley Ranges

Landform
A very undulating plateau of rounded hills and ranges with abrupt escarpments, especially rugged on the southern perimeter. Several valleys dissect the plateau, some in the form of steeply incised gorges.

Vegetation
Generally savannah and hummock grasslands with scattered low trees and shrubs, featuring mulga, wattle and tea-tree scrub. Very sparse in some areas.

Waterform
Well dissected by several intermittent watercourses which form the headwaters of the Fortescue and Ashburton Rivers.

Land Use Patterns
Open cut mining is the major activity, with sheep and cattle grazing on pastoral leases. Tourism is relatively well developed.

Significant Features
Mt Meharry and also spectacular gorges such as Wittenoom, Yampire and Dales, Iron Ore mines.

21. Ashburton Valley and Ranges

Landform
Rugged country with steep ranges and low stony hills. Narrow valley plains between sharp dissections, surrounded by gently sloping plains.

Vegetation
Mulga scrub dominant with sparse, scattered woodland and shrubs over an understorey of mixed grasses.

Waterform
Headwaters of several rivers and their tributaries originate here.

Land Use Patterns
Grazing of beef cattle predominant in areas, and mining occurs also.

Significant Features
Mt Augustus

22. Murchison Plateau

Landform
An extensive area with a combination of landforms such as broad, gentle undulating sandplains, and areas of escarpments, gorges, floodplains, hills and ranges.

Vegetation
Mulga dominating a widespread area with mixed grasses and other scattered trees and shrubs including thickets of acacia and tea-tree. Saltbush is apparent along many watercourses.

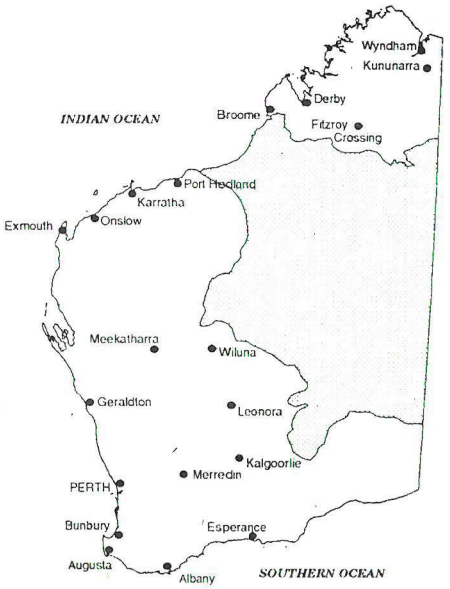
Waterform
The plateau is dissected by several watercourses including the extensive Murchison River with many intertwining floodplains. Headwaters for numerous rivers and tributaries begin here, such as the Greenough River, with westward drainage. Salt lakes are also a feature.

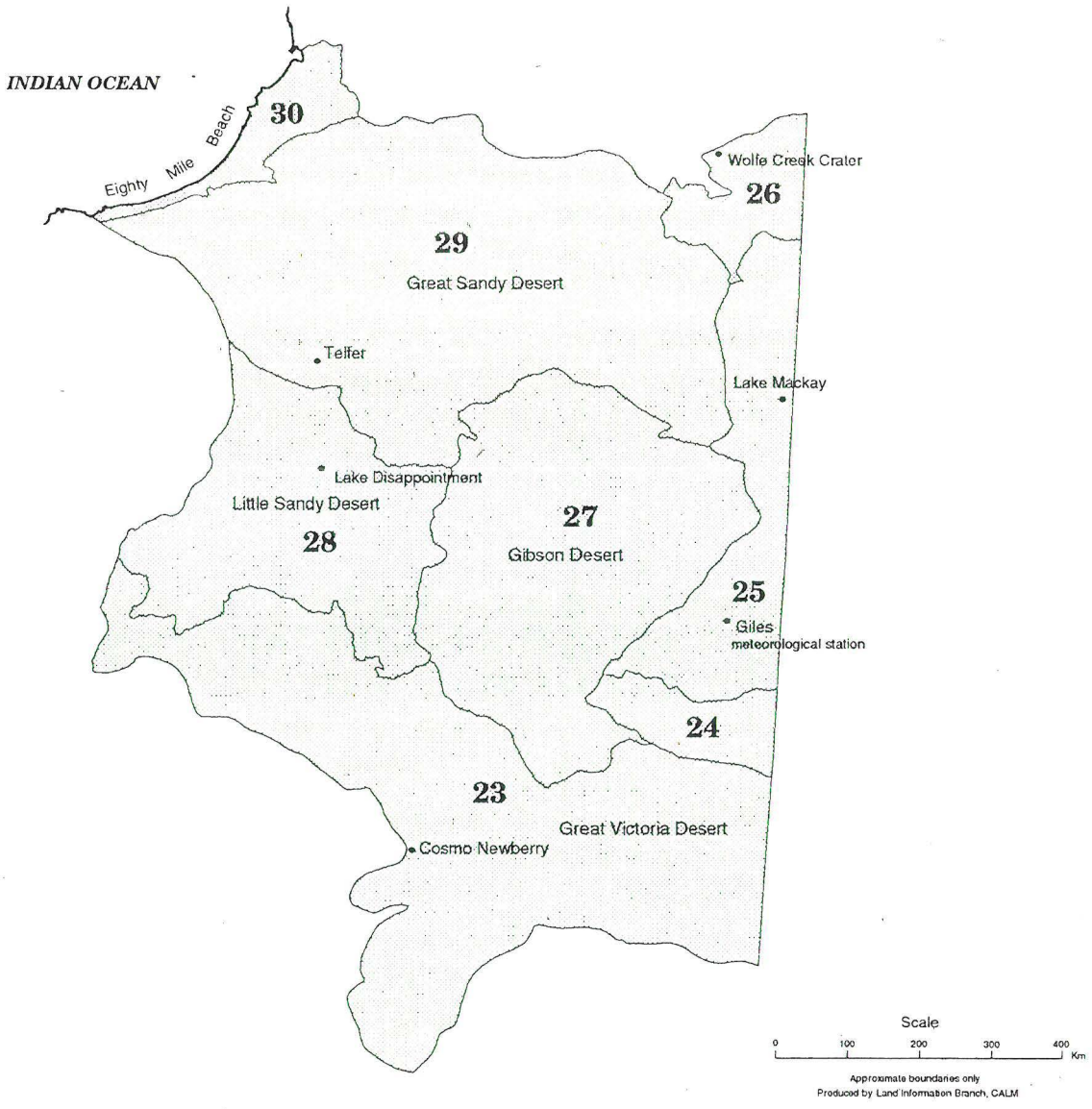
Land Use Patterns
Sheep and beef grazing is predominant with some mining.

Significant Features
Kennedy Range.

The Deserts

23. Great Victoria Desert Dunefields
24. Warburton Ranges
25. Central Sandplains
26. Tanami Sandplain
27. Gibson Desert
28. Little Sandy Desert
29. Great Sandy Desert
30. Eighty Mile Plain



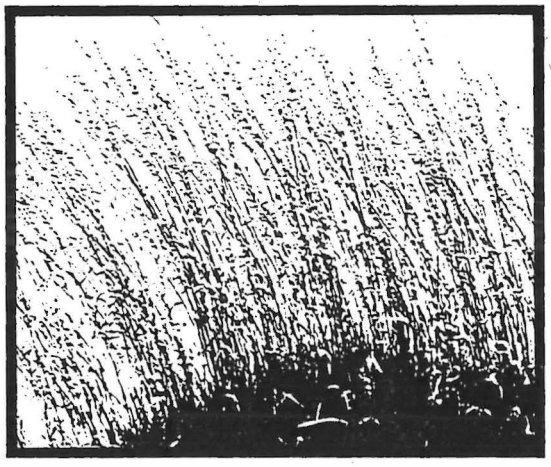


Summaries
The Deserts

23. Great Victoria Desert

Landform
Gently undulating sandy plain with numerous linear sand ridges predominating in the south-east and irregular plains and ridges in the north west.

Vegetation
Marble Gum and associated savanna with extensive mallee woodland, and some mulga in less sandy areas. Heath shrubs occur on dune ridges and in gullies.



Waterform
Numerous salt lakes.

Land Use Patterns
Cosmo Newberry Community and conservation estates are the major land use with several pastoral properties in the Mulga country to the west.

Significant Features
Great Victoria Desert Nature Reserve.

24. Warburton Ranges

Landform
A low plateau with numerous small ranges, in two distinct groups.

Vegetation
Mainly low woodland and shrubs associated with spinifex savanna. Bloodwoods feature on major drainage lines.

Waterform
Definite waterforms absent. Dry salt lakes and wells.

Land Use Patterns
The permanent settlement of the Warburton Community and numerous Aboriginal outstations are the major land use. (NB. Extensive contact between Aboriginal Communities across state borders.)

25. Central Sandplains

Landform
This region comprises of a combination of dissected sandstone ranges and escarpments surrounded by sandplains, with characteristic linear dunal ridges of varying intervals.

Vegetation
Tall, open acacia and eucalypt shrubland with areas of casuarina woodland generally occurring between sand ridges. Widespread grasslands dominated by hummocks of Spinifex (*Triodia pungens*), with some scattered tea-tree, mallee and Mulga (*Acacia aneura*) on drainage or in depressions. Saltpan areas support communities of grass savanna with samphire and saltbush.

Waterform
Numerous salt lakes are the dominant water form, including the quite extensive Lake Mackay. Evidence of floodplains also appears.

Land Use Patterns
Giles Meteorological Station, and Aboriginal Settlements occur.

Significant Features
Large areas of desert oak are a particular feature.

26. Tanami Sandplains

Landform
An extensive area of desert sandplains without linear sand ridges. Scattered low ranges and tablelands, and occasional granitic hills and small areas of sandridges.

Vegetation
Acacia shrubland with hakea featured in some areas. Scattered trees in small regions, and grasses are widespread throughout.

Waterform
Occasional salt lakes and minor creeks of indeterminate drainage terminating through evaporation.

Land Use Patterns
Balgo Aboriginal Settlement in the central Tanami. Sparse open range grazing for beef cattle.

27. Gibson Desert

Landform
At the west of the Rawlinson Range, this is the central and most elevated section of the region, consisting of an extensive area of gently undulating laterite plains broken only by rare mesaform hills, linear ridges, breakaways and dunefields.

Vegetation
Hardy vegetation in these conditions consists mainly of diverse spinifex grasses, mulga scrub and parkland, with scattered bloodwoods and desert oaks.

Waterform
Situated in the centre of the Western Plateau drainage system, featuring seasonal lakes.

Land Use Patterns
Gibson Desert Nature Reserve.

28. Little Sandy Desert

Landform
This region of numerous widely spaced linear sand ridges of NW-SE orientation, forms a drainage basin with Lake Disappointment at its lowest point. Some hills and low ranges are also evident with breakaways.

Vegetation
Mostly hummock grass with sparse mulga and desert oak cover. Mixed shrubs, acacia, grevillea and scattered eucalypts (notably desert bloodwood) occur between the dune ridges. Mallees common at the southern end.

Waterform
The large Lake Disappointment drainage basin featured, with other associated seasonal saline lakes.

Land Use Patterns
Conservation estates and Aboriginal settlements with increasing Tourism.

Significant Features
Carnarvon Ranges and Canning Stock Route

29. Great Sandy Desert

Landform
A rolling plain consisting almost entirely of linear sand ridges with a NNW-SSE orientation. Clearly marked valleys apparent, forming part of an ancient drainage system.

Vegetation
Sparse savannah with desert oaks and other isolated trees in the northern section and sparse shrubland and spinifex in the southern areas. In the salt lake regions, samphire and saltbush communities dominate.

Waterform
Man-made wells along the stock route. Ancient drainage system with chains of narrow salt lakes.

Land Use Patterns

A number of Aboriginal communities occur in this region, as well as mining and exploration.

Significant Features

Most pronounced development of seif dunes in the State.

30. Eighty Mile Plain

Landform

Occurring between the Indian Ocean and the Great Sandy Desert, this is an area of gently undulating sandplains and E-W oriented seif dunes and estuarine plains of grey mud.

Vegetation

Tall shrubland and pindan thicket, gaining height away from the coast. Patches of treeless areas with short grasses and mangrove communities appear on mudflats.

Waterform

Minor intermittent watercourses, salt lakes and saline mudflats which are susceptible to inundation. Some estuarine plains occur meeting the Indian Ocean.

Land Use Patterns

An area of Aboriginal Land Trust is situated in this region. Open range grazing of beef cattle occurs in suitable areas.

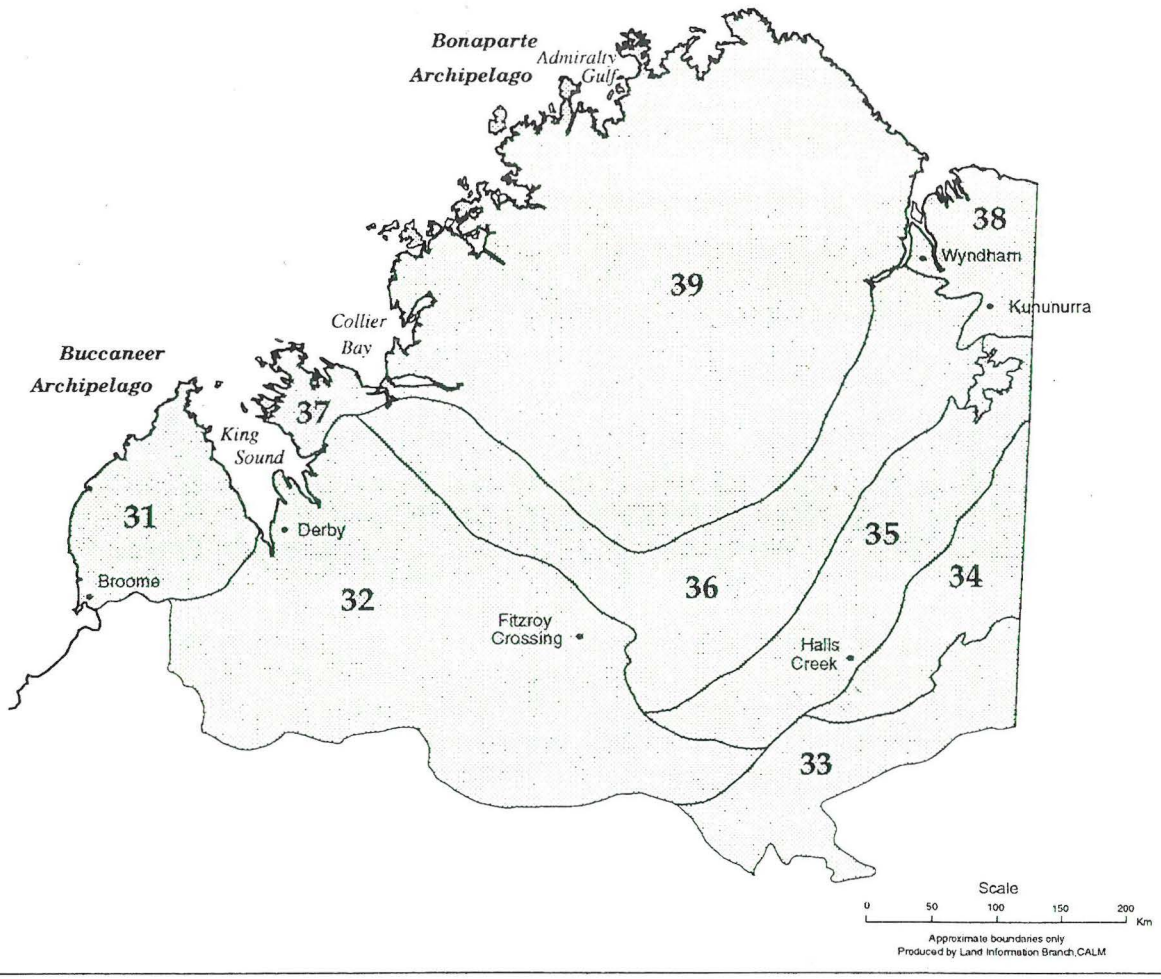
Significant Features

Eighty mile beach, Cape Keraudren, Roebuck Bay, Roebuck Plains, Mandora Claypans.

The Kimberley

31. Dampier Tablelands
32. Fitzroy Plains
33. Sturt Plateau
34. Ord Plain
35. Springvale Hills
36. Leopold-Durack Ranges
37. Yampi Peninsula
38. Cambridge Gulf Lowlands
39. Kimberley Plateau





Summaries
The Kimberley

31. Dampier Tablelands

Landform
Very gently undulating sandplain with closely spaced linear dunes. Flood plains and shallow swamp lands on coast.

Vegetation
Generally, a low open eucalypt and acacia woodland and thicket (pindan) with a hummock grass understorey and impenetrable vine thickets in some areas. On the coast, a melaleuca savanna and mangroves appear on the mudflats.



Waterform
Numerous creeks dissect the peninsula, which is surrounded by the Indian Ocean. Mudflats, swamps and floodplains on the coast.

Land Use Patterns
Scattered Aboriginal communities and open range grazing of beef cattle on pastoral leases.

Significant Features
Cable Beach.

32. Fitzroy Plains

Landform
Many areas of extensive sandplains often with longitudinal ridges to the south form a boundary of rocky plateaus and hilly terrain. The Oscar Ranges on the northern boundary create another rugged border with plateaus and gorges. Through the centre are wide floodplains and incised valleys. The coast is generally low lying with swamps and mudflats adjacent to the bays and estuaries.

Vegetation
Combination of shrubland with scattered, often sparse trees and spinifex grass, and acacia-eucalypt woodland. Mangroves appear on the coast.

Waterform
Broad hypersaline tidal mudflats and swampy areas on bays and estuaries on the Indian Ocean. The Fitzroy River and other streams and rivers drain towards the coast and form an extensive deltaic zone.

Land Use Patterns
Aboriginal community land use is widespread and open range grazing and mining also occur.

Significant Features
Gorges (e.g. Geikie) formed by the Fitzroy River, Oscar and Napier Ranges.

33. Sturt Plateau

Landform
Flat elevated plain dissected by meandering creeks, which in some areas has eroded the landscape to form mesas, and some extensive sandplains exist in the valleys.

Vegetation
The savannah plain is virtually treeless except along drainage areas where low open eucalypt woodland occurs.

SUMMARIES

Waterform
Indeterminate drainage areas here with large clay pans. Some slow meandering creeks such as Sturt Creek cut into the plain. Precipitation: 300-400 mm.

Land Use Patterns
No significant land use.

Significant Features
Wolfe Creek Meteorite Crater.

34. Ord Plain

Landform
A widespread, low lying area of plains and hills. Some rugged areas exist, with outcrops, boulders and mesas. Watercourses have cut narrow, vertical sided ravines in limestone, and rocky hills in sandstone areas. The Argyle Dam has flooded the lowest part of the plains.

Vegetation
High grass savanna to sparse scattered trees with spinifex and shrubs on stony ground. Isolated areas of treeless clay plains with short grasses and other mixed grasslands.

Waterform
Three major rivers dominate this area, the Ord, Nicholson and Negri. The immense man-made Lake Argyle features here also.

Land Use Patterns
Open range grazing of beef cattle occurs on pastoral leases. Areas reserved for water catchment and wildlife management.

Significant Features
Lake Argyle, the Ord River Dam.

35. Springvale Hills

Landform
An extremely rugged and varied region of ranges with dominant escarpments, ridges and rounded hills, dissected by deep gullies and gorges. This includes the tilted sandstone ("hog-back") strata of the Osmond Ranges. Irregular undulating plains occur in isolated areas.

Vegetation
Found here are low, open, occasionally sparse, eucalypt woodlands combined with areas of high and low grasslands.

Waterform
An area with intricate drainage pattern. The fast runoff from the steep sided landscape causes many streams and rivers to originate here, forming deep gullies and gorges in some areas.

Land Use Patterns
Open range grazing of beef cattle is predominant and mining occurs in some areas.

Significant Features
Unique ranges e.g. Bungle Bungles including Piccaniny Gorge, Echidna Chasm, China Wall.

36. Leopold-Durack Ranges

Landform
A narrow belt of steep sided, flat topped ridges adjacent to the Kimberley Plateau. These ridges are dissected by steep sometimes vertical sided valleys, giving the terrain a very rugged appearance.

Vegetation
Low, open, grassy woodland communities with scattered trees and shrubs over a mosaic of grasses.

Waterform
The ranges are dissected by many rivers and streams which create the characteristic erosional valleys.

Land Use Patterns
Aboriginal Communities occur in this region, with open range grazing of beef cattle on pastoral leases.

Significant Features
The rugged Elgee Cliffs, Carr Boyd Ranges, Lennard River, Lennard River Gorge, Leopold Durack Ranges.

37. Yampi Peninsula

Landform
This extremely inaccessible and rugged terrain features parallel flat-topped Yampi ridges with some extremely steeply eroded areas and irregular escarpments. A small, smooth-topped plateau is also evident. On the coastal fringes are low lying sandplains and river plains.

Vegetation
A mosaic of scattered trees with high grasses in some areas and low spinifex in others. Acacia thicket is also present. Suitable sheltered coastal areas feature mangroves.

Waterform
Only minor watercourses occur here. The Indian Ocean coastline does feature several bays and inlets.

Land Use Patterns
Mining occurs in areas.

38. Cambridge Gulf Lowlands

Landform
Low lying, generally sandy alluvial plains which extend inland from the tidal mud flats of the north coast, to the ranges where the landform appears as broad, flat valleys. Isolated mesas, ridges and rocky sandstone hills. Black Soil at Parry Lagoons.

Vegetation
Mangroves occur in the channel areas of the mudflats. On the plains, a combination of bunch grass, high grass savanna woodland and mallee shrubland exists, and watercourses are well vegetated.

Waterform
In this small part of the Timor Sea drainage basin are the seaward terminations of some large rivers, including the Ord. The tidal mudflats and the Cambridge Gulf as well as the northern coastline dominate this landscape.

Land Use Patterns
Mining occurs in areas, with open range grazing of beef cattle on pastoral leases.

Significant Features
Threatened endemic fauna.

39. Kimberley Plateau

Landform
An intricate landscape of high dissected sandstone plateaux, gently undulating with low hills, and well defined lines escarpments, lateritic capped buttes and mesas. The deeply indented coastline features imposing headlands, spectacular cliffs, and many off-shore islands. The extensive drainage network provides low swampy deltas and mudflats,.

Vegetation
Savanna grasslands of curly spinifex and annual sorghum with associated savanna woodland are found extensively throughout. Medium woodland species are found in isolated areas along streamlines and scarps. Fringing Mangroves occur on tidal mudflats and river estuaries.

Waterform
The Kimberley area features many seasonal water courses including numerous streams and large rivers such as the Ord, Fitzroy and Prince Regent. The coastline is adjacent to both the Indian Ocean and the Timor Sea, and the rugged coast abutting these forms many gulfs and bays. Swamps, mudflats, estuaries and deltas are numerous.

Land Use Pattern
Pastoral leases for the grazing of beef cattle is the most widespread land use. Fire as a management tool is often used in association with this. Numerous mineral leases

SUMMARIES

and Aboriginal reserves occur over this region. Conservation and Tourism are becoming an increasing land use in the area.

Significant Features

Bonaparte Archipelago, Walcott Inlet, Prince Regent River, Adcock Gorge, Manning River Gorge, Mitchell Plateau, Mitchell Plateau Falls.

Looking Ahead

Whilst current visual landscape management systems have a number of scientific limitations, they perform a significant role in the integrated practices of State land management and planning agencies. It is a major achievement for a number of these agencies to consider visual landscape values as community and environmental resources in their own right. This is considered as a vital step in the development of more integrated landscape assessment models, encompassing the broad range of other aesthetic values associated with landscape. Visual landscape knowledge is often recognised by these participating agencies as simply one component within a desirable landscape management system.

The Project Advisory Group envisages that with further research support, both inter and intra-state, the project will play a major role in this important theoretical and practical development of landscape assessment procedures. With further study collaborations with other key land management agencies, universities, the Western Australian Heritage Council and the Australian Heritage Commission, it is hoped that new landscape assessment systems can be developed and implemented in a comprehensive and efficient manner. The first priority of these future resources should be directed to the completion of this project by fully describing the remaining character types, as well as undertaking the comprehensive field reconnaissance and assessment of the boundary locations. Here, the importance of reading and experiencing the landscape at ground level should be addressed, as well as expanding upon the inventory of cultural landscape modification. This will provide essential insights into the core meanings of aesthetic landscape value. Additional resources will also be necessary to progress the landscape character data to enable the identification of particularly important landscapes of national estate significance, and to identity and map some sub-regions of high aesthetic value.

Finally, the ultimate success of this project will lie in its use across the State. Such usefulness will require means of promoting the and distributing study findings and educating user groups in its importance and application. Comments for improvement are actively sought. Hopefully the outcomes of further research and project communication will help provide a greater commitment to the requirements of sensitive landscape assessment, conservation and management of all appropriate land use activities throughout the State Of Western Australia.

Published Sources

Atlas of Australian Resources, (1980), *Soils and Land Use*, Third Series, Volume 1, Booklet and Map 1 : 6,000,000, Division of National Mapping, Canberra.

Beard, J. S., (1972-80), *Vegetation Survey of Western Australia*, 1 : 1,000,000 Vegetation Series, Vegmap Publications, Perth.

Beard, J. S., (1973-80), *Vegetation Survey of Western Australia*, Map and Explanatory Memoir, 1 : 250,000 Series, Vegmap Publications, Perth.

Beard, J. S., (1980), A New Phytogeographic Map of Western Australia, In: *Western Australian Herbarium Research Notes, no. 3, pp 37-58*, Western Australian Department of Agriculture, Perth.

Beard, J. S., (1990), *Plant Life of Western Australia*, Kangaroo Press, Kenshurst.

Bennett, E. M., (1991), *Common and Aboriginal Names of Western Australian Plant Species*, Wildflower Society of Western Australia, Eastern Hills Branch.

Bettenay, E., (1983), Western Region. In: *Soils - An Australian Viewpoint*, Division of Soils, CSIRO/Academic Press, Melbourne.

Bureau of Land Management, (1980), *Visual Resource Management Program.* US Department of the Interior, Washington, DC, USA.

Bureau of Meteorology, (1975), *Climatic Averages, Western Australia*, Australian Government Publishing Service, Canberra.

Burnside, D. G., The Pastoral Industry of the North-West, Kimberley and Goldfields. In: *Agriculture in Western Australia 1829 - 1979*, UWA Press, Nedlands.

Burvill, G. H., (Ed), (1979), *Agriculture In Western Australia 1829 - 1979*, UWA Press, Nedlands.

Burvill, G. H., The Natural Environment. In: *Agriculture in Western Australia 1829 - 1979.* (1979), UWA Press Nedlands.

Caulder, S. W., & Williamson, D. M., (1979), *Visual Resource Management of Victoria's Forests - A New Concept for Australia*, Forests Commission, Victoria.

Clarke, E. deC., (1926), *Natural Regions in Western Australia*, J. Proc. R. Soc. WA, no. 12, pp. 11-87.

Collins, P. D. K., (1982), *The Hydrologic Network for Western Australia*, Water Resources Branch Report no. 22, Public Works Department, Perth.

Department of Conservation & Land Management, (1989), *Visual Landscape Management of CALM Lands and Waters*, Policy Statement No. 34., Como, Western Australia.

Department of Conservation & Land Management, (1991), *Aboriginal Activities and Nature Conservation in the South West of Western Australia*, Department of Conservation and Land Management, Como, Western Australia.

Erickson, R., et al., (1979), *Flowers and Plants of Western Australia*, Reed Books, Sydney.

Environmental Protection Authority, (1974-83), *Conservation Reserves in Western Australia*, Department of Conservation and Environment, Perth.

Gardner, C. A., (1942), *The Vegetation of Western Australia with Special Reference to Climate and Soils*, J. Proc. R. Soc. WA, no. 28, pp. 11-87

Gardner, C. A., (1987), *Eucalypts of Western Australia*, Western Australian Herbarium, Department of Agriculture, Perth.

Gentilli, J., (ed), (1979), *Western Landscapes*, UWA Press, Nedlands.

Gentilli, J., (1979), Regions and Landscapes - Nature and Size, Function and Change. In: *Western Landscapes*, UWA Press, Nedlands.

Geological Survey of Western Australia, (1974), *Geology of Western Australia*, West Australia Geology Survey, Mem 2, p 541.

Geological Survey of Western Australia, (1990), *Geology and Mineral Resources of Western Australia*, Memoir 3.

Geological Survey of Western Australia, *1 : 250,000 Series, Maps and Explanatory Notes*, Western Australian Mines Department, Perth. (Full State coverage)

Government of Western Australia, 1992, *State of the Environment Report*, West Australian Government.

Hocking, R. M. & Moors, H. T., (1985), *Geology of the Carnarvon Basin, Western Australia*, Bulletin 133, Geological Survey of Western Australia, Perth.

Hodgkin, E. P., & Clarke, R., (1987-89), *Estuarine Studies Series, No's 1-6*, Environmental Protection Authority, Perth.

Isbell, R. F., (1983), Kimberley - Arnhem - Cape York. In: *Soils - An Australian Viewpoint*, Division Of Soils, CSIRO/Academic Press, Melbourne.

Jennings, N. T., & Mabbutt, J. A., (1977), Physiographic Outlines and Regions, In: *Australia - A Geography*, Editor: D. N. Jeans, Sydney University Press, Sydney.

Jutson, J. T., (1914), *An Outline of the Physical Geology (Physiography) of Western Australia*, Geological Survey Bulletin no. 61, pp. 3-175.

Leonard, M. & Hammond, R., (1984), *Landscape Character Types of Victoria*, Forests Commission, Victoria.

Mitchell, A. A. & Wilcox, D. G., (1988), *Arid Shrubland Plants of Western Australia*, UWA Press, Nedlands.

Northcote, K. H., Hubble, G. D., et al., (1975), *A Description of Australian Soils*, CSIRO, Melbourne.

Northcote, K. H. & Wright, M. J., (1983), Sandy Desert Region. In: *Soils - An Australian Viewpoint*, Division of Soils, CSIRO/Academic Press, Melbourne.

Northcote, K. H., (1983), Central Southern Region. In: *Soils - An Australian Viewpoint*, Division of Soils, CSIRO/ Academic Press, Melbourne.

O'Brien, M. & Ramsay J., (1992), *Assessing Aesthetic Values of Landscapes for the Register of the National Estate - A Discussion Paper*, Australian Heritage Commission.

Payne, A. L., Curry, P. J. & Spencer, G. F., (1987), *An Inventory and Condition Survey of Rangelands in the Carnarvon Basin, Western Australia*, Technical Bulletin No. 73, Text and Land System Maps (1:250,000), Department of Agriculture, Perth.

Pilgrim, A. T., Landforms. In: Gentilli, J. (1979), *Western Landscapes*, UWA Press, Nedlands.

Playford, P. E., Cockbain, A. E. & Low, G. H., (1976), *Geology of the Perth Basin Western Australia*, Geological Survey of Western Australia, Bulletin 124, Perth.

Revell, G., (1987), *Landscape Character Typing For the Southern Forest Region*, Unpublished Draft Report, Department of Conservation and Land Management.

Stuart-Street, A. & Kirkpatrick, B. A., (1990), *Landscape Character Types of Western Australia - Preliminary Draft*, Unpublished Report, CALM.

Tindale, N. B., (1974), *Aboriginal Tribes of Australia*, ANU Press, Canberra.

USDA, Forest Service, (1974), *The Visual Management System.* National Forest Landscape Management, Vol. 2, Chapter 1. Agriculture Hardbook 462, Washington, DC, USA.

Western Australia - An Atlas of Human Endeavour 1829-1979, Education and Lands and Surveys Departments of Western Australia.

Western Australia Public Works Department, (1984), *Streamflow Records of WA to 1982, Volumes I, II & III. Basins 601-809*, Water Resources Branch, Public Works Department, Perth.

Williamson, D. N., (1979), *Scenic Perceptions of Australian Landscapes : Research Needs in a New Frontier* Landscape Australia, Vol. 2 : 94-101.

Maps

National and Statewide Biophysical Resources Maps

State Map of WA, (1987), 1 : 3,000,000, Department of Land Administration.

Drainage Basin Boundary Map - Overlay to fit Geological Map of WA at 1 : 2,500,000, Public Works Department, Water Resources Branch, Perth.

Beard, J. S., (1972-80), *Vegetation Survey of Western Australia*, 1 : 1,000,000 Vegetation Series, Vegmap Publications, Perth.

Beard, J. S., (1981), *Vegetation Map of Western Australia*, 1:3,000,000, Government Printers, Perth.

Beard, J. S. & Sprenger, B. S., (1984), *Geographical Data From the Vegetation Survey of Western Australia with Map of Aeolian Landforms (1 : 3,000,000)*, Vegetation Survey of Western Australia, Occasional Paper No. 2, VegMap Publications, Perth.

Geological Survey of Western Australia, (1979), Geological Map of Western Australia, 1:2,500,000

Geological Survey of Western Australia, *1 : 250,000 Series, Maps and Explanatory Notes*, Western Australian Mines Department, Perth. (Full State coverage)

Atlas of Australian Resources, (1980), *Soils and Land Use*, Third Series, Volume 1, Booklet and Map 1 : 6,000,000, Division of National Mapping, Canberra.

Geological Society of Western Australia, (1971), *Tectonic Map of Australia and New Guinea*, 1 : 5,000,000, Geological Society of Australia, Sydney.

Collins, P. D. K., (1982), *The Hydrologic Network for Western Australia*, Water Resources Branch Report no. 22, Public Works Department, Perth.

Laut, P., et al, (1977), *Australian Biophysical Regions - A Preliminary Regionalisation* , CSIRO, Canberra. 1: 2,500,000; 1975 - NW Sheet & 1975 - SW Sheet.

Laut, P., Firth, D., & Paine, T. A., (1980), *Provisional Environmental Regions of Australia, Volume 1 - The Regions*, CSIRO, Canberra.

Teakle, L. J. H., (1938), A Regional Classification of the Soils of Western Australia. *J. R. Soc. West. Aust.* 24: 123-195 + Map.

Other Statewide Natural Regionalisations

Beard, J. S., (1980), A New Phytogeographic Map of Western Australia, In: *Western Australian Herbarium Research Notes, no. 3, pp 37-58,* Western Australian Department of Agriculture, Perth.

Clarke, E. deC., (1926), *Natural Regions in Western Australia*, J. Proc. R. Soc. WA, no. 12, pp. 11-87.

Jennings, N. T., & Mabbutt, J. A., (1977), Physiographic Outlines and Regions, In: *Australia - A Geography*, Editor: D. N. Jeans, Sydney University Press, Sydney.

Jutson, J. T., (1914), *An Outline of the Physical Geology (Physiography) of Western Australia*, Geological Survey Bulletin no. 61, pp. 3-175.

Gentilli, J., (1979), Regions and Landscapes - Nature and Size, Function and Change. In: *Western Landscapes*, UWA Press, Nedlands.

Stuart-Street, A. & Kirkpatrick, B., (1990), Preliminary Landscape Character Type Map of Western Australia, 1:3,000,000, Unpublished Map and Report, Department of Conservation & Land Management.

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Photographic Credits

Page 9. Lonely lighthouses warn shipping of this rocky coast at both Cape Leeuwin and Cape Naturaliste. (CALM Recreation & Landscape Branch)

Page 17. Waterbirds are abundant in the wetland lakes and swamps of the Swan Coastal Plain. (CALM Corporate Relations)

Page 25. Glassy waters of quiet inlets are scattered along the length of this landscape. (Wayne Schmidt)

Page 33. Tall, smooth Karri trunks silhouetted by early morning light. (Angela Stuart-Street)

Page 45. Sinuous lines across a harvested field of the central wheatbelt, overshadowed by fringing remnant vegetation. (Angela Stuart-Street)

Page 67. The glossy trunks of slender Salmon Gums reflect the copper shaded soils beneath. (Andrew Chapman)

Page 75. The precipitous Baxter Cliffs meet the Great Australian Bight on the abrupt southern margin of the Nullarbor. (Gil Field)

Page 91. Carpets of everlasting daisies spread beneath the Mulga after good rains. (Gil Field)

Page 101. The view through Nature's Window to the Murchison River shows the deeply eroded, rocky gorge which winds through Kalbarri National Park. (Wayne Schmidt)

Page 111. The stromatolites at Hamelin Pool are a unique marine feature. (CALM Corporate Relations)

Page 125. Steep limestone cliffs surround the coastal embayment of Cape Cuvier. (Natural Resource Assessment Group, Department of Agriculture)

Page 135. The rugged slopes of Cape Range dominate this landscape. (Gil Field)

Page 145. Eroded scarps line the dry river bed of the Wooramel River. (Natural Resource Assessment Group, Department of Agriculture)

Page 155. Large angular red boulders are a characteristic feature of Burrup Peninsula. (Gil Field)

Page 159. Spinifex is widespread across much of the arid centre of the state. (CALM Corporate Relations)

Page 163. The bulbous-trunked boab is a deciduous tree, characteristic of the Kimberleys. (CALM Recreation & Landscape Branch)

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General Bibliography

Atlas of Natural Resources, (1980), *Darling System, Western Australia*, Text and Accompanying Maps 1 : 250,000, Department of Conservation and Environment, Perth.

Bannister, J. L., 1969, *A Biological Survey of Kalbarri National Park*, WA Museum, Perth.

Battye Library, (1981), *Selected Bibliography of the Natural History of the Kimberley Region of Western Australia*, Library Board of WA, Perth.

Beard, J. S., (1970), *The Natural Regions of Deserts in Western Australia*, J. Ecol., no. 57, pp. 677-712.

Beard, J. S. & Sprenger, B. S., (1984), *Geographical Data From the Vegetation Survey of Western Australia with Map of Aeolian Landforms (1 : 3,000,000)*, Vegetation Survey of Western Australia, Occasional Paper No. 2, VegMap Publications, Perth.

Berndt, R. M. & Berndt, C. H., (ed's), (1979), *Aboriginies of the West - Their Past and Present*, University of Western Australia Press, Perth.

Bird, E. C. F., (1972), *Mangroves of the Australian Coast*, Australian Natural History, no. 17, pp. 167 - 171.

Blood, D., (1992), *Rangeland Reference Areas*, W.A. Department of Agriculture.

Bowdler, S. Before Dirk Hartog: Prehistoric Archaeological Research in Shark Bay, Western Australia. In: *Australian Archaeology*, 30, (1990), 46-57.

Bradshaw, F. J. & Lush, A. R., (1981), *Conservation of the Karri Forest*, Forests Department, Western Australia.

Brymora, W., 1979, *Mt Magnet - Gold Town on the Crossroads*, Mt Magnet Shire.

Burbidge, A., Hopper, S. & Van Leeuwen, S., (Ed's), (1990), *Nature Conservation, Landscape and Recreation Values of the Lesueur Area*, Bulletin 424, Environmental Protection Authority, Perth.

Bureau of Meteorology, (1972), *Climatic Survey, Northwest Region 6*, Western Australian Government Publishers, Perth.

Carman-Brown, A., (1989), *The Goldfields Planning & Development Strategy - The South East Coast of Western Australia Working Paper*, Coastal Section of the Country Branch Planning Services, State Planning Commission, Perth.

Chalmers, C. E., (1982), *Draft Development and Management Plan, Kalbarri Foreshore Reserve*, Department of Conservation & Environment, Perth.

Chalmers, C. E. & Woods, P. J., (1984), *Draft Coastal Management Plan, Shire of Broome*, Bulletin 166, Department of Conservation & Environment, Perth.

Chalmers, C. E. & Davies, S. M., (1984), *Coastal Management Plan - Jurien Bay Area*, Bulletin 176, Department of Conservation & Environment, Perth.

Chape, S. & Sansom, G., (1983), *Esperance District Coastal Management Plan*, Report 11, Department of Conservation & Environment, Perth.

Christensen, P., (1992), *The Karri Forest*, Department of Conservation & Land Management, Como.

Churchward, H. M., McArthur, W. M., et al. (1988), *Landforms and Soils of the South Coast and Hinterland, Western Australia*, CSIRO, Canberra.

Churchward, H. M., (In Press), *Soils and Landforms of the Manjimup Area, Western Australia*, CSIRO, Wembley.

Clarke, E. deC., Prider, R. T., & Teichert, C., (1948), *Elements of Geology for Western Australian Students*, UWA Press, Nedlands.

Clayton, D. M & Elliot, J. C., (1985), *Draft Coastal Management Plan - Shire of Greenough*, Bulletin 189, Department of Conservation & Environment, Perth.

Craig, G. F., (1983), *Pilbara Coastal Flora*, Soil Conservation Service, W.A. Department of Agriculture, Perth.

Curry, P. J., Payne, A. L., et al., (in prep), *An Inventory and Condition Survey in the Murchison River Catchment, Western Australia*, W.A. Dept. of Agriculture Technical Bulletin.

Davey, A.,(Ed), (1978), *Resource Management of the Nullarbor Region, Western Australia*, Environmental Protection Authority, Perth.

Deeney, A. C., (1989), *Geology and Groundwater Resources of the Superficial Formations Between Pinjarra and Bunbury, Perth Basin*, Report 26, Professional Papers, Geological Survey of Western Australia, Perth.

Department of Conservation and Environment, (1984), *Coral Bay Draft Coastal Management Plan*, Bulletin 174.

Department of Conservation & Land Management, (1986), *Cape Range National Park Draft Management Plan.*

Department of Conservation & Land Management, (1987), *Regional Management Plan 1987-1997, Central Forest Region.*

Department of Conservation & Land Management, (1988), *Range to Reef*, CALM, Como.

Department of Conservation & Land Management, (1988), *Voices of the Bush - A Wheatbelt Heritage Trail*, CALM, Como.

Department of Conservation & Land Management, (1988), *Wild Places, Quiet Places*, CALM, Como.

Department of Conservation & Land Management, (1989), *Shark Bay*, CALM, Como.

Department of Conservation & Land Management, (1990), *Leeuwin-Naturaliste National Park Management Plan, 1989-1999*, Management Plan no. 13.

Department of Conservation & Land Management, (1990), *North-West Bound*, CALM, Como.

Department of Conservation & Land Management, (1991), *Wildflower Country*, CALM, Como.

Department of Conservation & Land Management, *Draft Regional Management Plan - Goldfields Region*, July 1992.

Department of Planning and Urban Development, (1992), *Exmouth Coastal Strategy*.

Dye, R. A., et al., (1990), *Geraldton Rural-Residential Land Capability Study*, Land Res. Ser., no 4, Department of Agriculture, Perth

Findlay, M., (1984), *Carnarvon - Reflections of a Country Town*, Shire of Carnarvon.

Geological Society of Western Australia, (1971), *Tectonic Map of Australia and New Guinea*, 1 : 5,000,000, Geological Society of Australia, Sydney.

Graves, R. H., (1981), *Australian Vegetation*, Cambridge University Press, London.

Griffin, E. A. & Keighery, B. J., (1989), *Moore River to Jurien Sandplain Survey*, WA Wildflower Society Incorporated, Nedlands.

How, R. A., Newbey, K. R., The Biological Survey of the Eastern Goldfields of Western Australia, Part 4 - Lake Johnston-Hyden. *Rec. West. Aust. Mus. Suppl.* No. 30 W.A. Museum, Perth.

Keast, A., (ed), (1981), *Ecological Biogeography of Australia, Vol. 1-3*, Junk, Netherlands.

Keighery, G. Vegetation and Flora of Shark Bay, Western Australia. In: *Research in Shark Bay*, (1990), Report of the France-Australe Bicentennial Expedition Committee.

Keighery, G., An Introduction to the Flora of the Nullarbor. In: *An Introduction to the Flora Of W.A.*, (1991), Association of Societies for Growing Australian Plants, 16th Biennial Conference, Perth.

Kerr, M. G., (1984), *Draft Coastal Management Plan, Town of Geraldton*, Bulletin 185, Department of Conservation & Environment.

King, P. P. & Wells, M. R., (1990), *Darling Range Rural Land Capability Study*, Land Res. Ser., no 4, Department of Agriculture, Perth.

Kirkpatrick, B. A. & Stuart-Street, A., (1989), *Blackwood Hills Study Report*, Unpublished Report, CALM.

Kirkpatrick, B. A. & Stuart-Street, A., (1990), *Blackwood Hills Landscape Character Type*, Unpublished Report, CALM.

Kirkpatrick, B. A. & Stuart-Street, A., (1990), *Visual Resource Assessment of the Nullaki Peninsula*, Unpublished Report, EPA.

Kirkpatrick, B. A. & Stuart-Street, A., (1991), *Visual Resource Assessment of the Darling Scarp Regional Park*, Unpublished Report, DPUD.

Laut, P., et al, (1977), *Australian Biophysical Regions - A Preliminary Regionalisation*, CSIRO, Canberra. 1975 - NW Sheet & 1975 - SW Sheet

Laut, P., et al., (1977), *Environments of South Australia Handbook*, CSIRO, Canberra

Laut, P., Firth, D., & Paine, T. A., (1980), *Provisional Environmental Regions of Australia, Volume 1 - The Regions*, CSIRO, Canberra.

Lennard, R., Nulsen, R. A., & Southwell, C., (1991), *Climate Physiography, Geology, Hydrology and Land Use In the North Stirlings Area - A Precursory Report*, Technical Report 126, Department of Agriculture, Perth.

Lobry De Bruyn, L. & Ochman, P., (1987), *Draft Coastal Management Plan - Cervantes Area*, Bulletin 247, Department of Conservation & Environment, Perth.

Lowry, D. C., (1970), *Geology of the West Australian Part of the Eucla Basin*, Bull. Geological Survey WA, no. 122, Perth.

Lowry, D. C. & Jennings, J. N., (1974), The Nullarbor karst Australia. In: Sweeting, M. M., (ed), 1981, *Benchmark Papers in Geology: 59: Karst Geomorphology*. Hutchinson Ross, Penn. pp. 329-349.

Mabbutt, J. A., et al., (1963), *General Report on Lands of the Wiluna-Meekatharra Area, Western Australia*, Land Research Series, no. 7, CSIRO, Melbourne.

May, R. F, Lenanton, R. C. & Berry, P. F., (1983), *Ningaloo Marine Park*, Report 1, National Parks Authority.

McArthur, W. M. & Bettanay, E., (1974), *The Development and Distribution of the Soils of the Swan Coastal Plain, Western Australia*, Soil Publication No. 16, CSIRO, Melbourne.

McArthur, W. M., Churchward, H. M. & Hick, P. T., (1977), *Landforms and Soils of the Murray River Catchment Area of Western Australia*, Land Resources Management Series, no 3, CSIRO, Australia.

McArthur, W. M. & Bartle, G. A., (1980), *Soils and Land Use Planning in the Mandurah Bunbury Coastal Zone, Western Australia*, Land Res. Man. Series, no. 6, CSIRO, Melbourne.

McDonald, R. C., et al., (1984), *Australian Soil and Land Use Survey Field Handbook*, Inkata Press, Melbourne.

McKenzie N. L. & Robinson, A. C., (ed's), (1987), *A Biological Survey of the Nullarbor Region, South and Western Australia in 1984*, Department of Environment and Planning, Adelaide.

McKenzie, N. L., Scouting the Treeless Plain. In: *Landscope*. Vol 6, no 1, (1990), Department of Conservation & Land Management, Como.

Mineral Resources of Western Australia, (1980), Department of Mines, Perth.

Mulcahy, M. J. Landscapes, Laterites and Soils in Southwestern Australia. In: Jennings, J. N. & Mabbutt, J. A., Ed's., (1967), *Landform Studies from Australia and New Guinea*. Australian National University Press, Canberra.

National Parks Branch, (1971), *National Parks System Planning Manual*, National Parks, Canada.

Newbey, K.R., Dell, J., et al., (1984), The Biological Survey of the Eastern Goldfields of Western Australia, Part 2 - Widgiemooltha-Zanthus. *Rec. West. Aust. Mus. Suppl.* No. 18, (1984), W. A. Museum, Perth.

Palmer, A., (1985), *Yalgoo*, Lap Industries, Fremantle.

Pate & Beard, J. S., (Eds), (1984), *Kwongan - Plant Life of the Sandplain*, UWA Press, Nedlands.

Perry, R. A., (1970), *Pasturelands of the Ord-Victoria Area*, Land Res. Ser., no. 28, pp120-125, CSIRO, Australia

Pink, B. N., (ed), (1989), *WA Yearbook*, Australian Bureau of Statistics, Government Printers, Perth.

Russel, J., (1978), *Methodologies for Assessment and Mapping of Landsystems and Landscapes in South-West Tasmania*, South West Tasmania Resources Survey, Discussion Paper no. 15.

Schmidt, W. G., (1990), Landscape Values. In: Burbidge, A., Hopper, S., Van Leeuwin, S, (ed's), *Nature Conservation, Landscape and Recreation Values of the Lesueur Area*. Bulletin 424, Environmental Protection Authority, Perth, pp. 99-104.

Seddon, G., (1972), *Sense of Place*, UWA Press, Nedlands.

Seddon, G. & Davis, M., (1976), *Man and Landscape in Australia - Toward an Ecological Vision*, Australian UNESCO Committee for Man and the Biosphere, Publication No. 2, Australian Government Publishing Service, Canberra.

Semeniuk, V., (1986), *Terminology for Geomorphic Units and Habitats Along the Tropical Coast of Western Australia*, J. Roy. Soc. WA., Volume 68.

Serventy, V., (1967), *Landforms of Australia*, Angus & Robertson, Sydney.

Serventy, D. L. & Whittel, H. M., (1962), *Birds of Western Australia*, Paterson Bronkeshaw Pty. Ltd., Perth.

Shepherd R. Managing for Diversity. In: *Landscope*, Vol. 7, no. 2, 1991.

Simonds, J. O., (1961), *Landscape Architecture*, Iliffe Books, London.

Smith, F. G., (1972), *Vegetation Map of Pemberton and Irwin Inlet*, Western Australian Department of Agriculture, Perth.

Smith, R., (1969), *Geraldton, the Town with the Future*, Graylands Teachers College.

Speck, N. H., (1960), *Land Systems of the North Kimberley Area, Western Australia*, Land Res. Ser., no 4, pp. 71-85, CSIRO, Australia.

Speck, N. H., (1960), *General Report on the Lands of the West Kimberley Area, Western Australia*, Land Res. Ser., no. 9, CSIRO, Melbourne.

Stanton, J. E., (1985), Owners and Occupiers: The Eastern Goldfields Experience. In: *Anthropological Forum - An international Journal of Social and Cultural Anthropology and Comparative Sociology*. Volume V, No. 3, University of Western Australia, Perth.

State Planning Commission, & Department of Conservation & Land Management, (1988), *Shark Bay Region Plan*

Teakle, L. J. H., (1938), A Regional Classification of the Soils of Western Australia. *J. R. Soc. West. Aust.* 24: 123-195 + Map.

Thompson, C. Desert Coast. In: *Landscope*, Vol. 7, No. 2, 1991.

Tille, P. & Lantzke, N., (1990), *Busselton - Margaret River - Augusta Land Capability Study; Methodology and Results, Vol. 1 & 2*, Technical Report 109, Division of Resource Management, Dept of Agriculture, Perth.

Valli, J., (1983), *Gascoyne Days*, St George Books, Perth.