Mulga region Grazing Land Management land type information

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Noogoora burr*	*Xanthium occidentale*	MU06, MU08, MU10
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purple pentatrope	*Rhyncharrhena linearis*	MU02
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Queensland bluegrass	*Dichanthium sericeum*	MU01, MU06, MU07, MU08, MU10, MU11
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silver cassia	*Senna artemisioides* subsp. *coriacea*	MU08
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silver turkey bush	*Eremophila bowmanii*	MU02, MU04
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tree pear*	*Opuntia tomentosa*	MU01

tropical speedwell	*Evolvulus alsinoides*	MU05, MU08, MU09
Turanti barley Mitchell	*Astrebla pectinata* cv. Turanti	MU06, MU07, MU08, MU10, MU11
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two-gland wiregrass	*Aristida biglandulosa*	MU05
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umbrella grass	*Digitaria divaricatissima*	MU01, MU06, MU07
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wild parsnip	*Trachymene ochracea*	MU05
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wiregrass/es *see also* brush threeawn, bunched kerosene, dark, erect kerosene, feathertop, Jericho, many-headed, prickly threeawn, two-gland, wiregrass	*Aristida* spp.	MU01, MU02, MU03, MU04, MU05, MU06, MU07, MU08, MU09, MU10, MU11
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yakka grass *see* fairy grass		

Yanda curly Mitchell grass	*Astrebla lappacea* cv. Yanda	MU06, MU07, MU08, MU10, MU11
yapunyah	*Eucalyptus ochrophloia*	MU03, MU10
yellow everlasting daisy	*Xerochrysum bracteatum*	MU01, MU05
yellowjacket	*Eucalyptus intertexta*	MU08

# Denotes non-grass species that are important to grazing and land condition values in annually dominated land types.
* Denotes non-native species.

Brigalow

Landform

Flat alluvial plains in south-east, to gently undulating to undulating plains, low hills and lower slopes of scarps (slopes 2–8%) in north and north-east.

Woody vegetation

Brigalow low open woodlands to tall shrublands occurring variably with gidgee, belah, Dawson gum and mountain yapunyah, and scattered boonaree, whitewood and leopardwood. False sandalwood and wilga commonly form a shrubby understorey.

Expected pasture composition

** Denotes non-native "Expected Pasture Composition" species.*

Preferred

Mitchell grasses (curly, hoop), buffel grass* (naturalised), Queensland bluegrass, cotton panic, umbrella/blowaway grass, neverfail.

Intermediate

Bottlewasher grasses, curly windmill grass, brigalow grass, box grass, fairy/yakka grass, katoora, five-minute grass.

Non-preferred

Wiregrasses (e.g. dark, many-headed, feathertop).

Annual grasses

Native couch, comb chloris, button grass, small Flinders grass.

Common forbs

Red spinach, common prickly pear, daisies (e.g. yellow everlasting) daisy burrs, ruby saltbush, saltbushes, burrs, soft roly poly, black roly poly, sedges, *Abutilon* spp., sidas (e.g. flannel, high, pin), speedy weed, pigweed.

Suitable sown pastures

Buffel grass.

Introduced weeds

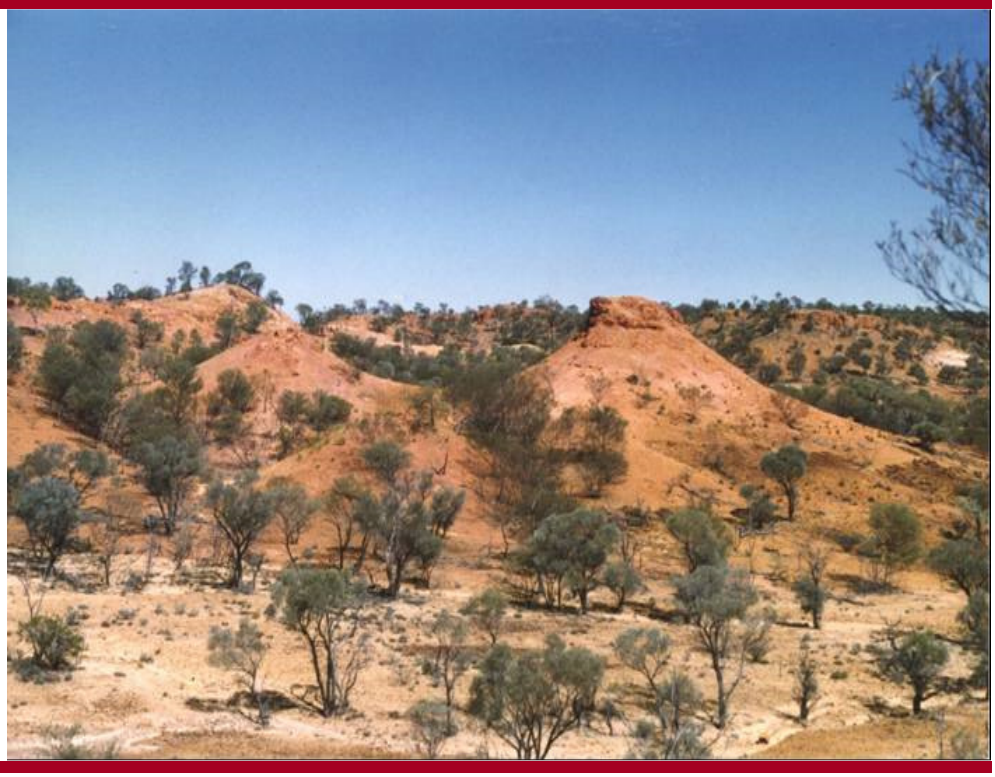
Tree pear, parkinsonia and African boxthorn around water points.

Soil

Moderately deep to very deep grey, reddish brown and brown cracking clays and texture contrast soils, with variable light cover of gravel/stone and gilgai development.

Description	***Surface:*** Weak crusts over weak to moderate self-mulching; some hard-setting; ***Surface texture:*** sandy clay or light to medium clay; ***Subsoil texture:*** medium-heavy clays at depth.
Features	Moderately self-mulching; some hard-setting.
Water availability	High
Rooting depth	Sodicity or alkalinity of soils at >60 cm depth limits effective soil depth.
Infiltration	Cracking clays high when dry, becoming rapidly less as soils become saturated; slow on hard-setting soils.
Fertility	Moderate; low to very fair carbon and nitrogen, low acid phosphorus.
Salinity	Non-saline; some soils have saline subsoils.
Sodicity	Non-sodic at surface; sodic to strongly sodic at depth.
pH	Variable; ranging from sightly acid to strongly alkaline at surface, often increasing down profile.
Utilisation	20%
Enterprise	Breeding sheep and cows.
Land use and management recommendations	• Pastures are of low productivity but high quality and respond well to clearing operations but regrowth needs controlling. • Pasture on texture contrast soils responds to light falls of rain; heavier falls (>30 mm) are needed for a response on cracking clays. • The drier areas are suitable for short-term cropping only as a precursor to permanent pasture establishment. • Non-continuous winter cropping with rotational periods under pasture in areas that receive sufficient rainfall. • Use of contour banks, grassed waterways and conservation cropping needed to minimise runoff and soil erosion on more steeply sloping land (>1% slope). • Slopes greater than 6% should not be cultivated.
Land use limitations	• Dense brigalow and false sandalwood regrowth can severely limit productivity. • Secondary salinity may be a problem if surrounding high country has been cleared. • Low drought grazing capacity unless buffel well established.
Conservation features and related management	• Brigalow, particularly in association with belah, provide potential habitat for rare and threatened fauna (e.g. painted honeyeater, black-chinned honeyeater, woma python). These areas also provide habitat for a very high diversity of birds (yellow-tailed black-cockatoo, Bourke's parrot, crested bellbird, spotted bowerbird), reptiles (eastern spiny-tailed gecko, slider and striped skinks), and insectivorous bats including the vulnerable greater long-eared bat. • Extensive areas of brigalow have been, and are prone to being, cleared. Some areas are also prone to scalding. • Use of a combination of soil conservation techniques will help minimise soil erosion and scalding; and use of fire to control regrowth can enhance the productivity and potential habitat of this land zone.
Regional ecosystems	4.9.15, 4.9.17, 4.9.19, 6.3.25, 6.4.2, 6.4.4, 6.9.3, 11.3.1, 11.9.11.

Dissected residuals (jump-ups)



Landform	Actively eroding undulating plateaus, dissected low hills, mesas, buttes and tablelands, and scarps that form ranges and watershed boundaries (slopes 3–10%) with shallow soils and significant stone coverage.
Woody vegetation	Open eucalypt woodland to low shrubby woodlands of mulga or bendee - dominated communities associated with bastard mulga, lancewood, mountain yapunyah, western bloodwood and other wattles. A variable dense shrubby understorey of silver turkey bush, hopbushes or mint bushes is often found.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species*.
Preferred	Cotton panic, mulga oats, hairy panic, mulga Mitchell.
Intermediate	Dwarf mulga grass, bottlewasher grasses, purple lovegrass, woollybutt wanderrie grass, mountain wanderrie grass, five-minute grass.
Non-preferred	Coarse wiregrasses (e.g. many-headed, Jericho).
Annual grasses	Button grass, pretty wanderrie grass, rare panic. Bunched kerosene (non-preferred).
Common forbs	Daisy burrs, burrs, soft roly poly (western form), green pussytail, silvertail, ruby saltbush, green crumbweed, sidas (e.g. corrugated, flannel, ridge), purple pentatrope, potato bushes.
Suitable sown pastures	Not suitable for sown pastures.
Introduced weeds	None of significance known to occur.

Soil	Very shallow to shallow (<50 cm) gravely lithosols and red earths.
Description	***Surface*:** Loamy hard surfaces with significant stone or rock cover in parts; ***Surface texture*:** Sandy loam to loams; ***Subsoil texture*:** no or very limited horizon structure, underlain by weathered rock.
Features	Surface sealing and hard-setting soil, stone with rock outcrops.
Water availability	Very low.
Rooting depth	Shallow to very shallow.
Infiltration	Poor; high runoff zones.
Fertility	Very low phosphorus, low nitrogen and carbon.
Salinity	Very low.
Sodicity	Non-sodic
pH	Variable, predominantly strongly acid to acid.
Utilisation	15%
Enterprise	Adult wethers.
Land use and management recommendations	• Provides runoff to adjoining areas and alluvial plains following rain. • Some mulga provides limited drought protein reserves. • Often critical wildlife habitat.
Land use limitations	• Limited inherent productivity, further reduced by shrub invasion and/or thickening of various *Acacia* species, mint bushes, hopbushes, and cassias. • Inherently infertile with low water holding capacity. • Maintenance of vegetative cover essential to minimise excessive runoff and erosion of associated lands.
Conservation features and related management	• These areas provide habitat for fauna of conservation significance (yellow footed rock wallaby); the rare square-tailed kite; a range of birds (white-backed swallow, spinifex pigeon), koalas, striped skinks (*Ctenotus* spp.) and some rare and threatened flora species (*Melaleuca kunzeoides, Xerothamnella parviflora, Hakea* sp., *Euphorbia sarcostemmoides*). • Residuals may be heavily impacted by goats which decimate the ground layer. • Maintenance of vegetative cover is important in minimising excessive runoff and erosion of associated lands. • Control of feral animals can help prevent the degradation of the ground layer.
Regional ecosystems	6.7.1, 6.7.2, 6.7.5, 6.7.6, 6.7.7, 6.7.13, 6.7.14, 6.7.15, 6.7.16, 6.7.17.

Gidgee

Landform

Undulating plains and lower slopes (slopes 3%), minor ridges and scarp retreats of dissected residuals in the west and north-west; on flat to gently undulating plains in Blackall district; and plains associated with major watercourses in the south (e.g. Warrego).

Woody vegetation

Gidgee low woodland to woodland with mulga, boree, coolibah, yapunyah, mountain yapunyah, whitewood, brigalow, and false sandalwood in some areas.

Expected pasture composition

Uncleared: Sparse pasture dominated by saltbushes, copperburrs, twinleaf, red spinach, pigweed, button grass and fairy/yakka grass in wet seasons.

** Denotes non-native "Expected Pasture Composition" species.*

Preferred	Mitchell grasses (hoop, curly, bull), buffel grass* (naturalised), silky umbrella grass, early spring grass, neverfail.
Intermediate	Slender chloris, bottlewasher grasses, curly windmill grass, dwarf mulga grass, native millet, western rat's tail grass, katoora, fairy/yakka grass, five-minute grass.
Non-preferred	Wiregrasses (e.g. feathertop).
Annual grasses	Native couch, comb chloris, button grass, barnyard grass, pepper grass, weeping lovegrass, small Flinders grass. Bunched kerosene (non-preferred).
Common forbs	Giant pigweed, red spinach, lamb's tail, burrs (goathead), tangled and woolly copperburrs, desert Chinese lantern, saltbushes (e.g. climbing, Mueller's), ruby saltbush, *Maireana* spp., soda bush, soft roly poly, *Abutilon* spp., sidas (e.g. high, pin), speedy weed.

Suitable sown pastures

Buffel grass in softer gidgee land zones (to the east of the region).

Introduced weeds

Parkinsonia, parthenium and African boxthorn.

Soil	Shallow to very deep grey, brown and red cracking clays and texture contrast soils, varying in stoniness and gilgai development. Deeper on flat land and lower slopes.
Description	***Surface*:** Predominantly cracking, self-mulching; some hard-setting; ***Surface texture*:** light to medium-heavy clays; ***Subsoil texture*:** medium to heavy clays.
Features	High sodicity limits effective soil depth.
Water availability	Variable; low to moderate on surface increasing with depth.
Rooting depth	High sodicity of soils at >60 cm depth limits effective soil depth.
Infiltration	Higher on self-mulching soils; lower on hard-setting soils.
Fertility	Low; low organic carbon; total nitrogen low to very low.
Salinity	Mostly non-saline; some soils have saline subsoils.
Sodicity	Non-sodic at surface, subsoils sodic to strongly sodic.
pH	Variable; generally neutral to strongly alkaline at surface, increasing down the profile.
Utilisation	20% (25% where buffel grass is well established).
Enterprise	Mixed cattle and sheep.
Land use and management recommendations	• Pasture on texture contrast soils respond to light falls of rain. • Moderate susceptibility of soils to erosion. • Some areas are suitable for establishment of improved pastures (buffel grass). • Low drought grazing capacity unless buffel grass is well established. • Maintenance of vegetation cover to minimise soil erosion on steeply sloping land. • Development of lands should only be undertaken if there is sufficient flexibility to spell areas to achieve sufficient fuel for a hot fire.
Land use limitations	• High sodicity can limit effective soil depth and reduce plant available moisture. • Fertility may limit production. • Dense gidgee, cassia, brigalow and false sandalwood regrowth can severely limit productivity.
Conservation features and related management	• Gidgee areas provide habitat for birds (thornbills, red-browed pardalotes, blue bonnet and Bourke's parrots); insectivorous bats; and reptiles (marbled velvet gecko, Burn's lash-tail dragon) that use the fallen woody material on the ground. • Gilgai areas are particularly important for frog breeding especially for the burrowing frog species (e.g. *Cycloranas*). • Maintenance of ground cover in gidgee areas is important to minimise soil erosion and help protect the wildlife habitat. • Use of fire could assist in controlling regrowth and woody weeds, and enhance productivity and habitat potential of the land zone.
Regional ecosystems	6.3.4, 6.3.6, 6.4.1, 6.9.4.

Hard mulga

Landform	Gently undulating to undulating plains with variable stone and gravel cover (slopes 1–6%). Often occur on scarp retreats and back slopes of residuals.
Woody vegetation	Sparse mulga shrublands to mulga low woodlands, some areas associated with poplar box, bastard mulga and western bloodwood, and variable shrubby understorey of cassia, hopbush or turkey bushes. Areas of heathlands and spinifex patches occur on ridges.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species*.
Preferred	Cotton panic, mulga oats, kangaroo grass, mulga Mitchell.
Intermediate	Dwarf mulga grass, bottlewasher grasses, purple lovegrass, woollybutt wanderrie grass, mountain wanderrie grass, five-minute grass.
Non-preferred	Wiregrasses (e.g. Jericho, brush threeawn, dark, erect kerosene).
Annual grasses	Hairy armgrass, button grass, pretty wanderrie grass, rare panic. Bunched kerosene (non-preferred).
Common forbs	Caustic vine, daisy burrs, silvertail, green pussytail, green crumbweed, burrs, smooth goodenia, hill hibiscus, sidas (e.g. corrugated, ridge), mulga nettle, soft roly poly (western form), potato bushes.
Suitable sown pastures	Not suitable for sown pastures.
Introduced weeds	None of significance known to occur.

Soil	Shallow to moderately deep (30–90 cm), stony or gravely loamy red earths with areas of ironstone and stone throughout the profile.
Description	***Surface*:** Loamy hard surfaces; ***Surface texture*:** Sandy clay loam to clay loam; ***Subsoil texture*:** Clay content may increase down profile to light clay; ironstone gravel common throughout profile.
Features	Hard-setting; high runoff zone.
Water availability	Low to medium.
Rooting depth	Shallow
Fertility	Very low to low (phosphorus, nitrogen, carbon).
Salinity	Very low
Sodicity	Non-sodic
pH	Very acid to slightly acid throughout profile.
Utilisation	15%
Enterprise	Mixed dry sheep and cattle, or adult wethers only.
Land use and management recommendations	• Stock lightly during dry periods and post drought to maintain ground cover. • Mulga fodder provides drought protein reserves. • Wiregrasses often predominate in areas cleared of mulga. • Opportunistic use of fire as management tool to control woody weeds (e.g. turkey bush, hopbush, cassias and mint bush). • Maintain ground cover to minimise water and wind erosion and maximise rainfall capture. Any grass cover is better than none. • Strip clearing is preferable to clearing of large areas to minimise erosion and degradation.
Land use limitations	• Fragile grazing lands. • Difficult to reclaim if degraded by either soil erosion or woody weed domination. • Poor surface structure, soil acidity and stoniness limit mechanical treatment options.
Conservation features and related management	• These areas provide potential habitat for rare and threatened fauna (pink cockatoo, red-throat, yellow-footed rock-wallaby, woma python) and flora (climbing caustic, *Euphorbia sarcostemmoides).* • Maintenance of ground cover will minimise extensive loss of topsoil and degradation of these areas.
Regional ecosystems	6.7.9, 6.7.10, 6.7.11, 6.7.12, 6.5.16, 6.5.16a.

Mulga sandplains

Landform	Flat to gently undulating sandplains (slopes up to 2%) that generally occur east of Bulloo river. Occasional small claypans occur throughout and sometimes interspersed with linear sandhills.
Woody vegetation	Mulga low open forest to woodlands sometimes associated with poplar box, Clarkson's bloodwoods, beefwood, ironwood and gundabluie. Some areas may be dominated by whipstick mulga, eastern dead finish, hopbush or turpentine.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Buffel grass* (naturalised), cotton panic, silky umbrella grass, mulga oats, hairy panic, kangaroo grass, mulga Mitchell.
Intermediate	Bottlewasher grasses, woollybutt, purple lovegrass, woollybutt wanderrie grass, mountain wanderrie grass, native millet, purple plume grass.
Non-preferred	Greybeard grass, cane panic, wiregrasses (e.g. two-gland, prickly threeawn, brush threeawn, Jericho, erect kerosene, dark).
Annual grasses	Three-awn wanderrie grass, comet grass, small burr grass. Bunched kerosene (non-preferred).
Common forbs	Pussytails, foxtails, wild parsnip, sidas (e.g. shrub, fine, spiked, lifesaver), tropical speedwell, daisies (e.g. native, clustered copperwire, yellow everlasting), sunrays, daisy burrs, galvanised burr, green crumbweed, billy buttons, caustic weed, small-leaved darling pea, smooth goodenia, smooth velleia, mulga fern, broadleaf parakeelya.
Suitable sown pastures	Buffel grass.
Introduced weeds	Mesquite, parkinsonia and African boxthorn around water points.

Soil	Moderately deep to deep (80–220 cm) sandy red earths, minor areas of earthy sands.
Description	***Surface*:** Hard-setting, occasionally loose; ***Surface texture*:** Predominantly light sandy loam to sandy-clay loam; ***Subsoil texture*:** Texture uniform or may increase at depth to sandy-clay or light clay; hardpans are present in some areas.
Features	Sandy surfaces limit runoff, have high infiltration rate, and enable growth response to lighter falls of rain.
Water availability	Low to very low.
Rooting depth	Generally deep; limited by hardpans (120 cm) in some areas.
Infiltration	High
Fertility	Low to very low.
Salinity	Very low.
Sodicity	Non-sodic
Salinity	Very low.
pH	Acid, sometimes extremely acid (pH <4.0); alkaline soils due to iron hardpans in south.
Utilisation	15%
Enterprise	Mixed sheep and cattle.
Land use and management recommendations	• Stable, when vegetated, country that responds well to light rain (25 mm). • High infiltration rates minimise runoff. • Mulga fodder provides drought protein reserves. • Use fire regularly (4–5 year) as management tool to control woody weeds. • Buffel grass establishment is possible in some areas of better pH. • Strip clearing is preferable to clearing of large areas to minimise erosion, regrowth and associated degradation.
Land use limitations	• Mulga, turkey bush, turpentine, cassias or hopbush densities can become very high, limit production and reduce carrying capacity. • Susceptible to wind and water erosion if tree cover is too low.
Conservation features and related management	• This land zone provides potential habitat for rare and threatened fauna (kultarr or marsupial mouse) and flora (e.g. *Acacia ammophila*), and a wide range of birds (e.g. mulga and Bourke's parrots, splendid fairy-wren, red-capped robin), mammals (e.g. sandy inland mouse) and striped skinks (e.g. royal *Ctenotus*). • Structural and floristic compositions may be highly modified and areas threatened by high densities of woody weed. • Use of fire could assist in controlling woody weeds and enhance productivity and habitat potential of the land zone.
Regional ecosystems	6.3.21, 6.3.22, 6.3.23, 6.5.15, 6.5.15a, 6.5.19a, 6.6.1, 6.6.2.

Open alluvial plains

Landform

Occasionally or seasonally, sometimes rarely, flooded alluvial plains (slopes <1%) associated with drainage lines, watercourses and major river systems. Large scalded areas, saltpans and claypans may be present on some plains.

Woody vegetation

Predominantly treeless with vegetation ranging from saltbush/burr and bluebush forblands to sparse open Mitchell grass tussock and/or bluegrass grasslands. Where trees are present they occur as scattered whitewood, poplar box or coolibah on watercourses.

Expected pasture composition

** Denotes non-native "Expected Pasture Composition" species.*

 # Denotes non-grass species that are important to grazing and land condition values in annually dominated land types.

Preferred

Mitchell (barley, hoop, curly, bull) grasses, Queensland bluegrass, neverfail, umbrella/blowaway grass, silky browntop, early spring grass.

Intermediate

Bottlewasher grasses, swamp cane grass, native millet, rat's tail couch, katoora, fairy/yakka grass, five-minute grass.

Non-preferred

Wiregrasses (e.g. feathertop).

Annual grasses

Preferred species include channel millet. Native couch grass, comb chloris, button grass, mulka, weeping lovegrass, small and red Flinders grass. Bunched kerosene (non-preferred).

Common forbs

Red spinach, Australian carrot, lamb's tail, daisy burrs, paper daisy, saltbushes# (e.g. Mueller's, old man), Queensland bluebush#, ruby saltbush, cotton bush, soda bush, soft roly poly, burrs, black roly poly, Australian bindweed, cow vine#, sedges, caustic weed, annual verbine, rhynchosia, silky goodenia#, high sida, nardoo.

Suitable sown pastures

Turanti barley Mitchell and Yanda curly Mitchell in southern Mitchell grass country.

Introduced weeds

Mother-of-millions, Noogoora burr, Bathurst burr, parkinsonia, African boxthorn, coral cactus to south, mesquite to west, saffron thistle to the east.

Soil

Deep to very deep alluvial cracking red, brown and grey clays, often intermixed with texture contrast soils.

Description	***Surface:*** Thin or thick surface crusts over self-mulching or weakly self-mulching soils; ***Surface texture:*** medium to heavy clays, some intermixing of sand and silt; ***Subsoil texture*****:** heavy clays throughout (grey clays) or becoming lighter clay on smaller watercourses (grey or red colouring).
Features	Self-mulching or hard-setting. Scalded surfaces are common.
Water availability	High
Rooting depth	Sodicity at depth (usually >60 cm) may limit effective soil depth.
Infiltration	High on self-mulching; low on hard-setting soils.
Fertility	Generally moderate.
Salinity	Generally low at surface, increasing with depth.
Sodicity	Increasing at depth; lime present at depth.
pH	Commonly slightly acid to neutral (red and brown) or more strongly alkaline (grey), increasingly alkalinity at depth.
Utilisation	20%
Enterprise	Breeding cows and sheep.
Land use and management recommendations	• Deep alluvial cracking clays are stable, highly productive Mitchell grass and bluegrass pastures with a high proportion of seasonal forbs. • Deep alluvial texture contrast soils tend to be unstable and, with a sparser vegetation cover, are subject to widespread scalding. • Lighter soils may respond to moderate rainfall (25–50 mm) with heavy clays requiring rainfall of 50–75 mm to promote good pasture growth, germination and for seed to set. • Improved pastures possible in some areas subject to frequent inundation. • Opportunistic cropping may be undertaken after flooding in some areas. • Careful management of grazing pressure to maintain vegetation cover and retain topsoil is necessary to avoid further degradation and extension of scalded surfaces. • Maintenance of vegetation cover can minimise flood (riverbank) and gully erosion and siltation of waterways.
Land use limitations	• Texture contrast soils are prone to wind and/or water erosion that results in scalding and degradation, particularly near water holes and along main channels.
Conservation features and related management	• Alluvial plains provide habitat for a range of birds (e.g. ground cuckoo-shrike, plum-headed finch, brolga, bustard, little button-quail), reptiles (netted dragons, tessellated and fat-tailed geckos) and for rare and threatened flora species (*Picris evae, Aponogeton queenslandicus)*. • Some areas are unstable and a loss of topsoil and frequent scalding are evident over extensive areas. • Careful management of grazing pressure to maintain vegetation cover and retain topsoil is necessary to avoid further degradation and extension of scalded surfaces.
Regional ecosystems	6.3.10, 6.3.10a-b, 6.3.11, 6.3.11a-b, 6.3.11f, 6.3.12, 6.3.13, 6.3.13a-b, 6.3.14, 6.3.15, 6.3.16, 6.3.17, 11.3.21.

Open downs

Landform	Gently undulating plains (slopes up to 2%) associated with rolling downs in the north east.
Woody vegetation	Predominantly treeless open Mitchell grass tussock grasslands with some short grasses and forbs. Boree may occur occasionally as scattered trees, and mimosa bush, gundabluie, myall and boonaree may occur as low shrubs. In some areas whitewood, boonaree, ironwood, eastern dead finish tall open shrublands occur on rubbly outcrops; with mimosa bush and needlewood along drainage lines.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Mitchell (hoop, curly, bull) grasses, satin top, desert bluegrass, buffel grass* (naturalised), Queensland bluegrass, early spring grass, umbrella/blowaway grass, neverfail, silky browntop.
Intermediate	Bottlewasher grasses, curly windmill grass, native millet, yabila, katoora, fairy/yakka grass, five-minute grass.
Non-preferred	Wiregrasses (e.g. curled, feathertop, white speargrass).
Annual grasses	Native couch grass, comb chloris, button grass, weeping lovegrass, red and small Flinders grass, pepper grass, small burr grass.
Common forbs	Red spinach, saltbushes, ruby saltbush, burrs, black roly poly, soft roly poly, down's nutgrass, caustic weed, silky goodenia, rhynchosia, sidas (e.g. high, pin).
Suitable sown pastures	Buffel grass, old man saltbush, Turanti barley Mitchell, Yanda curly Mitchell.
Introduced weeds	Prickly acacia, parkinsonia.
Soil	Moderately deep to deep, occasionally shallow, grey and brown cracking clays.

Description	***Surface:*** Occasional scattered deposits of sandstone or ironstone pebble; strong self-mulching soils, possibly with thin surface crust; ***Surface texture:*** medium to heavy clays ***Subsoil texture*****:** heavy clays; lime and gypsum are usually present.
Features	Strongly self-mulching.
Water availability	Very high.
Rooting depth	Moderately deep (>75 cm), sodicity and salinity may reduce effective depth.
Infiltration	High when dry, becoming rapidly less as soils become saturated.
Fertility	Low to fair nitrogen and carbon; low to fair phosphorus at surface.
Salinity	Low to very low at surface increasing with depth.
Sodicity	Non-sodic at surface becoming sodic to strongly sodic at depth.
pH	Commonly neutral to slightly alkaline; alkalinity increasing at depth.

Utilisation

20%

Enterprise

Mixed cattle and sheep breeding.

Land use and management recommendations

- Generally highly productive and stable lands if native pastures maintained and conservatively stocked.
- Suitable for continuous winter and summer cropping in more easterly areas that receive reliable rainfall.
- Use of broad-based contour banks, maintenance of naturally grassed waterways and conservation cropping techniques are needed to control soil runoff and erosion.

Land use limitations

- Drought grazing capacity of these lands is low due to a lack of alternate fodder sources (e.g. top-feed).
- Due to low levels of organic matter cultivated soils are prone to water erosion on slopes >1%.
- Coarse-surface structure may limit germination of pasture species, summer crops and small-seeded crops.

Conservation features and related management

- These grasslands provide potential habitat for endemic (Spencer's goanna) and rare and threatened fauna species (kultarr or marsupial mouse, Julia Creek dunnart, Collett's snake and the skink, *Ctenotus schevilli*).
- Deep soil cracks provide important refuges for mammals (e.g. striped faced and fat-tailed dunnarts, narrow-nose planigale) and reptiles (e.g. earless dragons and soil-crack skink), whilst grassy ground cover is important for birds such as the brolga and bustards.
- Maintenance of ground cover in grasslands is important to minimise risk of sheet and gully erosion, reduce runoff, improve water quality and protect the wildlife habitat.
- Some areas are being degraded by weed infestation (e.g. prickly acacia).
- Vigilance in controlling weed and feral animals can help prevent the degradation of these areas.

Regional ecosystems

4.9.1, 4.9.20.

Poplar box woodlands (red soils)

Landform

Shallow drainage lines developed on flat plains or low sloping to gently undulating plains (slopes to 3%) forming run-on areas that extend to local alluvia.

Woody vegetation

Poplar box woodland to open woodland with a variable shrubby understorey of false sandalwood and black fuchsia. Often associated with mulga, yellowjacket or silver-leaved ironbark with occasional patches of cypress pine, belah and brigalow depending on soil.

Expected pasture composition

** Denotes non-native "Expected Pasture Composition" species.*

Preferred	Desert bluegrass, buffel grass* (naturalised), Queensland bluegrass, cotton panic, silky umbrella grass, black speargrass, hairy panic, kangaroo grass, mulga Mitchell.
Intermediate	Pitted bluegrass, tall chloris, bottlewasher grasses, curly windmill grass, lovegrasses (e.g. purple, dainty, clustered), five-minute grass, box grass.
Non-preferred	Cane panic, wiregrasses (e.g. Jericho, dark).
Annual grasses	Comb chloris, three-awn wanderrie grass, hairy armgrass, button grass, mulka, weeping lovegrass. Bunched kerosene (non-preferred).
Common forbs	Lesser joyweed, blue trumpet, caustic weed, hill hibiscus, burrs (e.g. black roly poly, galvanised, goathead, tall copperburr), sidas (e.g. corrugated, fine, high, pin), daisy burrs, mulga fern, smooth velleia, tropical speedwell.

Suitable sown pastures

Buffel grass, mulga oats.

Introduced weeds

Mother-of-millions, Noogoora burr, spiked malvastrum, Bathurst burr, parkinsonia, African boxthorn, saffron thistle to the east.

Soil	Moderately deep to deep red earths, red clays and red texture contrast soils.
Description	***Surface*:** Hard-setting: ***Surface texture*:** Light sandy clay loam to clay loams; ***Subsoil texture*:** Sandy light to medium clay.
Features	Hard-setting, sometimes hardpans at 40–80 cm depth.
Water availability	Low to moderate.
Rooting depth	Deep, hardpans may limit effective rooting depth.
Fertility	Low to fair; low to fair carbon, low to very low nitrogen, low to very low phosphorus.
Salinity	Low throughout.
Sodicity	Negligible at surface.
pH	Usually acid to neutral; becoming alkaline to strongly alkaline at depth.
Utilisation	15%
Enterprise	Breeding ewes and cows.
Land use and management recommendations	• Pastures respond to light (>15 mm) to moderate (25 mm) falls of rain in areas that receive runoff and have higher productive potential than surrounding lands. • Opportunistic winter grazing crops are possible on areas not prone to flooding or overland wash. • Can be developed with improved pastures if phosphorus levels are adequate (>20 mg/kg). • Use fire judiciously as management tool to control woody weeds.
Land use limitations	• Maintenance of ground cover to minimise shrub invasion and wind and water (gully) erosion. • Regrowth and high shrub densities (e.g. butter bush, silver cassia, Charleville turkey bush, black fuchsia) can limit productivity. • Strip clearing is preferable to clearing of large areas to minimise erosion and degradation.
Conservation features and related management	• This land zone has high fauna diversity, particularly birds (e.g. brown treecreeper, rainbow bee-eater, red-backed kingfisher, thornbills) and many insectivorous bats (e.g. vulnerable greater long-eared bat). • The presence of logs and fallen woody material can provide habitat for a variety of geckos, lizards and skinks (e.g. marbled velvet gecko, the rare yakka skink, Delma legless lizards, slider skinks). • Poplar box lands have been extensively cleared in the east, and disturbance can cause thick regrowth and high understorey shrub densities (e.g. false sandalwood). • Use of fire could assist in controlling woody weeds and enhance productivity and habitat potential of the land zone.
Regional ecosystems	6.3.18, 6.4.3, 6.5.2, 6.5.3, 6.5.5, 6.5.17.

Soft mulga

Landform

Flat to gently undulating plains (slopes <1%).

Woody vegetation

Mulga low open woodlands to tall woodlands; often associated with poplar box, ironwood, Clarkson's bloodwood and false sandalwood east of the Grey Range, and with western bloodwood and beefwood to the west. Patches with a spinifex understorey are found throughout on very acidic soils.

Expected pasture composition

** Denotes non-native "Expected Pasture Composition" species.*

Preferred	Silky umbrella grass, cotton panic, mulga oats, hairy panic, kangaroo grass, mulga Mitchell.
Intermediate	Silky heads, bottlewasher grasses, woollybutt, purple lovegrass, woollybutt wanderrie grass, mountain wanderrie grass, five-minute grass, cane panic.
Non-preferred	Greybeard grass, wiregrasses (e.g. Jericho, dark).
Annual grasses	Hairy armgrass, three-awn wanderrie grass, comb chloris, button grass, comet grass, small burr grass, annual digit grass. Bunched kerosene (non-preferred).
Common forbs	Green pussytail, silvertail, longtails, small purple foxtail, daisy burrs, silky bluebush, galvanised burr, goathead burr, copperburrs (tangled, woolly), black roly poly, tropical speedwell, green crumbweed, *Muelleranthus trifoliolatus*, smooth goodenia, smooth velleia, mulga nettle, hill hibiscus, sidas (e.g. fine, lifesaver, ridge, shrub), tarvine, parakeelyas, caustic weed, mulga fern, weir vine, potato bushes.

Suitable sown pastures

Buffel grass, old man saltbush, mulga Mitchell, mulga oats.

Introduced weeds

Mesquite to west, saffron thistle to the east, parkinsonia and African boxthorn around water points.

Soil	Shallow to moderately deep (50–150 cm) sandy to loamy red earths.
Description	***Surface*:** Loamy hard or moderately hard surfaces; ***Surface texture*:** Light sandy loam to clay loams; ***Subsoil texture*:** Clay content increasing down profile to light to medium clays. Layers of ironshot and charcoal pieces common at depth.
Features	Hard-setting, hardpans may occur at depth.
Water availability	Low to moderate.
Rooting depth	Can be limited by hardpans (>70 cm).
Fertility	Very low to fair (phosphorus, carbon, nitrogen).
Salinity	Very low.
Sodicity	Non-sodic, except when associated with hardpans.
pH	Usually acid to slightly acid throughout profile of red loams; tending towards neutral at depth or alkaline values with occurrence of hardpans.
Utilisation	15%
Enterprise	Breeding ewes and cows.
Land use and management recommendations	• Mulga fodder provides drought protein reserves. • Stock lightly during dry periods and post drought to maintain ground cover and to minimise water and wind erosion and maximise rainfall capture. • Use fire opportunistically as management tool to control woody weeds and dense mulga.
Land use limitations	• Fragile grazing lands. • Wiregrasses often predominate in areas cleared of mulga and sandier soils. • Mulga density and/or butter bush, fire bush, green turkey bush, false sandalwood and hopbush invasion commonly limits pasture growth. • Strip clearing is preferable to clearing of large areas to minimise erosion, degradation and widespread whipstick mulga regeneration. • Soil nutrient deficiencies (phosphorus, sulphur, calcium, magnesium), acidity and poor surface structure.
Conservation features and related management	• Mulga groves to the north and west may provide habitat for the rare and threatened fauna (pink cockatoo, painted honeyeater, yakka skink and Forest's mouse), and a diverse range of birds (Hall's babbler, thornbills, pardalotes and mallee ringneck, blue bonnet, mulga and red-winged parrots). • Some areas to north and east are highly modified in their structural and floristic composition, and significant areas are in poor condition due to irreversible sheet erosion. • Maintenance of ground cover is important to minimise erosion.
Regional ecosystems	6.5.1, 6.5.10, 6.5.6, 6.5.7, 6.5.8, 6.5.9, 6.5.10, 6.5.11, 6.5.12, 6.5.13, 6.5.14, 6.5.16, 6.5.18.

Wooded alluvial plains

Landform	Periodically or rarely flooded alluvial plains (slopes <1%) associated with levees, watercourses and major river systems. Seasonally swampy areas and billabongs are common.
Woody vegetation	Open tussock grassland to open woodlands dominated by coolibah, yapunyah, poplar box or gidgee depending on soil type. Associated trees include whitewood and boonaree with belalie, sally wattle and fuchsia bush a common understorey. River red gums and coolibah fringe major watercourses. Scattered areas of Queensland bluebush and lignum occur in seasonal swamps.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Mitchell grasses (hoop, curly, bull), forest bluegrass, desert bluegrass, buffel grass* (naturalised), Queensland bluegrass, neverfail, silky browntop, black speargrass, early spring grass.
Intermediate	Pitted bluegrass, golden beard grass, lovegrasses (e.g. dainty, clustered, purple), curly windmill grass, umbrella canegrass, native millet, Warrego summer grass, fairy/yakka grass, katoora, five-minute grass.
Non-preferred	Wiregrass (dark, feathertop, Jericho), rat's tail couch.
Annual grasses	Comb chloris, button grass, barnyard/swamp grass, mulka, weeping lovegrass, small and red Flinders grass, pepper grass.
Common forbs	Australian carrot, Queensland bluebush, saltbushes, smooth minuria, ruby saltbush, cow vine, grey raspweed, polymeria, annual verbine, silky goodenia, high sida, down's nutgrass, sedges, nardoo, native bluebell, rhynchosia, and burrs (goathead, galvanised, black roly poly).
Suitable sown pastures	Turanti barley Mitchell and Yanda curly Mitchell in southern Mitchell grass country.
Introduced weeds	Mother-of-millions, Noogoora burr, spiked malvastrum, Bathurst burr, parkinsonia, African boxthorn, mesquite, coral cactus to south, saffron thistle to the east.

Soil	Mix of deep grey to brown cracking clays and texture contrast soils; commonly interspersed with sand patches and lenses.
Description	***Surface*****:** self-mulching or thin crust over weakly self-mulching; ***Surface texture*****:** medium to heavy clays with sand patches; ***Sub-soil texture*****:** heavy clays throughout (grey clays) or generally becoming lighter clay on smaller watercourses (red or grey colouring); more sodic at depth.
Features	Self-mulching or hard-setting.
Water availability	Lower for lighter textured soils, moderate to high for heavier soils.
Rooting depth	Sodicity at depth (usually >60 cm) may limit effective soil depth.
Infiltration	High on self-mulching; low on hard-setting soils.
Fertility	Moderate.
Salinity	Generally low at surface increasing with depth.
Sodicity	Non-sodic at surface, sodic to strongly sodic subsoils.
pH	Slightly acid (red) or neutral to alkaline (grey), increasingly alkaline at depth.
Utilisation	20%
Enterprise	Breeding cows and sheep.
Land use and management recommendations	• Potential pasture growth following light to moderate rainfall (25–50 mm), due to concentration of runoff water on deep clays, is higher than for non-alluvial land. • Improved pastures possible in some areas not subject to frequent inundation. • Opportunistic cropping may be undertaken after good rains in some areas. • Maintenance of vegetation cover can minimise flood (riverbank) and gully erosion and siltation of waterways.
Land use limitations	• In some areas productivity is reduced by shrub invasion and/or thickening of belalie, false sandalwood, Ellangowan poison bush and lignum. • Texture contrast soils prone to scalding and degradation. • Difficult to distinguish from adjoining land zones, although it may need different management.
Conservation features and related management	• Timbered watercourses are critically important wildlife habitat in providing a corridor through the landscape, drought refuge and vital resources for a wide range of birds, mammals, reptiles and amphibians. • Wooded alluvial plains have the highest bird diversity of all land zones and provide habitat for threatened fauna that includes squatter pigeon, pink cockatoo, black-chinned honeyeater, as well as mammals such as the kultarr and little pied bat. • Other wildlife that occur in these areas include hollow-dwelling species (e.g. owls, red-tailed black cockatoo, insectivorous bats); koalas; native rodents (long-haired rats); and a wide range of waterbirds (including the threatened freckled duck), frogs and turtles that use the wetlands. • Structural and floristic compositions may be highly modified; topsoil loss and scalding is widespread; and riparian plant communities may be threatened by weeds (e.g. Noogoora burr, parkinsonia). • Maintenance of ground cover is important to minimise risk of sheet and gully erosion, reduce runoff, improve water quality and protect the wildlife habitat. • Vigilance in controlling weed and feral animals can help prevent the degradation of these areas.
Regional ecosystems	6.3.1, 6.3.1a, 6.3.2, 6.3.2b, 6.3.3, 6.3.3a, 6.3.5, 6.3.5a, 6.3.7, 6.3.8, 6.3.9, 6.12.1, 6.3.13b, 6.3.24, 6.3.24a, 11.3.2, 11.3.16, 11.3.25, 11.3.27, 11.3.28, 11.3.3, 11.3.5.

Wooded downs

Landform	Flat to gently undulating plains (slopes up to 3%) of the 'rolling downs' in the north. Wooded downs are often associated with open downs and are commonly fringed on the upper slopes by gidgee lands.
Woody vegetation	Boree, boonaree, myall, silver-leaved ironbark open woodlands to bauhinia, vine tree, ironwood and eastern dead finish wooded open tussock grassland. Shrub layers are usually present and may include gidgee, whitewood, false sandalwood, leopardwood, mimosa bush and gundabluie. Ground cover is variable and fluctuates between forb-dominated and grass-dominated community.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Mitchell (hoop, curly, bull) grasses, desert bluegrass, buffel grass* (naturalised), Queensland bluegrass, early spring grass.
Intermediate	Curly windmill grass, yabila, katoora, fairy/yakka grass.
Non-preferred	Wiregrasses (e.g. feathertop, white speargrass).
Annual grasses	Button grass, weeping lovegrass, small burr grass.
Common forbs	Giant pigweed, red spinach, paper daisy, saltbushes, daisy burrs, burrs, black roly poly, soft roly poly, down's nutgrass, caustic weed, rhynchosia, mintweed, Australian carrot, flaxweed, tarvine, sidas (e.g. corrugated, high, silver).
Suitable sown pastures	Buffel grass, old man saltbush, Turanti barley Mitchell, Yanda curly Mitchell.
Introduced weeds	Prickly acacia, parkinsonia, spiked malvastrum.
Soil	Moderately deep to deep, sometimes shallow, grey and brown cracking clays; prominent linear gilgais on grey clays in some areas.

Description	***Surface:*** Variable scattered ironstone pebbles, soft self-mulching soils, shallow soils can be hard-setting; ***Surface texture:*** medium and heavy clays ***Subsoil texture*****:** medium to heavy clays; lime and gypsum are usually present in profile.
Features	Soft self-mulching or hard-setting; ironstone maybe present at base of profile.
Water availability	High
Rooting depth	Mostly moderately deep (>75 cm), sodicity and salinity may reduce effective depth.
Infiltration	High when dry, becoming rapidly less as soils become saturated.
Fertility	Low carbon and nitrogen; low phosphorus.
Salinity	Low to very low at surface increasing with depth.
Sodicity	Non-sodic at surface becoming sodic at depth.
pH	Moderately to strongly alkaline throughout.
Utilisation	20%
Enterprise	Mixed cattle and sheep breeding.
Land use and management recommendations	• Tree densities are sufficiently sparse as to not interfere with pasture growth, and provide valuable drought protein reserves, and shade and protection for animals on adjacent open downs. • Generally highly productive and stable lands if native pastures are maintained and conservatively stocked. • Suitable for continuous winter and summer cropping in more easterly areas that receive reliable rainfall.
Land use limitations	• Due to low levels of organic matter cultivated soils are prone to water erosion on slopes >1%. Use of broad-based contour banks, maintenance of naturally grassed waterways and conservation cropping techniques are needed to control soil runoff and erosion. • Coarse-surface structure may limit germination of pasture species, summer crops and small-seeded crops. • Little regeneration of boree but seedling regeneration of gidgee has extended onto adjacent grasslands and can limit productivity.
Conservation features and related management	• The wooded grasslands provide habitat for the seed or insect eating ground dwelling birds (e.g. singing bushlark, little button-quail, Australian bustard, ground cuckoo-shrike), or those birds that feed on the ground but use tree hollows for nesting (e.g. budgerigar and cockatiel). The cracking soils also provide habitat for many skinks, snakes and small mammals (e.g. Collett's snake, striped faced dunnart, narrow-nosed planigale). • Maintenance of ground cover in these wooded grasslands is important to minimise risk of sheet and gully erosion, reduce runoff, improve water quality and protect the wildlife habitat. • Vigilance in controlling weed and feral animals can help prevent the degradation of these areas.
Regional ecosystems	4.9.6, 4.9.7a, 6.9.2.