Mallee

Eucalyptus hypochlamydea mallee over *Melaleuca* low shrub-land in Bendering Nature Reserve, Mallee Bioregion W.A. Photo: G.J. Keighery

Description

Bioregional description and biodiversity values

The south-eastern part of Yilgarn Craton is gently undulating, with partially occluded drainage. The climate is Mediterranean to semi-arid, with winter rainfall of between 250 and 500mm. There are two subregions – the Eastern Mallee and the Western Mallee.

The Eastern Mallee region contains calcareous clays and loams as duplex soils that often contain sheet and modular kankar, outcrops of metamorphosed sandstone, white and yellow sandplains, and loamy plains with numerous salt pans (pan fields). The vegetation is a mosaic: mallee grows on sandplains, samphire is common around small salt lakes, mallee and patches of woodland are found on clay, scrub-heath is present on sandstone, while mallee with boree (*Melaleuca pauperiflora*) grow on calcareous clay and loam.

The Western Mallee has more relief than its eastern counterpart. Its main surface-types comprise clays and silts underlain by kankar, exposed granite, sandplains, isolated uplands of laterite pavements and salt lake systems (on a granite basement). Mallee communities can be found on a variety of surfaces and *Eucalyptus* woodlands occur mainly on fine-textured soils, with scrub-heath on sands and laterite.

Land use is mainly grazing of improved pasture and dryland agriculture, with lesser areas of conservation, unallocated Crown land and Crown reserves, roads and other easements, and forestry plantation.

Rare features include:

- Granite outcrops. Four reptile species, uncommon terrestrial and aquatic invertebrates, and hundreds of plant species are restricted to granite outcrops. Individual outcrops have up to 200 species, including many endemics, making them the most diverse in the south west of Western Australia. These also provide seasonal resources and temporary refuge for fauna of surrounding habitats such as the black-flanked rock wallaby.
- Gypsum dunes such as Lake Tay are rich in rare and endemic plants (*Anigozanthos bicolor* subsp. *minor, Eremophila lactea, Myoporum turbinatum, Ricinocarpos trichophorus*, etc).
- The mixed thicket complex peculiar to the Russell Range includes dominants *Eucalyptus doratoxylon, Adenanthos oreophilus, Dampiera parvilolia, Monaotoca oligarrhenoides,* declared rare flora *Kennedia beckiana*, and priority taxa *Leucopogon apiculatus* and *Chorizema nervosum*.
- There are numerous endemic plant species belonging to the genera *Grevillea, Hakea, Eucalyptus, Acacia, Dryandra* and *Asteraceae*.
- Rare vertebrates including the western whipbird, western ground parrot, malleefowl, Cape Barren goose, slender-billed thornbill and chuditch.
- Freshwater wetlands are important refugia. Examples, such as Lake Bryde, East Lake Bryde and Lake Cronin, are becoming increasingly important as surrounding areas are salinised.
- Salt lake systems, the Russell Ranges and the region's eucalypt woodlands have high species- and ecosystem-diversity.

Overall condition and trend

Salinity, vegetation fragmentation, weeds, fire, feral herbivores and predators have had a profound affect on the bioregion. Many ecosystems and species populations are in poor condition. Overall condition is fair to poor, and the trend is declining. Except for the presence of several large reserves, the Western Mallee resembles the Avon Wheatbelt which has a continental stress class of one (awful). A continental stress value of two is appropriate.

Conservation priorities

Reserve threatened ecosystems and populations of threatened species. Focus on protecting remaining populations of threatened species, both on and off reserves. Protect reserves and other ecosystem remnants low in the landscape from salinity and excessive inundation. Control weeds, fire, pathogens, feral herbivores and predators on reserves and other vegetation remnants. Halt clearing.

Nationally important wetlands

There are two wetlands of national significance, the Lake Grace System and Lake Bryde/East Lake Bryde. Their condition is fair; recovery is considered achievable but needing significant management intervention. Unfortunately, both are declining. The threatening processes include changes in hydrology (particularly increased salinity levels resulting from

input of saline surface water), disturbance of lake edges by recreational use of vehicles, and mining (gypsum and exploration permits).

Wetlands of regional significance

Nineteen wetlands have regional importance. Their overall condition is good to near pristine, although the trend is for decline or unknown. Key threatening processes are changing hydrology (increasing salinity), vegetation clearing, grazing pressure, pollution (agricultural chemicals), exotic weed species and gypsum mining.

Riparian zone

Three catchments extend into the region: Albany Coast, Esperance Coast and south-eastern periphery of Avon River Catchment. Their river systems are either in fair condition (Lort and Fitzgerald Rivers) or degraded (Young and Pallinup Rivers), and all are forecast to decline. Key threatening processes are the same as for other wetlands although pathogens are an additional problem.

Ecosystems at risk

Three ecosystems are listed as threatened under State legislation: Lake Bryde wetland area (critically endangered), mixed thicket in the Russell Range and herblands (vulnerable) and bunch grasses on gypsum dunes (vulnerable). Changed fire regimes and pathogens are threatening the Russell Range mixed thicket, while changes to hydrology (salinity as well as flow regimes) are affecting the Lake Bryde wetland area. The gypsum dune communities are threatened by mining.

In addition, there are 13 other ecosystems at risk in the bioregion, all in fair or good condition where condition is known. The trends are for decline or rapid decline and again, many ecosystems are unknown. Relevant threatening processes include:

- changed hydrology (particularly salinity),
- clearing,
- pathogens (*Phytopthora* sp.) and
- mining.

The Western Mallee region is part of the wheatbelt and as such a general risk statement applies to its vegetation associations. More than 75 per cent has been cleared for agriculture (comprising about one third of the total number of vegetation associations in the subregion). The remaining areas of all valley floor woodlands are subject to secondary salinity. Therefore, a further 20 to 30 vegetation associations in the Western Mallee should be treated as being at risk.

Species at risk

More than 35 per cent of the Mallee bioegion's original mammal fauna is now regionally extinct.

Under State legislation:

- eleven plant species have been declared as critically endangered,
- twenty one plants, two mammals and one bird are endangered, and
- fifteen plants, three mammals and four birds are listed as vulnerable.

Their trend ranges from static to declining rapidly. One bird, the slender-billed thornbill, is thought to be extinct, but one mammal, the Chuditch, is increasing in numbers under a fox baiting program. Most other species at risk are declining. Large numbers of ground-dwelling invertebrates are locally endemic and might face extinction from salinity.

Threatening processes affecting animals include land clearing, grazing pressure (mainly sheep and rabbits), changed fire regimes, feral predators (cats and foxes), and changed hydrology. Plants are threatened by clearing, vegetation fragmentation, weeds, changed fire regimes, salinity, changed hydrology, roadworks and small populations or restricted distributions.

Management responses

Reserve system

The conservation estate comprises 40 reserves, 38 nature reserves and two national parks.

It is biased towards ecosystems found high in the landscape (for example, at Dragon Rocks and Bendering Nature Reserves), and those on poor soils around salt lake systems at the bottom (Lake Grace-Chinocup), although the Lake Magenta Nature Reserve includes an entire landscape profile. The reserve system in the Western Mallee is biased and fragmented.

Eighteen ecosystems are not reserved and have high priority for acquisition. They are:

- woodlands of wandoo, salmon gum, corel gum, morrel, yate and York gum on fine textured soils,
- jam-sheoak woodland,
- fresh water lakes,
- sedgelands,
- myall-greybush and salmon gum-saltbush on calcareous plains,
- woodland and samphire communities around saltlakes, and
- a scrub-heath.

Unreserved Threatened Ecological Communities include greenstone communities associated with the Bremer Range, shrublands on floors of freshwater lakes such as Lake Bryde and herblands and bunch grasslands of gypsum lunettes.

Reserve management across the bioregion is fair to good. Fire breaks and fire access tracks are installed and maintained. Some feral predator control occurs in larger reserves such as Lake Magenta, Dragon Rocks, Bendering, Row and North Kalgarin Nature Reserves, although feral herbivores such as rabbits are not controlled.

Many nature reserves are threatened by saline groundwater, especially in the Western Mallee, but are mitigated (by pumping) on only a few reserves such as Lake Toolibin.

Competing land-uses are the main constraint to completing a comprehensive, adequate and representative (CAR) reserve system – agriculture, grazing and mining. Most ecosystems have been cleared well below CAR thresholds, so virtually all remnants are important for biodiversity conservation. Those with lowland communities (tall woodlands, mallee and melaleuca shrublands, freshwater and naturally saline wetlands) are under threat from rising watertables, and most of these communities will be lost.

Some opportunities exist to add to the conservation estate through the vesting of unallocated Crown land and the re-vesting of other Crown reserves, but there is some competition with other government agencies and local government for these areas. The process is also lengthy and somewhat ad hoc, and at present there are insufficient resources to acquire and manage an increased conservation estate.

The region has been assessed as IBRA Reservation Class five because more than 15 per cent of its area is reserved in CALM tenure. However, both the Eastern and Western Mallee subregions should be upgraded in priority to class three because of bias in coverage by their reserve systems.

Many surfaces are virtually all cleared, low-level landscape units are threatened, and while 33 per cent of native vegetation cover remains in the Western Mallee, only 17.3 per cent of native vegetation cover remains in its western and central parts.

Off-reserve conservation for species and ecosystem recovery

Priority species and ecosystems include:

- critical weight range mammals and threatened birds,
- biota of granite outcrops, and
- flora with Interim Recovery Plans, of roadsides and of lowland communities, and the plant communities of banded ironstone ranges, Bremer Range, gypsum lunettes and Lake Bryde.

Recovery actions for all species and ecosystems include:

- habitat retention through reserves, private lands and other state lands,
- weed control,
- feral animal control,
- fencing,
- fire management,
- survey and mapping work,
- incentives for landholders to conserve communities,
- control of mining activities,
- pumping to control water tables (especially lowland areas),
- translocation,
- revegetation,
- germplasm storage and
- capacity building with local government authorities and landholders.

However, there are constraints on some of the above actions because:

- many species are locally extinct, making it is hard to obtain sufficient numbers for translocation (particularly mammals),
- habitat patches of large enough areas no longer exist in western parts of the bioregion,
- there are a variety of competing land uses (crop-farming, grazing, mining),
- predators are expensive to control,
- there is no viable technology to control salinity which affects 30 per cent of the cleared landscape,
- there is a lack of survey data and knowledge on habitat requirements, and
- there is a lack of staff resources.

The Eastern Mallee has an off-reserve conservation priority of four (some limited off-reserve measures are required) because significant areas of unallocated Crown land remain. In contrast, the Western Mallee is priority one (major constraints to achieve conservation outcomes).

Integrated natural resource management (NRM)

The most significant contributions to biodiversity conservation in the Mallee region are the on-ground activities of the Department of Conservation and Land Management.

Natural resource management initiatives affecting biodiversity include incentives for re-vegetation, protecting vegetation remnants (by fencing and earthworks) and abating threats such as dieback, feral animals, fire, salinity and weeds.

To this end, industry codes of practice for extractive industries, mining, timber plantations and roadside construction and maintenance exist, there are integrated regional management plans, and rural land-use plans and environmental management systems are being prepared.

Government agencies are interacting with non-government organisations such as the Avon Catchment Network, Greening Australia, the World Wildlife Fund's Woodland Watch, the Threatened Species Network and the Malleefowl Preservation Society to build capacity among landholders and to implement strategic plans, including new industries based on native biota, particularly deep rooted perennial plants. Environment and natural resources policies under the Town Planning and Development Act 1928 will guide and coordinate many State agencies and local governments on the use and development of land.

The main constraints on successful natural resource management include:

- the lack of resources (human and infrastructure) for implementation,
- lack of rigour in the natural resource management area,
- the generally very poor understanding of the relevant socio-political processes,
- the lack of technical solutions that are economically viable,
- the need for more controls on land clearing and drainage and
- the need to integrate property management planning, catchment planning and Landcare.

While various Acts protect wildlife and soils, there is no duty of care legislation.

The Eastern Mallee was assessed as having a natural resource management rank of three to four. The capacity for ensuring that conservation is integrated into natural resource management to achieve significant biodiversity outcomes has been recognised. Natural resource management instruments are in place with some achieved biodiversity outcomes.

The Western Mallee has a natural resource management rank of one, and has major constraints to implementing effective natural resource management actions to achieve biodiversity outcomes. An overall rank of two seems appropriate.

Major data gaps and research priorities

- A field survey of biodiversity in relation to physical landscape attributes is required in vegetation remnants. This commenced in 1999.
- Robust biodiversity surrogates need to be identified, as does population viability in the context of the region's fragmented landscape and fire.
- There is no data to provide a regional context on life-history (including population-trend) of most species, including foxes.
- Quantitative data on the effect of fire, exotic predators, weeds, landscape fragmentation and farm clean-up, mining, and a rising water table on communities is also required.
- A standardised database and GIS application is also essential for data querying and management.