Pilbara

Shot Pool Pyramid,
Photo: Peter Kendrick

Description

Bioregional description and biodiversity values

The Pilbara Craton Bioregion has a semi-desert-tropical climate, with active drainage in the Fortescue, De Grey and Ashburton river systems.

There are four subregions – Chichester, Fortescue Plains, Hamersley and Roebourne.

The Chichester subregion has undulating Archaean granite and basalt plains including significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia pyrifolia* over *Triodia pungens* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on the ranges.

The Fortescue Plains subregion is alluvial and has river frontages, with extensive salt marsh, mulga-bunch grass, and short grass communities on the plains in the east. River gum woodlands fringe the drainage lines. An extensive calcrete aquifer (originating within a palaeo-drainage valley) feeds numerous permanent springs in the central part of the Fortescue region, supporting large permanent wetlands with extensive stands of river gum and cajuput.

The Hamersley subregion is a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by basalt, shale and dolerite gorges. The valley floors have low mulga woodland over bunch grasses on fine textured soils, while the ranges have *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils.

The Roebourne subregion comprises Quaternary alluvial and older colluvial coastal and sub-coastal plains, with a grass savanna of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia translucens* or *A. pyrifolia* and *A. inequilatera*. Resistant linear ranges of basalts occur across the coastal plains. These uplands are dominated by Triodia hummock grasslands. Ephemeral drainage lines support *Eucalyptus* woodlands. Samphire, *Sporobolus* grasslands and mangal occur on the marine alluvial flats and river deltas. The islands are Quaternary sand accumulations, basalt and/or limestone.

This bioregion has many special values including:

- the geological complexity of the Marble Bar-Nullagine mineral province,
- persisting populations of threatened and endangered species (mulgara, spectacled hare-wallaby, bilby, orange leaf-nosed bat and princess parrot),
- arid zone populations of northern brushtail possums, ghost bats and north-western long-eared bats,
- physical features, endemic species and species-rich ecosystems associated with the Fortescue River, especially the Millstream wetlands, Millstream aquifer, Fortescue Marsh and Chichester gorges, which are also refugia for various fire-sensitive plants,
- species-rich, refugial ecosystems associated with gorges, waterfalls and mountain-tops of the Hamersley Range with undescribed land snail, lizard and plant species,
- endemic stygofaunal radiations in calcrete aquifers,
- coastal islands act as refugia for vulnerable species now rare or extinct on the adjacent mainland (for example the western chestnut mouse and *Ctenotus angusticeps*), and breeding sites for turtles and sea-birds,
- many Aboriginal culturally significant sites and
- rock piles of the Burrup Peninsula which act as fire refuges.

Bioregional endemics include *Ningaui timealeyi*, an undescribed *Planigale, Dasykaluta rosamondae, Pseudomys chapmani, Pseudantechinus roryi, Diplodactylus savagei, Diplodactylus wombeyi, Delma elegans, Delma pax, Ctenotus rubicundus, Egernia pilbarensis, Lerista zietzi, Lerista flammicauda, Lerista neander*, two or three undescribed taxa within *Lerista muelleri, Notoscincus butleri, Varanus pilbarensis, Acanthophis wellsi, Demansia rufescens, Ramphotyphlops pilbarensis, Ramphotyphlops ganei*, and stygofauna of the calcrete aquifers.

Overall condition and trend

The continental stress class across the Pilbara bioregion ranges from three to six (see Glossary), but a combination of weed invasions, hot frequent bushfires, feral predators and grazing by exotic herbivores is causing a loss of soil fertility and vegetation cover, and consequent loss of native species such as critical weight range mammals. Erosion from increased runoff velocities is occluding drainage lines.

Conservation priorities

There is a need to improve the conservation reserve system's CAR, and to control weeds and manage fire regimes both on and off reserves.

Nationally important wetlands

Six wetlands of national importance are listed, including river courses, aquifer-fed springs, an inland salt marsh, natural springs and an artificial salt marsh. They act as refuges, support populations of endemic species, and are species-rich ecosystems. On average, their condition is fair (improvement requires significant management intervention) while the trend is declining or static. Threatening processes include grazing pressure, weed colonisation, changes to hydrology and water extraction for development.

Wetlands of regional significance

Twelve wetlands of regional significance have been identified, including riverine gorges, aquifer-fed springs, ephemeral swamps and lakes, claypans, river sections with permanent pools, and mangrove communities.

Some are extensive and species-rich ecosystems, acting as refuges and supporting populations of endemic species. On average, their condition is fair (improvement requires significant management intervention) while the trend is declining or static. Threatening processes include grazing pressure, weed colonisation, changes to hydrology and water extraction for development.

Riparian zone

The main river systems include the De Grey, Oakover, Turner, Fortescue, Robe, Cane and Ashburton rivers. All arise in the region's uplands and are active systems. Their riparian zones are generally degraded to fair (significant management intervention is required for recovery). They are declining because of:

- trampling and grazing pressure from cattle and feral herbivores,
- colonisation by a variety of weeds such as buffel grass, mesquite and Parkinsonia, and
- fire.

Ecosystems at risk

Two Threatened Ecological Communities (TECs) have been declared vulnerable under State legislation – the Ethel Gorge aquifer stygobiont community and the *Themeda* grasslands of the Pilbara region. The condition of TECs is fair or good but declining. Threats are groundwater drawdown, grazing, stock animals, weeds, changed fire regimes and changed hydrology.

A further 35 community-types are considered to be at risk, though they are not declared threatened under WA legislation. These ecosystems include:

- freshwater wetlands,
- mulga and snakewood communities,
- scree-slope and hilltop communities,
- mangroves,
- stygofaunal communities near mines,
- grasslands and salt marshes,
- cracking clay communities and
- islands.

Most appear to be vulnerable, but many have unknown status and one mulga community is probably endangered.

Their condition varies from degraded (lower slope mulga and Munjina Claypan) to fair or good. The trend in the condition of these ecosystems is declining although lower slope mulga, fresh water swamps, mangrove and island communities are often rapidly declining.

All except the islands are threatened by cattle, feral herbivores and fires. Feral mammals are ubiquitous on the Pilbara mainland, and also present on some islands. Wetlands and islands are being colonised by invasive weeds such as buffel grass and kapok bush. Hydrological changes are also degrading mulga, mangrove and stygofauna communities.

Species at risk

Move than 15 per cent of the Pilbara's original mammal fauna is now extinct in the region.

Under State legislation one reptile species is declared as endangered, and four mammals, six reptiles and two plants are vulnerable.

Under the Commonwealth EPBC Act:

- six mammals are vulnerable (the listing for the *Rhinonicteris aurantius* only applies to its Pilbara population),
- one reptile is endangered,
- five reptiles are vulnerable (four marine turtles and a python),
- one bird is vulnerable (the Alexander parrot) and
- two plants are vulnerable.

The vertebrates generally display a declining or static trend, while the plants are improving. The condition of extant fauna ranges from degraded in the case of the bilby and rock wallabies to good-near pristine for the Pilbara olive python. The conditions of most other species is unknown. The condition of the two declared rare flora (DRF) plants in the Pilbara is good.

The Pilbara olive python is not thought to be threatened. The plants listed are thought to be disturbance specialists.

Threatening processes for fauna species at risk include habitat changes associated with land use (direct recreation and hunting for turtles), feral predators and grazing. Various other plant, mammal, reptile and bird species are listed as priority and have similar threatening processes with the addition of mining, changed hydrology, weeds and changed fire regimes.

Management responses

Reserve system

There are two major National Parks: Karijini (in the Hamersley subregion) and Millstream-Chichester (in the Chichester and Fortescue subregions). The Mungaroona Ranges (Chichester) and many coastal islands (Roebourne) are nature reserves. Meentheena (Chichester) and Cane River-Mount Minnie (Hamersley) are conservation parks.

Conservation lands are dominated by uplands and ranges country with hummock grass communities on skeletal soils on scree-slopes. Upper-slope and mulga communities are also present. Networks of gorges, ephemeral watercourses with riparian woodland communities, freshwater springs and riverine communities are prominent features. A total of 1.7 million hectares (with examples of 42 of the region's 88 vegetation associations) is in this conservation estate, which is 8.7 per cent of the region's area.

Forty-five vegetation associations are listed as having a high priority for reservation. They comprise:

- various snakewood, cassia, acacia and eremophila shrublands,
- desert bloodwood or mallee/hummock grass,
- mulga/tussock grass,
- acacia and eucalyptus woodland,
- teatree,
- mangrove,
- grass plain,
- sedgeland,
- river gum,
- coolibah,
- samphire and
- pindan communities.

Various fresh-water swamps, claypans, inland salt marshes, mangrove stands and valley floor mulga woodlands specifically identified among the 35 'at risk' communities are also unreserved.

Overall, riverine systems and wetlands have the highest priority for reservation, as do some of the most productive parts of pastoral leases, and coastal and island sites important for industrial development or prospective for minerals. Aboriginal lands may not be available for reservation.

Bioregional priority for reserve acquisition is Class three. The Fortescue Plains region has the highest priority for further reservation because only 0.8 per cent is reserved in CALM estate. The next highest priority is the Chichester region, which has 3.9 per cent in reserves with a further 2.7 per cent of its area recently being purchased by CALM. Reserve systems in Chichester, Fortescue Plains and Roebourne are highly biased. Invasive weeds, wildfires and eradication of feral mammals are issues on all reserves, even those with resident staff; some reserves are seldom visited by management staff, and access to Mungaroona Nature Reserve is difficult.

Off-reserve conservation for species and ecosystem recovery

Recovery actions are identified for ecosystems and species at risk found off CALM estate.

- Habitat protection is required for five species of marine turtle (especially nesting locations), dugong, *Ctenotus angusticeps* (a skink), estuarine crocodile, *Lagorchestes conspicillatus*, *Macrotis lagotis* and the tree *Terminalia supranitifolia*. Better fire control is needed for the land-dwelling species, and fox management for the mammals.
- The two bats (*Macroderma gigas* & *Rhinonicteris aurantius*) need protection with the maintenance of old mine workings, a mining industry code of practice, the removal of barbed-wire fences (for ghost bats), and the completion of surveys for natural roosts.
- *Petrogale lateralis* and *Petrogale rothschildi* need to be translocated to Pilbara islands, followed by fox control.
- Broad-scale surveys to clarify the distribution and status of stygofaunas are required, followed by habitat protection as required in regions where research shows that mine dewatering may affect their persistence.
- Weed (buffel grass) control is urgently needed on coastal islands. Its interaction with indigenous fauna is unknown, but it eliminates native flora.
- Wetlands of the lower De Grey River require protection from weeds, stock and feral herbivores, including pigs. Fencing is required if lands remain under cattle production.

- Surveys to clarify distributions, status and threatening processes are needed for *Falco peregrinus, Sminthopsis longicaudata, Ramphotyphlops gaini* and 38 plant species (including herbs, shrubs, grasses, trees and sedges).

Significant off-reserve conservation activities are needed in Fortescue Plains subregion particularly habitat protection through agreements. Significant biodiversity gains can be made from translocations in the Roebourne subregion, and from fire control, habitat protection and feral mammal control (mangroves, lower riparian fencing and fox eradication) in the Hamersley and Roebourne subregions. Weed control is urgent, especially on the islands.

Integrated Natural Resource Management (NRM)

Existing actions:

- There are threat abatement plans on pastoral lands for vegetation (including fire), for fox and feral herbivore control, and for de-commissioning and revegetating mine-sites.
- Industry codes of practice have been set up, with capacity building through Land Conservation District Committees and Chamber of Minerals and Energy in liaison with landholders.
- Environmental management systems and ecological sustainable product marketing have been set up.

Opportunities:

- Legislated 'duty of care' needs to be enacted for pastoral leases, Aboriginal lands and mining areas.
- There needs to be joint or compatible management of pastoral lands owned by mining companies.
- Institutional reform (for example, rural reconstruction, industry reconstruction, new joint management arrangements and excision of high quality conservation lands when leases/tenements are renewed) needs to occur.
- There should be State and local government planning for the CAR reserve system, and planning for the National Action Plan for Water Quality and Salinity.

Constraints:

- There is a lack of funding to acquire high value lands held under pastoral lease when they are offered for sale, and to adequately manage existing estate for control of fire, weeds and feral herbivores, even in major national parks.
- The Pastoral Lands Board needs to co-operate in restructuring leases after reserve areas are excised.
- There needs to be an increased awareness of conservation values by educating the mining and pastoral industries, and the general public.
- 'Conservation Through Reserves' is limited by the extensiveness of mining leases, tenements and associated infrastructure, resulting in unnecessary alienation of high quality conservation areas (for example, Legendre Island).

The priority across the bioregion is to integrate conservation into pastoral production and development systems.

Major data gaps and research priorities

- The coverage by environmental geology/regolith mapping at better than 1:250,000 scale is incomplete.
- There is no quantitative (quadrat-based) regional survey of flora or fauna, so regional flora and fauna is poorly known. Only small, local areas have been examined in detail by biologists, usually for industrial development.
- There is little detailed data on the ecological requirements and life histories of virtually all invertebrate species, plants, persisting critical weight range mammals, uncommon vertebrate and plant species, and ecologically dominant plant species (e.g. hummock grasses).
- There is little data to provide a regional context on population-trends for even ecologically significant species such as native rodents, dasyurids, spinifex reptile communities, termites, ants, weeds such as buffel grass, kapok bush and ruby dock.
- There is no quantitative data on the impact of weed colonisation, fire in hummock grasslands, exotic herbivores on aquatic and terrestrial communities, or the long term effect of mining on stygofaunas.