# Moreton Region Plant index

| Common name | Scientific name | Page |
|---|---|---|
| castor oil plant* | *Ricinus communis* | MO01, MO03 |
| Clarkson's bloodwood | *Corymbia clarksoniana* | MO05, MO08 |
| climbing asparagus fern* | *Asparagus africanus* | MO02 |
| clovers* *see also* white clover | *Trifolium* spp. | MO01 |
| corkwood | *Duboisia myoporoides* | MO04, MO05 |
| couch grass* | *Cynodon dactylon* | MO01, MO02, MO03, MO04, MO05, MO06, MO08, MO09, MO10, |
| creeping bluegrass* | *Bothriochloa insculpta* | MO01, MO02, MO03, MO04, MO05, MO08, MO12 |
| creeping tick trefoil | *Desmodium triflorum* | MO01, MO03, MO04, MO05, MO08, MO11, MO12 |
| crow's ash | *Flindersia australis* | MO09, MO10 |
| curly windmill grass | *Enteropogon acicularis* | MO03 |
| cycads | *Cycads* and *Zamias* spp. | MO06, MO11 |
| early spring grass | *Eriochloa pseudoacrotricha* | MO02, MO09, MO10 |
| emu-foot | *Cullen tennax* | MO03, MO04, MO08, MO12 |
| feathertop Rhodes grass* | *Chloris virgata* | MO07 |
| fine stem stylo* | *Stylosanthes guianensis* var. *intermedia* | MO04, MO06, MO07, MO08, MO10, MO12 |
| flooded gum | *Eucalyptus grandis* | MO09, MO11 |
| forest bluegrass | *Bothriochloa bladhii* | MO01, MO02, MO03, MO04, MO05, MO07, MO09, MO10, MO11 |
| giant stinging tree | *Dendrocnide excelsa* | MO09 |
| glycine* | *Neonotonia wightii* | MO09, MO11 |
| glycine pea | *Glycine tabacina* | MO01, MO02, MO05, MO06, MO07, MO09, MO10, MO11 |
| golden beard grass | *Chrysopogon fallax* | MO07 |
| green panic* | *Panicum maximum* var. *trichoglume* | MO02, MO09, MO10, MO11 |
| grey gum | *Eucalyptus propinqua* | MO08, MO11, MO12 |
| grey ironbark *see* narrow-leaved ironbark | *Eucalyptus crebra* (includes *E. drepanophylla)* | |
| gum-topped box | *Eucalyptus moluccana* | MO03, MO08 |

| Common name | Scientific name | Page |
|---|---|---|
| hooky grass | *Ancistrachne uncinulata* | MO02, MO06 |
| hoop pine | *Araucaria cunninghamii* | MO09, MO10 |
| hopbush | *Dodonaea* sp. | MO07 |
| ironbarks | *Eucalyptus* spp. | MO07 |
| kangaroo grass | *Themeda triandra* | MO03, MO06, MO08, MO09, MO10, MO12 |
| kikuyu* | *Pennisetum clandestinum* | MO09, MO11 |
| lantana* | *Lantana camara* | MO01, MO02, MO03, MO09, MO10, MO11, MO12 |
| leucaena* | *Leucaena leucocephala* | MO01, MO02, MO05, MO09, MO10, MO11 |
| liverseed grass | *Urochloa panicoides* | MO01, MO05, MO11 |
| lotononis* | *Lotononis bainesii* | MO03 |
| lovegrass/es | *Eragrostis* spp. | MO08 MO12 |
| lucerne* | *Medicago sativa* | MO01 |
| mat grass | *Hemarthria uncinata* | MO09 |
| medics* | *Medicago* spp. | MO01, MO02, MO05, MO10 |
| Moreton Bay ash | *Corymbia tessellaris* | MO01, MO03, MO04, MO05, MO08 |
| narrow-leaved indigo | *Indigastrum parviflorum* | MO06 |
| narrow-leaved ironbark | *Eucalyptus crebra* (includes *E. drepanophylla)* | MO03, MO04, MO06, MO07, MO08, MO12 |
| pangola* | *Digitaria eriantha* | MO01, MO03 |
| paspalum* | *Paspalum dilatatum* | MO04, MO09, MO11 |
| pink bloodwood | *Corymbia intermedia* | MO04, MO07, MO08 |
| pitted bluegrass | *Bothriochloa decipiens* | MO03, MO04, MO06, MO07, MO08, MO12 |
| poverty grass | *Eremochloa bimaculata* | MO04 |
| Queensland bluegrass | *Dichanthium sericeum* | MO01, MO02, MO04, MO05, MO09, MO10, MO11 |
| Queensland blue gum | *Eucalyptus tereticornis* | MO01, MO03, MO04, MO05 |
| Queensland white stringybark *see* stringybark | | |
| quinine bush | *Petalostigma pubescens* | MO07 |

| Common name | Scientific name | Page |
|---|---|---|
| rattlepod | *Crotalaria* sp. | MO07 |
| red ash | *Alphitonia excelsa* | MO03, MO07, MO08, MO10 |
| red cedar | *Toona ciliata* | MO09, MO10 |
| red Natal grass* | *Melinis repens* | MO02, MO07, MO09, MO10 |
| Rhodes grass* | *Chloris gayana* cv. Callide | MO01, MO02, MO03, MO04, MO05, MO08, MO09, MO10, MO12 |
| rhynchosia | *Rhynchosia minima* | MO01, MO04, MO05, MO08, MO11, MO12 |
| rose gum *see* flooded gum | | |
| rose satinash | *Syzygium francisii* | MO10 |
| rough bark apple | *Eucalyptus setosa* | MO04 |
| rusty gum | *Angophora leiocarpa* | MO06 |
| scentedtop | *Capillipedium parviflorum* | MO01, MO04, MO11 |
| Shrubby stylo* | *Stylosanthes scabra* cvv. Seca, Siran | MO02, MO04, MO06, MO07, MO08, MO10, MO12 |
| silky oak | *Grevillea robusta* | MO10 |
| silky umbrella grass | *Digitaria ammophila* | MO07 |
| silver-leaved ironbark | *Eucalyptus melanophloia* | MO05, MO07, MO08 |
| siratro* | *Macroptilium atropurpureum* | MO01, MO02, MO03, MO04, MO05, MO09, MO10, MO11, MO12 |
| slender bamboo grass | *Austrostipa verticillata* | MO01, MO05, MO11 |
| slender chloris | *Chloris divaricata* | MO01, MO02, MO03, MO04, MO05, MO07, MO08, MO09, MO10, MO11, MO12 |
| small burr grass | *Tragus australianus* | MO01, MO02, MO03, MO05, MO07, MO08, MO09, MO10, MO11, MO12 |
| snowgrass | *Poa sieberiana* | MO11 |
| southern silver ash | *Flindersia schottiana* | MO10 |
| spotted gum | *Eucalyptus citriodora* | MO04, MO06, MO07, MO08, MO12 |
| spring grass | *Eriochloa crebra* | MO01, MO05, MO11 |
| strangler figs | *Ficus watkinsiana* | MO09 |

| Common name | Scientific name | Page |
|---|---|---|
| stringybark | *Eucalyptus tindaliae* | MO11, MO12 |
| swamp mahogany | *Lophostemon suaveolens* | MO03 |
| Sydney blue gum | *Eucalyptus saligna* | MO11 |
| reedgrass | *Arundinella nepalensis* | MO07, MO08, MO12 |
| tallowwood | *Eucalyptus microcorys* | MO11, MO12 |
| tambookie grass | *Hyparrhenia filipendula* | MO01, MO02, MO03, MO04, MO05, MO06, MO07, MO08, MO11, MO12 |
| tree pear | *Opuntia tomentosa* | MO02 |
| umbrella grass | *Digitaria divaricatissima* | MO01, MO03, MO04, MO05, MO11 |
| variable-barked bloodwood | *Corymbia erythrophloia* | MO04, MO08 |
| wattles | *Acacia* spp. | MO03, MO04, MO05, MO06, MO07, MO08 |
| white beech | *Gmelina leichhardtii* | MO10 |
| white cedar | *Melia azedarach* var. *australasica* | MO09, MO10 |
| white clover* | *Trifolium repens* | MO03, MO09, MO11 |
| white mahogany | *Eucalyptus acmenoides* | MO08, MO11 |
| wild tobacco tree* | *Solanum mauritianum* | MO09, MO11 |
| wiregrasses | *Aristida* spp. | MO01, MO02, MO03, MO04, MO05, MO06, MO07, MO08, MO09, MO10, MO11, MO12 |
| woodland lovegrass | *Eragrostis sororia* | MO04 |
| woolly glycine | *Glycine tomentella* | MO02, MO04, MO05, MO08, MO10, MO11, MO12, MO01, MO03, MO09 |
| Wynn cassia* | *Chamaecrista rotundifolia* var. *rotundifolia* cv. Wynn | MO03, MO06, MO07, MO08 |
| yellow carabeen | *Sloanea woollsii* | MO09 |

* Denotes non-native species

# Blue gum on alluvial plains

| | |
|---|---|
| **Landform** | Flat to gently undulating alluvial plains, levees and terraces (0–3% slope) along rivers and creeks. |
| **Woody vegetation** | Predominantly cleared. Remnant Queensland blue gum woodland with occasional Moreton Bay ash. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, black speargrass, scentedtop, Rhodes grass*, creeping bluegrass*. |
| Intermediate | Umbrella grass, tambookie grass, couch grass*, spring grass, slender bamboo grass, liverseed grass. |
| Non-preferred | Wiregrasses, slender chloris. |
| Legumes | Rhynchosia, creeping tick trefoil, glycine pea, woolly glycine. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, Angleton grass, pangola, lucerne, leucaena, siratro, clovers and medics. |
| **Introduced weeds** | Lantana, camphor laurel, castor oil plant. |
| **Soil** | Dominantly deep, dark grey to dark brown cracking clays on alluvial flats (black earths) or free draining loamy soils associated with watercourses (prairie soils). Occasional gilgai development. |
| Description | ***Surface:*** Cracking and self-mulching or surface crust*;* ***Surface texture:*** sandy clay loam to light or heavy clay; ***Subsoil texture:*** clay loam to medium or heavy clays |
| Features | Lime is commonly present in cracking clays subsoils. |
| Water availability | Medium (loams) to high (cracking clays); PAWC 100–200 mm in root zone. |
| Rooting depth | Effective rooting depth >1.2 m for loams and >1.5 m for cracking clays. |
| Fertility | Low to medium (loams) to high (cracking clays) nitrogen; high to very high phosphorus; high to very high potassium; medium zinc and copper. |

**Salinity**

Very low to low at surface; very low subsoils.

**Sodicity**

Non-sodic; cracking clays occasionally sodic at depths >60 cm.

**pH**

Medium acid (6.0) to moderately alkaline (8.0) at surface; loamy soils neutral (7.0) to moderately alkaline (8.0), and moderate alkaline (8.0) to strongly alkaline (9.5) in cracking clay subsoils.

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 3950 - 4510 | 35% | 1.9 – 2.1 |
| | 17 TBA<br>41 FPC | 1380 - 2510 | 35% | 6.0 – 3.3 |

## Enterprise

Fattening on native and improved pastures.

## Land use and management recommendations

- Predominantly cropping.
- Extensively developed for agriculture, including wide range of dryland and irrigated crops and pastures. Soils are suitable for most grain, fodder and small crops.
- Coordinated drainage strategy of subsurface drains, diversion banks and crop layout design is required in intensively developed areas.
- Adopt practices such as minimum tillage, stubble mulching, include green cover crops in crop rotations, and retain crop residues to maintain soil structure and reduce erosion.
- Maintain adequate surface cover at all times in areas used for grazing.
- Spell pastures when flowering and seeding.
- Control woody weeds.

## Land use limitations

- Slow drainage, particularly black earths with high clay content, may cause water logging and restrict growth of some crops.
- Alluvial loams become cloddy after cultivation and may become hard-setting if compacted by continual cropping.
- Local frosts and flooding may occur. Erosive flooding may be a high risk in some locations.
- Surface runoff may be high, particularly following irrigation.
- Overland flow may cause rill and sheet erosion on unprotected surfaces.
- Stream banks are susceptible to erosion.
- Soil structural problems and plough pans may develop if cropped continuously.

## Conservation features and related management

- Many of the freshwater wetlands in the Moreton are associated with this land type.
- While blue gum is common, few extensive, intact remnants remain.
- Large hollows, often found in large, old blue gums, are important nesting sites and habitat for birds and marsupials.
- Blue gum regenerates readily in the absence of grazing and regular fire.
- Regrowth can be encouraged to allow remnants to expand and establish connection with other areas of remnant vegetation.
- Regrowth has hardwood potential.

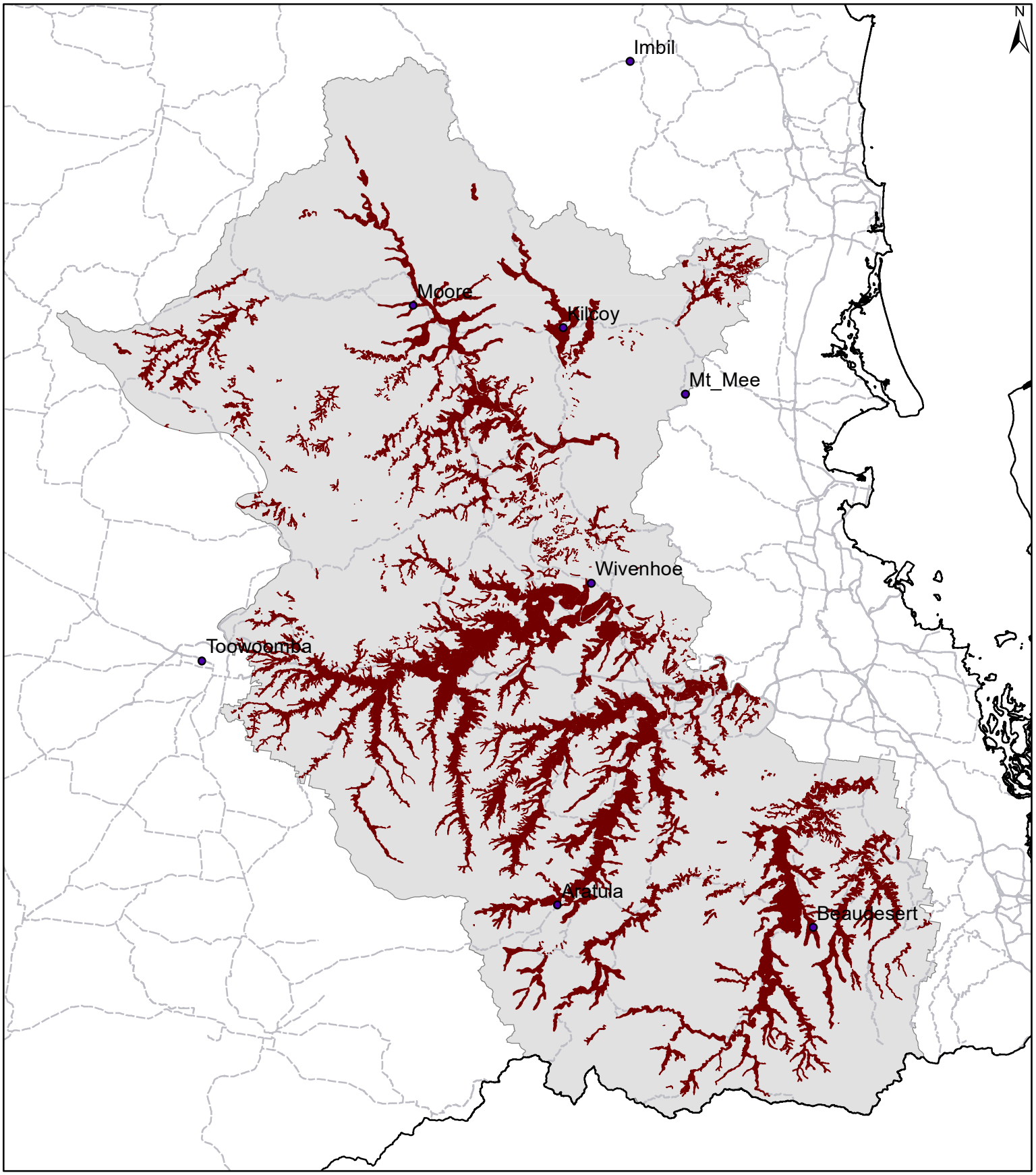
## Regional Ecosystems

11.3.23, 12.3.16, 12.3.17, 12.3.18, 12.3.19, 12.3.1a, 12.3.21, 12.3.3, 12.3.7a, 12.3.7c, 12.3.8.

## Land resource area

Fine Textured Alluvial Plains, 1b (Noble, 1996).

# MO01 Blue gum on alluvial plains




Area of land type in region: 12%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 2%
Median FPC: 41%
Median TBA: 17 m2/ha

Queensland Government

# Brigalow softwood scrub

| | |
|---|---|
| **Landform** | Undulating low hills and steep hills (3–10% slopes). |
| **Woody vegetation** | Mostly cleared; brigalow softwood scrub, occasionally with belah. |
| **Expected pasture composition** | Minimal grassy understorey.<br>** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, Rhodes grass*. |
| Intermediate | Early spring grass, hooky grass, couch grass*, red Natal grass*. |
| Non-preferred | Wiregrasses, slender chloris. |
| Legumes | Woolly glycine, glycine pea. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, green panic, creeping bluegrass, leucaena, Shrubby stylo, Caatinga stylo, siratro, medics. |
| **Introduced weeds** | Lantana. |
| **Soil** | Grey and brown cracking clays with self-mulching surfaces (grey and brown clays). Variable gilgai development often present. |
| Description | ***Surface*:** medium to strongly self-mulching and cracking*; **Surface texture:*** Light to medium clay; ***Subsoil texture:*** medium to heavy clay. |
| Features | Brown clays often shallower than grey clays. Sometimes mottling of grey clay subsoils. Varying amounts of soft and concretionary lime below 30 cm, and occasional weathered rock fragments and iron/manganese. |
| Water availability | High; PAWC 150–200 mm in root zone. |
| Rooting depth | Effective rooting depth <0.8 m (grey clays) to >1 m (brown clays). |
| Fertility | Medium to high nitrogen; low (brown clays) to very high (grey clays) phosphorus; medium to high (grey clays) to very high (brown clays) potassium; medium zinc and copper. |
| Salinity | Low to very low at surface; medium to high at depths below 0.5 m. |

**Sodicity**

Non-sodic at surface; sodic (<0.3 m) to strongly sodic (0.5 m) subsoils.

**pH**

Surface slightly acid (6.1) to neutral (7.0); moderately alkaline (8.0) to very strongly alkaline (9.5).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 909 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 4220 - 4640 | 30% (sown) | 2.1 – 2.3 |
| | 19 TBA<br>45 FPC | 2170 - 2400 | 30% (sown) | 4.1 – 4.5 |

## Enterprise

Fattening

## Land use and management recommendations

- Suitable for grazing of native and improved pastures, dryland (brown clays) and irrigation (grey clays) cropping.
- Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion.
- Include cover crops in crop rotations and retain crop residues.
- Use broad based banks to reduce effect of cracking.
- Do not cultivate on slopes greater than 8%.
- Maintain adequate surface cover at all times.
- Spell pastures when flowering and seeding.
- Control weeds and regrowth (lantana, brigalow, scrub species).

## Land use limitations

- Soils may become hard-setting with cultivation.
- Workability difficult immediately after rain, irrigation or when soil is dry.
- Highly erodible if bare or cultivated on slopes >2%.
- Sodicity (below 0.5 m), salinity, poor drainage, depth to bedrock can limit effective rooting depth.
- Low phosphorus and slow drainage that may cause water logging in brown clay soils.
- High salinity in subsoils, particularly grey clays, can reduce plant available water capacity to 100–150 mm. Saline outbreaks may occur on lower slopes.

## Conservation features and related management

- Extensively cleared for pasture and cropping.
- Only very small areas of the original vegetation remain.
- Remnant areas are used by migratory birds such as yellow robins, grey fantails, varied trillers and rufous fantails.
- These scrubs provide habitat for a wide range of fauna including the woodland birds (e.g. bush stone-curlew, squatter pigeon, brown treecreeper, grey-crowned babbler bush turkeys), black-striped wallabies, and a highly diverse reptile community of geckos, skinks and dragons that inhabit fallen timber, dead trees and exfoliating bark.
- Remaining patches of scrub are threatened by weed invasion and fire on their margins (e.g. climbing asparagus fern, exotic grasses and tree pear).
- The use of fire breaks and cool season burns reduce this risk.
- The ideal scenario for conservation would be to fence these unique areas off from grazing.

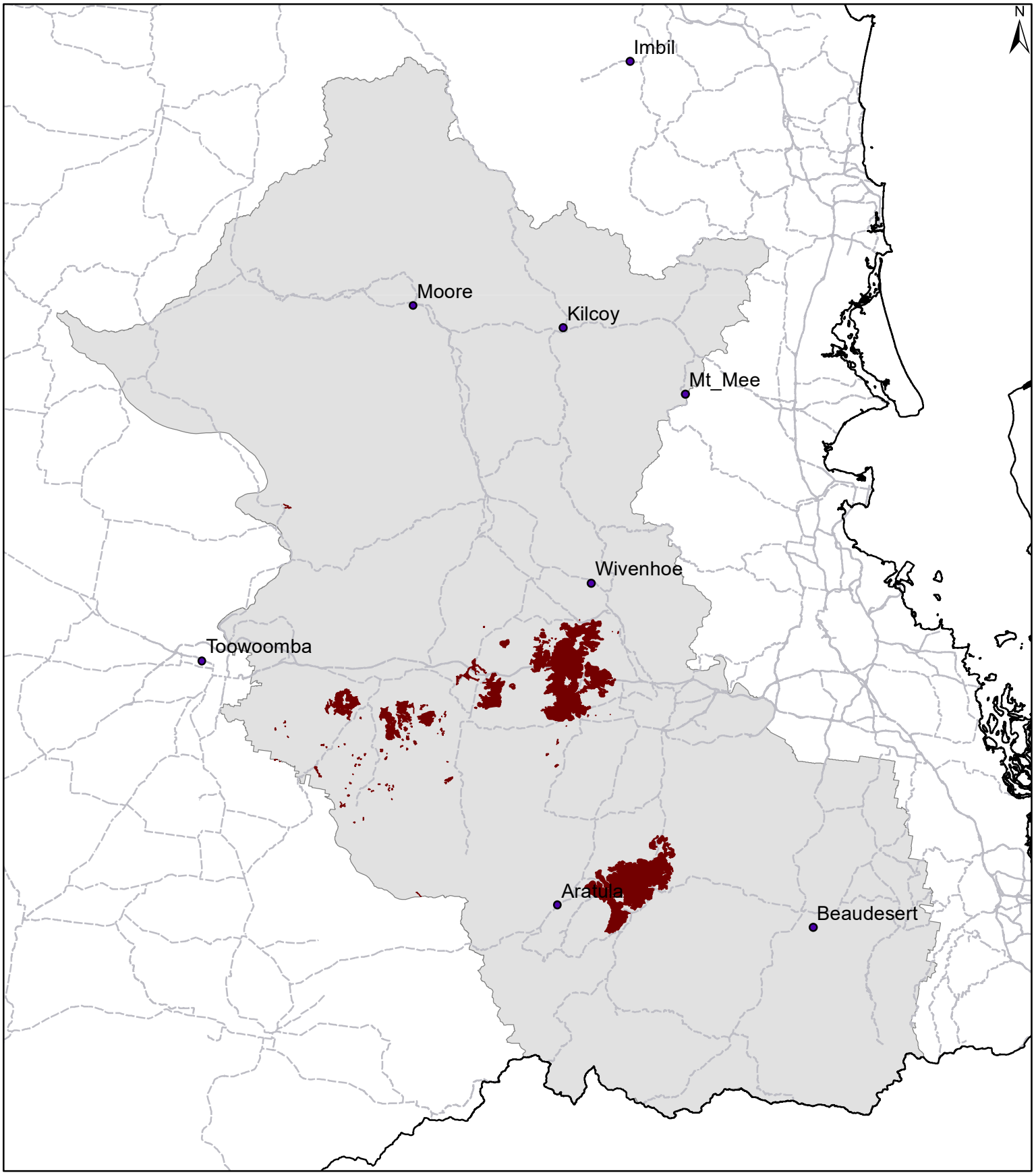
## Regional Ecosystems

12.3.9, 12.3.10a, 12.9-10.6.

## Land resource area

Scrub Walloons, 6b (Noble, 1996).

# MO02 Brigalow softwood scrub




Area of land type in region: 2%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 1%
Median FPC: 45%
Median TBA: 19 m2/ha

Queensland Government

# Gum-topped box and blue gum on mixed alluvium

| | |
|---|---|
| **Landform** | Alluvial plains, gently undulating levees and terraces, high river terraces and narrow drainage flats (0–6% slopes). |
| **Woody vegetation** | Grassy open forest to woodland of gum-topped box and Queensland blue gum. Swamp mahogany, Moreton Bay ash, grey ironbark / narrow-leaved ironbark may also be present. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, barbwire grass, black speargrass, kangaroo grass, Rhodes grass*, creeping bluegrass*. |
| Intermediate | Pitted bluegrass, tambookie grass, umbrella grass, couch grass*, bottlewasher grasses, curly windmill grass. |
| Non-preferred | Wiregrasses, slender chloris. |
| Legumes | Emu-foot, creeping tick trefoil, woolly glycine. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, pangola, lotononis, Wynn cassia, siratro, white clover. |
| **Introduced weeds** | Lantana, camphor laurel, castor oil plant. |
| **Soil** | Deep dark brown to dark grey cracking clays (coarse structured clays), or loamy sand to clay loam (prairie soils), texture contrast soils (soloths). Usually gilgai development is present, and a thick bleached zone occurs above the hard clays in duplex soils. |
| Description | ***Surface:*** Cracking and often self-mulching, or hard-setting; ***Surface texture:*** loamy sand to clay loam to medium clay; ***Subsoil texture:*** light to heavy clays. |
| Features | Hard-setting. Highly saline and strongly sodic subsoils. If strongly acid, chemical toxicities (aluminium, magnesium) may increase the dispersion tendency. |
| Water availability | High (cracking clays) to very low (soloths); PAWC >150 mm or <50 mm in root zone. |
| Rooting depth | Effective rooting depth <0.6 m to >1.2 m on alluvial loams. |

**Fertility**

Low to medium nitrogen; very low to low (soloths), medium (coarse clays), to high (loams) phosphorus; variable (soloths), low to medium (coarse clays), very high (loams) potassium; medium zinc; and low to medium (loams, soloths) copper.

**Salinity**

Very low to low at surface; medium to high salinity at depths >50 cm (coarse clays).

**Sodicity**

Non-sodic; strongly sodic at depths >50 cm (coarse clays, soloths).

**pH**

Soil surface very strongly acid (4.5) to slightly acid (6.5) (coarse clays, soloths) to mildly alkaline (7.7) (alluvial loams); coarse clays may be either moderate (8.0) (loams) to strongly alkaline (8.5) or extremely acid (4.2) to medium acid (6.0) (soloths).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744– 909 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 3420 - 3670 | 30% | 2.7 – 2.8 |
| | 16 TBA<br>39 FPC | 920 - 1150 | 30% | 8.5 – 11 |

## Enterprise

Breeding

## Land use and management recommendations

- Suitable for grazing of native and improved pastures, timber reserves, softwood plantations.
- Not suitable for irrigation; duplex soils are not suitable for agricultural development.
- In better drained areas short-term forage crops may be grown.
- Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion. Include cover crops in crop rotations and retain crop residues.
- Maintain adequate surface cover at all times.
- Maintain timber growth on steeper slopes and ridges.
- Burn every 4–6 years to control thick regrowth (ironbarks, gum-topped box, wattles) if restricting grass cover.

## Land use limitations

- Poor to very poor drainage causes frequent water logging after rain, particularly in soils with high clay content, with some areas seasonally inundated.
- Effective rooting depth reduced by poor drainage, high subsoil salinity and sodicity.
- Moderate to high risk of sheet and gully erosion on cracking clays on sloping sites. Texture contrast soils very susceptible to sheet, tunnel, and gullying erosion.
- Plant growth limited by very tough, poorly structured subsoil and hard setting surfaces of duplex soils. Saline seeps may occur in lower slope positions.

## Conservation features and related management

- These remnant woodlands provide important habitat for gliders, possums, koalas, tree creepers, speckled warblers, powerful owls and ground foraging birds.
- Also these woodlands provide important corridors that both resident and dispersing fauna use to move through the landscape.
- Frequent fires reduce the shrubby understorey, but variable fire regimes encourage mosaics.
- Heavy grazing reduces fuel loads and exposes the soil surface to erosion.

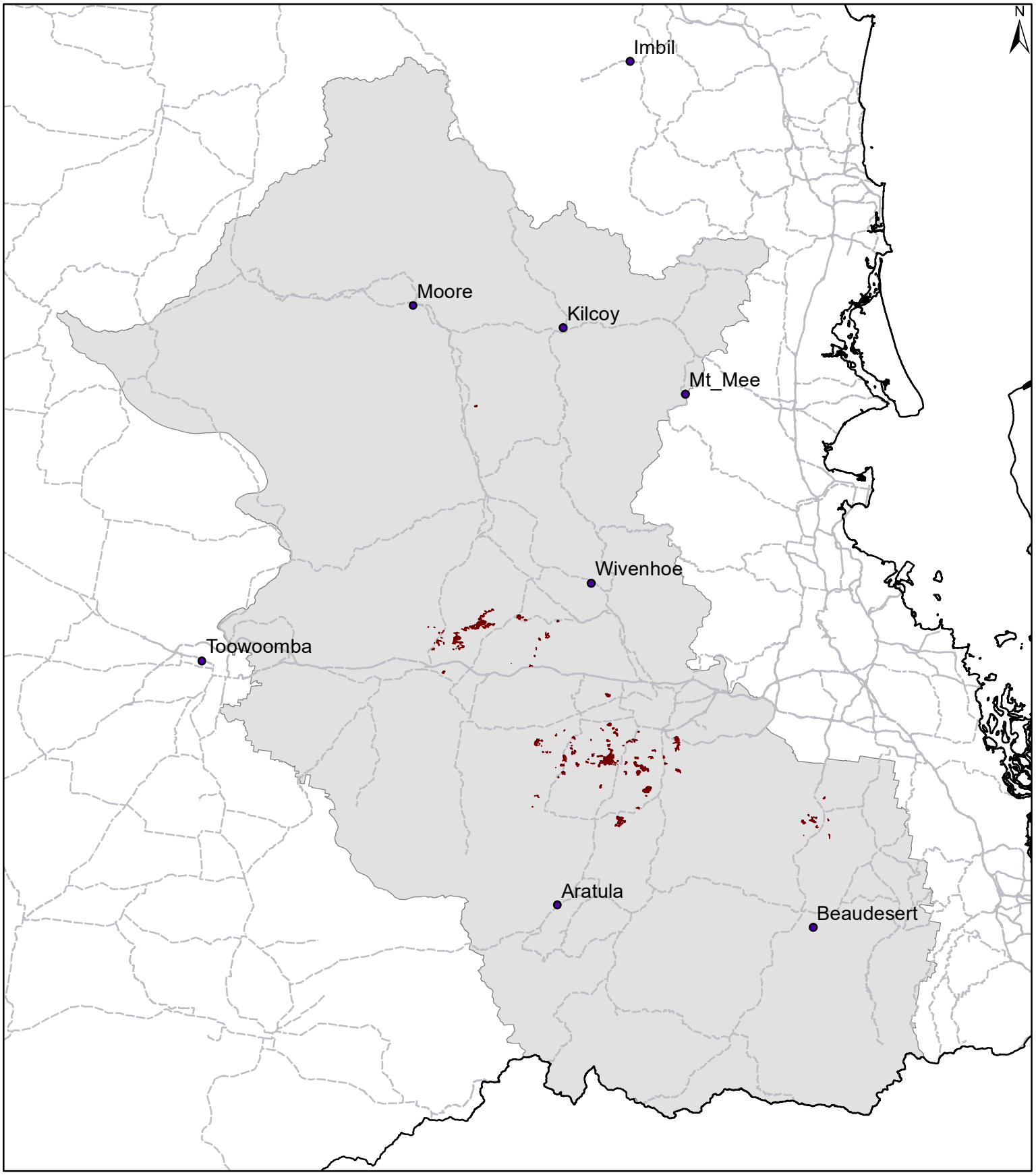
## Regional Ecosystems

12.3.3a, 12.9-10.11.

## Land resource area

Mixed alluvial plains, 1c (Noble, 1996).

# MO03 Gum-topped box and blue gum on mixed alluvium




Area of land type in region: 0.2%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 0.1%
Median FPC: 39%
Median TBA: 16 m2/ha

Queensland Government

# Ironbark and bloodwood on non-cracking clay

| | |
|---|---|
| **Landform** | Predominantly mid to upper slopes (slopes up to 40%) in hilly country. |
| **Woody vegetation** | Open forest of silver-leaved and narrow-leaved ironbarks, and pink and variable-barked bloodwoods. Often associated with Moreton Bay ash, spotted gum, Queensland blue gum commonly on lower slopes, and rough bark apple along drainage lines. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, black speargrass, scentedtop, Rhodes grass*, creeping bluegrass*, paspalum*. |
| Intermediate | Pitted bluegrass, tambookie grass, umbrella grass, couch grass*, bottlewasher grasses. |
| Non-preferred | Wiregrasses, poverty grass, slender chloris, woodland lovegrass. |
| Legumes | Woolly glycine, rhynchosia, emu-foot, creeping tick trefoil. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, Shrubby stylo, fine stem stylo, Caatinga stylo, siratro. |
| **Introduced weeds** | |
| **Soil** | Shallow, texture contrast soils with loamy surfaces overlying reddish brown, well structured clays (non-calcic brown soils). |
| Description | ***Surface*:** Usually thin (0.2 m), hard-setting; ***Surface texture:*** clay loam, occasionally more sandy; ***Subsoil texture:*** light to medium clay. |
| Features | Subsoil of well structured clay (0.25 m to 0.50 m thick) over permeable fractured rock. Sometimes mottled at depth due to weathering. |
| Water availability | Low, PAWC 50–100 mm in root zone. |
| Rooting depth | Effective rooting depth <0.6 m. |

**Fertility**

Very low to low nitrogen; very low to low phosphorus; medium potassium; medium zinc; medium copper.

**Salinity**

Very low.

**Sodicity**

Non-sodic

**pH**

Medium acid (6.0) to neutral (7.0); neutral to slightly alkaline (6.7 to 7.2) at depth.

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 3370 - 3930 | 30% | 2.5 – 2.9 |
| | 15 TBA<br>36 FPC | 1420 - 2470 | 30% | 3.9 – 6.9 |

## Enterprise

Breeding and fattening.

## Land use and management recommendations

- Not suitable for cropping.
- Suitable for grazing of native and, on better slopes, improved pastures.
- Maintain adequate grass cover at all times, and timber cover on steeper slopes and ridges, to reduce risk of erosion.
- Control dense regrowth (ironbarks, wattles) by burning every 2–3 years.

## Land use limitations

- Effective rooting depth limited by depth to bedrock.
- Low plant available water capacity due to shallow soil depths.
- Hard-setting reduces infiltration rate.
- Often occur on very steep slopes.
- Risk of erosion on steep slopes if surface is disturbed.

## Conservation features and related management

- This woodland is an important wildlife habitat. Mature stands with numerous tree hollows are home to possums, koalas and gliders. The rough fissured bark of the ironbarks is ideal habitat for skinks and geckoes.
- The grassy understorey provides habitat for ground fauna such as small marsupials (bettongs), reptiles (frilled-neck lizards) and birds (quail) and is an important food source for the large macropods (whip-tailed wallabies, eastern grey kangaroos).
- While large areas of this land type have been thinned for grazing, reasonably sized remnants remain.
- The health of the landscape can be enhanced through appropriate fire regimes, grazing management an allowing regrowth to develop into effective wildlife corridors.

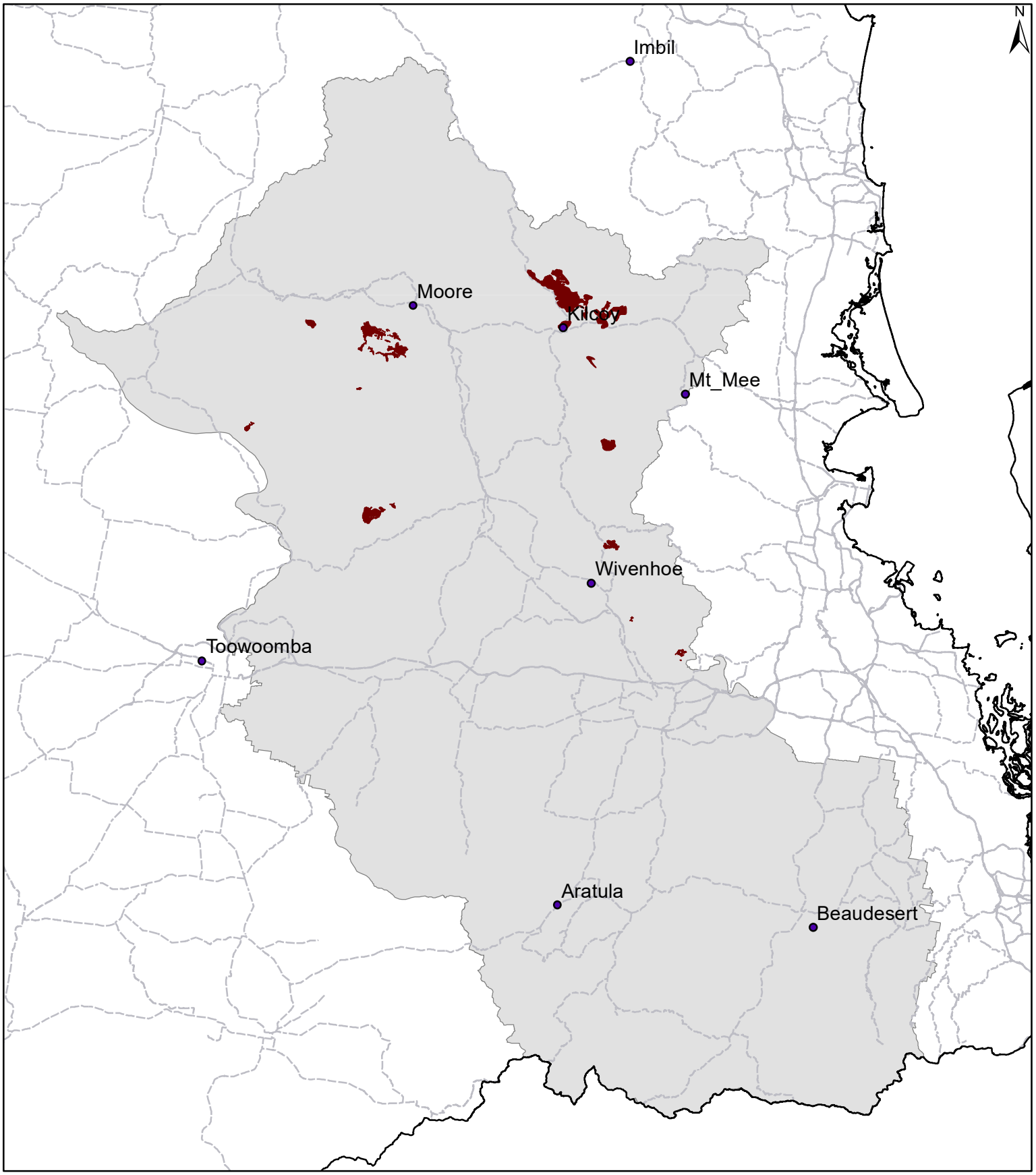
## Regional Ecosystems

12.11.8.

## Land resource area

Basaltic Uplands 2b, Forest Walloons, 6a (Noble, 1996).

# MO04 Ironbark and bloodwood on non-cracking clay




Area of land type in region: 0.5%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 0.3%
Median FPC: 36%
Median TBA: 15 m2/ha

Queensland Government

# Ironbark and blue gum on clay


| | |
|---|---|
| **Landform** | Ridge crests, and mid to upper slopes in undulating rises to rolling low hills. |
| **Woody vegetation** | Open forest of silver-leaved ironbark and Queensland blue gum. Often associated with Moreton Bay ash and Clarkson's bloodwood. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, black speargrass, Rhodes grass*, creeping bluegrass*. |
| Intermediate | Umbrella/blowaway grass, tambookie grass, couch grass*, spring grass, slender bamboo grass, liverseed grass. |
| Non-preferred | Wiregrasses, blady grass, slender chloris. |
| Legumes | Glycine pea, woolly glycine, rhynchosia, creeping tick trefoil. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, Caatinga stylo, siratro, leucaena, medics. |
| **Introduced weeds** | |
| **Soil** | Very shallow (lithosols) to shallow, dark clay loams and clays (rendzinas) over weathering rock. |
| Description | ***Surface*:** Loose to self-mulching, occasionally hard-setting; ***Surface texture:*** sandy, loamy or clayey; clay loam; ***Subsoil texture:*** little profile development in lithosols; medium clay (rendzinas). |
| Features | Shallow soils have bedrock at <0.3–0.8 m, with varying amounts of limestone, stone and gravel throughout profile. Fragmented and weathering bedrock usually highly permeable. |

**Water availability**

Very low to low, PAWC <50–100 mm in root zone.

**Rooting depth**

Effective rooting depth <0.3 m (lithosols) and <0.8 m (rendzinas).

**Fertility**

Low generally for lithosols; medium to high (shallow clays) nitrogen; medium to high (shallow clays) phosphorus; medium to high (shallow clays) potassium; medium zinc and copper.

**Salinity**

Very low to low.

**Sodicity**

Non-sodic

**pH**

Acid (6.0) to neutral (6.6) (lithosols) to slightly alkaline (7.5) (shallow clays) at surface; slightly acid (6.4) to strongly alkaline (8.5) at depth (shallow clays).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 854 – 909 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 4600 - 4760 | 30% | 2.0 – 2.1 |
| | 18 TBA<br>43 FPC | 2680 - 2900 | 30% | 3.4 – 3.6 |

## Enterprise

Breeding and fattening.

## Land use and management recommendations

- Suitable for grazing of non-irrigated improved pastures.
- Areas with suitable depth soils (>0.5 m) and low slopes (<10%) grain, fodder and small crops may be grown.
- Very shallow soils are not suited for development, and support generally poor quality native pastures.
- Maintain maximum surface cover to maintain soil structure and reduce erosion.
- Very shallow soils should be left as undisturbed as possible with maximum surface cover maintained at all times.
- Implement contour banks, safe disposal areas for runoff and crop management strategies to control erosion.
- Timber and other woody vegetation should be retained on ridges and steep slopes.
- Burn every 2–3 years to help control weeds and regrowth (silver-leaved ironbark, wattles, corkwood).

## Land use limitations

- Effective rooting depth limited by depth to bedrock.
- Low plant available water capacity due to shallow soil depths.
- Hard-setting with large amounts of gravel and stone (lithosols).
- Often occur on steep slopes that are highly erodible with poorly structured soils.

## Conservation features and related management

- These basalt ridges are associated with several significant eucalypts, and the vegetation communities have outstanding fauna value, especially for arboreal hollow dwellers.
- Uplands areas are important in a biogeographic sense with many species limited to these areas.

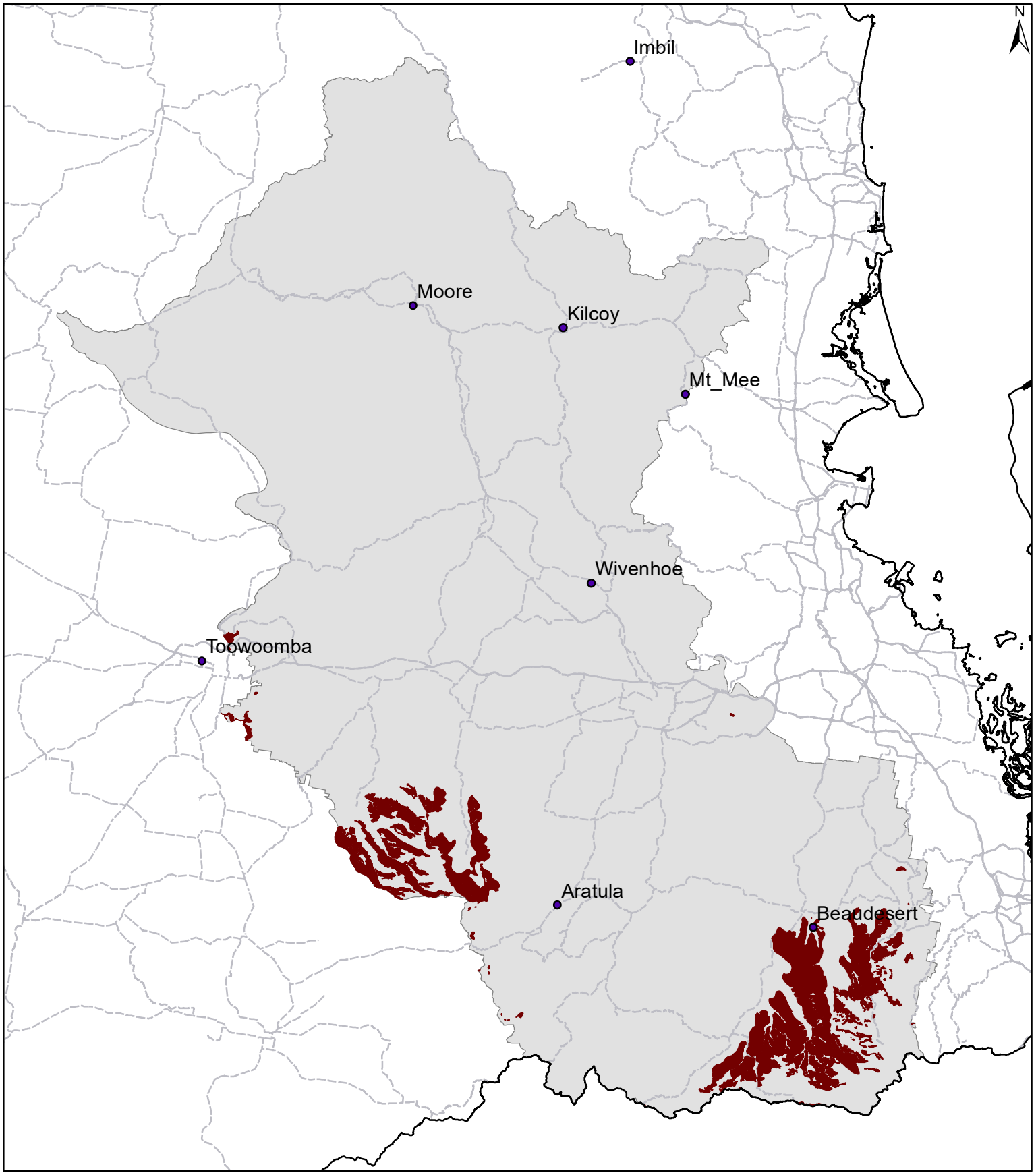
## Regional Ecosystems

11.8.8, 12.8.16, 12.8.17, 12.8.27.

## Land resource area

Basaltic Uplands 2b, Forest Walloons, 6a (Noble, 1996).

# MO05 Ironbark and blue gum on clay




Area of land type in region: 5%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 3%
Median FPC: 43%
Median TBA: 18 m2/ha

Queensland Government

# Ironbark and spotted gum ridges



| | |
|---|---|
| **Landform** | Steep hills and mountains. |
| **Woody vegetation** | Eucalypt open forest of narrow-leaved ironbark / grey ironbark, spotted gum with some softwood scrub. Patches of rusty gum and understorey of wattles and bulloak. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Black speargrass, barbwire grass, kangaroo grass, tambookie grass, pitted bluegrass. |
| Intermediate | Bottlewasher grasses, hooky grass, couch grass*. |
| Non-preferred | Wiregrasses. |
| Legumes | Glycine pea, narrow-leaved indigo. |
| **Suitable sown pastures** | Shrubby stylo, fine stem stylo, Wynn cassia. |
| **Introduced weeds** | |
| **Soil** | Texture contrast soils of brown to dark grey loamy sands overlaying red, brown or yellow clay. |
| Description | ***Surface*:** Sandy or loamy, hard-setting; ***Surface texture:*** loamy sand or sandy clay loam to clay loam; ***Subsoil texture:*** light to heavy clay. |
| Features | Usually a prominent bleached zone above hard clay subsoil. Strongly sodic and dispersible, with dominance of magnesium in subsoil increasing tendency for dispersion. Sometimes mottled (yellow or grey). Sometimes contains lime. |
| Water availability | Very low, PAWC <50 mm in root zone. |
| Rooting depth | Effective rooting depth <0.4 m. |
| Fertility | Low to medium, can be variable (loamy solodics) nitrogen; very low to low, can be variable (loamy solodics) phosphorus; low to medium to high (loamy solodics, variable soloths) potassium; medium zinc; low to medium copper. |

**Salinity**

Very low at surface; medium to high at depth below 0.5 m.

**Sodicity**

Non-sodic at surface; sodic to strongly sodic at depth.

**pH**

Soil surface very strongly acid (4.5) or strongly acid (5.4); subsoils very strongly acid (5.0) to medium acid (6.0) (soloths) or moderately alkaline (8.0) to strongly alkaline (9.0) (solodics).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744– 909 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 1920 - 2260 | 25% | 5.2 – 6.1 |
| | 17 TBA<br>41 FPC | 460 - 610 | 25% | 19 – 25 |

## Enterprise

Breeding

## Land use and management recommendations

- Suitable for grazing of native and improved pastures. Timber reserves.
- Maintain maximum surface cover at all times.
- Over-sowing of legumes should be done with minimal soil disturbance (e.g. strip cultivation).
- Maintain as much timber cover as possible, especially on steeper slopes and ridges.
- Burn every 2–3 years to help control weeds and regrowth (wattles).

## Land use limitations

- Rooting depth limited by hard, and saline or acid, subsoils.
- Hard clay subsoils impede drainage and are prone to water logging in wet periods.
- Very susceptible to sheet, tunnel and gullying erosion.
- Generally very low nutrient status, particularly nitrogen and phosphorus.

## Conservation features and related management

- These land types provide valuable resources for forest dependent fauna such as possums, gliders, forest owls, microbats, insectivorous birds and arboreal and ground dwelling reptiles.
- Rare flora (*Persoonia* spp. and cycads) occur in these communities.
- These land types have generally been cleared or thinned for grazing on the moderate and lower slopes.
- Areas extensively managed for timber have been modified through selective thinning and frequent fire resulting in even aged stands with minimal habitat trees and poor stand succession.
- Retaining adequate numbers of habitat trees is important for forest health and biodiversity.
- The careful use of fire (especially following disturbance such as thinning or harvesting) allows forest regeneration and can be proactively used to promote biodiversity values within the land type and across the landscape.

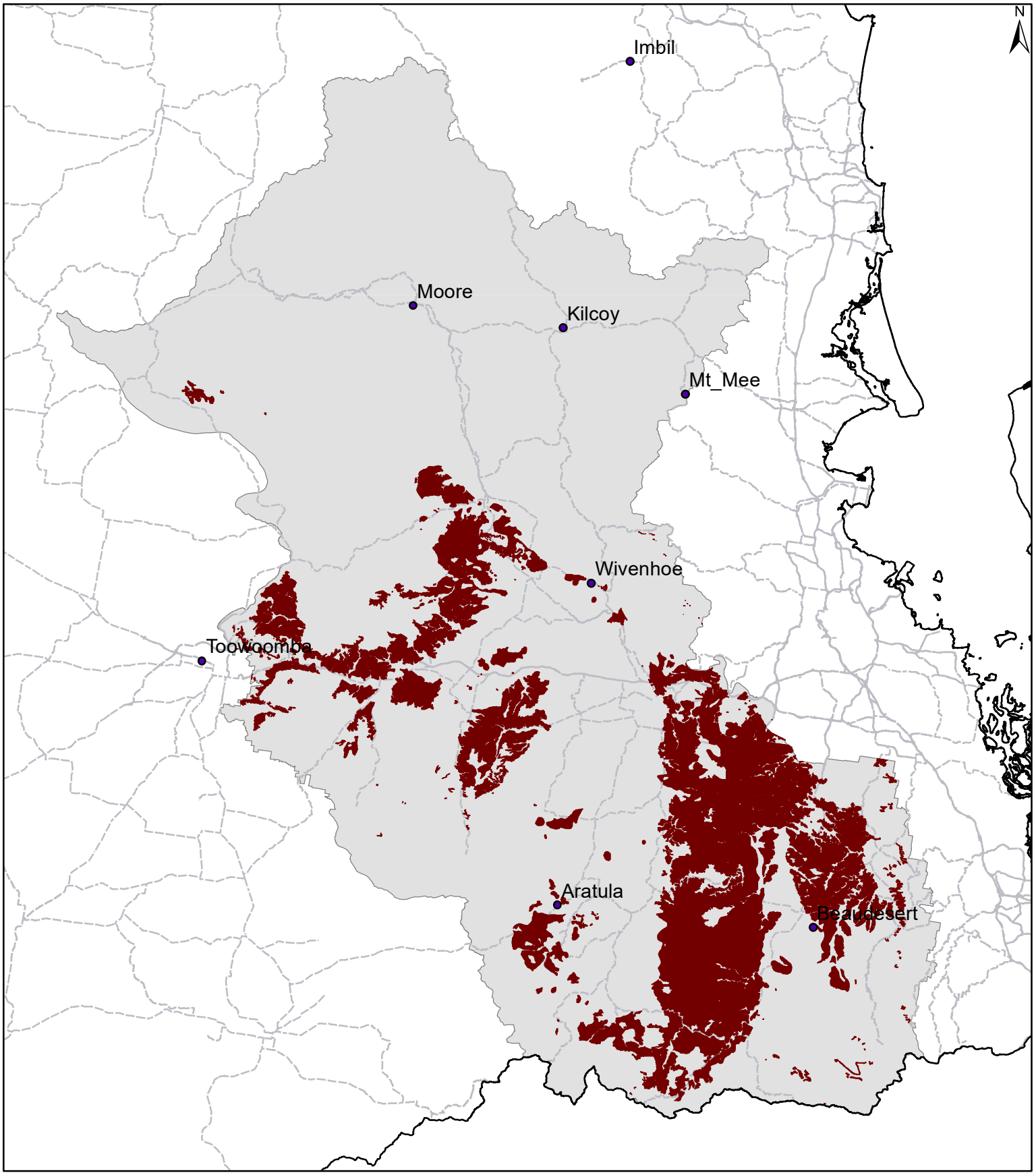
## Regional Ecosystems

12.11.5m, 12.8.24, 12.9-10.17a, 12.9-10.19a, 12.9-10.2.

## Land resource area

Marburg Forest, 7a; Volcanic Peaks, 3a (Noble, 1996).

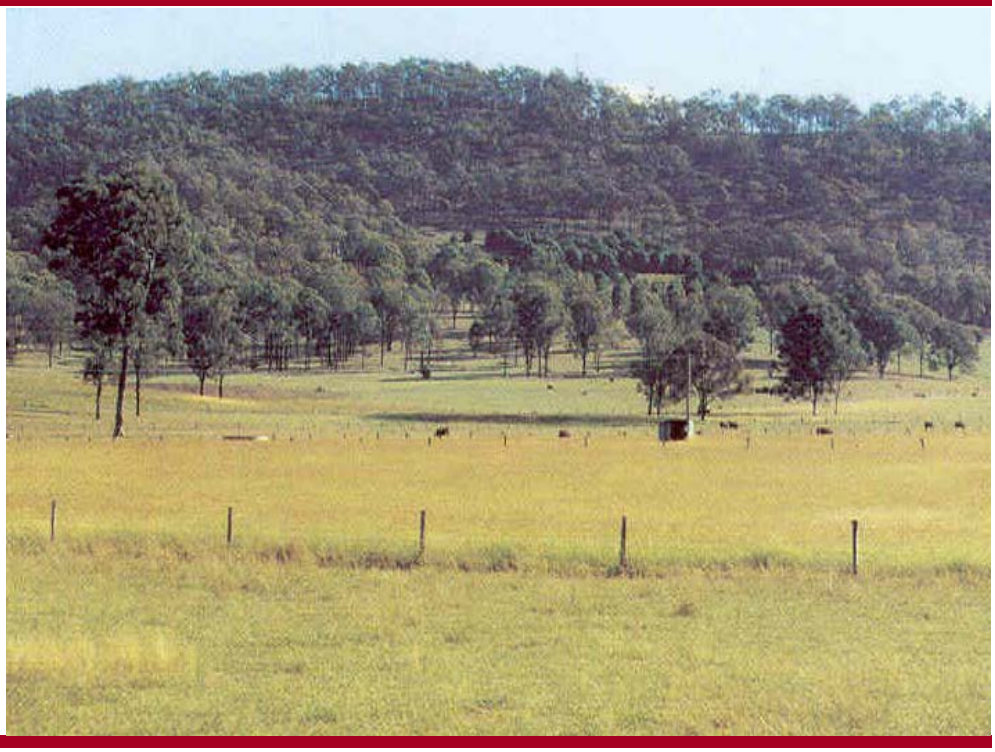
# MO06 Ironbark and spotted gum ridges




Area of land type in region: 14%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 10%
Median FPC: 41%
Median TBA: 17 m2/ha

Queensland Government

# Ironbark on granite



| | |
|---|---|
| **Landform** | Rolling hills and mountains. |
| **Woody vegetation** | Narrow-leaved / grey ironbark and silver-leaved ironbark woodland. Pink bloodwood, spotted gum, wattles and red ash may also occur. |
| **Expected pasture composition** | * *Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, barbwire grass, black speargrass, tambookie grass. |
| Intermediate | Pitted bluegrass, silky umbrella grass, golden beard grass, red Natal grass*. |
| Non-preferred | Wiregrasses, reedgrass, slender chloris. |
| Legumes | Glycine pea, Birdsville indigo, rattlepod. |
| Annual grasses | Small burr grass, feathertop Rhodes grass. |
| **Suitable sown pastures** | Shrubby stylo, fine stem stylo, Wynn cassia. |
| **Introduced weeds** | |
| **Soil** | Deep sandy soils showing very little texture change with depth; or sandy loams overlying red or yellow strongly structured clays. |
| Description | ***Surface*:** Loose to hard-setting; ***Surface texture:*** coarse loamy sand or sandy loam; ***Subsoil texture:*** clayey sand or medium to heavy clay. |
| Features | Hard-setting surface on earthy sands, still usually high permeability. Podzolics have pale, but not bleached, subsurface; may be mottled and sometimes gravelly. |
| Water availability | Low, PAWC 50–100 mm in root zone. |
| Rooting depth | Effective rooting depth >1 m (earthy sands) to <1.5 m (podzolics). |

**Fertility**

Low nitrogen; very low phosphorus; variable (very low to high) potassium; low to medium zinc; low to high copper.

**Salinity**

Very low.

**Sodicity**

Non-sodic

**pH**

Soil surface strongly acid (5.2) to slightly acid (6.5) or neutral (earthy sands 7.0); podzolic subsoils very strongly acid (5.0) to slightly acid (6.5) or occasionally neutral to mildly alkaline (up to 7.8).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 815 mm | | | | |
| Pasture type | Median tree cover (TBA $m^2$/ha) (FPC %) | Median annual pasture growth (DM kg/ha) | Safe annual utilisation pasture growth (%) | LTCC (ha/AE) |
| Native species | 0 TBA/FPC | 2930 - 2960 | 30% | 3.3 |
| | 24 TBA 55 FPC | < 730 - 1000 | 30% | > 10 – 13 |

## Enterprise

Breeding and stores.

## Land use and management recommendations

- Suitable for grazing of native and oversown pastures.
- Timber reserves.
- Scattered areas of low slope and suitable soils will support horticulture and limited cropping.
- Maintain adequate surface cover at all times to reduce erosion.
- Spell pastures when flowering and seeding.
- Do not cultivate on slopes >8%.
- Burn every 2–3 years to help control weeds and regrowth (ironbarks, wattles, red ash).

## Land use limitations

- Plant available water capacity is low (even considering deep rooting depth).
- Nutrient status is low, especially phosphorus and nitrogen.
- Highly erodible on slopes if ground cover is inadequate.
- Hard-setting soils inhibit seed germination, infiltration and increase runoff.
- Root development and nutrient uptake may be impeded in more acid subsoils.

## Conservation features and related management

- Extensively cleared for native pasture in some areas; whilst relatively intact in others.
- These are generally grassy woodlands that provide habitat for larger marsupials.
- Hollow bearing habitat trees are important nesting sites for birds and arboreal mammals.
- Landscape health can be enhanced through appropriate fire regimes, grazing management and allowing regrowth to develop into effective wildlife corridors.

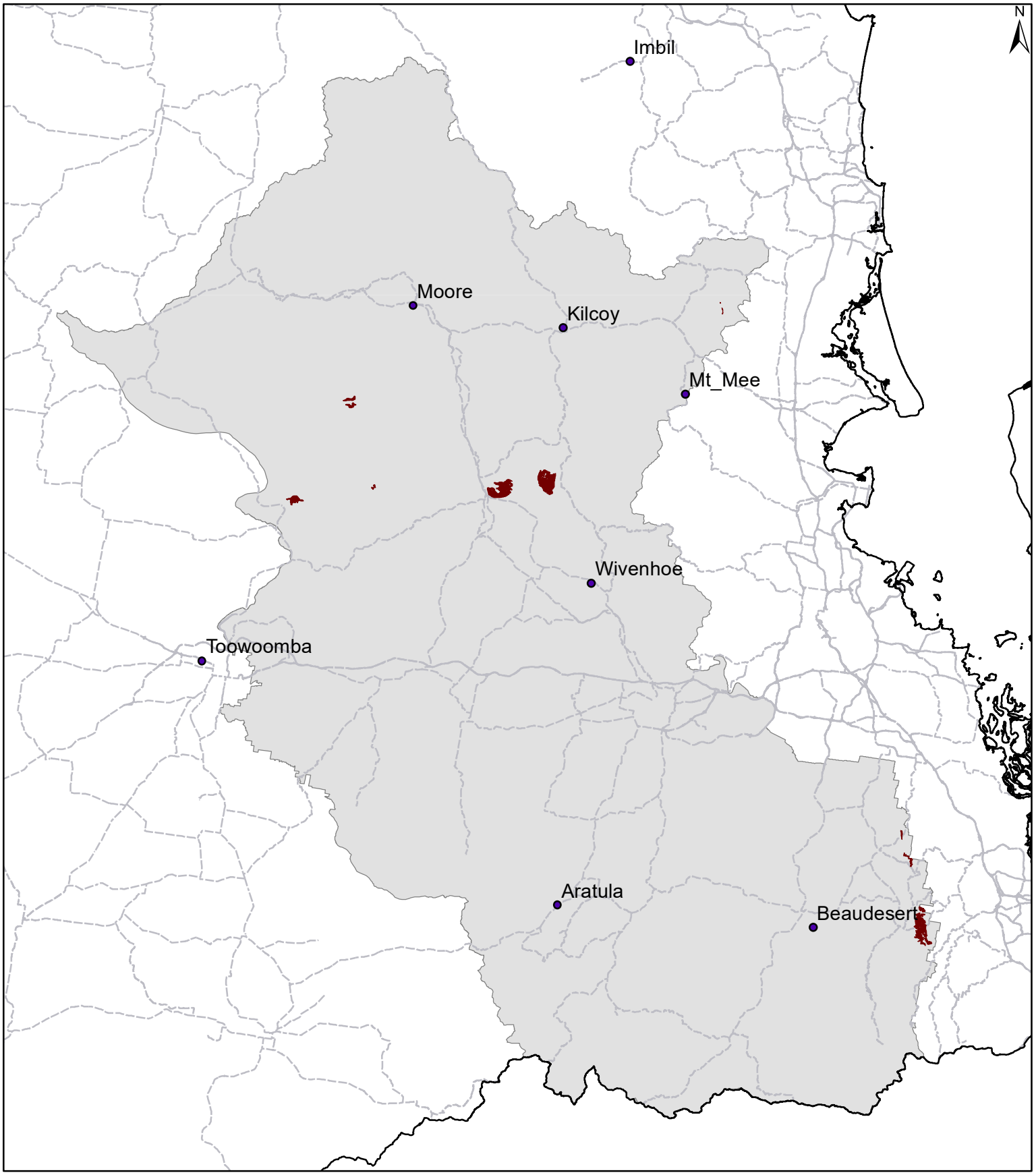
## Regional Ecosystems

12.12.3a, 12.12.9, 12.12.14.

## Land resource area

Granite Hills, 5 (Noble, 1996).

# MO07 Ironbark on granite




Area of land type in region: 0.2%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 0.2%
Median FPC: 55%
Median TBA: 24 m2/ha

Queensland Government

# Mixed open forests on duplex and loam


| | |
|---|---|
| **Landform** | Undulating to steep hills. |
| **Woody vegetation** | Grassy open forest of narrow-leaved ironbark / grey ironbark and silver-leaved ironbark with and bloodwoods (pink, brown, Clarkson's and variable-barked). Spotted gum, gum-topped box, Moreton Bay ash, grey gum, white mahogany may also occur. An understorey of bulloak and wattles may be present. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Black speargrass, barbwire grass, kangaroo grass, tambookie grass, Rhodes grass*, creeping bluegrass*. |
| Intermediate | Pitted bluegrass, couch grass*, bottlewasher grasses, lovegrasses. |
| Non-preferred | Wiregrasses, reedgrass, slender chloris. |
| Legumes | Emu foot, woolly glycine, rhynchosia, creeping tick trefoil. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, Shrubby stylo, fine stem stylo, Wynn cassia. |
| **Introduced weeds** | |
| **Soil** | Texture contrast soils of brown to dark grey loamy sands overlaying red, brown or yellow clay. |
| Description | ***Surface*:** Sandy or loamy, loose to hard-setting; ***Surface texture:*** sandy clay loam or loamy sand to clay loam; ***Subsoil texture:*** light to heavy clay. |
| Features | Usually a prominent bleached zone above hard clay subsoil. Strongly sodic and dispersible, with dominance of magnesium in subsoil increasing tendency for dispersion. Sometimes mottled (yellow or grey). Sometimes contains lime. |
| Water availability | Very low to low, PAWC <50–100 mm in root zone. |
| Rooting depth | Effective rooting depth <0.4 m (solodics) to <1.5 m (podzolics). |
| Fertility | Low to medium, can be variable (loamy solodics) nitrogen; very low to low, can be variable (loamy solodics) phosphorus; variable, very low to high potassium; low to medium zinc; low to high copper. |
| Salinity | Very low at surface; high at depth. |
| Sodicity | Non-sodic at surface; strongly sodic at depth (solodics). |

**pH**

Soil surface very strongly acid (4.5) or strongly acid (5.4) to slightly acid (6.5); subsoils very strongly acid (5.0) to medium acid (6.0) (soloths, podzolics), or moderately alkaline (8.0) to strongly alkaline (9.0) (solodics).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 3030 - 3720 | 25% | 3.1 - 3.9 |
| | 15 TBA<br>36 FPC | 1200- 2100 | 25% | 5.6 – 9.7 |

## Enterprise

Breeding.

## Land use and management recommendations

- Suitable for grazing of native and improved pastures.
- Timber reserves.
- Maintain maximum surface cover at all times.
- Oversowing of legumes should be done with minimal soil disturbance (e.g. strip cultivation).
- Maintain as much timber cover as possible, especially on steeper slopes and ridges.
- Burn every 2–3 years to help control weeds and regrowth (ironbarks, wattles, red ash).

## Land use limitations

- Plant growth limited by tough clay subsoil and hard setting surfaces.
- Rooting depth limited by hard, and saline or acid, subsoils.
- Hard clay subsoils impede drainage and are prone to water logging in wet periods.
- Very susceptible to sheet, tunnel and gullying erosion.
- Generally very low nutrient status, particularly nitrogen and phosphorus.

## Conservation features and related management

- This woodland is an important wildlife habitat with a surprisingly wide range of fauna. Larger marsupials such as wallabies often use this habitat. Numerous tree hollows are home to possums and gliders. The rough fissured bark provides good reptile habitat for skinks and geckoes.
- A good grass cover protects slopes and hillsides from erosion and provides habitat for ground fauna such as button-quail.
- Mosaic burning for regeneration and retention of microhabitats is critical for maintaining species richness. Burning every three years in winter or just prior to summer rains is an optimum regime. To maintain a diversity of habitat for wildlife it is better to burn patches rather than large areas, although selective overgrazing in the burnt areas needs to be managed.
- Retention of mature trees is necessary, as only long-lived trees will form hollows.
- Conservation management should aim to retain remnant patches especially where these offer connectivity values.

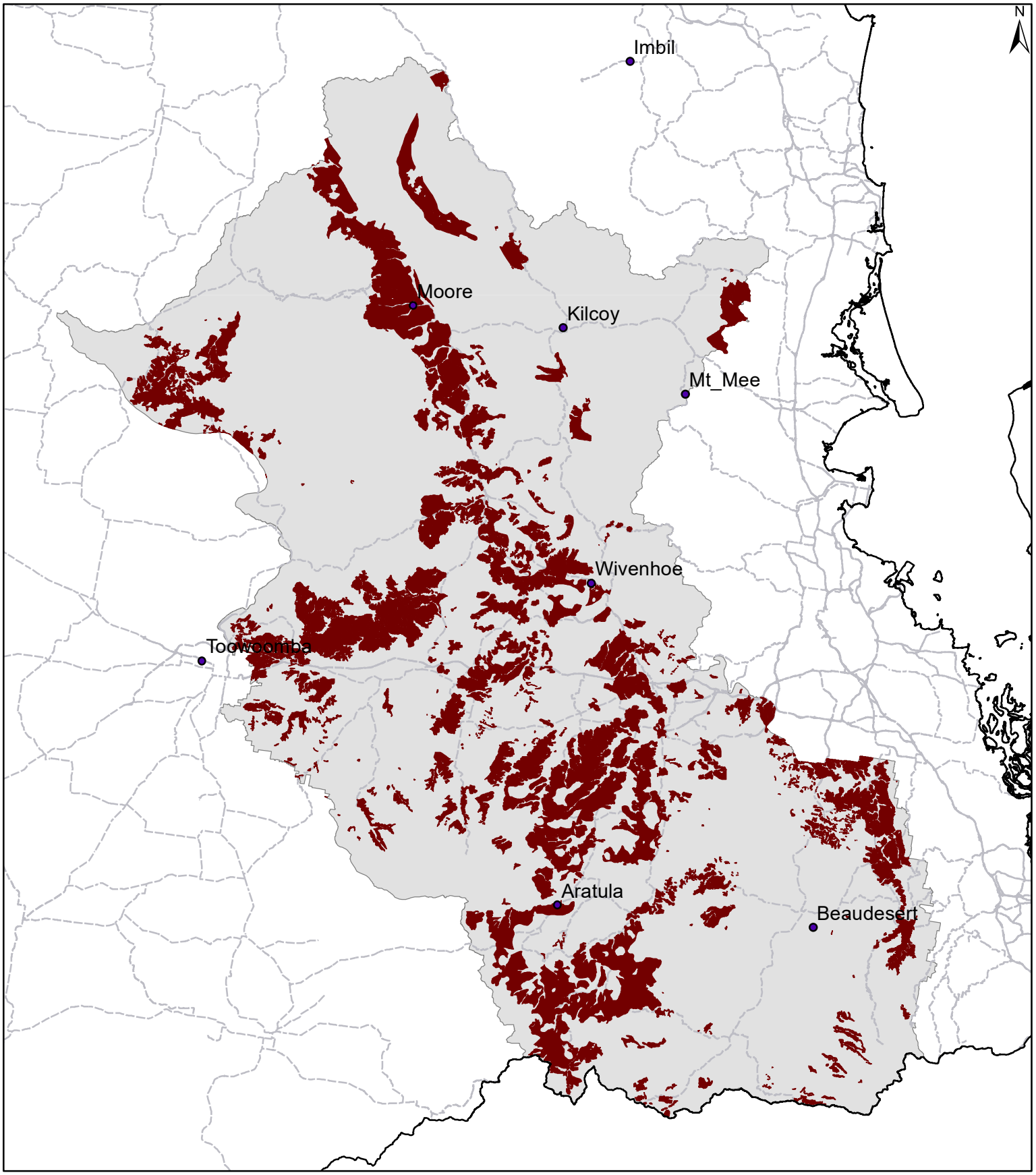
## Regional Ecosystems

12.11.14, 12.11.27, 12.5.1c, 12.5.1g, 12.5.3, 12.5.3a, 12.9-10.12, 12.9-10.17, 12.9-10.17c, 12.9-10.17e, 12.9-10.25, 12.9-10.26, 12.9-10.27, 12.9-10-28, 12.9-10.4, 12.9-10.4a, 12.9-10.5, 12.9-10.5a, 12.9-10.5d, 12.9-10.7.

## Land resource area

Forest Walloons, 6a; Helidon Forest, 7b; Marburg Forest, 7a (Noble, 1996).

# MO08 Mixed open forests on duplex and loam




Area of land type in region: 17%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 9%
Median FPC: 36%
Median TBA: 15 m2/ha

Queensland Government

# Rainforest (closed forest) on basalt


| | |
|---|---|
| **Landform** | Undulating rises to rolling low hills and plateaus (slopes 3–40%). |
| **Woody vegetation** | Original vegetation largely cleared. Mixed rainforest with crow's and bumpy ash, hoop and bunya pines, black bean, yellow carabeen, red and white cedars, strangler figs, giant stinging tree. Flooded gum occurs along watercourse and rainforest margins. |
| **Expected pasture composition** | *No native pastures in uncleared rainforest. Some naturalised paspalum and mat grass and minimal grassy understorey after clearing.*<br>** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, kangaroo grass, black speargrass, Rhodes grass*, kikuyu*, paspalum*, mat grass. |
| Intermediate | Early spring grass, couch grass*, red Natal grass*. |
| Non-preferred | Wiregrasses, blady grass, slender chloris. |
| Legumes | Glycine pea, woolly glycine. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Kikuyu, paspalum, green panic, white clover, glycine, siratro, leucaena. |
| **Introduced weeds** | Lantana, wild tobacco tree. |
| **Soil** | Deep, red, strongly structured clays that are friable and highly permeable. Occurrences also on shallow, dark friable clay loams and clays over weathered parent rock. |
| Description | ***Surface*:** Loose to self-mulching, occasionally hard-setting; ***Surface texture:*** clay loam to light or medium clay; ***Subsoil texture:*** medium to heavy clay. |
| Features | Deep soils (often >5 m), with varying amounts of ironstone gravel and rock fragments throughout profile. Shallower soils have bedrock at 0.3–0.8 m. |
| Water availability | High, PAWC 150–200 mm in root zone; low 50–100 mm in shallow soils. |
| Rooting depth | Effective rooting depth <0.8 m (prairie) to >1.5 m (krasnozems). |
| Fertility | Medium to high nitrogen; very low to low (krasnozems) to medium to high phosphorus; medium to high potassium; medium zinc and copper. |
| Salinity | Low to very low. |

**Sodicity**

Non-sodic

**pH**

Soil surface strongly acid (5.5) (krasnozems) to slightly acid (6.5) (shallow clays); very strongly acid (4.8) to medium acid (6.0) (krasnozems) or strongly alkaline (8.5) (shallow clays).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 815 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 6260 - 6900 | 30% (sown) | 1.4 – 1.6 |
| | 13 TBA<br>32 FPC | 3930 - 5100 | 30% (sown) | 1.9 – 2.5 |

## Enterprise

Breeders and fattening.

## Land use and management recommendations

- Suitable for grazing of improved pastures, dryland and irrigated cropping.
- Suitable for dairying and hoop pine plantations.
- Maintain maximum surface cover to maintain soil structure and reduce erosion. Avoid trafficking and cultivation when wet to reduce soil compaction.
- Rotate intensively cultivated crops with broadacre field crops and legumes to improve soil structure and fertility. Periods under pasture rotation is recommended to enhance long-term soil stability and soil organic matter content.
- Regular additions of fertiliser are required to maintain productivity. Lime application required on average every 3–5 years.
- Do not cultivate on slopes greater than 10–15%.
- Adopt practices such as minimum tillage, stubble mulching, weed control to maintain soil structure and reduce erosion on sloping lands.
- Control weeds and undesirable ground cover species (lantana, wild tobacco, bracken fern, blady grass).

## Land use limitations

- Surface structure becomes cloddy and hard setting under cultivation; plough pans may develop.
- Effective rooting depth limited by very strongly acid soils.
- Fertility is variable and declines rapidly under development.
- Highly erodible on cultivated slopes >3% (krasnozems).
- Prairie soils are moderate to high erosion risk, particularly on steeper slopes.
- Shallow soils often stony and <0.5 m above weathered bedrock.

## Conservation features and related management

- Habitat for endemic and rare and threatened flora and fauna.
- These rainforests on the fertile elevated plateaus have been extensively cleared and established with kikuyu.
- The remnants tend to be small and are threatened at the margins by weed invasion.
- Outside of national parks and reserves, the lack of connectivity in the landscape threatens the genetic vigour of the species that make up and inhabit these rainforests.

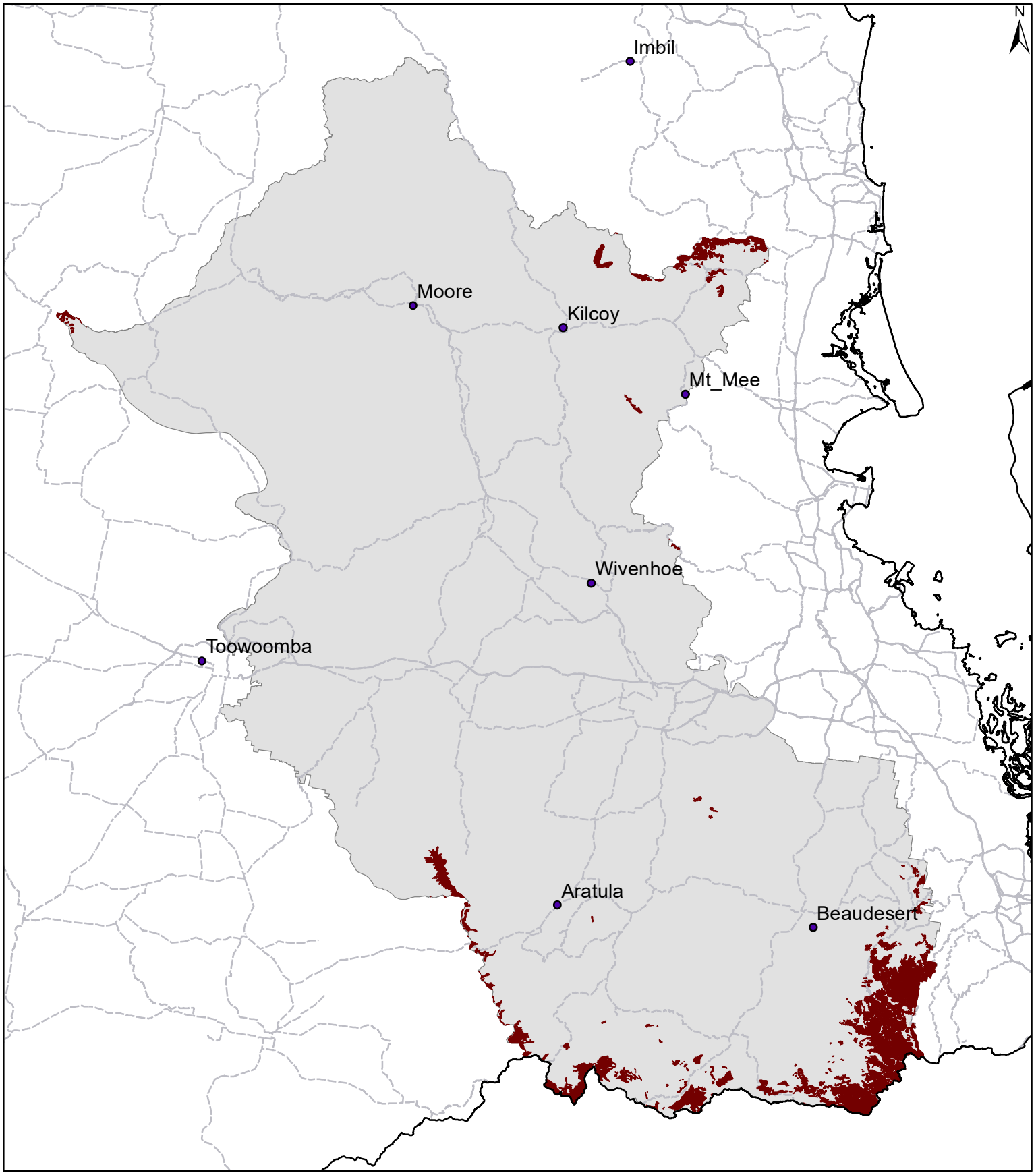
## Regional Ecosystems

12.8.3, 12.8.4, 12.8.5, 12.12.15a.

## Land resource area

Red Volcanics, 2a (Noble, 1996).

# MO09 Rainforest (closed forest on basalt)




Area of land type in region: 4%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 2%
Median FPC: 32%
Median TBA: 13 m2/ha

Queensland Government

# Softwood vine scrub

| | |
|---|---|
| **Landform** | Mid to upper slopes of rolling hills (3–30% slopes). |
| **Woody vegetation** | Largely cleared open softwood scrub with vine species. Other trees that may occur include crow's and southern silver ash, blush tulip oak, broad-leaved leopardwood, red ash, rose satinash, red and white cedar, white beech, silky oak and hoop pine. |
| **Expected pasture composition** | *Minimal grassy understorey.*<br>** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, black speargrass, kangaroo grass, Rhodes grass*, green panic*. |
| Intermediate | Early spring grass, couch grass*, red Natal grass*. |
| Non-preferred | Wiregrasses, blady grass, slender chloris. |
| Legumes | Woolly glycine, glycine pea. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, green panic, leucaena, Shrubby stylo, fine stem stylo, siratro, medics. |
| **Introduced weeds** | Lantana, African boxthorn, wild tobacco tree. |
| **Soil** | Friable, well drained loamy soils that are brown, yellowish brown or reddish brown (brown earths). Some soils are shallow dark, clay loams over weathered parent rock (prairie soils). |
| Description | ***Surface*:** Firm to loose, occasionally hard-setting*; **Surface texture:*** sandy loam to clay loam to medium clay; ***Subsoil texture:*** light to medium clay. |
| Features | Bedrock 0.3–0.8 m in shallow clays. |
| Water availability | Low; PAWC 50–100 mm in root zone. |
| Rooting depth | Effective rooting depth <1 m. |

**Fertility**

Low (brown earths) to medium to high nitrogen; medium (shallow clays) to high phosphorus; medium to high (shallow clays) to very high potassium; medium zinc and copper.

**Salinity**

Very low to low.

**Sodicity**

Non-sodic

**pH**

Soil surface slightly acid (6.5) to neutral (7.0) (brown earths) to mildly alkaline (7.4); medium acid (6.0) to mildly alkaline (brown earths 7.5) to strongly alkaline (8.5).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 4390 - 5780 | 30% (sown) | 1.7 – 2.2 |
| | 18 TBA<br>43 FPC | 1590 - 2500 | 30% (sown) | 3.9 – 6.1 |

## Enterprise

Breeding and fattening.

## Land use and management recommendations

- Suitable for grazing of improved pastures, timber reserves, softwood plantations.
- Not suitable for irrigation; duplex soils are not suitable for agricultural development.
- In better drained areas short-term forage crops may be grown.
- Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion. Include cover crops in crop rotations and retain crop residues.
- Maintain adequate surface cover at all times. Spell pastures when flowering and seeding.
- Control weeds and regrowth (lantana, scrub species).

## Land use limitations

- Moderate to high risk of erosion on all slopes if bare or cultivated.
- Shallow and stony soils, low plant available water capacity.
- Susceptible to compaction, hard-setting and rapid decline in soil fertility if cultivated.
- Areas may act as intake for groundwater recharge, thereby contributing to salinity problems in lower areas.

## Conservation features and related management

- Very few scrub remnants remain; remnants are small and isolated.
- Habitat for rare and threatened flora and fauna.
- Remnants are threatened by weed invasion and fire on their margins.
- The use of fire breaks and cool season burns reduce this risk.
- Natural regeneration should be encouraged to develop connectivity with other areas of remnant vegetation.

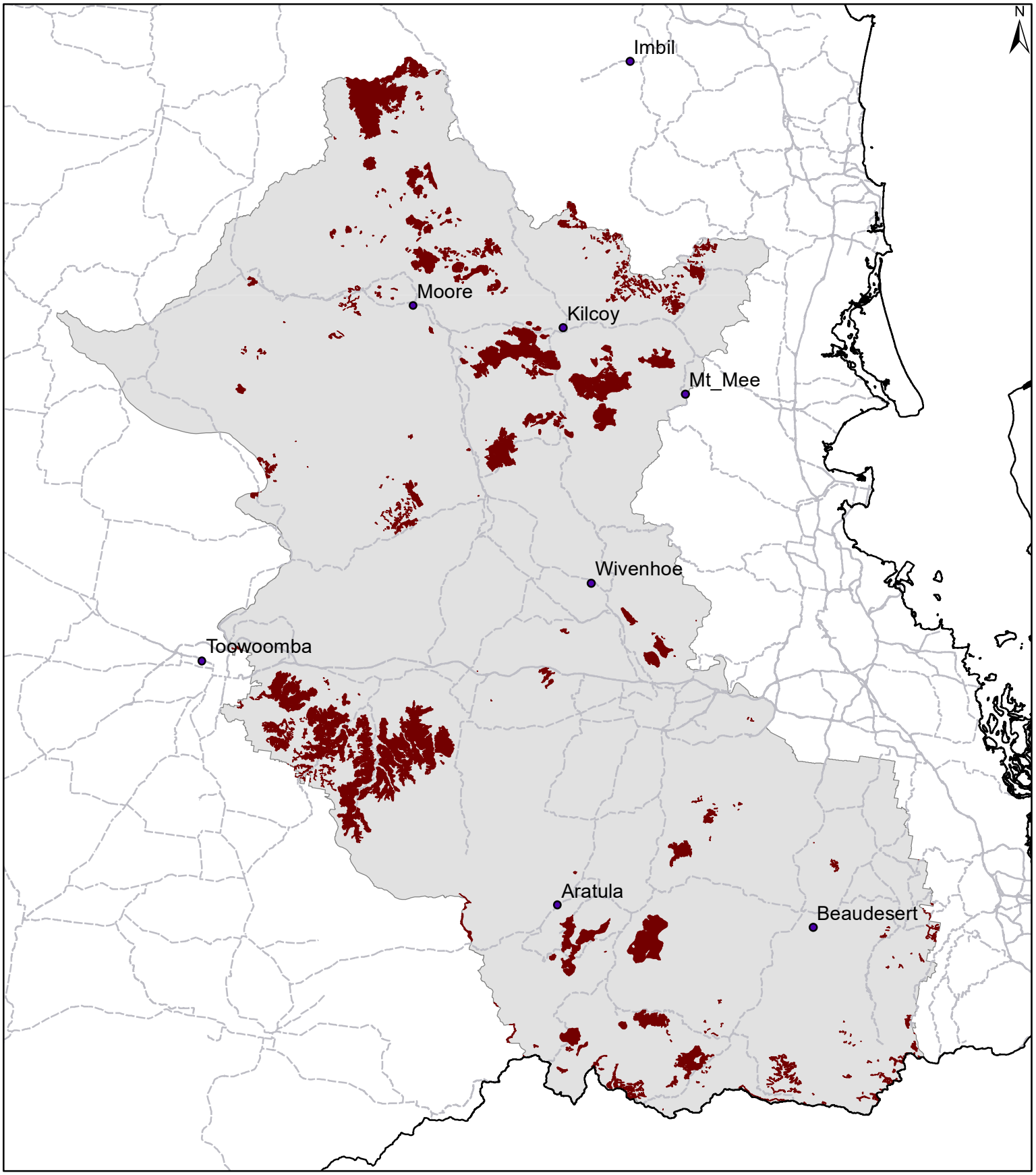
## Regional Ecosystems

12.8.6, 12.8.7, 12.8.18, 12.9-10.15, 12.9-10.16, 12.11.1, 12.11.11, 12.12.1, 12.12.13.

## Land resource area

Marburg Scrub, 7c (Noble, 1996).

# MO10 Softwood vine scrub




Area of land type in region: 5%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 3%
Median FPC: 43%
Median TBA: 18 m2/ha

Queensland Government

# Tall open forests on basalt

| | |
|---|---|
| **Landform** | Mainly on plateaus, but also occurs undulating rises to rolling low hills (slopes 3–40%). |
| **Woody vegetation** | Flooded (rose) gum, Sydney blue gum, tallowwood, brush box with small areas of rainforest. Blue Mountains ash, stringybark, grey gum and white mahogany may also occur. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Forest bluegrass, Queensland bluegrass, black speargrass, tambookie grass, scentedtop, kikuyu*, paspalum*, green panic*. |
| Intermediate | Umbrella grass, spring grass, slender bamboo grass, liverseed grass. |
| Non-preferred | Wiregrasses, blady grass, slender chloris. |
| Legumes | Glycine pea, woolly glycine, rhynchosia, creeping tick trefoil. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Kikuyu, paspalum, green panic, white clover, glycine, siratro, leucaena. |
| **Introduced weeds** | Lantana, wild tobacco tree. |
| **Soil** | Deep, red, strongly structured clays that are friable and highly permeable. Occurrences also on shallow, dark friable clay loams and clays over weathered parent rock. |
| Description | ***Surface*:** Loose to self-mulching, occasionally hard-setting; ***Surface texture:*** clay loam to light or medium clay; ***Subsoil texture:*** medium to heavy clay. |
| Features | Deep soils (often >5 m), with varying amounts of ironstone gravel and rock fragments throughout profile. Shallower soils have bedrock at 0.3–0.8 m. |
| Water availability | High, PAWC 150–200 mm in root zone; low 50–100 mm in shallow soils. |
| Rooting depth | Effective rooting depth <0.8 m (prairie) to >1.5 m (krasnozems). |
| Fertility | Medium to high nitrogen; very low to low (krasnozems) to medium to high phosphorus; medium to high potassium; medium zinc and copper. |

**Salinity**

Low to very low.

**Sodicity**

Non-sodic

**pH**

Soil surface strongly acid (5.5) (krasnozems) to slightly acid (6.5) (shallow clays); very strongly acid (4.8) to medium acid (6.0) (krasnozems) or strongly alkaline (8.5) (shallow clays).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 785 – 909 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 6710 - 7150 | 30% | 1.4 – 1.5 |
| | 29 TBA<br>64 FPC | <2200 - 3270 | 30% | > 3.0 – 4.4 |

## Enterprise

Growing and fattening.

## Land use and management recommendations

- Suitable for grazing of improved pastures, dryland and irrigated cropping.
- Do not cultivate on slopes greater than 10–15%.
- Rotate intensively cultivated crops with broadacre field crops and legumes to improve soil structure and fertility. Periods under pasture rotation are recommended to enhance long-term soil stability and soil organic matter content. Adopt practices such as minimum tillage, stubble mulching, and weed control to maintain soil structure and reduce erosion on sloping lands.
- Regular additions of fertiliser are required to maintain productivity. Lime application required on average every 3–5 years.
- Maintain maximum surface cover to maintain soil structure and reduce erosion. Avoid trafficking and cultivation when wet to reduce soil compaction.
- Burn every 4–6 years to help control weeds and undesirable ground cover species (lantana, wild tobacco).

## Land use limitations

- Surface structure becomes cloddy and hard-setting under cultivation; plough pans may develop. Fertility is variable and declines rapidly under development.
- Effective rooting depth limited by very strongly acid soils. Shallow soils often stony and <0.5 m above weathered bedrock.
- Highly erodible on cultivated slopes >3% (krasnozems). Prairie soils are moderate to high erosion risk, particularly on steeper slopes.

## Conservation features and related management

- These are wet sclerophyll forests and have been important sources of timber in the past.
- They are associated with high rainfall on elevated and fertile sites.
- These forests are rich in biodiversity; have outstanding fauna value, especially for arboreal hollow dwellers and a diverse variety of fauna that use the many associated springs; and provide vital corridors between the closely associated rainforest.
- Many species are endemic to these land types in uplands areas.
- Plants like snowgrass poa represent an ‘older’ ecology of the SE Bioregion.

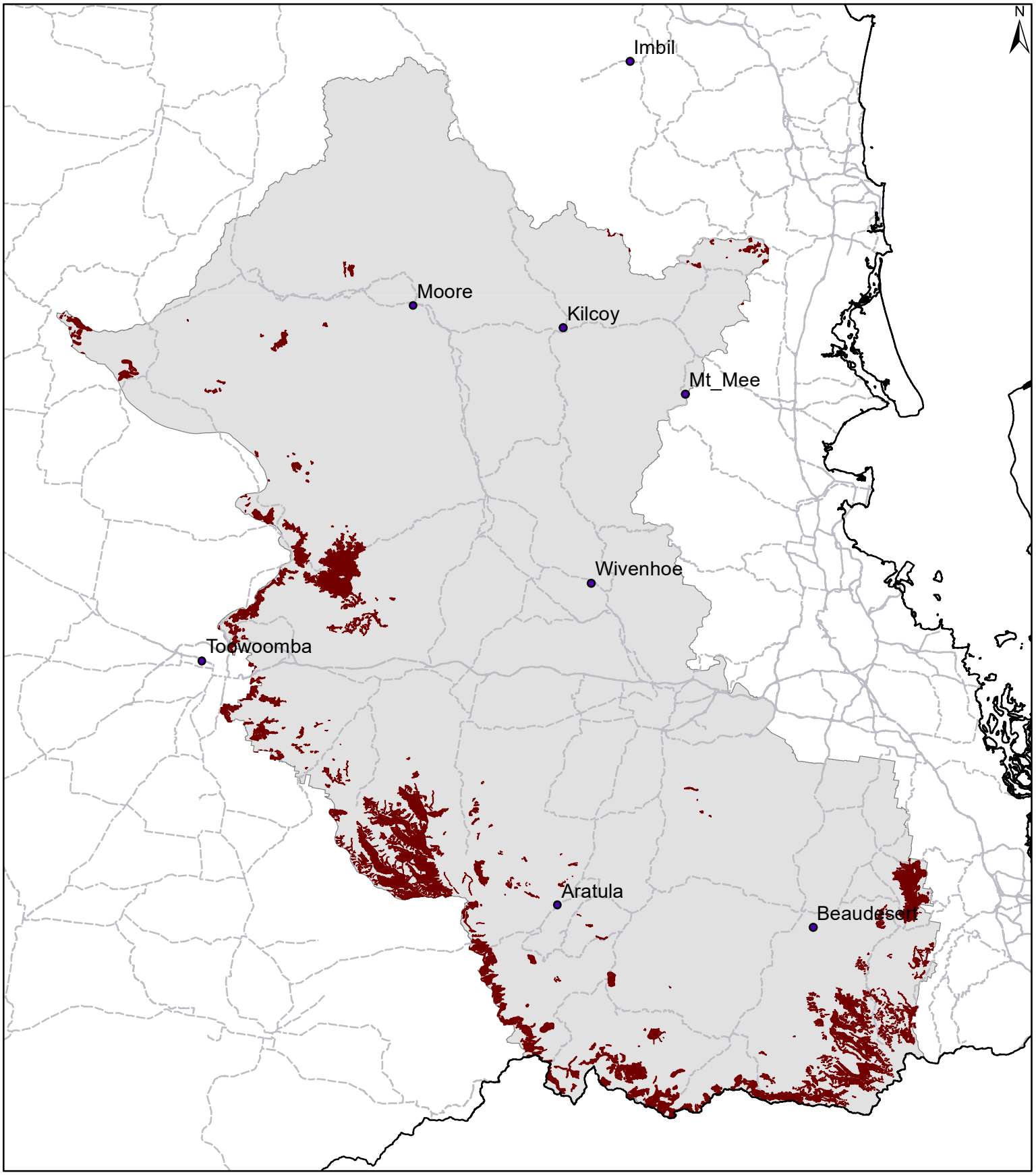
## Regional Ecosystems

11.8.2a, 11.8.5a, 12.3.2, 12.5.6a-b, 12.8.1, 12.8.10, 12.8.2, 12.8.8, 12.8.9, 12.8.11, 12.8.12, 12.8.14, 12.8.19, 12.8.1a, 12.8.26, 12.8.8a.

## Land resource area

Red volcanics, 2a, basaltic uplands 2b (Noble, 1996).

# MO11 Tall open forests on basalt




Area of land type in region: 4%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 3%
Median FPC: 64%
Median TBA: 29 m2/ha

Queensland Government

# Tall open forests on steep hills and mountains

| | |
|---|---|
| **Landform** | Steep mountains and hills. |
| **Woody vegetation** | Grassy open forest of wide range of species including grey gum, stringybark, blackbutt, tallowwood, spotted gum, narrow-leaved ironbark and scattered rainforest. |
| **Expected pasture composition** | ** Denotes non-native "Expected Pasture Composition" species.* |
| Preferred | Black speargrass, barbwire grass, kangaroo grass, tambookie grass, Rhodes grass*, creeping bluegrass*. |
| Intermediate | Pitted bluegrass, bottlewasher grasses, lovegrasses. |
| Non-preferred | Wiregrasses, reedgrass, blady grass, slender chloris. |
| Legumes | Emu-foot, woolly glycine, rhynchosia, creeping tick trefoil. |
| Annual grasses | Small burr grass. |
| **Suitable sown pastures** | Rhodes grass, creeping bluegrass, Shrubby stylo, fine stem stylo, Caatinga stylo, siratro. |
| **Introduced Weeds** | Lantana. |
| **Soil** | Texture contrast soils of brown loamy sands overlaying red or yellow well structured clays; or very shallow soil overlying weathering rock. |
| Description | ***Surface*:** Loose to hard-setting, sometimes gravelly or very shallow; ***Surface texture:*** sandy loam, occasionally sandy clay loam to clay loam; ***Subsoil texture:*** medium to heavy clay; weathered rock. |
| Features | Sub-surface may be paler but generally not bleached. Well structured and friable clays. Sometimes mottled. Very shallow soils (<0.3 m) have variable amounts of stone and gravel. |
| Water availability | Very low to low, PAWC <50–100 mm in root zone. |

**Rooting depth**

Effective rooting depth <0.3 m (lithosols) to <1.5 m (podzolics).

**Fertility**

Low nitrogen; very low phosphorus; variable (very low to very high) potassium; low to medium zinc; low to high copper.

**Salinity**

Very low to low.

**Sodicity**

Non-sodic

**pH**

Soil surface strongly acid (5.2) to slightly acid (6.5) (podzolics) to medium acid (6.0) to neutral (lithosols 6.6); podzolic subsoils very strongly acid (5.0) to slightly acid (6.5), occasionally neutral to mildly alkaline (up to 7.8).

## Long-term carrying capacity information (A condition)

| Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day | | | | |
|---|---|---|---|---|
| Median annual rainfall 744 – 1372 mm | | | | |
| Pasture type | Median tree cover<br><br>(TBA $m^2$/ha)<br>(FPC %) | Median annual pasture growth<br><br>(DM kg/ha) | Safe annual utilisation pasture growth<br><br>(%) | LTCC<br><br>(ha/AE) |
| Native species | 0 TBA/FPC | 2860 - 3430 | 25% | 3.4 – 4.1 |
| | 28 TBA<br>63 FPC | < 810 - 1470 | 25% | > 8 – 14 |

## Enterprise

Breeding and growing.

## Land use and management recommendations

- Suitable for grazing of native and improved pastures.
- Do not clear steep slopes or areas with very shallow soils.
- Maintain maximum surface cover at all times.
- Spell pastures when flowering and seeding.
- Burn every 4–6 years to help control weeds and regrowth (lantana, wattles).

## Land use limitations

- Highly erodible, with high risk of landslips on over-cleared steeper slopes.
- Prone to sheet erosion and wind erosion on bare, exposed slopes.
- Generally very low nutrient status, particularly nitrogen and phosphorus.
- Root development and nutrient uptake may be impeded in very shallow soils or more acid subsoils.
- Surface stone can be a problem.
- Red clays generally well drained, yellow clay subsoils poorly drained that can result in water logging after heavy rain.

## Conservation features and related management

- Habitat for rare and threatened flora including *Persoonia* spp. and cycads.
- Relatively uncleared, these land types provide valuable resources for forest dependent fauna such as possums, gliders, forest owls, microbats, insectivorous birds and arboreal and ground dwelling reptiles.
- Retaining adequate numbers of habitat trees is important in providing food and shelter resources for these species.
- Frequent fire regimes can reduce the shrubby understorey that contributes to the structural complexity of the habitat so important for a number of fauna.

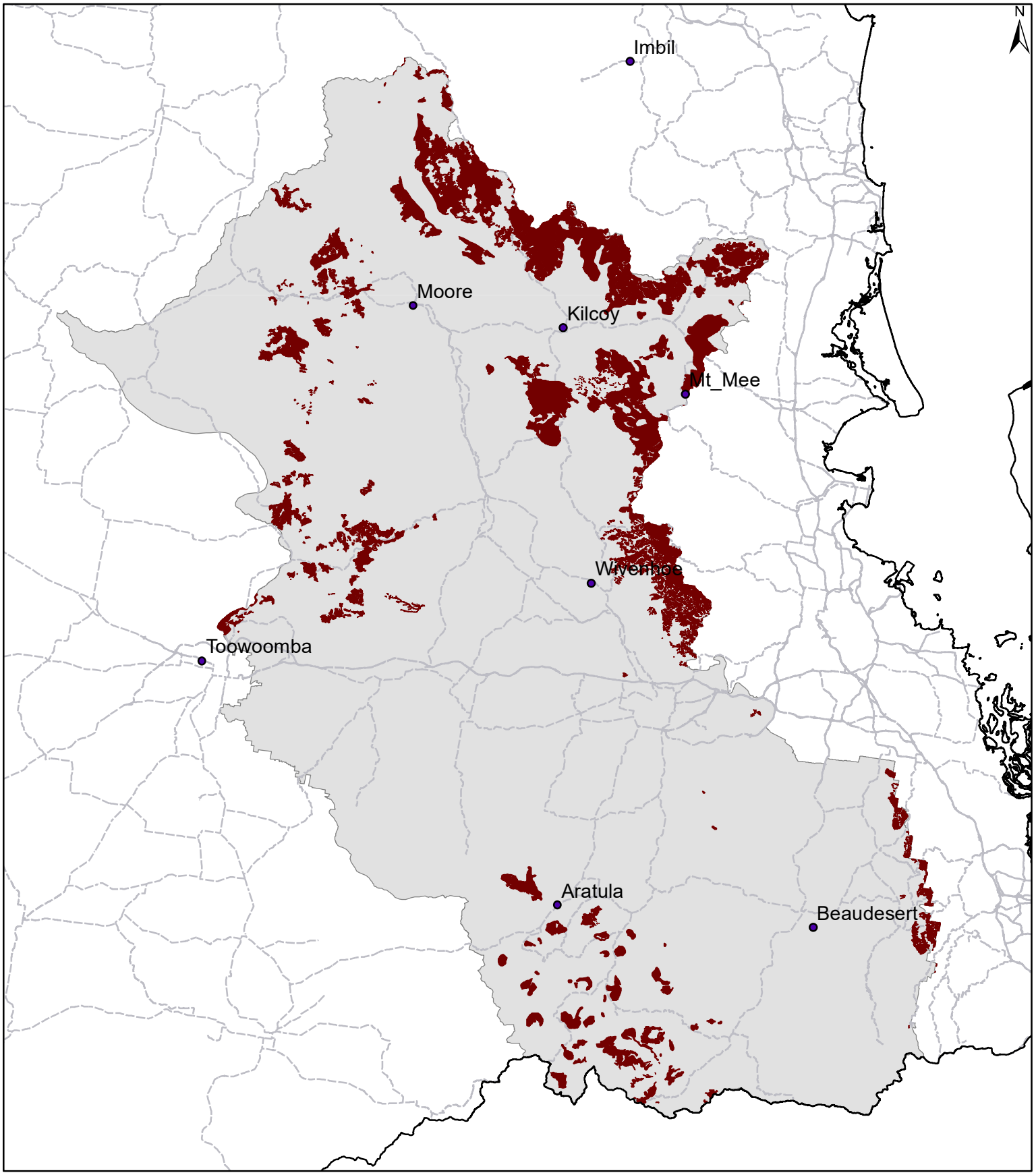
## Regional Ecosystems

12.11.16, 12.11.2, 12.11.20, 12.11.23, 12.11.24, 12.11.25, 12.11.26, 12.11.28, 12.11.3, 12.11.3a-b, 12.12.15, 12.12.2, 12.12.20, 12.12.23, 12.12.2a-b, 12.12.6, 12.5.6, 12.8.20, 12.8.25, 12.9-10.1, 12.9-10.13, 12.9-14, 12.9-14a-b, 12.9-10.17d, 12.9-10.20, 12.9-10.20, 12.9-10.23, 12.9-10.24.

## Land resource area

Metamorphic Hills, 4 (Noble, 1996).

# MO12 Tall open forests on steep hills and mountains




Area of land type in region: 9%
Median rainfall (region): 632 – 1372 mm
Average rainfall (region): 637 – 1536 mm
Area of land type with FPC: 7%
Median FPC: 63%
Median TBA: 28 m2/ha

Queensland Government