Northern Gulf Region Plant Index

* Denotes non-native species.

Black soils on basalt and granite

Landform	Undulating to gently undulating plains and rises formed on predominantly basalt but also granite and granodiorite.
Woody vegetation	Treeless plains with scattered black tea tree scrub; or open mountain coolibah, bloodwood and narrow-leaved ironbark woodlands. Generally understorey is absent.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.* *Bare ground or little grass cover occurs on the hard rock rubble of lava flows.*
Preferred	Angleton bluegrass* (naturalised), couch grass, forest bluegrass, kangaroo grass, black speargrass.
Intermediate	Pitted bluegrass, silky browntop, canegrass, golden beard grass, lemon-scented grass, native millet.
Non-preferred	Wiregrasses, northern wanderrie grass.
Annual grasses	Comet grass, Flinders grass, two-coloured panic. Non-preferred species include asbestos grass.
Suitable sown pastures	Angleton grass, Indian couch, creeping bluegrass, butterfly pea, leucaena, Caatinga stylo, desmanthus.
Introduced weeds	Mimosa bush, rubbervine, Noogoora burr, grader grass, mission grass.
Soil	Massive black and brown earths; sometimes cracking.
Description	***Surface:*** Self-mulching; ***Surface texture:*** medium clay; ***Subsoil texture:*** medium to heavy clay.

Features

Slight gilgai development. High moisture holding capacity. Slow internal drainage. Carbonate concretions at depth. Black basalt soils can have high boulder coverage.

Water availability

High

Fertility

High (basalt-derived soils); moderate nitrogen (5 mg/kg); moderate phosphorus (11 mg/kg); high potassium (1.0 cmol /kg).

Moderate (granite-derived soils); moderate nitrogen (5 mg/kg); moderate phosphorus (6 mg/kg); moderate potassium (0.7 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Neutral (7.0) surface increasing alkalinity 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 663 – 742 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	1250 - 1460	30%	6.7 – 7.8
	6 TBA 15 FPC	690 - 980	30%	10 – 14

Enterprise

Breeding and growing.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody weeds (e.g. rubbervine).

Land use limitations

- Internal drainage may be slow leaving soils prone to waterlogging.
- Basalt soils have rocky profile throughout.
- Narrow range of optimum moisture for tillage and traffic.

Conservation features and related management

- Largely restricted to the south-west of the Einasleigh bioregion.
- Subject to high grazing pressure.
- Subject to weed infestation by rubbervine (*Cryptostegia grandiflora)* and grader grass (*Themeda quadrivalvis*) and invasive exotic weed species such as mimosa (*Acacia farnesiana*) that may change the community to a tall open shrubland.

Regional Ecosystems

9.3.10a-b, 9.3.11a.

Land system, Local Pasture Unit

Rosella (59) (Perry *et al* 1964); LPU 28 (Tothill and Gillies 1992).

NG01 Black soils on basalt and granite

Area of land type in region: 0.005%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 62%
Median FPC: 15%
Median TBA: 6 m2/ha

Queensland Government

Coolibah country

Landform	Riverine lightly timbered floodplains that are seasonally inundated.
Woody vegetation	Open coolibah grassy woodland. Associated with whitewood, terminalia, ghost gum and guttapercha.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Silky browntop, forest bluegrass, Queensland bluegrass, black speargrass, golden beard grass, plume sorghum.
Intermediate	Pitted bluegrass, Rhodes grasses, bull Mitchell grass, bottlewasher grasses, northern rice grass, twirly windmill grass.
Non-preferred	Wiregrasses, reedgrass.
Annual grasses	Button grass, long-awn wanderrie, Flinders grass. Non-preferred species include asbestos grass.
Suitable sown pastures	Not suitable for sown pastures.
Introduced weeds	Parkinsonia, mimosa bush.
Soil	Cracking and calcareous clays. Frequently there is a thin crust of fine soil/sand on the surface. Colours range from dark grey to olive-brown to red-yellow. Commonly interspersed with alluvial soils along stream, river and creek beds.
Description	***Surface:*** Variable gravel cover, sometimes with self-mulching surfaces; ***Surface texture:*** Fine sand/silt; ***Subsoil texture:*** sandy loams to heavy clays.
Features	Subsoils are massive silty clays or heavy clays that can be mottled at depth.

Water availability

High

Rooting depth

0.1–1 m.

Fertility

Moderate. Low to moderate nitrogen (6 mg/kg); low to moderate phosphorus (4 mg/kg); high potassium (0.3 cmol /kg).

Salinity

Low

Sodicity

Moderate

pH

Neutral (7.0) at surface.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 544 – 1297 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	560 - 2400	25%	4.9 - 21
	6 TBA 15 FPC	290 - 1280	25%	9.1 – 41

Enterprise

Breeding herds.

Land use and management recommendations

- Strategic burning (late dry hot burn) to manage woody weeds (e.g. parkinsonia).
- Phosphate supplements are required in the wet season.
- These areas are preferentially grazed and require cattle control to prevent over grazing and degradation of areas.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.

Land use limitations

- Seasonal inundation.
- Uncontrolled grazing (cattle, pigs, wallabies) leads to overgrazing of these areas with subsequent loss of 3P grasses and weed invasions.
- Regrowth and high shrub densities can limit productivity.

Conservation features and related management

- Subject to very high grazing pressure, particularly during wet season.
- This land type includes a variety of seasonal wetlands significant as feeding sites for water birds.

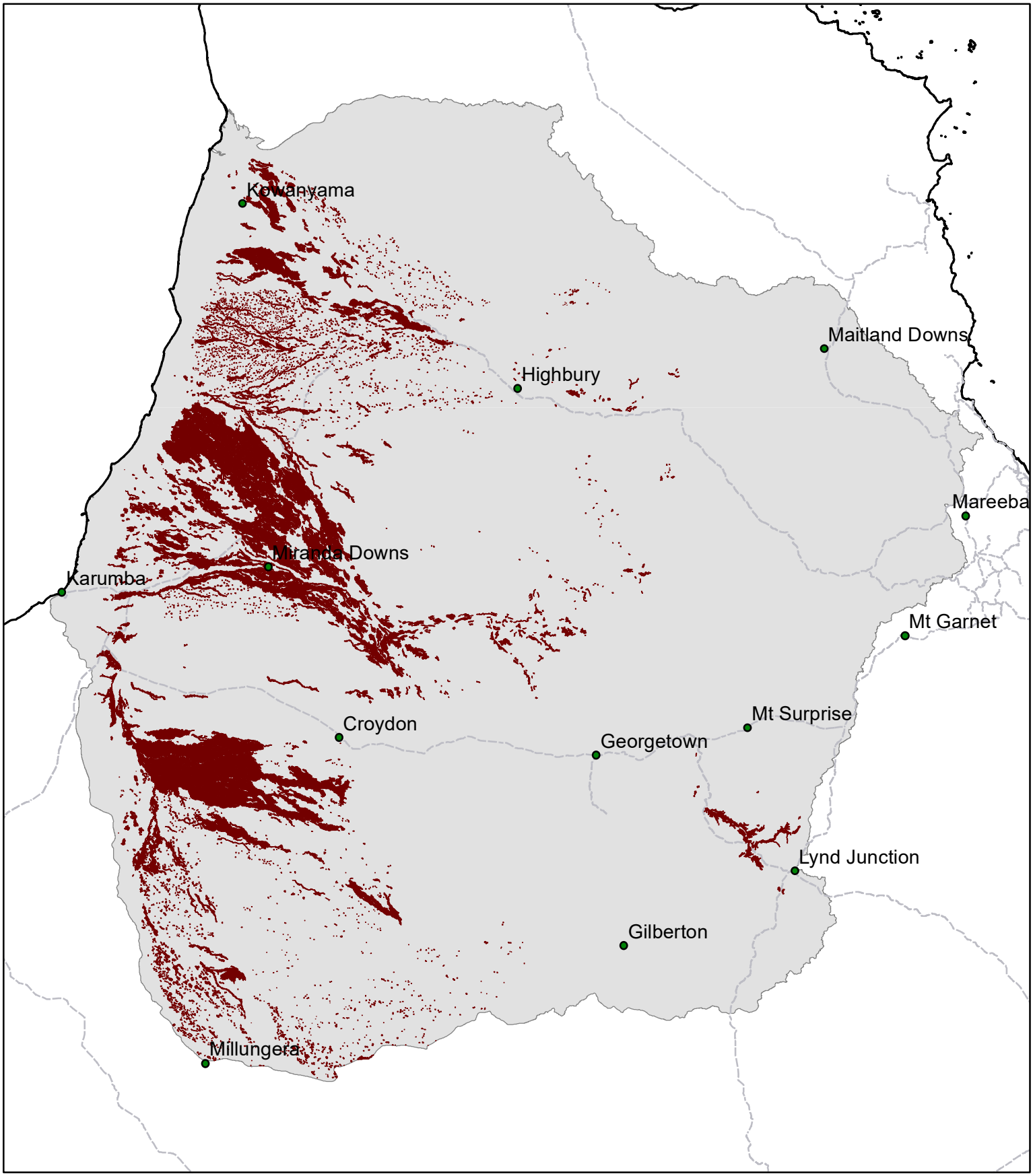
Regional Ecosystems

2.3.11, 2.3.13, 2.3.15, 2.3.17a-b, 2.3.19, 2.3.27x2, 2.3.33a-b, 2.3.42a-c, 2.3.51, 2.3.55b-c, 2.3.61a-c, 2.3.63, 2.3.9, 2.4.4a, 3.3.35, 3.3.37a, 3.3.46, 9.3.19a.

Land system, Local Pasture Unit

Glenore (50) (Perry *et al* 1964); LPU 67 (Tothill and Gillies 1992).

NG02 Coolibah country



Area of land type in region: 5%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 80%
Median FPC: 15%
Median TBA: 6 m2/ha

Queensland Government

Frontage

Landform	Level plains.
Woody vegetation	Grey box, Moreton Bay ash, ghost gum and broad-leaved carbeen woodlands.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Black speargrass, forest bluegrass, golden beard grass, silky browntop, giant speargrass.
Intermediate	Pitted bluegrass.
Non-preferred	Wiregrasses.
Annual grasses	Comet grass.
Suitable sown pastures	Buffel grass on lighter soils. Urochloa, Desmanthus, Shrubby, Caribbean and Caatinga stylos on heavier soils.
Introduced weeds	Castor oil bush, rubbervine, calotrope, parkinsonia, Noogoora burr, hyptis, bellyache bush, chinee apple, grader grass.
Soil	Alluvial loams.
Description	***Surface:*** Fine, non-cracking; ***Surface texture:*** silty loam; ***Subsoil texture:*** loam to clay.
Features	Depth to clay is variable in these land types.

Water availability

Moderate

Fertility

High. Low nitrogen (0.08%); high phosphorus (>20 mg/kg); high potassium (0.45 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Slightly acidic (6.0) throughout the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 716 – 1297 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	1860 - 2560	30%	3.8 – 5.2
	7 TBA 18 FPC	930 - 1390	30%	7 – 11

Enterprise

Breeding and growing.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Frontage areas are preferentially grazed and require cattle control to prevent over grazing and degradation of areas.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody weeds (e.g. rubbervine).

Land use limitations

- Uncontrolled grazing (cattle, pigs, wallabies) leads to overgrazing of these areas with subsequent loss of 3P grasses and weed invasions.

Conservation features and related management

- Subject to erosion and weed infestation due to high grazing pressure.
- Subject to weed infestation by rubbervine (*Cryptostegia grandiflora)*, lantana and grader grass *(Themeda quadrivalvis*).
- Hollows that occur in older trees provide habitat for arboreal mammals.

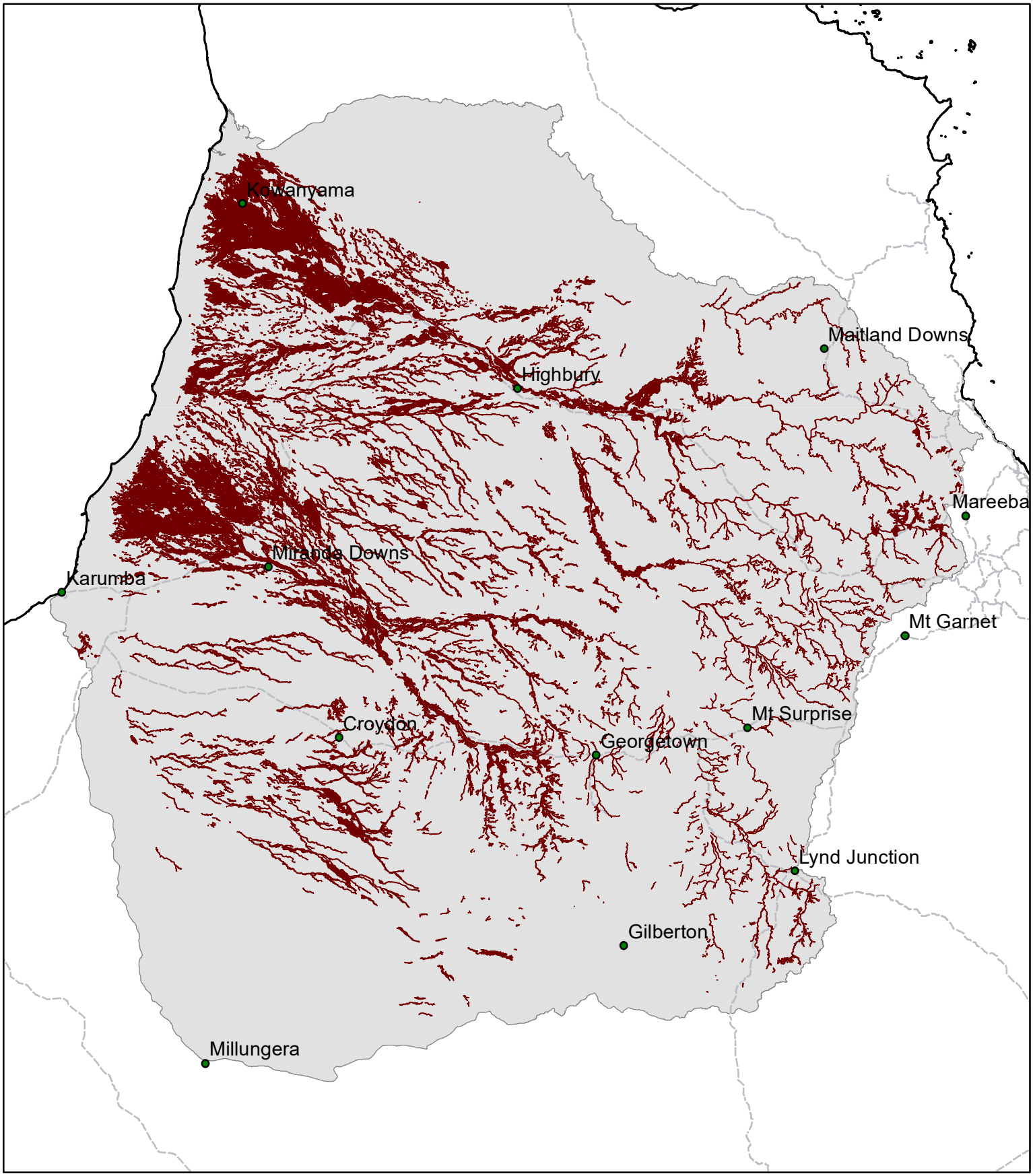
Regional Ecosystems

2.3.21f-j, 2.3.22, 2.3.24a-c, 2.3.26a-f, 2.3.41, 2.3.44a-c, 2.3.44e, 2.3.52, 2.3.53, 2.3.54, 2.3.62a-b, 2.3.68, 2.3.69a, 2.3.6a-b, 2.3.72a-b, 9.3.13, 9.3.14a-b, 9.3.15, 9.3.16, 9.3.20, 9.3.21, 9.3.26, 9.3.3c-e, 9.3.6a.

Land system, Local Pasture Unit

Gilbert (54), Miranda (51) (Perry *et al* 1964).

NG03 Frontage



Area of land type in region: 8%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 82%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Georgetown granites

Landform	Rolling granite plains.
Woody vegetation	Georgetown box open woodlands with terminalia, gum-topped bloodwood and understorey of breadfruit, bauhinia, quinine and corkwood wattle.
Expected pasture composition	**Denotes non-native "Expected Pasture Composition" species.* *Pastures often dominated by* Aristida *species.*
Preferred	Black speargrass, forest bluegrass, golden beard grass, plume sorghum, giant speargrass.
Intermediate	Northern wanderrie grass, cotton panic, wiregrasses.
Non-preferred	
Annual grasses	Silkytop grass, fire grass, rare panic, comet grass, comb finger grass, pigeon grass, long-awn wanderrie grass, fire grass. Non-preferred species include grader grass*.
Suitable sown pastures	Oversow with legumes – Caribbean and Shrubby stylos.
Introduced weeds	Chinee apple, mimosa bush, rubbervine, grader grass.
Soil	Brown soils of light texture, earthy sands, and texture contrast soils.
Description	***Surface:*** Originally sandy, loose surface; ***Surface texture:*** sandy loam; ***Subsoil texture:*** medium clay.

Features

Large granite outcrops. Sheet erosion is widespread. Often associated with red duplex land type.

Water availability

Moderate

Fertility

Moderate; low nitrogen (0.02%); moderate phosphorus (5 mg/kg); low potassium (0.15 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Slightly acid (6.0) throughout profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 663 – 927 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	1720 - 2420	20%	6.0 – 8.5
	7 TBA 18 FPC	820 - 1600	20%	10 – 19

Enterprise

Breeding and growing.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. breadfruit).
- Phosphate supplements are required in wet season.

Land use limitations

- Granite rock outcrops.
- Loss of 3 P grasses has greatly reduced the productivity potential on this land type.

Conservation features and related management

- Vulnerable to the invasion of exotic weed *Senna magnifolia* (weedy Cassia).

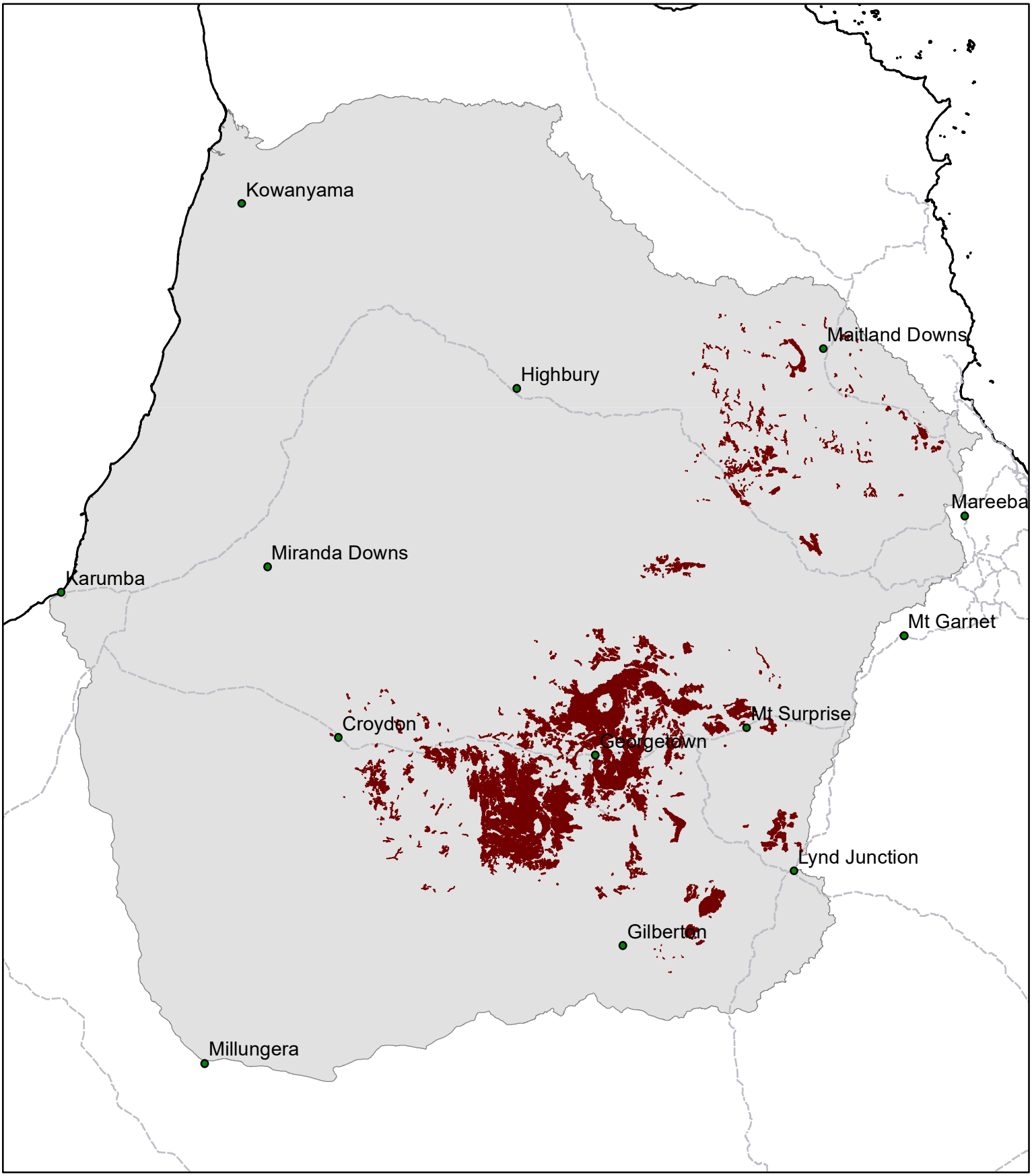
Regional Ecosystems

2.3.71, 7.12.55, 9.11.23a-c, 9.11.24a-b, 9.11.26a-b, 9.12.33, 9.12.36a, 9.5.10a-c.

Land system, Local Pasture Unit

Georgetown (38) (Perry *et al* 1964); LPU 41 (Tothill and Gillies 1992).

NG04 Georgetown granites



Area of land type in region: 3%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 93%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Lancewood

Landform	Scarps and remnant plateaus.
Woody vegetation	Lancewood woodland with occasional narrow-leaved ironbark and Darwin woollybutt. Quinine, mock orange and soap tree occur infrequently.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.* *Pastures may be dominated by the annual fire grass species.*
Preferred	Forest bluegrass, lemon-scented grass, spinifex.
Intermediate	Wiregrasses
Non-preferred	
Annuals	Fire grass, lovegrasses, slender wanderrie grass.
Suitable sown pastures	Not suitable for sown pastures.
Introduced weeds	

Soil

Skeletal, stony soils.

Description

Surface: Variable cover of rock and gravel; ***Surface texture:*** sandy clay; ***Subsoil texture:*** fragmented bedrock.

Features

Hard-setting, very shallow, usually stony.

Water availability

Low

Fertility

Low

Salinity

Non-saline

Sodicity

Non-sodic

pH

Variable, slightly acid soils.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 692 – 961 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	640 - 1170	15%	17 - 30
	8 TBA 20 FPC	210 - 330	15%	59 – 93

Enterprise

Breeding

Land use and management recommendations

- Lancewood is useful for yard rails.

Land use limitations

- Skeletal, shallow and rocky soils limit productivity.

Conservation features and related management

- Structural diversity in this land type provides habitat for range of fauna.
- Some areas are subject to timber harvesting.

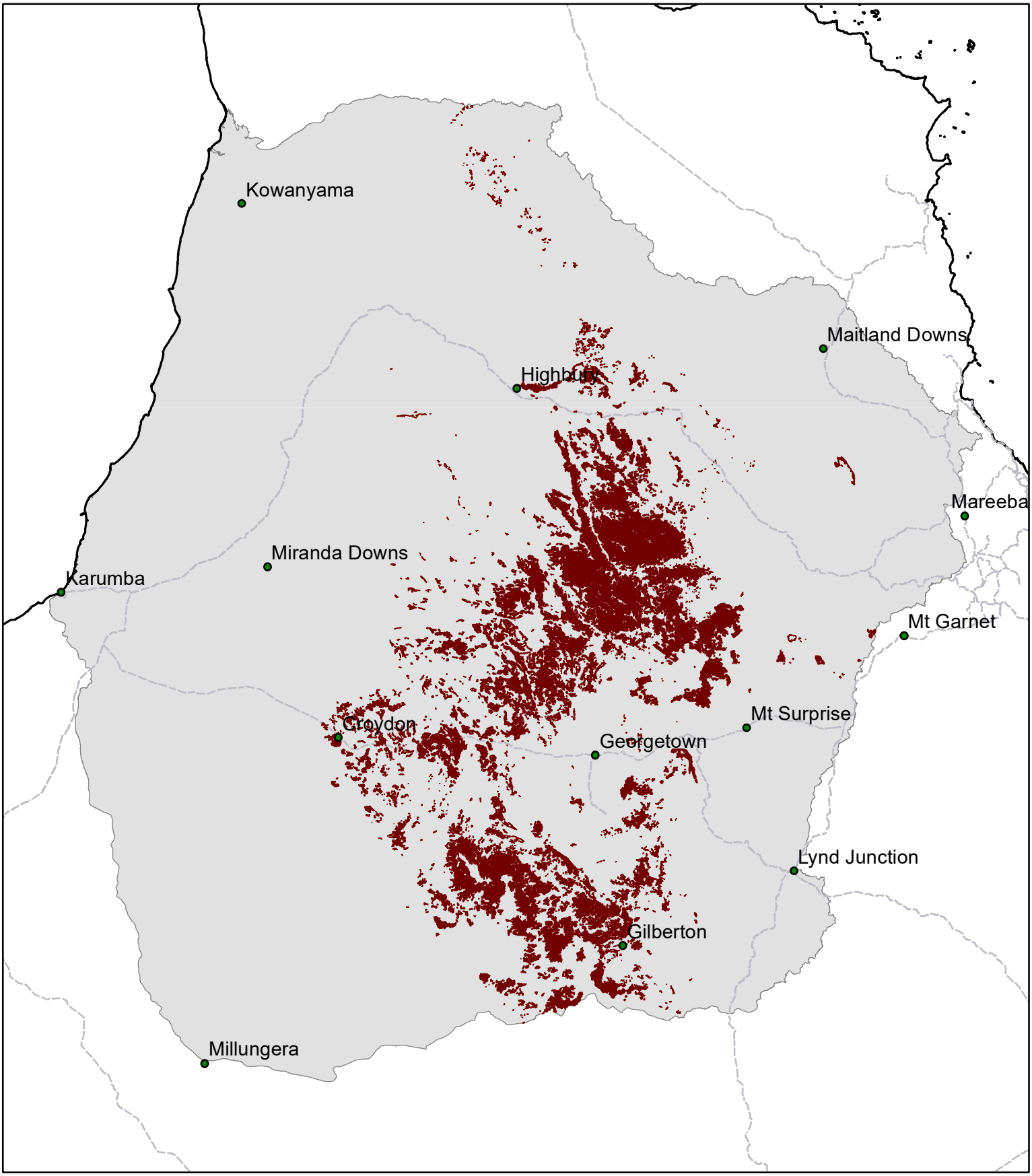
Regional Ecosystems

2.10.5a, 2.10.5b, 2.10.5x1, 2.10.5x4, 2.7.1, 2.7.1x2a-c, 2.7.1x3a, 2.7.1x4, 2.7.1x5, 2.7.1x6, 2.7.1x7, 2.7.2a, 2.7.2x10, 2.7.2x11, 2.7.2x2a-f, 2.7.2x3, 2.7.2x4, 2.7.2x5, 2.7.2x6, 2.7.2x8, 3.7.2, 9.10.1, 9.10.1c, 9.10.3a-c, 9.10.9, 9.11.28a-c, 9.11.30a-b, 9.12.37, 9.12.38a.

Land system, Local Pasture Unit

Torwood (11) Perry *et al* 1964); LPU 47 (Tothill and Gillies 1992).

NG05 Lancewood



Area of land type in region: 6%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 93%
Median FPC: 20%
Median TBA: 8 m2/ha

Queensland Government

Marine plains

Landform	Level, saline coastal plains, mostly bare mud and salt flats or plains of saline clays.
Woody vegetation	Treeless plains.
Expected pasture composition	**Denotes non-native "Expected Pasture Composition" species.*
Preferred	Marine couch, mudgrass, northern rice grass.
Intermediate	Canegrass, slender chloris.
Non-preferred	
Annual grasses	None.
Common forbs	Spike rushes, fringe rush, sedges. Samphire grows on some mud and salt flats but is not eaten.
Suitable sown pastures	Not suitable for sown pastures.
Introduced weeds	Rubbervine, parkinsonia (more elevated areas).
Soil	Grey and black saline, cracking clay soils (solonchaks).
Description	***Surface:*** Thin salt crust*;* ***Surface texture:*** heavy clay; ***Subsoil texture:*** heavy clay.
Features	Carbonate nodules and/or gypsum at shallow depths.
Water availability	High

Fertility

Moderate to high. Low nitrogen (2%); high phosphorus (21 mg/kg); high potassium (2.2 cmol /kg).

Salinity

Very high.

Sodicity

Highly sodic.

pH

Neutral (6.7) at surface; increasing alkalinity down the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 778 – 1297 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	3420	25%	3.4
	7 TBA 18 FPC	2890 - 3030	25%	3.9 – 4.0

Enterprise

Breeding herds.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Seasonal inundation provides wet season spelling in most years.
- Early dry (July) burning and overgrazing should be avoided to maintain effective ground cover at break of season.

Land use limitations

- Regular inundation.
- Most surface water is saline, restricting grazing to short periods only during wet season when fresh water is available.
- Soils too saline for agriculture.

Conservation features and related management

- Significant wader habitat.
- Seasonally important habitat for water birds for feeding and breeding.

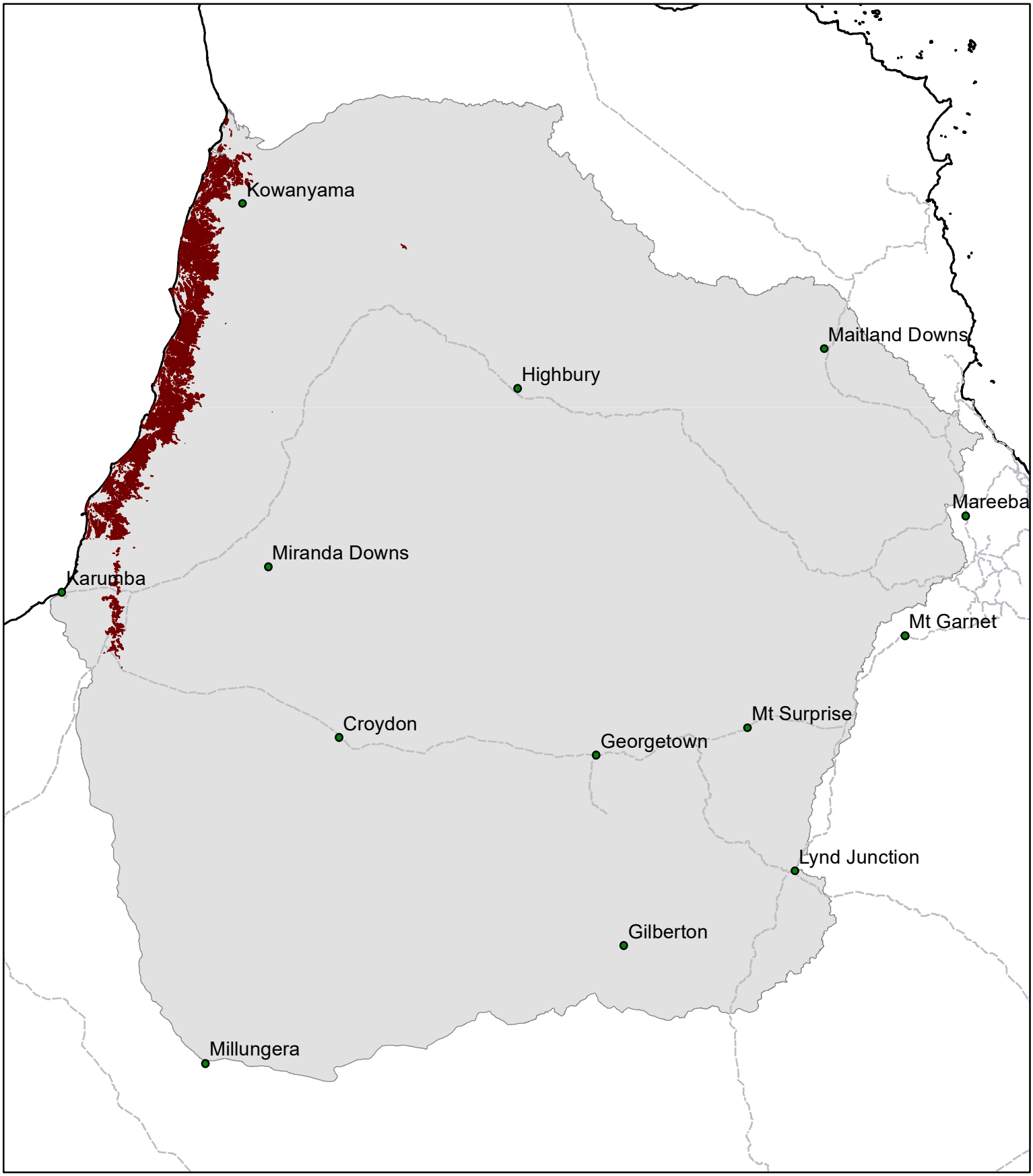
Regional Ecosystems

7.1.1, 7.1.2a-b, 7.1.3a-c, 7.1.4a-d, 7.1.5.

Land system, Local Pasture Unit

Carpentaria (58) (Perry *et al* 1964); LPU 131 (Tothill and Gillies 1992).

NG06 Marine plains



Area of land type in region: 1%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 13%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Old alluvials

Landform	Level plains including abandoned stream channels, backslopes and adjacent floodplains.
Woody vegetation	Ghost gum, bloodwood, grey box, terminalia open woodlands with breadfruit or guttapercha understorey.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Black speargrass, forest bluegrass, golden beard grass, silky browntop, giant speargrass.
Intermediate	Pitted bluegrass.
Non-preferred	Wiregrass.
Annual grasses	Comet grass.
Suitable sown pastures	Buffel grass, urochloa, Shrubby and Caribbean stylos.
Introduced weeds	Rubbervine, parkinsonia, hyptis, chinee apple.
Soil	Alluvial loams and yellow duplex soils.
Description	***Surface:*** Non-cracking; ***Surface texture:*** loamy clay; ***Subsoil texture:*** light to medium clay.
Features	

Water availability	Moderate
Fertility	Moderate
Salinity	Non-saline
Sodicity	Non-sodic
pH	Slightly acidic (6.0) throughout the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 778 – 1297 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	980 - 2040	25%	6 - 12
	7 TBA 18 FPC	460 - 890	25%	13 – 25

Enterprise

Breeding and growing.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody weeds (e.g. rubbervine).

Land use limitations

- Moderate erodibility on duplex soils on steeper slopes.

Conservation features and related management

- Subject to high total grazing pressure leading to wind erosion, scalding and weed invasion (e.g. rubbervine, hyptis).
- Significant habitat particularly for herbivores such as macropods and arboreal mammals.
- Significant habitat as drought refuge, wildlife corridors and for arboreal animals.

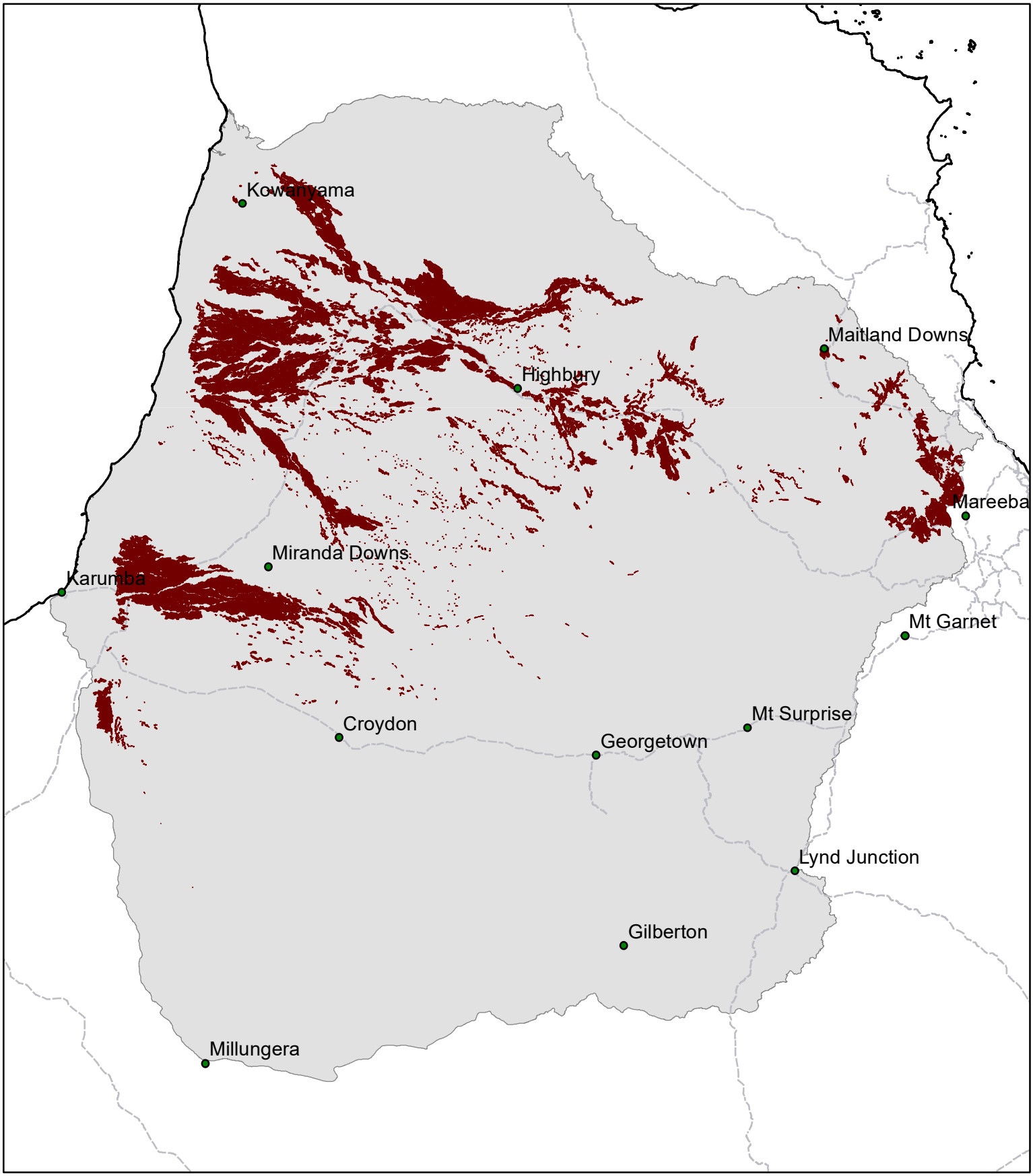
Regional Ecosystems

2.3.10a-c, 2.3.10e-f, 2.3.18, 2.3.21b, 2.3.21e, 2.3.40, 2.3.42e, 2.3.45, 2.3.46, 2.3.49, 2.3.55a, 2.3.56, 2.3.57, 2.3.58, 2.3.59a, 2.3.60, 2.3.66, 2.3.69b, 9.3.70, 2.4.4b, 2.5.22a-b, 2.5.23c, 9.5.9a-c.

Land system, Local Pasture Unit

Gilbert (54), Miranda (51) (Perry *et al* 1964).

NG07 Old alluvials



Area of land type in region: 5%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 90%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Range soils

Landform	Dissected hilly country.
Woody vegetation	Silver-leaved ironbark, narrow-leaved ironbark and bloodwood woodland with understorey of grevilleas, breadfruit, wattles and quinine.
Expected pasture composition	**Denotes non-native "Expected Pasture Composition" species.* *Pastures often dominated by* Aristida *and the annual fire grass species.*
Preferred	Black speargrass, kangaroo grass, golden beard grass, gulf bluegrass, spinifex, lemon-scented grass, giant speargrass, silky browntop, plume sorghum.
Intermediate	Cotton panic, sandstone panic, wiregrasses.
Non-preferred	
Annual grasses	Fire grass, comet grass, silkytop grass, slender wanderrie grass, *Themeda arguens.*
Suitable sown pastures	Shrubby stylos.
Introduced weeds	
Soil	Shallow soils.
Description	***Surface:*** Variable gravel cover; sometimes hard-setting; ***Surface texture:*** variable***,*** sandy clay; ***Subsoil texture:*** limited by underlying bedrock.

Features	Shallow, generally stony and rocky soils.
Water availability	Low
Fertility	Low
Salinity	Non-saline
Sodicity	Non-sodic
pH	Variable, slightly acid soils.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 692 – 927 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	920 - 2040	15%	10 - 21
	7 TBA 18 FPC	300 - 980	15%	20 – 65

Enterprise

Breeding

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. breadfruit, wattles).

Land use limitations

- Skeletal, shallow and rocky soils limit productivity.

Conservation features and related management

- Subject to degradation from high total grazing pressure and may become vulnerable to weed invasion (e.g. mimosa).
- Some areas are subject to timber harvesting.

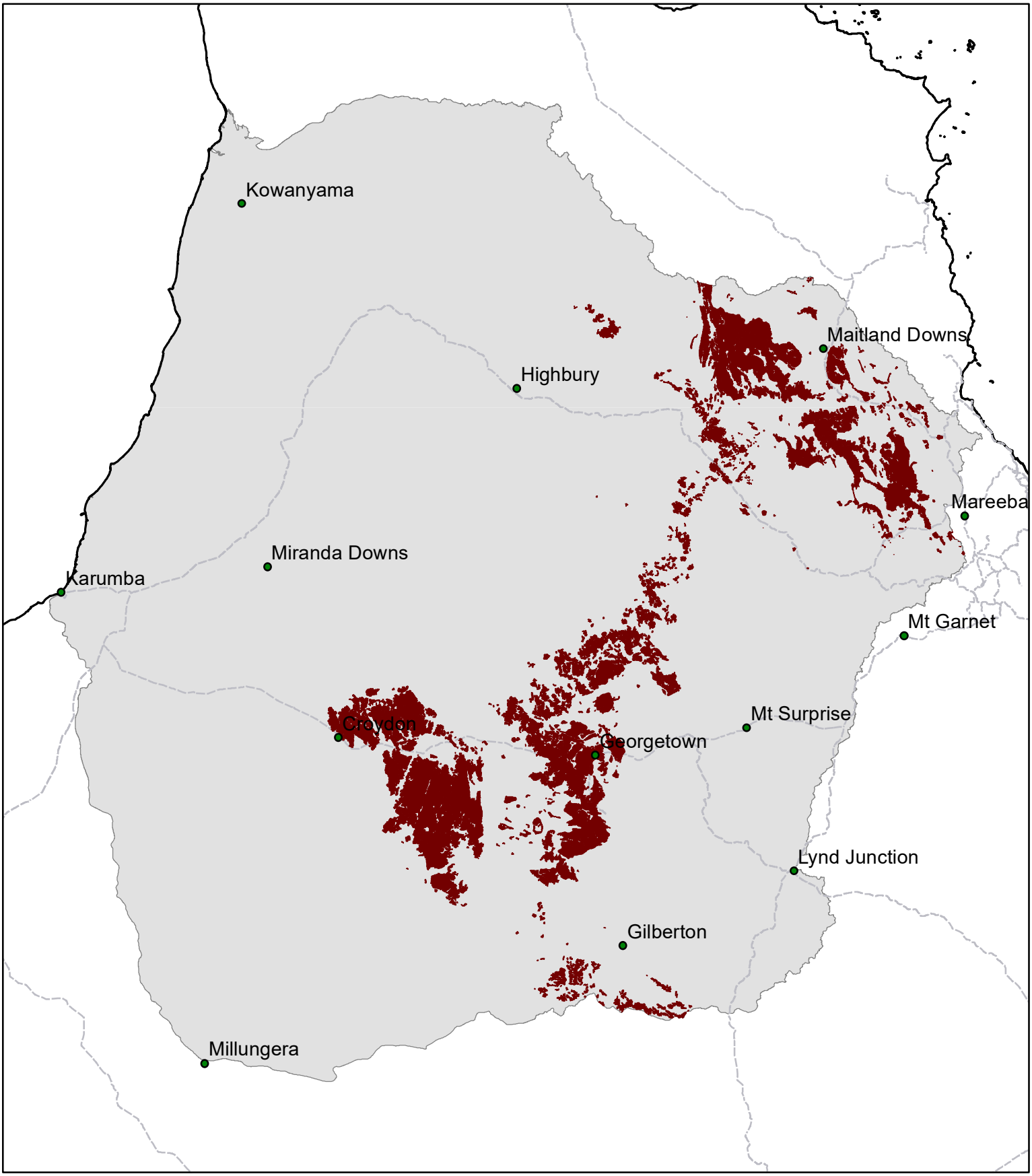
Regional Ecosystems

2.10.2x10a-c, 2.10.2x2, 2.10.2x3a-b, 2.10.2x5a-c, 3.12.21, 7.12.7c-d, 9.11.12, 9.11.15a-b, 9.11.16, 9.11.24c, 9.11.25, 9.12.12, 9.12.14, 9.12.15, 9.12.17, 9.12.2, 9.12.27, 9.12.29, 9.12.33a, 9.12.43a-b, 9.12.4a-c, 9.12.6a-b, 9.12.6e, 9.12.7a-c.

Land system, Local Pasture Unit

Ortona (10), Leichhardt (16), Belmore (17) (Perry *et al* 1964).

NG08 Range soils



Area of land type in region: 5%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 91%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Red basalt

Landform	Irregular stony plains and low hills.
Woody vegetation	Narrow-leaved ironbark woodlands with gum-topped bloodwood, ghost gum, grevilleas.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Black speargrass, kangaroo grass, forest bluegrass, Queensland bluegrass, giant speargrass.
Intermediate	Silky browntop, lemon-scented grass, gulf bluegrass, pitted bluegrass, plume sorghum, Indian couch*.
Non-preferred	Wiregrasses.
Annual grasses	Fire grass, comet grass, lovegrasses.
Suitable sown pastures	Buffel grass, leucaena, Angleton bluegrass, creeping bluegrass, Caatinga stylo, desmanthus, butterfly pea.
Introduced weeds	Rubbervine, lantana, grader grass.
Soil	Red brown clay loams (euchrozems, krasnozems).

Description

Surface: Usually stony; ***Surface texture:*** clay loam; ***Subsoil texture:*** clay loam to medium clay.

Features

Free draining and high fertility. Rocks throughout profile.

Water availability

Moderate to high.

Fertility

High; high nitrogen (14 mg/kg); high phosphorus (40 mg/kg); high potassium (0.6 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Neutral to slightly acid (6.8) throughout profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 716 – 742 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	1080 - 1890	30%	5.2 – 9.0
	7 TBA 18 FPC	360 - 760	30%	13 – 27

Enterprise

Breeding and growing.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. eucalypts).
- Salt and sulphur supplements required in wet season.

Land use limitations

- Rocks throughout profile.

Conservation features and related management

- Subject to weed infestation by rubbervine (*Cryptostegia grandiflora)*, lantana and grader grass *(Themeda quadrivalvis*).

Regional Ecosystems

7.8.7a, 9.8.1a.

Land system, Local Pasture Unit

Boonderoo (60) (Perry *et al* 1964); LPU 28 (Tothill and Gillies 1992).

NG09 Red basalt

Area of land type in region: 0.01%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 96%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Red duplex

Landform	Irregular plains and low hills.
Woody vegetation	Narrow-leaved ironbark woodlands with gum-topped bloodwood, corkwood wattle and understorey currant bush and breadfruit.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Forest bluegrass, Queensland bluegrass, black speargrass, giant speargrass.
Intermediate	Pitted bluegrass, silky browntop, golden beard grass, lemon-scented grass, gulf bluegrass, plume sorghum, Indian couch*, bottlewasher grasses, native couch.
Non-preferred	Wiregrass, white speargrass.
Annual grasses	Comet grass, fairy grass, fire grass.
Suitable sown pastures	Buffel grass, Shrubby and Caribbean stylos.
Introduced weeds	Chinee apple, thornapple.
Soil	Texture contrast soils (mostly red podzolics).

Description

Surface: Variable quartz pebbles and outcrops; ***Surface texture:*** loamy; ***Subsoil texture:*** medium clay.

Features

Water availability

Moderate

Fertility

Moderate. Low nitrogen (4 mg/kg); moderate phosphorus (9 mg/kg); high potassium (0.43 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Neutral (6.3) at surface; increasing alkalinity down the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 716 – 833 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	1400 - 2000	25%	5.8 – 8.3
	11 TBA 27 FPC	410 - 990	25%	12 – 29

Enterprise

Breeding and growing herds.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. breadfruit).

Land use limitations

- Limit mechanical disturbance (nothing more severe than a crocodile seeder) due to the slope and fragile nature of the duplex soils.

Conservation features and related management

- Flowers of dominant tree species are important feed sources for nectivorous birds.

Regional Ecosystems

9.5.6a.

Land system, Local Pasture Unit

Reedy Springs (39), Kilbogie (40) (Perry *et al* 1964); LPU 28 (Tothill and Gillies 1992).

NG10 Red duplex

Area of land type in region: 0.1%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 55%
Median FPC: 27%
Median TBA: 11 m2/ha

Queensland Government

Red earths

Landform	Upper slopes on level to gently undulating plains.
Woody vegetation	Bloodwood, narrow-leaved ironbark woodland with understorey of grevilleas, wattles and quinine.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.*
Preferred	Golden beard grass, forest bluegrass, black speargrass, kangaroo grass.
Intermediate	Cotton panic, silky browntop, lemon-scented grass, gulf bluegrass, plume sorghum, Indian couch*, bottlewasher grasses, giant speargrass.
Non-preferred	Wiregrasses.
Annual grasses	Fire grass, comet grass, fairy grass.
Suitable sown pastures	Shrubby and Caribbean stylos.
Introduced weeds	
Soil	Free draining, grey to red surface grading to red clay soils.
Description	***Surface:*** Loose; ***Surface texture:*** sandy loam; ***Subsoil texture:*** medium clay.
Features	Free draining. Ironstone nodules in subsoils.

Water availability

Low

Fertility

Variable, generally low. Low nitrogen (1 mg/kg); low phosphorus (4 mg/kg); low potassium (0.1 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Neutral (6.4) at surface; increasing acidity down the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 692 – 927 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	1580 - 2610	20%	5.6 – 9.2
	9 TBA 22 FPC	630 - 1440	20%	10 – 23

Enterprise

Breeding herds.

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. breadfruit, wattles).
- Native pastures need to be burnt prior to over-sowing with stylos.

Land use limitations

- Timber thickening limits pasture productivity.
- Low fertility limits possibilities for sown grasses.
- Phosphorus supplements are required in wet season.

Conservation features and related management

- The vulnerable plant species *Jedda multicaulis* and rare species *Gardenia scabrella*, *Acacia ommatosperma* and *Labichea brassii* may occur in this land type.

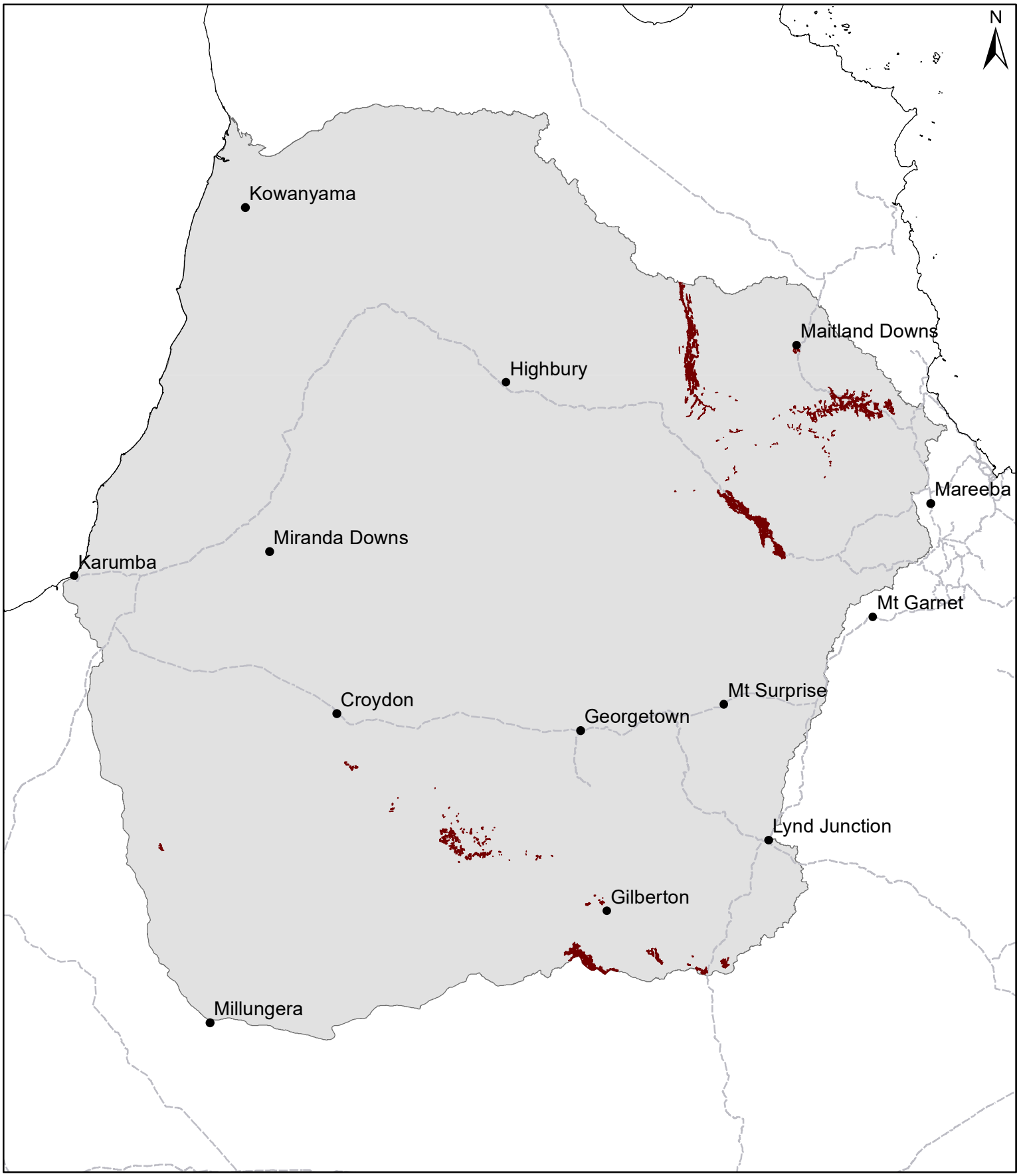
Regional Ecosystems

2.10.1a, 2.10.4b, 2.11.1a-b, 2.5.1a-b, 2.5.24a-c, 2.5.25, 9.11.13, 9.3.2.

Land system, Local Pasture Unit

Karoon (2), Boorooman (4), Yanman (25), Glenharding (26), Lyall (32) (Perry *et al* 1964); LPU 28, 41 (Tothill and Gillies 1992).

NG11 Red earths



Area of land type in region: 0.5%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 82%
Median FPC: 22%
Median TBA: 9 m2/ha

Queensland Government

Sand ridge

Landform	Subtle ridges on the outwash plains.
Woody vegetation	Messmate, Darwin woollybutt, Cooktown ironwood, bloodwood, narrow-leaved ironbark woodland with understorey dominated by wattles.
Expected pasture composition	** Denotes non-native "Expected Pasture Composition" species.* *Preferred species rarely dominate this land type. Pasture may be dominated by fire grass.*
Preferred	Golden beard grass, forest bluegrass, plume sorghum, black speargrass, giant speargrass.
Intermediate	Northern wanderrie grass, cotton panic, wiregrasses.
Non-preferred	
Annuals	Fire grass, silkytop grass, lovegrasses, long-awn wanderrie grass, rare panic, comb finger grass, pigeon grass.
Suitable sown pastures	Shrubby and Caribbean stylos with fertiliser.
Introduced weeds	
Soil	Sandy red earths.
Description	***Surface:*** Loose; ***Surface texture:*** sandy; ***Subsoil texture:*** light red clay.

Features	Dry refuge for stock during wet season.
Water availability	Low
Fertility	Low; low nitrogen (0.022%); low phosphorus (2 mg/kg); low potassium (0.1 cmol /kg).
Salinity	Non-saline
Sodicity	Non-sodic
pH	Slightly acidic (6.0).

Utilisation

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 544 – 961 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	520 - 1530	15%	13 - 37
	7 TBA 18 FPC	140 - 480	15%	41 – 136

Enterprise

Breeding

Land use and management recommendations

- Suitable for grazing of native pastures, but only at low carrying capacities.
- Spelling to achieve fuel loads and strategic burning (late dry hot burn) to manage woody thickening (e.g. wattles).

Land use limitations

- Very low fertility limits potential carrying capacities.
- Phosphorus supplements are essential in wet season.

Conservation features and related management

- Seasonal refuge for fauna.
- Subject to heavy total grazing pressure. In some areas prone to scalding and wind erosion.
- The vulnerable plant species *Acacia crombiei* and the rare species Howitt's box *Eucalyptus howittiana*, *Labichea brassii* can occur in this land type.

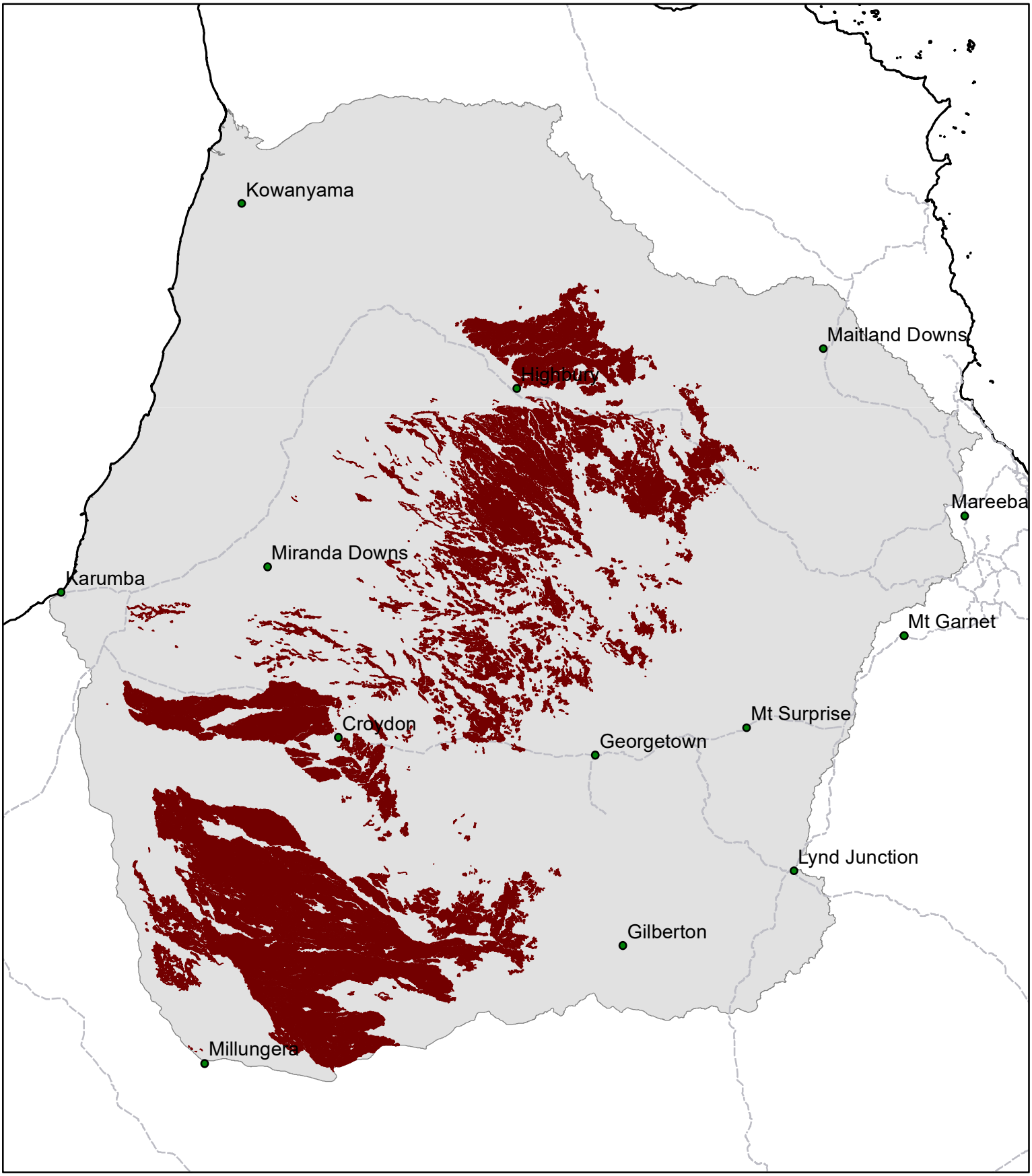
Regional Ecosystems

2.5.14a, 2.5.19a-d, 2.5.27, 2.5.3, 2.5.5a-b, 2.5.6a-c, 3.5.32, 9.11.32, 9.12.33c.

Land system, Local Pasture Unit

Strathpark (19), Dandry (21), Esmeralda (22), Strathmore (23), Stanhill (36), Mayvale (42), Claraville (43), Abingdon (45), Prospect (57) (Perry *et al* 1964); LPU 41 (Tothill and Gillies 1992).

NG12 Sand ridge



Area of land type in region: 13%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 99%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Bauhinia sandy forest

Landform	Outwash sandy plains.
Woody vegetation	Low, moderately dense, woodland of bauhinia, beefwood, whitewood, emu apple, dead finish, ironwood, Cooktown ironwood, arid peach and paperbarks. Emergent long-fruited bloodwoods may occur in some stands. Scattered shrubs include currant bush, wait-a-while and mimosa bush*.
Expected pasture composition	**Denotes non-native "Expected Pasture Composition" species.* *Pastures often dominated by* Aristida *and the annual fire grass species.*
Preferred	Golden beard grass, plume sorghum, black speargrass, forest bluegrass, gulf bluegrass, kangaroo grass.
Intermediate	Northern wanderrie grass, lovegrasses, cotton panic, wiregrasses.
Non-preferred	
Annual grasses	Fire grass, silkytop grass, comb finger grass, comet grass, rare panic, pigeon grass, long-awn wanderrie grass.
Suitable sown pastures	Shrubby and Caribbean stylos, buffel grass.
Introduced weeds	Chinee apple, grader grass, mimosa bush.
Soil	Red to yellow, light grey uniform or light textured deep sandy soils.
Description	***Surface:*** Loose; ***Surface texture:*** sandy; ***Subsoil texture:*** sand to light clay.

Features

Surface runoff is very low with high infiltration and internal drainage. Subsoils are soft to slightly hard.

Water availability

Low

Fertility

Low nitrogen (0.022%); low phosphorus (2 mg/kg); low potassium (0.1 cmol /kg).

Salinity

Non-saline

Sodicity

Non-sodic

pH

Strongly acid to neutral in surface.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 544 – 961 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	380 - 1640	15%	12 - 51
	8 TBA 20 FPC	180 - 620	15%	32 – 106

Enterprise

Breeding

Land use and management recommendations

- Suitable for grazing of native pastures.
- Generally higher stocking rate than northern sandy forest country, possibly because of top feed (bauhinia, whitewood).
- Spelling to achieve fuel loads and strategic burning (late dry hot burn) to manage woody thickening (e.g. tea trees).
- Native pastures need to be burnt prior to over-sowing with stylos.

Land use limitations

- Extremely low fertility limits potential carrying capacities.
- Phosphorus supplements are essential in wet season.

Conservation features and related management

- Subject to heavy total grazing pressure. In some areas prone to scalding and wind erosion.
- Provides wetland habitat for a flora and fauna.
- Includes seasonal wetlands significant as feeding sites for water birds.

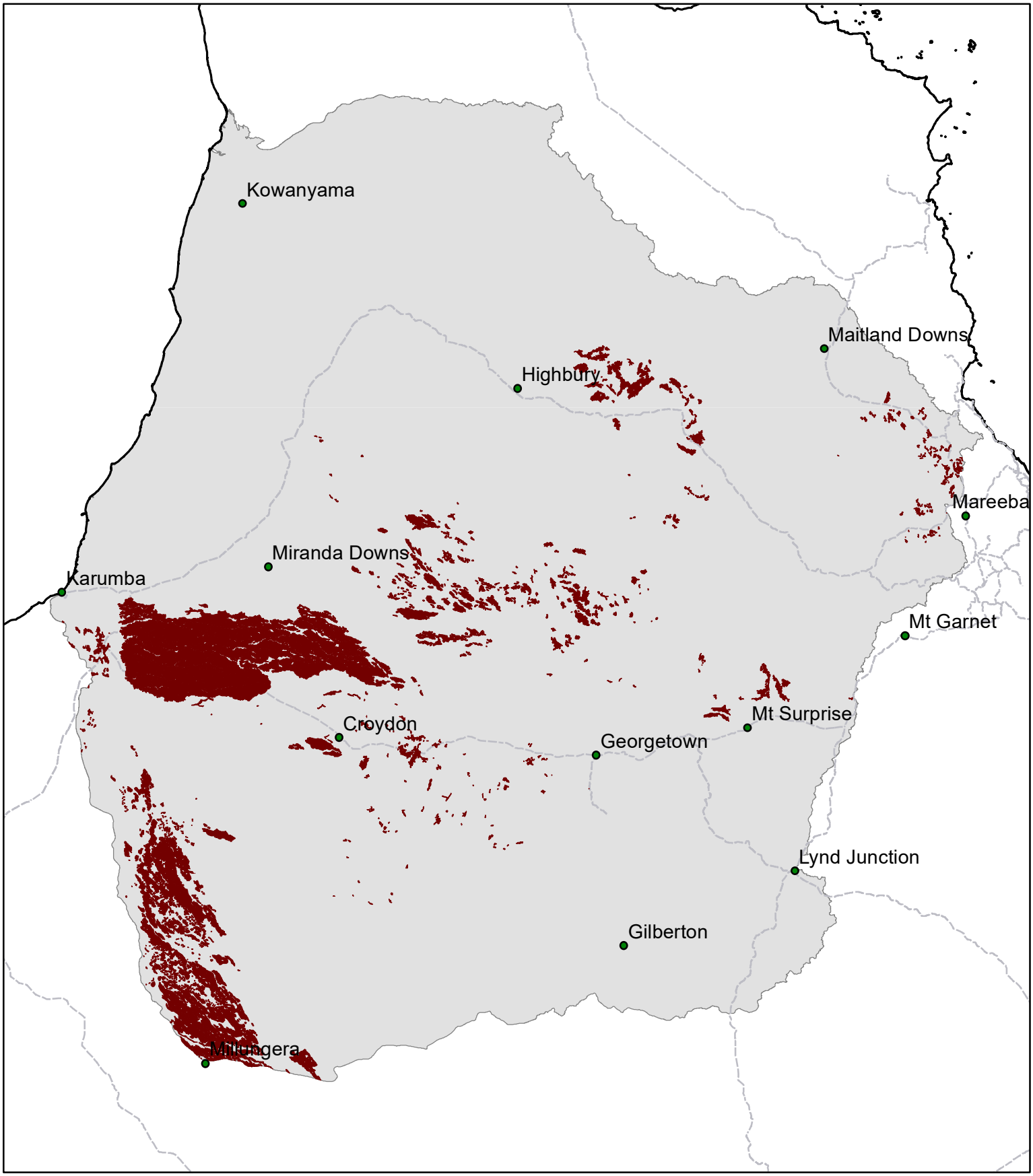
Regional Ecosystems

2.5.17a-b, 2.5.30, 2.5.36, 2.5.36, 2.5.37a-b, 2.5.41, 9.5.13a-b, 9.5.14, 9.5.15a-b.

Land system, Local Pasture Unit

Bylong (44), Strathmore (23), Mayvale (42), Claraville (43) (Perry *et al* 1964) LPU 41 (Tothill and Gillies 1992).

NG13 Bauhinia sandy forest



Area of land type in region: 5%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 97%
Median FPC: 20%
Median TBA: 8 m2/ha

Queensland Government

Northern sandy forest

Landform	Outwash plains.
Woody vegetation	Broad-leaved and narrow-leaved tea tree low woodland and Georgetown box woodland. In areas of higher rainfall messmate and bloodwood woodlands occur. Associated species include Cooktown ironwood, wattles, terminalia, guttapercha, quinine and bauhinia. Sparse occurrence of currant bush and wait-a-while.
Expected pasture composition	**Denotes non-native "Expected Pasture Composition" species.* *Pastures often dominated by* Aristida *and the annual fire grass species*.
Preferred	Golden beard grass, forest bluegrass, plume sorghum, black speargrass, giant speargrass.
Intermediate	Northern wanderrie grass, cotton panic, wiregrasses.
Non-preferred	
Annual grasses	Fire grass, silkytop grass, lovegrasses, long-awn wanderrie grass, rare panic, comb finger grass, pigeon grass.
Suitable sown pastures	Shrubby and Caribbean stylos with fertiliser.
Introduced weeds	
Soil	Texture contrast soils and sandy grey and yellow earths.
Description	***Surface:*** unstructured; ***Surface texture:*** loamy sand; ***Subsoil texture:*** loamy clay.

Features	Frequently turn to bulldust, mottling of subsoils, slow or impeded drainage.
Water availability	Low to moderate.
Fertility	Low nitrogen (0.022%); low phosphorus (2 mg/kg); low potassium (0.1 cmol /kg).
Salinity	Non-saline
Sodicity	Moderate to high sodicity at surface; high to extremely high at depth.
pH	Acidic (5.5–6.0) throughout the profile; sometimes becoming more neutral (6.5) 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 723 – 1297 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	1210 - 1580	15%	12 - 16
	7 TBA 18 FPC	460 - 980	15%	20 – 42

Enterprise

Breeding

Land use and management recommendations

- Suitable for grazing of native pastures.
- Spelling to achieve fuel loads and strategic burning (late dry hot burn) to manage woody thickening (e.g. tea trees).
- Native pastures need to be burnt prior to over-sowing with stylos.

Land use limitations

- Extremely low fertility limits potential carrying capacities.
- Phosphorus supplements are essential in wet season.

Conservation features and related management

- Subject to heavy total grazing pressure. In some areas prone to scalding and wind erosion.
- Provides wetland habitat for a flora and fauna.
- Includes seasonal wetlands significant as feeding sites for water birds.
- The rare species Kurrajong *Brachychiton vitifolius* and *Homoranthus tropicus* and vulnerable species *Macropteranthes montana* can occur in this land type

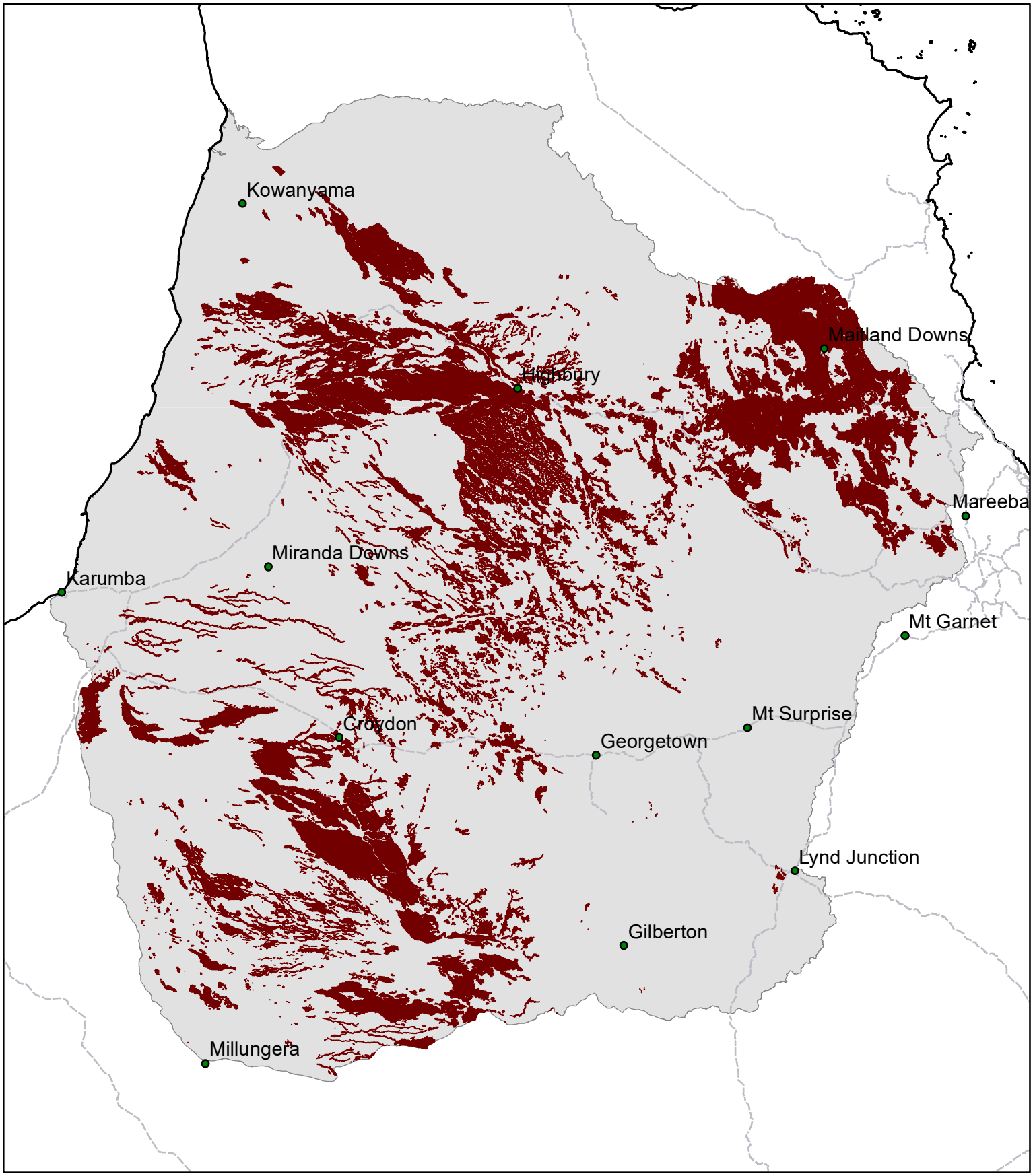
Regional Ecosystems

2.3.29a-c, 2.3.30a-e, 2.3.36a, 2.5.18a-b, 2.9.6x1, 2.9.7a-b, 9.11.3a, 9.3.24, 9.5.12, 9.5.16, 9.5.8.

Land system, Local Pasture Unit

Strathmore (23), Mayvale (42), Claraville (43), Prospect (57), Strathpark (19), Dandry (21), Esmeralda (22), Stanhill (36), Abingdon (45) (Perry *et al* 1964); LPU 41, 42 (Tothill and Gillies 1992).

NG14 Northern sandy forest



Area of land type in region: 14%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 92%
Median FPC: 18%
Median TBA: 7 m2/ha

Queensland Government

Yellow earths

Landform	Mid to lower slopes of level to gently undulating plains.
Woody vegetation	Grey box and narrow-leaved ironbark woodland with understorey of breadfruit, tea trees, wattles and quinine.
Expected pasture composition	* *Denotes non-native "Expected Pasture Composition" species.*
Preferred	Golden beard grass, forest bluegrass, black speargrass, kangaroo grass.
Intermediate	Cotton panic, silky browntop, lemon-scented grass, gulf bluegrass, plume sorghum, bottlewasher grasses, giant speargrass, northern wanderrie grass.
Non-preferred	Wiregrasses.
Annual grasses	Fire grass, comet grass, fairy grass, lovegrasses.
Suitable sown pastures	Shrubby and Caribbean stylos.
Introduced weeds	
Soil	Yellow brown texture contrast soils (solodics).
Description	***Surface:*** Loose or soft; ***Surface texture:*** sandy loam or sandy clay loam; ***Subsoil texture:*** light to medium heavy clay.
Features	Subsoils can have very hard consistence. Impeded drainage leading to bogginess when wet. Mottling of soil at depth. Dispersive subsoils.

Water availability

Low to moderate.

Fertility

Variable, generally low. Low nitrogen (0.08%); low phosphorus (6 mg/kg); low potassium (0.17 cmol /kg).

Salinity

Non-saline

Sodicity

Low at depth.

pH

Slightly acidic (6.1) at surface; increasing to medium acidity down the profile.

Long-term carrying capacity information (A condition)

Based on fully watered area for 1AE = 450 kg animal consuming 8kg DM/day				
Median annual rainfall 723 – 961 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	1160 - 1820	20%	8.0 - 13
	6 TBA 15 FPC	450 - 860	20%	17 – 33

Enterprise

Breeding

Land use and management recommendations

- Suitable for grazing of native pastures.
- Rotational wet seasons spelling to maintain perennial pasture composition.
- Manage grazing pressure to ensure at least 50% ground cover at break of season.
- Strategic burning (late dry hot burn) to manage woody thickening (e.g. breadfruit, wattles).
- Native pastures need to be burnt prior to over-sowing with stylos.

Land use limitations

- Timber thickening limits pasture productivity.
- Low fertility limits possibilities for sown grasses.
- Phosphorus supplements are required in wet season.
- Limit mechanical disturbance (nothing more severe than crocodile seeder) due to the fragile nature of the duplex soils.

Conservation features and related management

- Provincial refuge for some flora and fauna species.

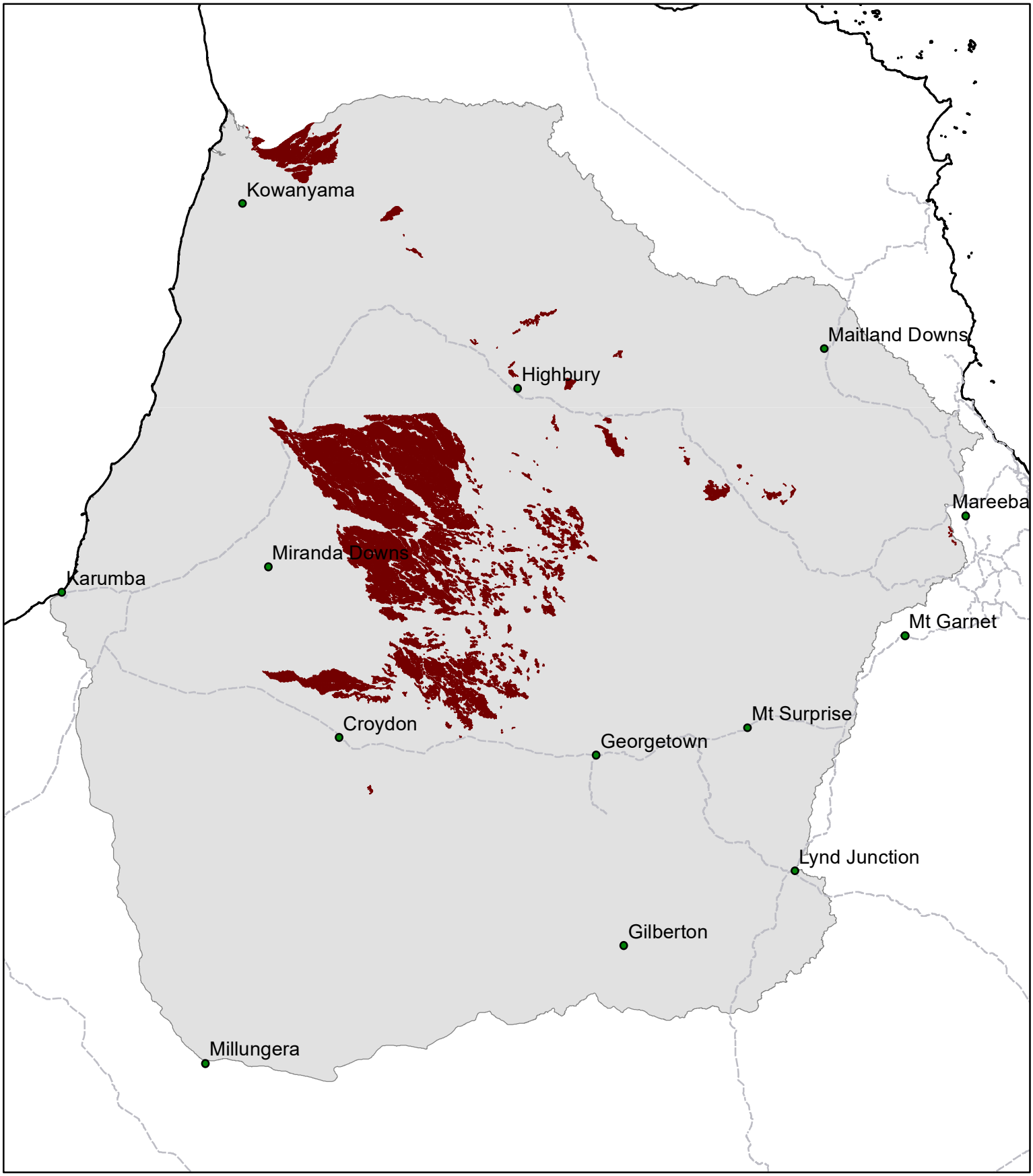
Regional Ecosystems

2.3.64, 2.5.14c, 2.5.26, 3.3.61b, 9.12.40.

Land system, Local Pasture Unit

Karoon (2), Yanman (25) (Perry *et al* 1964); LPU 28, 41 (Tothill and Gillies 1992).

NG15 Yellow earths



Area of land type in region: 4%
Median rainfall (region): 544 – 1297 mm
Average rainfall (region): 580 – 1370 mm
Area of land type with FPC: 97%
Median FPC: 15%
Median TBA: 6 m2/ha

Queensland Government