Northern Australia Environmental Resources Hub

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Environmental economic accounting for interconnected ecosystem assets and ecosystem services in the Mitchell River catchment, Queensland

Data inventory

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Cover photographs

Front cover: Mitchell River catchment, Queensland, Australia (photo: Chantal Saint Ange)

Back cover: Mitchell River catchment, Queensland, Australia (photo: Graeme Curwen)

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Acronyms and abbreviations

AquaBAMM	Aquatic Biodiversity Assessment and Mapping Methodology
BVG	Broad Vegetation Group
DEA	Digital Earth Australia
DERM	Department of Environment and Resource Management (Qld Govt)
DM	Dry matter
EFG	Ecosystem Functional Group
GCDI	Ground Cover Disturbance Index
GET	Global Ecosystem Typology
GIS	Geographic Information System
GVAP	Gross Value of Agricultural Production
MODIS	Moderate Resolution Imaging Spectroradiometer (satellite)
NAFI	Northern Australian Fire Information
NAWRA	Northern Australia Water Resource Assessment
NDVI	Normalized Difference Vegetation Index
QLUMP	Queensland Land Use Mapping Program
RDI	River Disturbance Index
RE	Regional Ecosystem
SEEA-EA	System of Environmental Economic Accounting – Ecosystem Accounts
TERN	Terrestrial Ecosystem Research Network
WOfS	Australian Water Observations from Space
WRMC	Australian Water Resources Management Committee

1. Layout

This data inventory is produced to supplement the information contained in the accompanying reports that present the pilot set of ecosystem accounts for the Mitchell catchment and describe the methodologies used in account construction. The data inventory documents the various sources of data that exist for the Mitchell River catchment. Information pertaining to each dataset, much of which comes directly from metadata accompanying the dataset, is provided in a standardised format organised as follows:

Dataset	Provides the name(s) of the data, including version number and/or year(s), as it appeared in the listing of the original data provider(s).
Purpose	Describes the purpose for which the data were collected.
Format	Formats include GIS shapefiles, rasters, and Microsoft Excel spreadsheets
Extent	Provides the spatial extent and, where relevant, the spatial resolution of the data i.e., national, state, region, district, catchment, sub-catchment, local government area, statistical area 1 or statistical area 2.
Temporal resolution	Provides the temporal resolution of the data i.e., one-off, annual or periodic. If data are collected periodically, time stamps and frequency of data collection will be stated.
Custodian	Provides the name of the organisation or entity that publishes the data
Notes	Provides additional information about the data that is not explained elsewhere. Also includes notes from the data provider and describes any additional data processing undertaken by project team members to enable data tabulation by ecosystem type.
Access	Provides the URL of the website from which the data were downloaded.
Citation	Provides a suggested citation for the dataset. If a suggested citation is provided by the data provider, then that is used in preference.
Supporting papers	Information on the accompanying report(s), map products and/or peer-reviewed papers are listed under this heading.

In addition to the information provided above, summaries of each dataset in the form of maps, graphs and/or tables are also provided.

Ecosystem types for the Mitchell catchment were determined by cross-walking between the broad vegetation groups (BVGs) of Queensland and the IUCN global ecosystem typology (GET), in consultation with experts at the Queensland Herbarium. The spatial layer for the

BVGs of Queensland (Version 4 2017,[1] based on regional ecosystem (RE) mapping Version 12), was used as the underlying ecosystem asset spatial layer for the Mitchell catchment.

The cross-walking exercise for the Mitchell catchment revealed that all but three of the Queensland BVGs can be matched to ecosystem functional groups (EFGs) contained within the IUCN GET.

Whenever possible, data are presented by ecosystem types (IUCN EFG) found in the Mitchell River catchment as maps and account tables. The processes undertaken to present data by ecosystem type are explained under 'Notes'.

1.1 GIS 'edge effects' in calculating ecosystem extents

The sum of post-clearing BVG polygons (7,172,218 ha) as shown in the ecosystem extent account in the main accounts report, exceeds the total extent for the Mitchell catchment when calculated using GIS raster data (7,171,100 ha) due to GIS 'edge effects'. The edge effects prevent complete spatial alignment between raster-based and polygon-based datasets. This results in some post-clearing EFG extents being slightly larger than the extents of the same EFGs derived using raster datasets. This discrepancy produces approximately a 0.0156% error in total extent which can be considered negligible. These errors are reflected in the following ecosystem types: estuary (12% error), MFT1.2 (1.9% error), MFT1.3 (0.14% error), MT2.1 (1% error), Non-remnant (0.03% error), T1.1 (0.3% error) and T4.2 (0.0002% error). The IUCN EFG areas presented in this data inventory are based on GIS raster data, hence the sum of EFG extents equals 7,171,100 ha.

1.2 Mitchell River catchment

The Mitchell catchment boundary was defined by the Australian Water Resources Management Committee (WRMC). All spatial data throughout the data inventory have been clipped to the Mitchell catchment (projected to coordinate system GDA 2020 MGA 54). The eastern boundary of the catchment falls in the MGA 55 zone, which introduces some distortion to data projection, but this was considered acceptable compared to the gross generalisation of datasets at the catchment scale and sub-setted into 13 IUCN EFGs and 3 BVGs of Queensland.

[1] Version 5 Broad Vegetation Groups mapping is now available; however, it was released post-study commencing (May 2021).

Figure 1: Map showing the Mitchell catchment (blue) in Queensland, Australia.

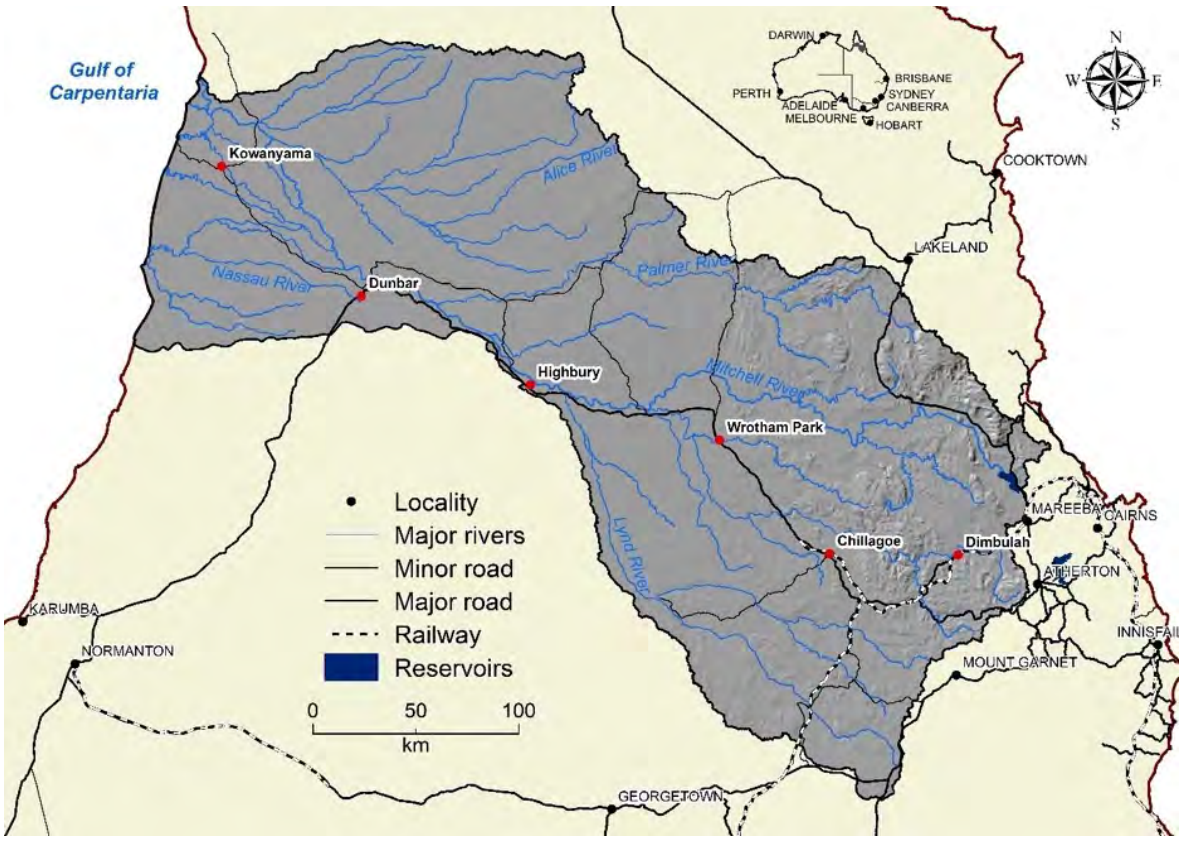


Figure 2: The Mitchell catchment showing major rivers, minor and major roads, railways, and reservoirs.

2. Ecosystem extent and land uses

This section outlines the data used to compile the ecosystem extent account.

2.1 Broad vegetation groups

Dataset	Version 4.0 Remnant 2015 Broad Vegetation Groups of Queensland (BVG).
Purpose	To delineate and define the ecosystem types/assets using the locally mapped product of broad vegetation groups matched to IUCN global ecosystem typology – ecosystem functional groups (IUCN EFG).
Format	Polygons
Extent	Queensland-wide and allows comparison with the Australian National Vegetation Information System.
Temporal resolution	Pre-clearing and post-clearing with updates by the Queensland Herbarium on an on-going basis.
Custodian	© State of Queensland (Department of Science, Information Technology and Innovation) 2017.
Notes	The BVGs are at; 1:1 million, 1:2 million and 1:5 million scales. IUCN EFG classes for the Mitchell Catchment have been derived by assigning BVGs at the 1:1 million scale to the IUCN EFG classes. This was done in consultation with the Queensland Herbarium.
Access	https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/broad-vegetation/
Citation	Queensland Herbarium (2017). Remnant 2015 Broad Vegetation Groups of Queensland. Version 4.0 (December 2017). State of Queensland (Department of Science, Information Technology and Innovation).
Supporting papers	Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

2.2 IUCN ecosystem typology 2.0

Dataset	IUCN global ecosystem typology 2.0: descriptive profiles for biomes and ecosystem functional groups (EFGs).
Purpose	The IUCN global ecosystem typology classifies ecosystems by ecological functions.
Format	Report (PDF).
Extent	Global.
Temporal resolution	2020.
Custodian	© 2020 IUCN, International Union for Conservation of Nature and Natural Resources.
Notes	To assign BVGs to the IUCN EFG classes. This was done in consultation with the Queensland Herbarium.
Access	https://doi.org/10.2305/IUCN.CH.2020.13.en
Citation	Keith, D.A., Ferrer-Paris, J.R., Nicholson, E. and Kingsford, R.T. (eds.) (2020). The IUCN Global Ecosystem Typology 2.0: Descriptive profiles for biomes and ecosystem functional groups. Gland, Switzerland: IUCN.
Supporting papers	n.a.

Table 1: Crosswalk between broad vegetation groups of Queensland and IUCN global ecosystem typology 2.0 in consultation with experts at the Queensland Herbarium.

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
10	10b	Moist open forests to woodlands dominated by *Corymbia citriodora* (spotted gum)	T4	T4.2	Pyric tussock savannas
11	11b	Moist to dry open forests to woodlands dominated by *Eucalyptus crebra* (narrow-leaved red ironbark) or *E. tereticornis* (blue gum), frequently with *Corymbia* species or *E. microneura* (Gilbert River box) on red ferrosols on undulating terrain	T4	T4.2	Pyric tussock savannas
	11c	Moist woodlands dominated by *Eucalyptus leptophleba* (Molloy red box) ± *Corymbia papuana* (ghost gum) ± *C. tessellaris* (carbeen)	T4	T4.2	Pyric tussock savannas
12	12b	Woodlands and open woodlands dominated by *Eucalyptus crebra* (narrow-leaved red ironbark) and/or *Corymbia* spp. such as *C. clarksoniana* (grey bloodwood), *C. stockeri*, *C.* setosa (rough leaved bloodwood) or *C. peltata* (yellowjacket) on hilly terrain	T4	T4.2	Pyric tussock savannas
13	13a	Woodlands and open woodlands dominated by ironbarks such as *Eucalyptus cullenii* (Cullen's ironbark), *E. staigeriana* (lemon-scented ironbark) or *E. melanophloia* (silver-leaved ironbark) and bloodwoods such as *Corymbia stockeri* subsp. *peninsularis, C. clarksoniana* (grey bloodwood) or *C. leichhardtii* (rustyjacket)	T4	T4.2	Pyric tussock savannas
	13b	Woodlands to open woodlands dominated by *Eucalyptus microneura* (Gilbert River box) on shallow soils on rolling hills	T4	T4.2	Pyric tussock savannas
	13c	Woodlands of *Eucalyptus crebra* (narrow-leaved red ironbark), *E. drepanophylla* (grey ironbark), *E. fibrosa* (dusky-leaved ironbark), *E. shirleyi* (Shirley's silver-leaved ironbark) on granitic and metamorphic ranges	T4	T4.2	Pyric tussock savannas
14	14a	Woodlands and tall woodlands dominated by *Eucalyptus tetrodonta* (Darwin stringybark) (or *E. megasepala*), with *Corymbia nesophila* (Melville Island bloodwood). Occasionally *E. chartaboma* (or *E. miniata* (Darwin woollybutt)), on deeply weathered plateaus and remnants	T4	T4.2	Pyric tussock savannas
	14b	Woodlands dominated by *Eucalyptus tetrodonta* (Darwin stringybark) (or *E. megasepala*) or *E. chartaboma* or *E. miniata* (Darwin woollybutt), with *Corymbia clarksoniana* (grey bloodwood) on erosional surfaces,	T4	T4.2	Pyric tussock savannas

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
		residual sands and occasionally alluvial plains			
	14d	Woodlands dominated by *Corymbia stockeri* (or *C. hylandii*) and *Eucalyptus megasepala* (or *E. tetrodonta* (Darwin stringybark)) on sandstone, metamorphic and ironstone ranges	T4	T4.2	Pyric tussock savannas
16	16a	Open forests and woodlands dominated by *Eucalyptus camaldulensis* (river red gum) (or *E. tereticornis* (blue gum)) and/or *E. coolabah* (coolibah) (or *E. microtheca* (coolabah)) fringing drainage lines. Associated species may include *Melaleuca* spp., *Corymbia tessellaris* (carbeen), *Angophora* spp., *Casuarina cunninghamiana* (river she-oak). Does not include alluvial areas dominated by herblands or grasslands or alluvial plains that are not flooded	TF1	TF1.2	Subtropical-temperate forested wetlands
	16b	Woodlands dominated by *Eucalyptus leptophleba* (Molloy red box), and associated *Corymbia tessellaris* (carbeen) or *C. clarksoniana* (grey bloodwood) or *C. dallachiana*; or dominated by *Corymbia terminalis* (desert bloodwood) or other *Corymbia* spp. in the Gulf Plains and Northwest Highlands bioregions. On sandy levees	T4	T4.2	Pyric tussock savannas
	16c	Woodlands and open woodlands dominated by *Eucalyptus coolabah* (coolibah) or *E. microtheca* (coolibah) or *E. largiflorens* (black box) or *E. tereticornis* (blue gum) or *E. chlorophylla* on floodplains. Does not include alluvial areas dominated by herblands or grasslands or alluvial plains that are not flooded	TF1	TF1.2	Subtropical-temperate forested wetlands
	16d	River beds, open water or sand, or rock, frequently not vegetated	TF1	TF1.2	Subtropical-temperate forested wetlands
17	17b	Woodlands to open woodlands dominated by *Eucalyptus melanophloia* (silver-leaved ironbark) (or E. *shirleyi* (Shirley's silver-leaved ironbark)) on sand plains and footslopes of hills and ranges	T4	T4.2	Pyric tussock savannas
18	18a	Dry woodlands to open woodlands, dominated by bloodwoods (*Corymbia dallachiana*, *C. terminalis* (western bloodwood), *C. plena*, or *C. leichhardtii* (rustyjacket)) or ironbarks (*Eucalyptus quadricostata* (Pentland ironbark), *E. crebra* (narrow-leaved red ironbark) or *E. exilipes* (fine-leaved ironbark)), often with *E. acmenoides* (narrow-leaved white stringybark), *Angophora leiocarpa*	T4	T4.2	Pyric tussock savannas

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
		(rusty gum) and *Callitris glaucophylla* (white cypress pine) in the Brigalow Belt, on sandy plateaus and plains			
	18b	Woodlands dominated *Eucalyptus crebra* (narrow-leaved red ironbark) frequently with *Corymbia* spp. or *Callitris* spp. on flat to undulating plains	T4	T4.2	Pyric tussock savannas
	18c	Woodlands and open woodlands dominated by *Eucalyptus chlorophylla* (or *E. leptophleba* (Molloy red box) on heavy soils) frequently with *Corymbia* spp.; or dominated by *E. tectifica* west of Burketown	T4	T4.2	Pyric tussock savannas
	18d	Woodlands to low open woodlands dominated by *Eucalyptus microneura* (Gilbert River box/Georgetown box) sometimes with *Corymbia* spp.	T4	T4.2	Pyric tussock savannas
19	19d	Low open woodlands dominated by *Eucalyptus persistens* (or *E. normantonensis* (Normanton box), *E. tardecidens*, *E. provecta*) with *Triodia* spp. dominated ground layer, mainly on hills and ranges	T4	T4.3	Hummock savannas
1	1a	Complex mesophyll to notophyll vine forests usually in fertile and very wet locations	T1	T1.1	Tropical subtropical lowland rainforests
20	20a	Woodlands to open forests dominated by *Callitris glaucophylla* (white cypress pine) or *C. intratropica* (northern cypress pine)	T4	T4.4	Temperate woodlands
21	21a	Low woodlands and low open woodlands dominated by *Melaleuca viridiflora* (coarse-leaved paperbark) on depositional plains	T4	T4.2	Pyric tussock savannas
	21b	Low open woodlands and tall shrublands of *Melaleuca citrolens* or *M. stenostachya* or other *Melaleuca* spp.	T4	T4.2	Pyric tussock savannas
22	22a	Open forests and woodlands dominated by *Melaleuca quinquenervia* (swamp paperbark) in seasonally inundated lowland coastal areas and swamps	TF1	TF1.2	Subtropical-temperate forested wetlands
	22b	Open forests and low open forests dominated by *Melaleuca* spp. (*M. viridiflora*, *M. saligna*, *M. leucadendra* (broad-leaved tea-tree), *M. clarksonii* or *M. arcana* (winti)) in seasonally inundated swamps	TF1	TF1.2	Subtropical-temperate forested wetlands
	22c	Open forests dominated by *Melaleuca* spp. (*M. argentea* (silver tea-tree), *M. leucadendra* (broad-leaved tea-tree), *M. dealbata* (swamp tea-tree) or *M. fluviatilis*), fringing major streams with *Melaleuca*	TF1	TF1.2	Subtropical-temperate forested wetlands

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
		saligna or *M. bracteata* (black tea-tree) in minor streams			
24	24a	Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals. Species include *A. shirleyi* (lancewood), *A. catenulata* (bendee), *A. microsperma* (bowyakka), *A. clivicola*, *A. sibirica* (bastard mulga), *A. rhodoxylon* (rosewood) and *A. leptostachya* (Townsville wattle)	T4	T4.3	Hummock savannas
27	27c	Low open woodlands dominated by a variety of species including *Grevillea striata* (beefwood), *Acacia* spp., *Terminalia* spp. or *Cochlospermum* spp.	T3	T3.1	Seasonally dry tropical shrublands
28	28a	Complex of open shrublands to closed shrublands, grasslands, low woodlands and open forests, on strand and foredunes. Includes pure stands of *Casuarina equisetifolia* (coastal she-oak)	MT2	MT2.1	Coastal shrublands and grasslands
	28b	Open forests to woodlands dominated by *Acacia crassicarpa* (brown salwood) or other *Acacia* spp. with *Syzygium* spp., *Corymbia* spp. and/or *Parinari nonda* (parinari)	MT2	MT2.1	Coastal shrublands and grasslands
	28c	Low open forests dominated by *Asteromyrtus brassii*, *Neofabricia myrtifolia*, *Allocasuarina littoralis* (woolly oak), *Melaleuca viridiflora* (coarse-leaved paperbark) on sandplains and plateaus; or *Acacia brassii* low open forests or *Melaleuca viridiflora* low woodlands on ranges; or *Thryptomene oligandra* ± *Neofabricia mjoebergii* ± *Melaleuca viridiflora* woodlands on drainage depressions	T3	T3.1	Seasonally dry tropical shrublands
	28e	Low open forests to woodlands dominated by *Lophostemon suaveolens* (swamp box) (or *L. confertus* (brush box)) or *Syncarpia glomulifera* (turpentine) frequently with *Allocasuarina* spp. on rocky hill slopes	T4	T4.2	Pyric tussock savannas
29	29b	Open shrublands to open heaths on elevated rocky substrates	T3	T3.1	Seasonally dry tropical shrublands
2	2a	Complex evergreen notophyll vine forests frequently with *Araucaria cunninghamii* from foothills to ranges.	T1	T1.3	Tropical subtropical montane rainforests
30	30a	Tussock grasslands dominated by *Astrebla* spp. (Mitchell grass) or *Dichanthium* spp. (bluegrass) often with *Eulalia aurea* (silky browntop) on alluvia	T4	T4.2	Pyric tussock savannas
	30b	Tussock grasslands dominated by *Astrebla* spp. (Mitchell grass) or	T4	T4.2	Pyric tussock savannas

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
		Dichanthium spp. (bluegrass) often with *Iseilema* spp. on undulating downs or clay plains			
31	31a	Open forblands to open tussock grasslands which may be composed of *Atriplex* spp. (saltbush), *Sclerolaena* spp. (burr), Asteraceae spp. and/or short grasses on alluvial plains	T5	T5.1	Semi-desert steppes
32	32a	Closed tussock grasslands dominated by *Eriachne* spp., *Fimbristylis* spp., *Aristida* spp. or *Panicum* spp.; or *Themeda arguens*, *Dichanthium sericeum* (Queensland bluegrass) or *Imperata cylindrica* (blady grass) on marine and alluvial plains	T4	T4.2	Pyric tussock savannas
	32b	Closed tussock grasslands and associated open woodlands on undulating clay plains, upland areas and headlands. Dominant species include *Heteropogon triticeus* (giant speargrass) or *Themeda arguens* or *Sarga plumosum* or *Imperata cylindrica* (blady grass) or *Mnesithea rottboellioides* (cane grass)/*Arundinella setosa*. With areas of open woodland dominated by tree species such as *Corymbia papuana* (ghost gum)/*Terminalia* spp./*Vachellia ditricha*/*Piliostigma malabaricum*	T4	T4.2	Pyric tussock savannas
33	33b	Hummock grasslands dominated by *Triodia pungens* or *T. longiceps* (giant grey spinifex) or *T. mitchellii* (buck spinifex) sandplains or lateritic surfaces	T4	T4.3	Hummock savannas
34	34a	Lacustrine wetlands. Lakes, ephemeral to permanent, fresh to brackish; water bodies with ground water connectivity. Includes fringing woodlands and sedgelands	TF1	TF1.4	Seasonal floodplain marshes
	34c	Palustrine wetlands. Freshwater swamps on coastal floodplains dominated by sedges and grasses such as *Oryza* spp., *Eleocharis* spp. (spikerush) or *Baloskion* spp. (cord rush)/*Leptocarpus tenax*/*Gahnia sieberiana* (sword grass)/*Lepironia* spp. Includes small areas of estuarine wetlands	TF1	TF1.4	Seasonal floodplain marshes
	34d	Palustrine wetlands. Freshwater swamps or billabongs on floodplains ranging from permanent and semi-permanent to ephemeral	TF1	TF1.4	Seasonal floodplain marshes
	34e	Palustrine wetlands. Springs with water dependent herbs	TF1	TF1.4	Seasonal floodplain marshes

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
	34f	Palustrine wetlands. Sedgelands/grasslands on seeps and soaks on wet peaks, and other coastal non-floodplain features	TF1	TF1.4	Seasonal floodplain marshes
35	35a	Closed forests and low closed forests dominated by mangroves	MFT1	MFT1.2	Intertidal forests and shrublands
	35b	Bare saltpans ± areas of *Tecticornia* spp. (samphire) sparse forblands and/or *Xerochloa imberbis* or *Sporobolus virginicus* (sand couch) tussock grasslands	MFT1	MFT1.3	Coastal saltmarshes and reedbeds
3	3a	Evergreen to semi-deciduous, notophyll to microphyll vine forests/ thickets on beach ridges and coastal dunes, occasionally *Araucaria cunninghamii* (hoop pine) microphyll vine forests on dunes. *Pisonia grandis* on coral cays	T1	T1.1	Tropical subtropical lowland rainforests
4	4a	Notophyll and mesophyll vine forests with feather or fan palms in alluvia and in swampy situations on ranges or within coastal sand masses	T1	T1.1	Tropical subtropical lowland rainforests
	4b	Evergreen to semi-deciduous mesophyll to notophyll vine forests, frequently with *Archontophoenix* spp., fringing streams	T1	T1.1	Tropical subtropical lowland rainforests
5	5c	Simple to complex notophyll vine forests, often with *Agathis* spp. on ranges and uplands of the Wet Tropics bioregion	T1	T1.3	Tropical subtropical montane rainforests
	5d	*Acacia celsa*/*A. mangium* (brown sandalwood)/*A. polystachya* closed forests to open forests with mixed rainforest species understorey includes areas regenerating after disturbance (upland and lowland areas)	T1	T1.2	Tropical subtropical dry forest and thickets
6	6b	Simple evergreen notophyll vine forests to simple microphyll vine fern thickets on high peaks and plateaus of northern Queensland	T1	T1.3	Coastal saltmarshes and reedbeds
7	7a	Semi-evergreen vine thickets on wide range of substrates	T1	T1.2	Tropical subtropical dry forest and thickets
	7b	Deciduous microphyll vine thickets on ranges and heavy clay alluvia in northern bioregions	T1	T1.2	Tropical subtropical dry forest and thickets
8	8a	Wet tall open forests dominated by species such as *Eucalyptus grandis* (flooded gum) or *E. saligna*, *E. resinifera* (red mahogany), *Lophostemon confertus* (brush box), *Syncarpia* spp. (turpentine), *E. laevopinea* (silvertop stringybark)	T4	T4.2	Pyric tussock savannas

Broad vegetation group (BVG)			IUCN global ecosystem typology 2.0		
BVG2M	BVG1M	Description	Biome	Ecosystem functional group	Description
9	9b	Moist to dry woodlands dominated by *Eucalyptus platyphylla* (poplar gum) and/or *E. leptophleba* (Molloy red box). Other frequent tree species include *Corymbia clarksoniana* (grey bloodwood), *E. drepanophylla* (grey ironbark) and occasionally *E. chlorophylla*	T4	T4.2	Pyric tussock savannas
	9c	Open forests of *Corymbia clarksoniana* (grey bloodwood) (or *C. intermedia* (pink bloodwood) or *C. novoguinensis*), *C. tessellaris* (carbeen) ± *Eucalyptus tereticornis* (blue gum) predominantly on coastal ranges. Other frequent tree species include *Eucalyptus drepanophylla* (grey ironbark), *E. pellita* (large-fruited red mahogany), *E. brassiana* (Cape York red gum) and *Lophostemon suaveolens* (swamp box)	T4	T4.2	Pyric tussock savannas
	9d	Moist to dry open forests to woodlands dominated by *Eucalyptus portuensis, Corymbia intermedia* (pink bloodwood), *E. drepanophylla*, *E. resinifera* or *E. reducta* +/- *Syncarpia glomulifera* (turpentine) or E. *cloeziana* (Gympie messmate) on ranges. Also includes mixed forests with *E. pellita* or *C. torelliana* (cadaghi) emergents and rainforest understories	T4	T4.2	Pyric tussock savannas
	9e	Open forests, woodlands and open woodlands dominated by *Corymbia clarksoniana* (grey bloodwood) (or *C. novoguinensis* or *C. intermedia* (pink bloodwood) or *C. polycarpa* (long-fruited bloodwood)) frequently with *Erythrophleum chlorostachys* (red ironwood) or *Eucalyptus platyphylla* (poplar gum) predominantly on coastal sandplains and alluvia	T4	T4.2	Pyric tussock savannas

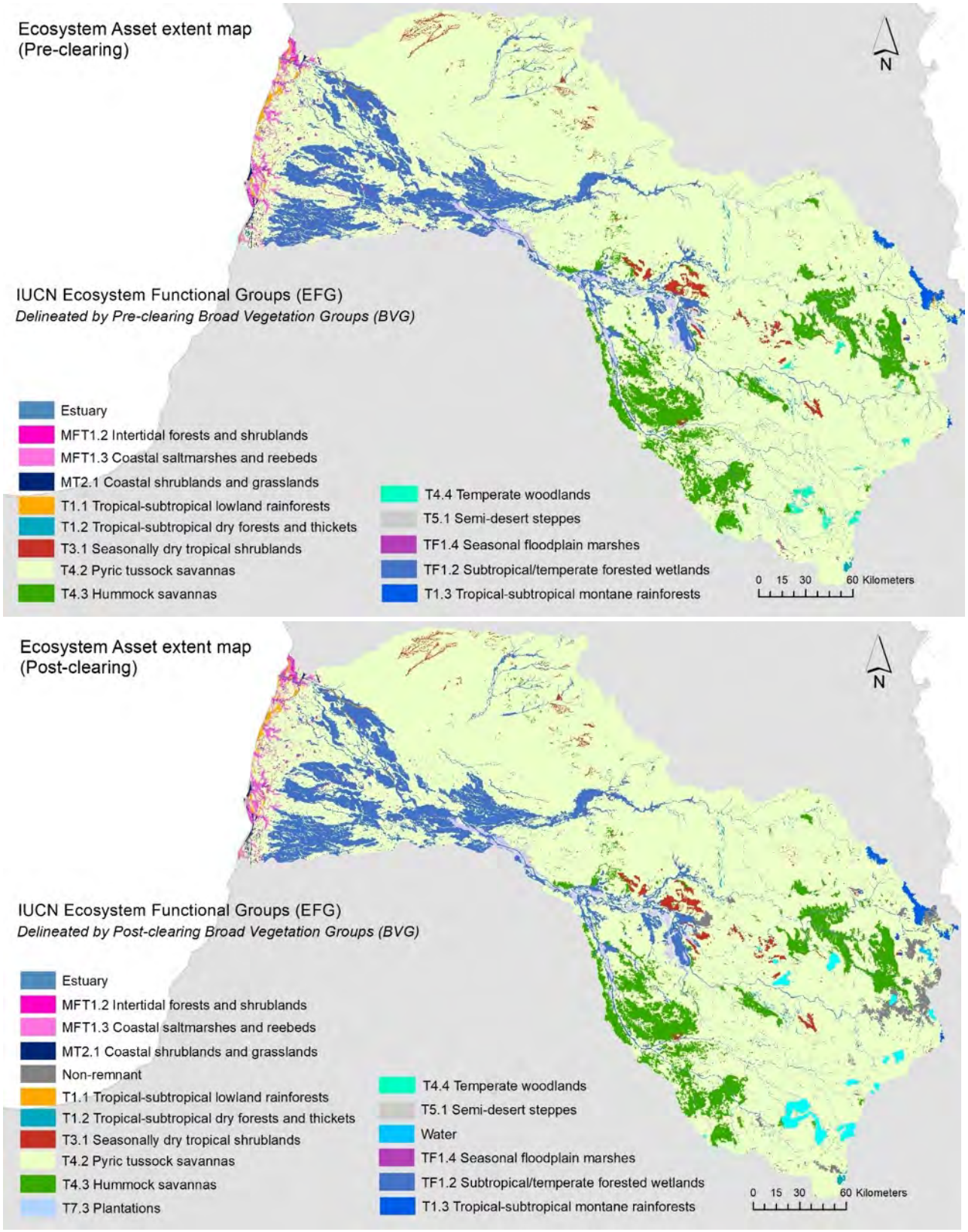


Figure 3: Ecosystem extent maps for the Mitchell catchment, Queensland, Australia. Top map: Map of pre-clearing ecosystem extent using IUCN ecosystem functional groups delineated by pre-clearing broad vegetation groups. Bottom map: Map of post-clearing ecosystem extent using IUCN ecosystem functional groups delineated by post-clearing broad vegetation groups.

Table 2: Change in extent (ha) of ecosystem types pre- and post-clearing, in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Pre-clearing (ha)	Post-clearing (ha)	Pre-clearing remaining (%)
Estuary	Estuary	5947	5947	100.00
Intertidal forests and shrublands	MFT1.2	11157	11211	100.48
Coastal saltmarshes and reedbeds	MFT1.3	40906	40972	100.16
Coastal shrublands and grasslands	MT2.1	5960	5962	100.03
Non-remnant	Non-remnant		91612	
Tropical subtropical lowland rainforests	T1.1	19070	18296	96.94
Tropical subtropical dry forest and thickets	T1.2	11960	12248	102.41
Tropical subtropical montane rainforests	T1.3	28615	26323	91.99
Seasonally dry tropical shrublands	T3.1	69389	72205	104.06
Pyric tussock savannas	T4.2	5685737	5603698	98.56
Hummock savannas	T4.3	442372	435831	98.52
Temperate woodlands	T4.4	21120	21049	99.66
Semi-desert steppes	T5.1	56687	56506	99.68
Subtropical-temperate forested wetlands	TF1.2	728885	740341	101.57
Seasonal floodplain marshes	TF1.4	44414	25233	56.81
Water	Water		4785	

Table 3: Matrix showing the percentage change (%) in ecosystem type extent from pre-clearing to post-clearing, in the Mitchell catchment, Queensland, Australia.

	Ecosystem type			Pre-clearing remaining (%)													
				Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes
		IUCN EFG		Estuary	MFT1.2	MFT1.3	MT2.1	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4
			Area (ha)	5947	11157	40906	5960	19070	11960	28615	69389	5685737	442372	21120	56687	728885	44414
Post-clearing	Estuary	Estuary	5947	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Intertidal forests and shrublands	MFT1.2	11211	0.00	99.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Coastal saltmarshes and reedbeds	MFT1.3	40972	0.00	0.18	99.33	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	Coastal shrublands and grasslands	MT2.1	5962	0.00	0.00	0.00	99.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Non-remnant	Non-remnant	91612	0.00	0.00	0.00	0.20	4.29	0.32	8.23	0.12	1.46	0.35	0.86	0.31	0.35	1.47
	Tropical subtropical lowland rainforests	T1.1	18296	0.00	0.00	0.00	0.00	95.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tropical subtropical dry forest and thickets	T1.2	12248	0.00	0.00	0.00	0.00	0.06	80.78	0.95	0.26	0.04	0.00	0.02	0.00	0.00	0.00
	Tropical subtropical montane rainforests	T1.3	26323	0.00	0.00	0.00	0.00	0.09	0.00	89.81	0.20	0.01	0.00	0.00	0.00	0.00	0.00
	Seasonally dry tropical shrublands	T3.1	72205	0.00	0.00	0.00	0.00	0.00	1.57	0.27	97.28	0.08	0.00	0.00	0.00	0.01	0.00
	Pyric tussock savannas	T4.2	5603698	0.00	0.00	0.12	0.42	0.00	16.61	0.69	1.96	98.07	1.37	1.09	0.00	2.23	3.26

Hummock savannas	T4.3	435831	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.07	0.02	97.99	0.25	0.00	0.15	0.00
Temperate woodlands	T4.4	21049	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.02	97.38	0.00	0.02	0.00
Semi-desert steppes	T5.1	56506	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.68	0.00	0.00
Subtropical-temperate forested wetlands	TF1.2	740341	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.11	0.22	0.25	0.39	0.00	97.21	40.22
Seasonal floodplain marshes	TF1.4	25233	0.00	0.00	0.37	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	54.93
Water	Water	4785	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.08	0.01	0.01	0.01	0.03	0.11

2.3 Queensland land use mapping program

Dataset	Queensland land use mapping program (QLUMP)
Purpose	Land use mapping for the Wet Tropics, southern Gulf and northern Gulf natural resource management regions to 2015.
Format	Polygons.
Extent	Queensland.
Temporal resolution	Datasets are available for 1999 and 2015. Updates scheduled approximately every 5 years.
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	Land use is classified according to the Australian Land Use and Management Classification (ALUMC) Version 7, May 2010. Five primary classes are identified in order of increasing levels of intervention or potential impact on the natural landscape. Water is included separately as a sixth primary class. Under the three-level hierarchical structure, the minimum attribution level for land use mapping in Queensland is secondary land use. Primary and secondary levels relate to land use (i.e. the principal use of the land in terms of the objectives of the land manager). The tertiary level includes data on commodities or vegetation, (e.g. crops such as cereals and oil seeds). Additional information can be found at: https://www.agriculture.gov.au/abares/aclump/land-use/alum-classification https://www.agriculture.gov.au/abares/aclump
Access	https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/qlump/qlump-datasets
Citation	Copyright State of Queensland (Department of Environment and Science) 2020. Updated data available at http://qldspatial.information.qld.gov.au/catalogue/
Supporting papers	n.a.

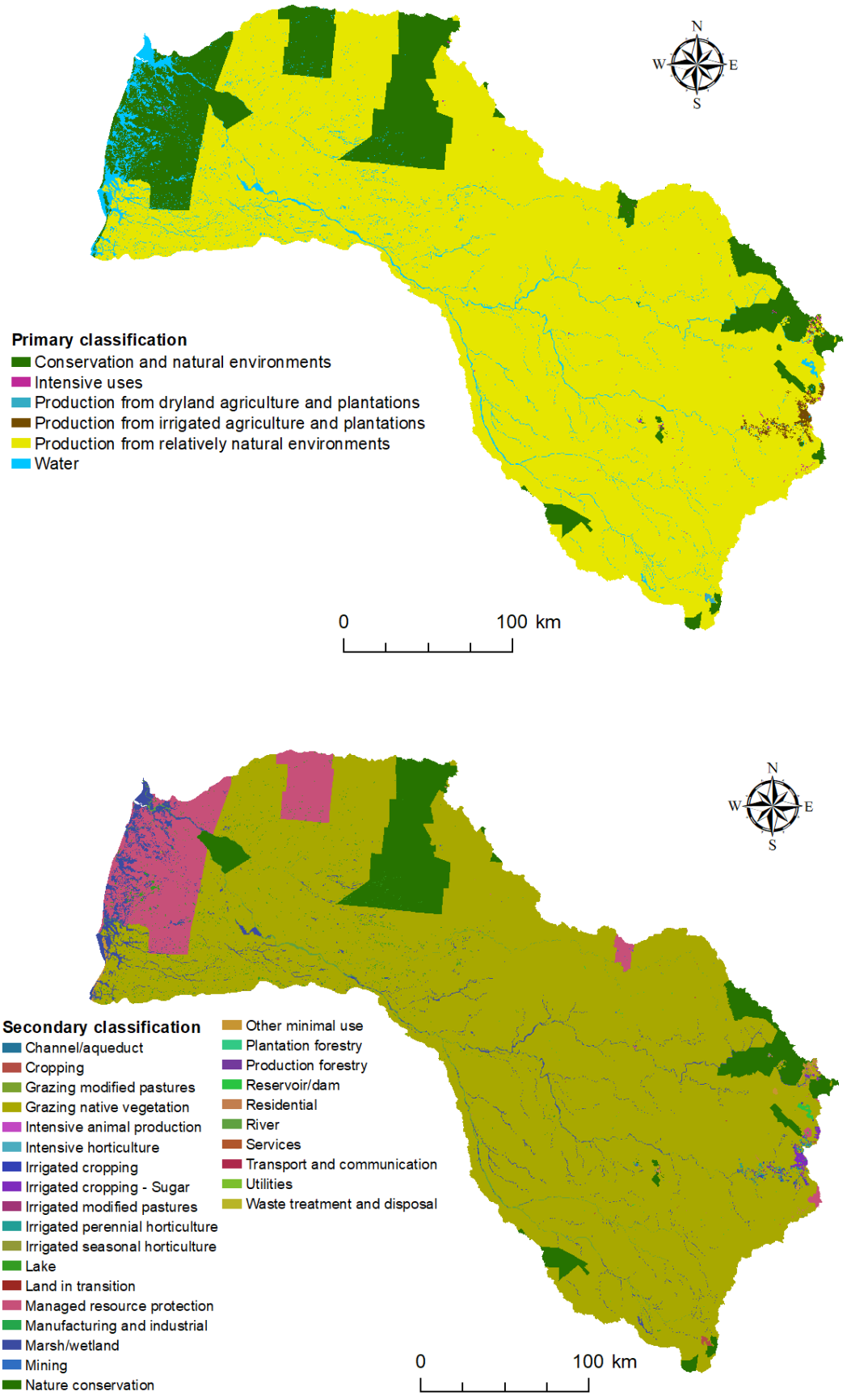


Figure 4: Queensland land-use mapping program across the Mitchell catchment according to the primary classification (top) and secondary classification (bottom) in 2015.

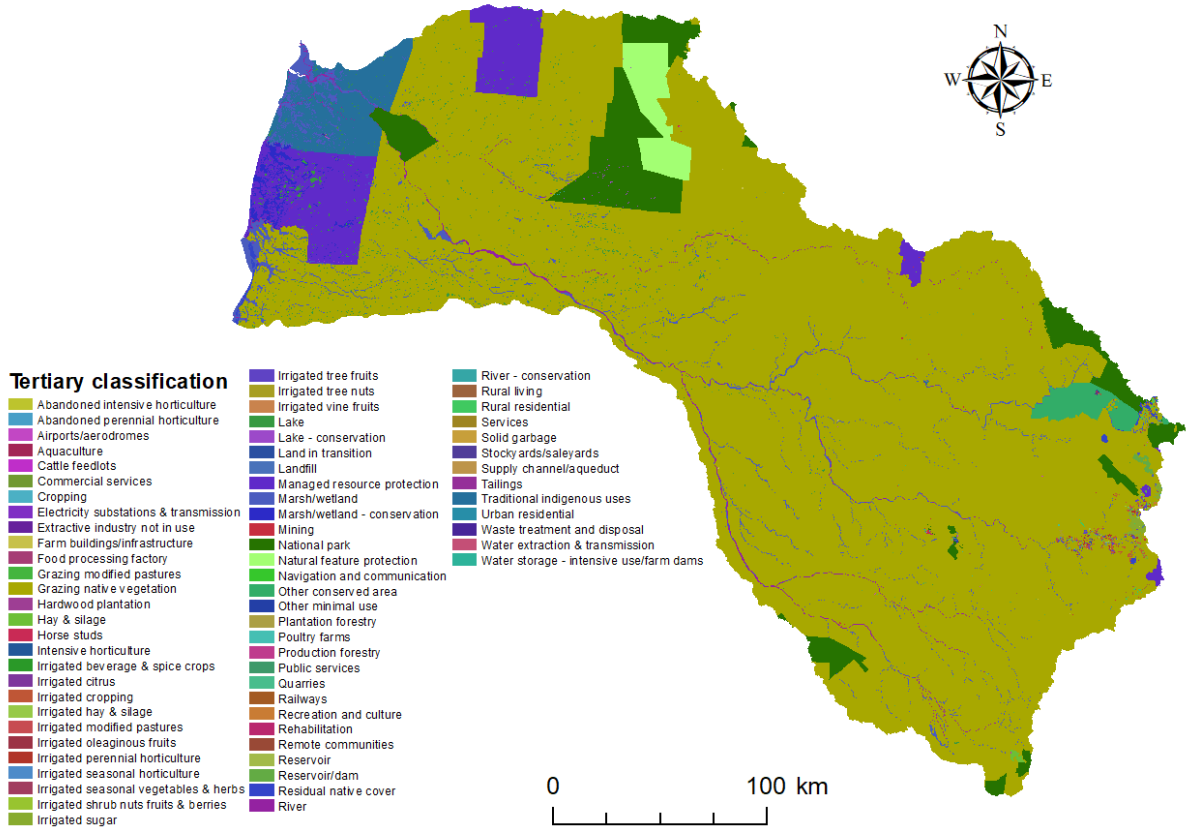


Figure 5: Queensland land-use mapping program across the Mitchell catchment according to the tertiary classification in 2015.

Table 4: Queensland land-use mapping program primary classes (ha) in each ecosystem type across the Mitchell catchment (2015).

Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-dessert steppes	Subtropical temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG	Estuary	MFT1.2	MFT1.3	MT2.1	Non-remnant	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
IUCN EFG area (ha)	5,226	10,996	40,916	5,902	91,612	18,244	12,248	26,323	72,205	5,603,684	435,831	21,049	56,506	740,341	25,233	4,785
Conservation and natural environments	33	130	508	3,474	2,377	12,074	3,423	25,387	11,467	879,627	23,200			119,689	2,563	26
Intensive uses			0.032	1	5,509	54	40	81	3	1,859	65	1	10	110	0.153	21
Production from dryland agriculture and plantations					2,269			1		63				1	2	
Production from irrigated agriculture and plantation					22,066	5	0.133	2		334	3			52	0.001	10
Production from relatively natural environments	7	16	975	1,603	58,177	2,285	8,770	851	60,358	4,642,510	411,239	20,980	56,071	526,227	4,918	239
Water	5,186	10,850	39,433	824	1,213	3,826	15	1	378	79,291	1,325	68	425	94,263	17,750	4,490

Table 5: Queensland land-use mapping program secondary classes (ha) in each ecosystem type across the Mitchell catchment (2015).

Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG	Estuary	MFT1.2	MFT1.3	MT2.1	Non-remnant	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
IUCN EFG Area (ha)	5,226	10,996	40,916	5,902	91,612	18,244	12,248	26,323	72,205	5,603,684	435,831	21,049	56,506	740,341	25,233	4,785
Channel/aqueduct					8					3						
Cropping					2,132					57				1	2	
Grazing irrigated modified pastures					534					10				1		
Grazing modified pastures					16											
Grazing native vegetation	7	16	975	1,603	58,175	2,285	8,770	846	60,358	4,642,504	411,239	20,980	56,071	526,227	4,918	239
Intensive animal production					260	2		0		10		0		2		
Intensive horticulture					10			0		0						
Irrigated cropping					15,334	5	0	2		227	3			36	0	10

Irrigated perennial horticulture					5,768	0	0	0		93	0			12		0
Irrigated seasonal horticulture					430					3				4		
Lake			22	16	51	42			67	14,921	25		122	11,425	8,133	41
Land in transition					44					1						
Managed resource protection	33	127	368	2,112	507	9,537	9	1,137	6,468	419,500				80,404	1,956	10
Manufacturing and industrial					15					0						
Marsh/wetland	510	10,600	39,213	794	490	3,627	11	1	292	60,521	1,216	66	277	51,747	9,568	168
Mining					1,130		21		0	600	25	1		2		7
Nature conservation					924	1,434	3,239	22,566	4,899	456,898	23,197			39,209	524	11
Other minimal use	0	2	140	1,362	944	1,103	175	1,684	100	3,229	3			76	83	4
Plantation forests					73			1		5						
Production native forests					3			5		6						
Reservoir/dam					497		2		19	521	9	2	8	67	36	4,281
Residential and farm infrastructure			0	1	3,222	52	14	81	2	1,091	16		8	99	0	4
River	4,676	250	198	14	167	157	2			3,325	74		19	31,024	13	
Services					499	1	5	0		83	24			2		

Transport and communication		343				0	65	0		2	2		
Utilities		5		0			4						
Waste treatment and disposal		25		0			7				4		9

2.4 Water datasets

2.4.1 Waterbodies

Dataset 1	Digital Earth Australia Waterbodies.
Purpose	Digital Earth Australia Waterbodies show the wet surface area of waterbodies as estimated from satellites. It does not show depth, volume, purpose of the waterbody, or the source of the water.
Format	Supplied as polygons, which are outlines of a minimum area of 3125m^2, five whole Landsat pixels (25m by 25m)
Extent	Australia.
Temporal resolution	1987 to present.
Custodian	Geoscience Australia.
Notes	A water classification algorithm is used for every available Landsat satellite image and maps the locations of waterbodies across Australia. It provides a timeseries of wet surface area for waterbodies that are present more than 10% of the time and are larger than 3125m^2 (5 Landsat pixels).
Access	https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/132814
Citation	Krause, Claire E.; Newey, Vanessa; Alger, Matthew J.; Lymburner, Leo. 2021. "Mapping and Monitoring the Multi-Decadal Dynamics of Australia's Open Waterbodies Using Landsat" Remote Sens. 13, no. 8: 1437. https://doi.org/10.3390/rs13081437
Supporting papers	Digital Earth Australia Waterbodies User Guide available at https://www.ga.gov.au/dea/products/dea-waterbodies/user-guide

Table 6: Digital Earth Australia waterbodies in the Mitchell catchment (1987).

Statistics	DEA Waterbodies. >90% of images. >= 5 pixels	50 days Full dataset	50 days plus with DEA waterbody overlay	50 days plus without DEA waterbody	100 days Full dataset	100 days plus with DEA waterbody overlay	100 days plus without DEA waterbody
Count	5624	12868	5841	7027	6859	4040	2819
Minimum (ha)	0.3	0.1	0.1	0.1	0.1	0.1	0.1
Maximum (ha)	3009.4	5631.3	5631.3	393.8	3469.9	3469.9	220.2
Sum (ha)	33671.6	27455.6	23587.3	3868.3	16687.4	14163.2	2524.2
Mean (ha)	6.0	2.1	4.0	0.6	2.4	3.5	0.9
Standard Deviation	48.5	61.1	90.2	7.9	58.6	76.1	6.8

Table 7: Statistics for Digital Earth Australia waterbodies.

Ecosystem type	IUCN EFG	Area (ha)	Number of waterholes mapped by Digital Earth Australia	
			DEA	Average area (ha)
Estuary	Estuary	5226	231.6	2.1
Intertidal forests and shrublands	MFT1.2	10996	255.9	0.8
Coastal saltmarshes and reedbeds	MFT1.3	40916	3101.5	6.8
Coastal shrublands and grasslands	MT2.1	5902	9.0	0.3
Non-remnant	Non-remnant	61612	390.5	1.3
Tropical subtropical lowland rainforests	T1.1	18244	134.7	1.8
Tropical subtropical dry forest and thickets	T1.2	12248	1.2	0.6
Tropical subtropical montane rainforests	T1.3	26323	0.0	
Seasonally dry tropical shrublands	T3.1	72205	11.5	0.6
Pyric tussock savannas	T4.2	5603684	5850.1	1.5
Hummock savannas	T4.3	435831	22.6	0.5
Temperate woodlands	T4.4	21049	2.5	0.4
Semi-desert steppes	T5.1	56506	141.2	2.2
Subtropical-temperate forested wetlands	TF1.2	740342	13129.3	4.3
Seasonal floodplain marshes	TF1.4	25233	6331.4	6.4
Water	Water	4785	3950.8	20.5

2.4.2 Dry-season wetlands

Dataset 2	Dry-season wetlands derived from Landsat archive for the NAWRA
Purpose	Dry-season wetlands data show the average value derived from each season's maximum number of consecutive days where surface water has been identified during the dry seasons from 1988 to 2016 from Landsat imagery.
Format	Polygons.
Extent	Northern Australia above 19º21'0".
Temporal resolution	1988 to 2016.
Custodian	CSIRO (Australia)
Notes	The method used to derive the surface water maps is described in the NAWRA technical report (Sims et al., 2016). The data are provided as the average number (from the 29 years of Landsat data) of the maximum consecutive days of inundation during each dry season. The average number of maximum consecutive days is then converted into shapefiles: one showing all pixels containing an average value of 50 or more maximum consecutive days of inundation from all the dry seasons; the other showing all pixels containing an average value of 100 or more maximum consecutive days of inundation from all the dry seasons.
Access	https://data.csiro.au/collections/collection/CIcsiro:37617v1
Citation	Ticehurst, Catherine (2018): *Dry-season wetlands derived from Landsat archive for NAWRA*. v1. CSIRO. Data Collection. https://doi.org/10.25919/5c0a052c3e391
Supporting papers	Sims N, Anstee J, Barron O, Botha E, Lehmann E, Li L., McVicar T, Paget M, Ticehurst C, Van Niel T and Warren G (2016) *Earth observation remote sensing*. A technical report from the CSIRO Northern Australia Water Resource Assessment to the Government of Australia. CSIRO, Australia.

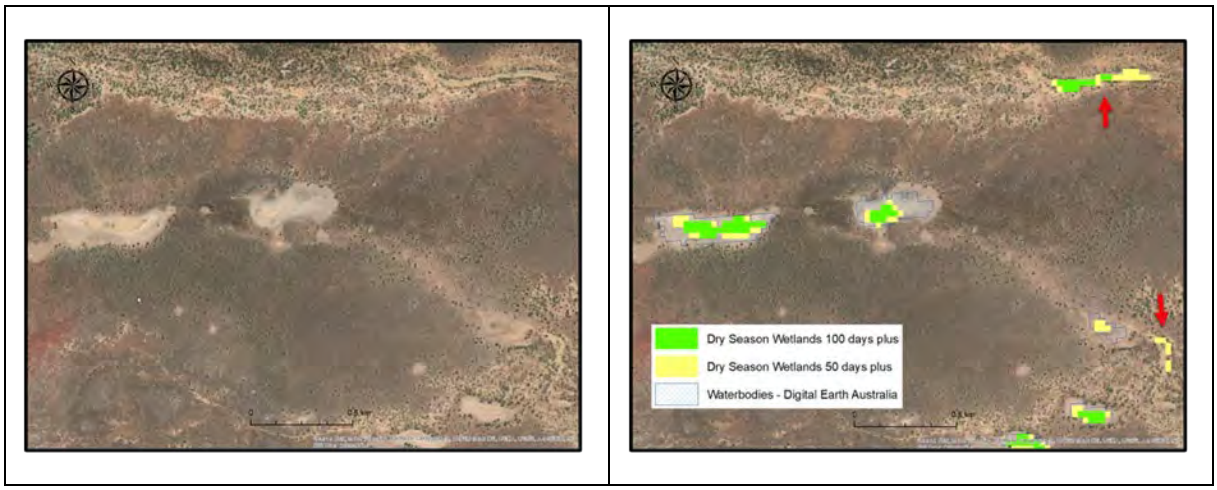


Figure 6: Left figure – water ponds in the Mitchell mega fan. Right figure - waterbodies from Digital Earth Australia and persistent waterbodies in the dry season. Base imagery courtesy of ESRI World Imagery.

The two waterbodies in Figure 6 show a progression from full extent, with the DEA outline closely matching the outline visible in the base imagery, with a smaller extent after 50 days, and a smaller extent again after 100 days. Red arrows point to waterbodies visible in the base imagery that have not been mapped by DEA but have been mapped as persistent for 50 or 100 days into the dry season.

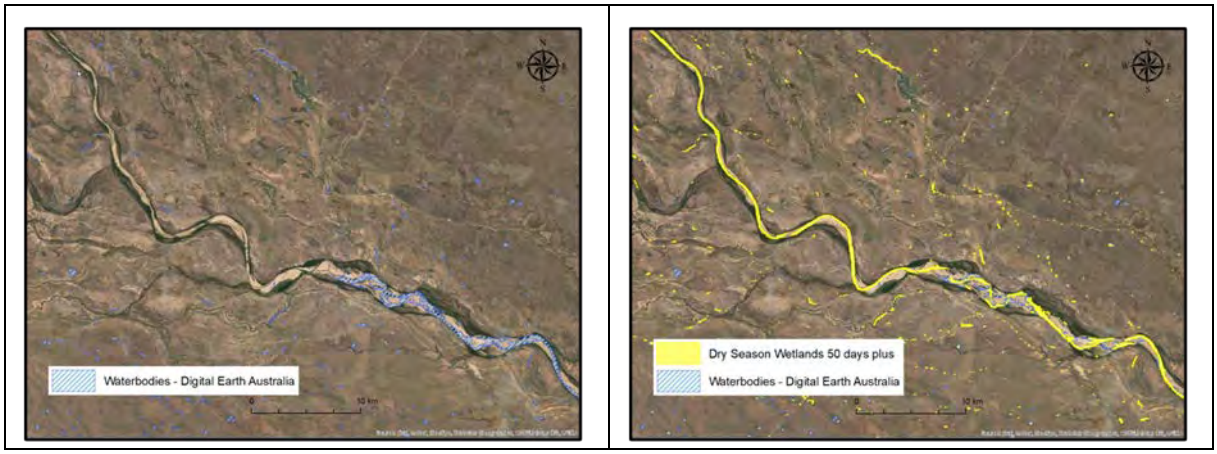


Figure 7: Maps of waterbodies in the Mitchell catchment showing the delineation of waterbodies by Digital Earth Australia in blue and the dry season wetlands derived from Landsat for NAWRA in yellow.

Table 8: Statistics from persistent dry-season waterholes.

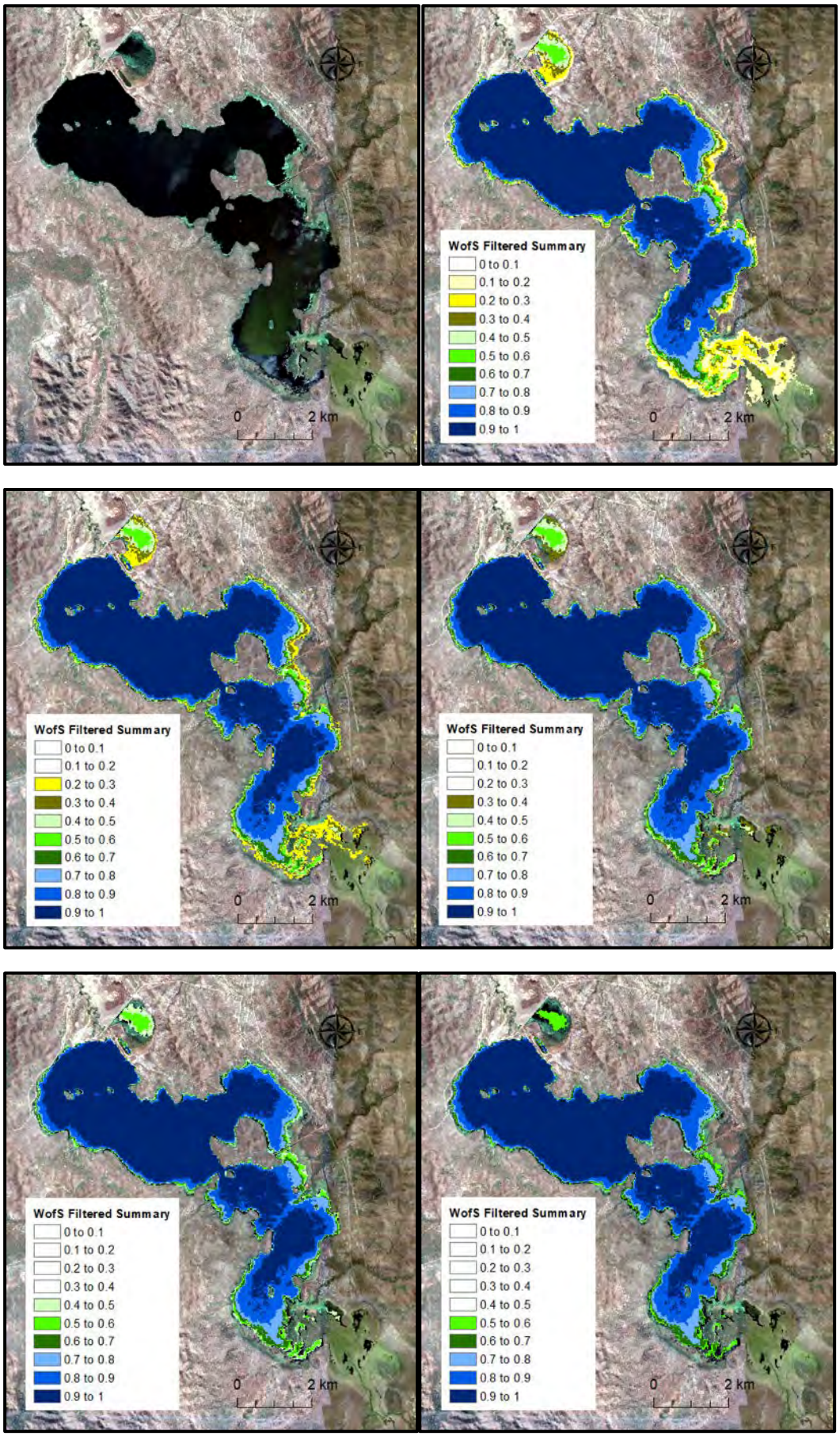
Ecosystem type	IUCN EFG	Area (ha)	Number of waterholes persisting during dry season for 50 days or more		Number of waterholes persisting during dry season for 100 days or more	
			50-day waterhole	Average area (ha)	100-day waterhole	Average area (ha)
Estuary	Estuary	5226	161	2	4253	24
Intertidal forests and shrublands	MFT1.2	10996	617.44	1	1795	2
Coastal saltmarshes and reedbeds	MFT1.3	40916	330	0	285	0
Coastal shrublands and grasslands	MT2.1	5902	53	0	118	1
Non-remnant	Non-remnant	91612	460	1	217	1
Tropical subtropical lowland rainforests	T1.1	18244	142	1	129	1
Tropical subtropical dry forest and thickets	T1.2	12248	1	0	1	0
Tropical subtropical montane rainforests	T1.3	26323	0	0	0	0
Seasonally dry tropical shrublands	T3.1	72205	11	0	5	0
Pyric tussock savannas	T4.2	5603684	2680	0	999	0
Hummock savannas	T4.3	435831	33	0	19	0
Temperate woodlands	T4.4	21049	2	0	1	0
Semi-desert steppes	T5.1	56506	78	0	42	0
Subtropical-temperate forested wetlands	TF1.2	740341	6184	1	3660	1
Seasonal floodplain marshes	TF1.4	25233	2551	2	1038	1
Water	Water	4785	825	3	3246	12

2.4.3 Water observations from space

Dataset 3	Australian Water Observations from Space (WOfS)
Purpose	To identify the presence and absence of water using Landsat satellite archive from 1987 to present day.
Format	Raster (25m by 25m).
Extent	Australia.
Temporal resolution	1987 to current. Updated as often as new imagery allows, approximately fortnightly.
Custodian	Geoscience Australia.
Notes	Water Observations from Space (WOfS) is the world's first continent-scale map of surface water and provides images and data showing where water has been seen in Australia from 1987 to the present.
Access	Information available at: https://www.ga.gov.au/dea/products/wofs
Citation	Geoscience Australia (2015) Australian Water Observations from Space (WOfS) - Water Summary, Filtered. Bioregional Assessment Source Dataset. Viewed 05 July 2017
Supporting papers	N. Mueller, A. Lewis, D. Roberts, S. Ring, R. Melrose, J. Sixsmith, L. Lymburner, A. McIntyre, P. Tan, S. Curnow, A. Ip, 2016. Water observations from space: Mapping surface water from 25 years of Landsat imagery across Australia. *Remote Sensing of Environment* 174, 341-352, ISSN 0034-4257.

Table 9: Water observations from space (WOfS). Table of the frequency of pixels observed as wet in the Mitchell catchment (0-1, lowest to highest).

Summary Value Range	Area (ha)	%	Cumulative %, excluding 0 to 0.1 class
0 to 0.1	7142273	99.58	
0.1 to 0.2	11800	0.16	0.16
0.2 to 0.3	4037	0.06	0.22
0.3 to 0.4	2172	0.03	0.25
0.4 to 0.5	1542	0.02	0.27
0.5 to 0.6	1264	0.02	0.29
0.6 to 0.7	1102	0.02	0.31
0.7 to 0.8	1071	0.01	0.32
0.8 to 0.9	1435	0.02	0.34
0.9 to 1	5600	0.08	0.42
Total	**7172296**	**100**	


WofS Filtered Summary
0 to 0.1
0.1 to 0.2
0.2 to 0.3
0.3 to 0.4
0.4 to 0.5
0.5 to 0.6
0.6 to 0.7
0.7 to 0.8
0.8 to 0.9
0.9 to 1
0
2 km

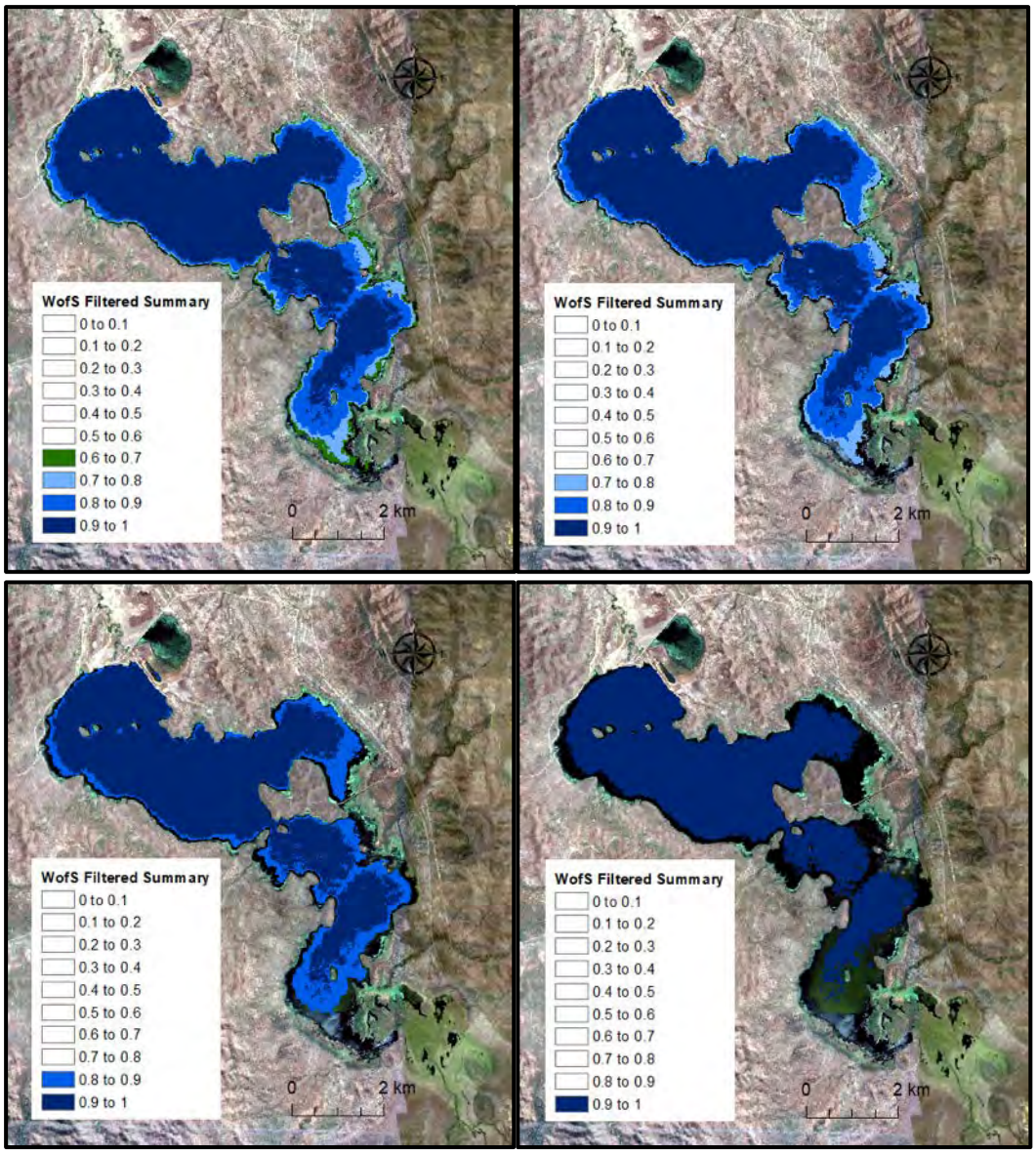


Figure 8: Map sequence illustrating the frequency of wet observations at Quaid's Dam, near the headwaters of the Mitchell catchment, approximately 15km north of Mareeba. The lighter coloured pixels in the south-east quadrant of the lake indicate a low frequency of observations that were considered to be wet, whereas the deepest, central part of the lake has the highest frequency of wet observations. Observations of water flowing from the dam, in the north-west corner of the lake are in the lowest class of 0 to 0.1.

Table 10: Number of waterholes mapped by Water Observations from Space and the relative average area (ha).

Ecosystem type	IUCN EFG	Area (ha)	Number of waterholes mapped by Water Observations from Space	
			WOfS	Average area (ha)
Estuary	Estuary	5226	5273	8
Intertidal forests and shrublands	MFT1.2	10996	784	1
Coastal saltmarshes and reedbeds	MFT1.3	40916	1310	1
Coastal shrublands and grasslands	MT2.1	5902	16	0
Non-remnant	Non-remnant	91612	323	0
Tropical subtropical lowland rainforests	T1.1	18244	156	1
Tropical subtropical dry forest and thickets	T1.2	12248	1	0
Tropical subtropical montane rainforests	T1.3	26323	0	0
Seasonally dry tropical shrublands	T3.1	72205	9	0
Pyric tussock savannas	T4.2	5603684	3230	0
Hummock savannas	T4.3	435831	23	0
Temperate woodlands	T4.4	21049	3	0
Semi-desert steppes	T5.1	56506	80	0
Subtropical-temperate forested wetlands	TF1.2	740341	11496	1
Seasonal floodplain marshes	TF1.4	25233	3574	1
Water	Water	4785	3728	10

2.4.5 Watercourse areas

Dataset 4	Watercourse areas
Purpose	To provide digital data on watercourse area features for use in land administration, emergency management, monitoring of climate change, hydrological modelling, and topographic mapping and in the production of navigational and web based mapping applications.
Format	Polygon.
Extent	Queensland.
Temporal resolution	2010 and 2014.
Custodian	© State of Queensland (Department of Natural Resources, Mines and Energy) 2020
Notes	The watercourse area feature is shown when a watercourse exceeds a set width and is dependent on the scale of the data. (e.g., for 1:25000 data, watercourses that are greater than 30 metres will be shown as a watercourse area. For 1:50000 data, it will be those watercourses greater than 60 metres wide)
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=%22Watercourse%20areas%20-%20Queensland%22
Citation	n.a.
Supporting papers	n.a.

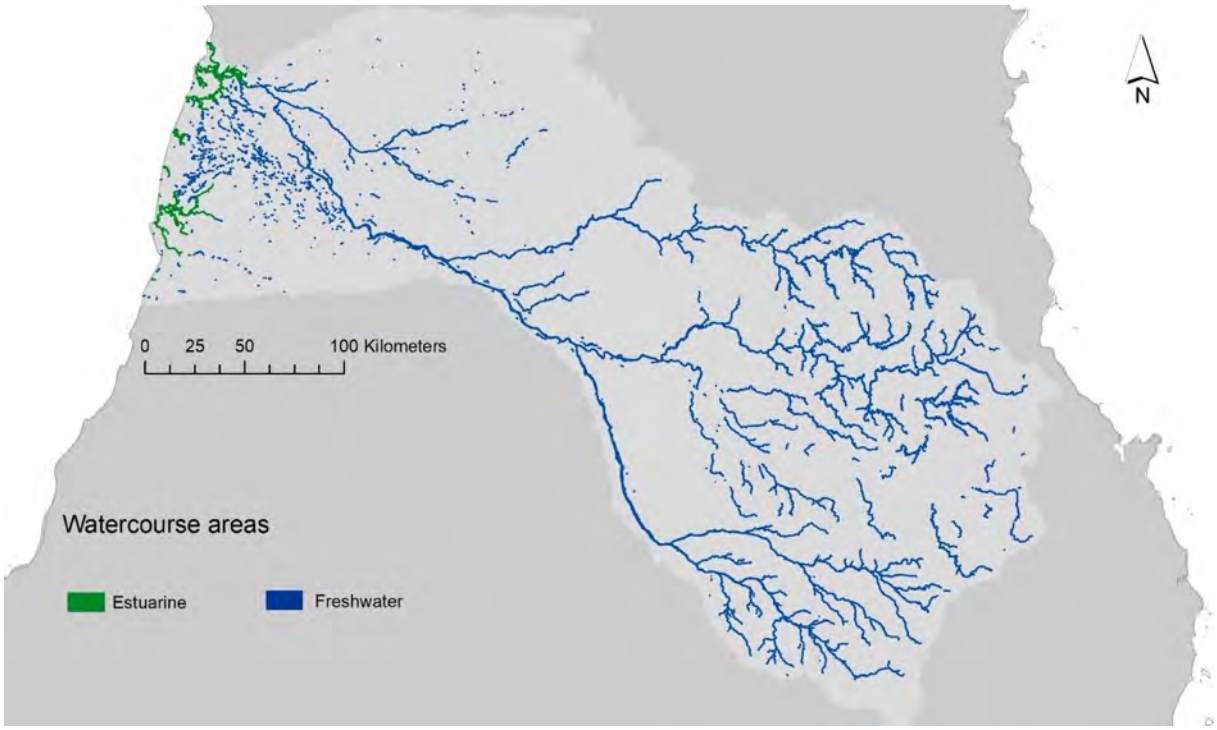


Figure 9: Watercourse areas in the Mitchell catchment, Queensland, Australia. Green areas indicate estuarine and blue indicates freshwater.

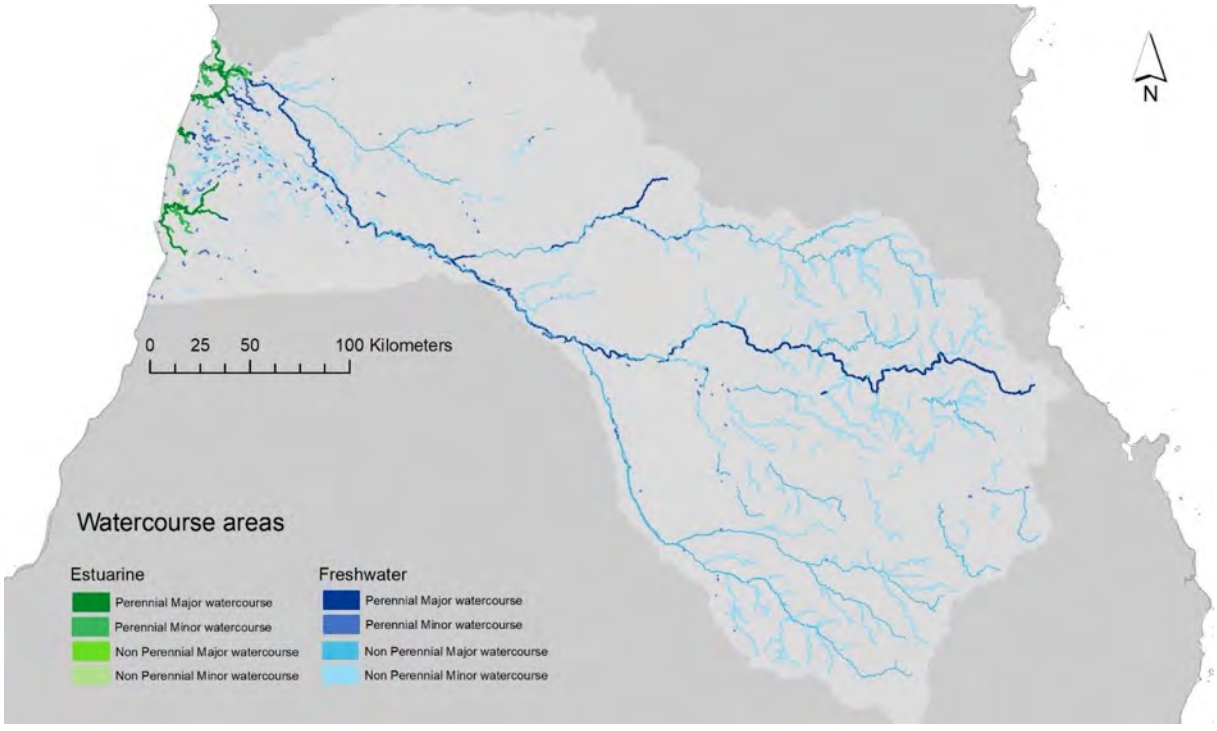


Figure 10: Watercourse areas (by perenniallity) in the Mitchell catchment, Queensland, Australia. Green areas indicate estuarine, and blue indicates freshwater. The intensity of the colour is determined by the perenniallity and size (major/minor) of the river segment.

2.4.6 Watercourse lines

Dataset 5	Watercourse lines
Purpose	To provide an authoritative single point of truth for watercourse features in Queensland. It is suitable for use in land administration, emergency management, monitoring of climate change, hydrological modelling, topographic and vegetation mapping and in the production of navigational and web-based mapping applications.
Format	Polylines.
Extent	Queensland.
Temporal resolution	2010 and 2014.
Custodian	© State of Queensland (Department of Resources) 2021. Updated data available at http://qldspatial.information.qld.gov.au/catalogue/ .
Notes	Spatial resolution of satellite imagery used to update watercourse lines data was 2.5m satellite imagery over the Gulf of Carpentaria and Cape York Peninsula.
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={AC14ABD2-05F4-443F-B0F5-BE52D1457D62}
Citation	n.a.
Supporting papers	n.a.

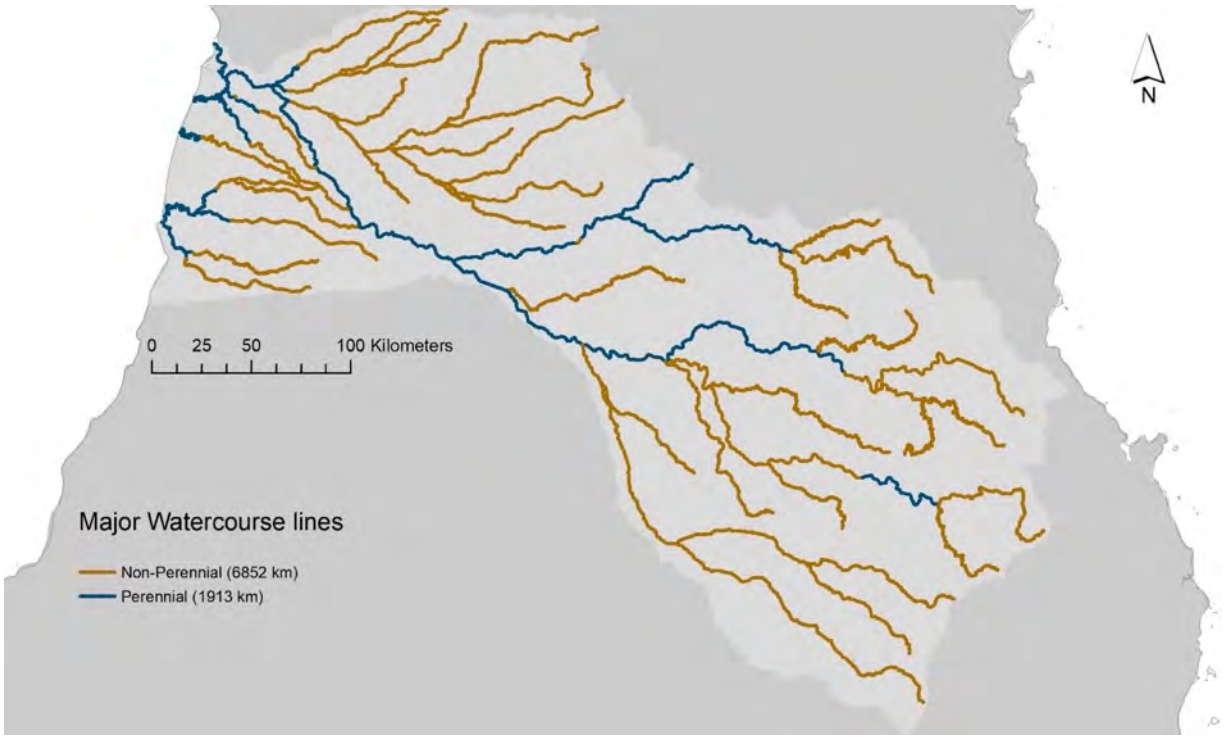


Figure 11: Major watercourse lines in the Mitchell catchment, Queensland, Australia. Brown indicates non-perennial watercourse lines and blue indicates the perennial watercourse lines.

3. Ecosystem condition

This section covers the data used to compile the ecosystem condition variable account. Condition variables are categorised according to the System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA-EA) ecosystem condition typology:

Ecosystem condition	Abiotic characteristics	Physical state
		Chemical state
	Biotic characteristics	Composition (including species-based indicators)
		Structure (including vegetation, biomass, food chains)
		Function (including ecosystem processes, disturbance regimes)
	Landscape and seascape level characteristics	Landscape diversity of biotic or abiotic characteristics
		Spatial distribution of characteristics such as connectivity, fragmentation

Figure 12: The SEEA-EA ecosystem condition typology used to organise and compile the ecosystem condition variable account.

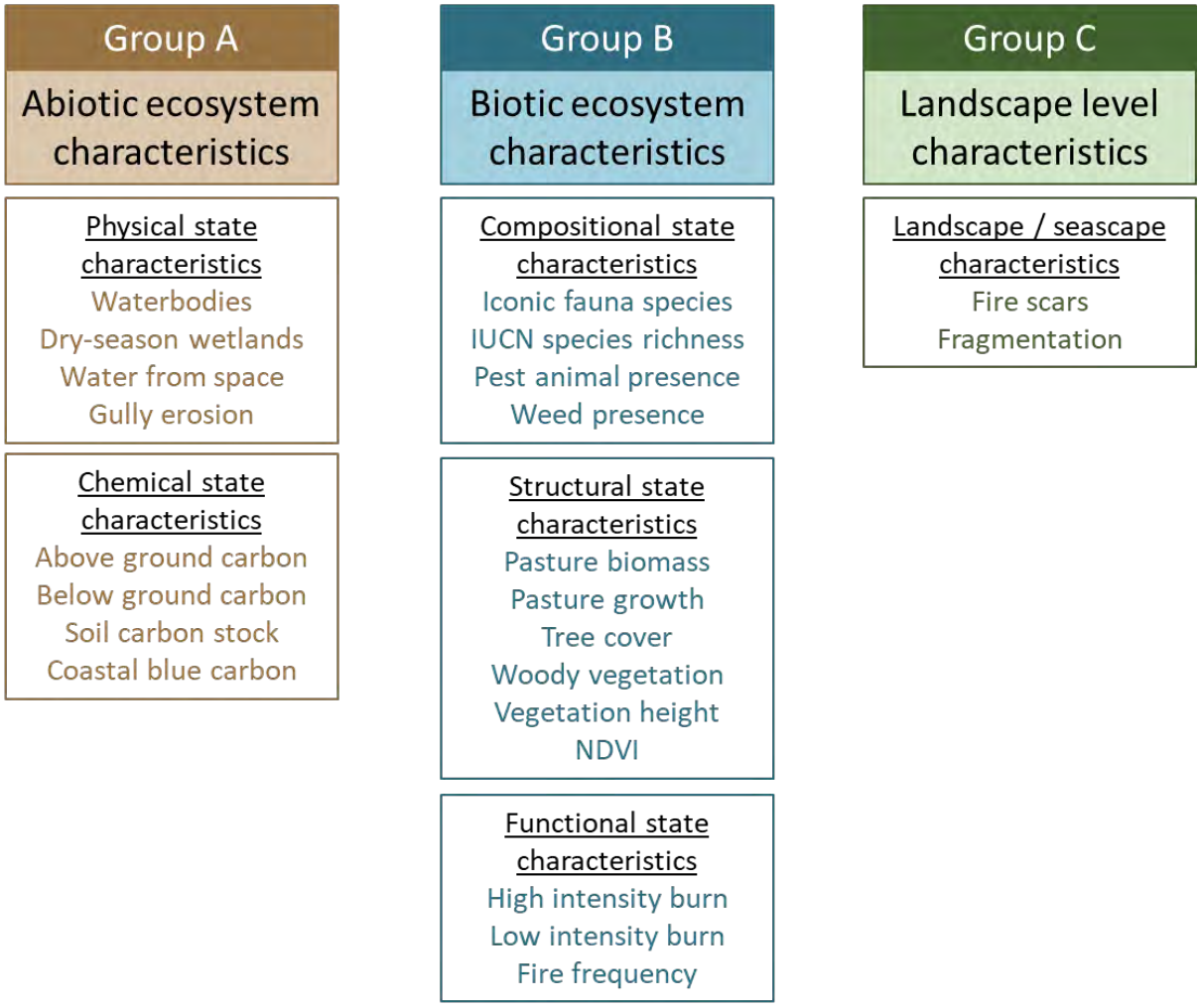


Figure 13: List of information and identified data that describe abiotic, biotic and landscape/seascape characteristics of ecosystem types, organised according to the SEEA-EA ecosystem condition typology. Note that for some ecosystem types, only a subset of these data are appropriate for inclusion into ecosystem condition variable accounts.

3.1 Abiotic physical state characteristics

3.1.1 Water datasets

Please refer to the following sections for details on the following datasets:

- Waterbodies
- Dry-season wetlands
- Water observations from space

3.1.2 Gully erosion

Dataset	Erosion
Purpose	Using remote sensing to quantify sediment budget components in the Mitchell River, Gulf of Carpentaria.
Format	Polygon.
Extent	Mitchell catchment.
Temporal resolution	Remote sensing data collected between 2000 and 2004, results published in 2008.
Custodian	Andrew Brooks, Precision Erosion and Sediment Management Research group, Griffith University. andrew.brooks@griffith.edu.au.
Notes	Using satellite imagery collected between the years 2000 and 2004, Brooks et al (2008) report that the mean rate of gully head scarp retreat was 0.34 m/yr across all sites. The area of gullies in ha is the area of gullies modelled within each grid square (1km × 1km) and this has been allocated to EFGs on a pro-rata basis. The values presented in Table 11 are consistent with the values presented in Brooks et al (2008). The total area of gullies from ASTER imagery (15m cell size) has been adjusted by cross checking a subset against higher resolution Quickbird imagery in Google Earth (highest resolution 0.61m). Total annual erosion volume in m^3/yr is presented as the median value, with 25^{th} percentile and 75^{th} percentile values regarded as a measure of error around the median. The last three rows in Table 11 give total annual erosion in t/yr at the 25^{th}, 50^{th} and 75^{th} percentiles, calculated by multiplying the volume in m^3 by 1.6 as described in Brooks et al (2008). The sum of total annual erosion in t/yr across ecosystem types (i.e. EFGs) match the whole-of catchment annual erosion value as reported in Brooks et al (2008, Table 3, p232).
Access	Contact Andrew Brooks for data access. Publication available at https://www.researchgate.net/publication/29469564 Using remote sensing to quantify sediment budget components in a large tropical river – Mitchell River, Gulf of Carpentaria
Citation	Using remote sensing to quantify sediment budget components in a large tropical river – Mitchell River, Gulf of Carpentaria. Brooks, A.P., Spencer, J., Shellberg, G., Knight, J. & Lymburner, L. (2008) Sediment Dynamics in Changing Environments (Proceedings of a symposium held in Christchurch, New Zealand, December 2008). IAHS Publ. 325, 2008
Supporting papers	Rustomji, P., Shellberg, J., Brooks, A., Spencer, J. and Caitcheon, G. (2010) *A catchment sediment and nutrient budget for the Mitchell River, Queensland*. A report to the Tropical Rivers and Coastal Knowledge (TRaCK) Research Program. CSIRO Water for a Healthy Country National Research Flagship. 119 pp. Shellberg, J. & Spencer, J., Brooks, A. & Pietsch, T.J. (2016). Degradation of the Mitchell River fluvial megafan by alluvial gully erosion increased by post-European land use change, Queensland, Australia. *Geomorphology*. 266. 105–120. 10.1016/j.geomorph.2016.04.021.

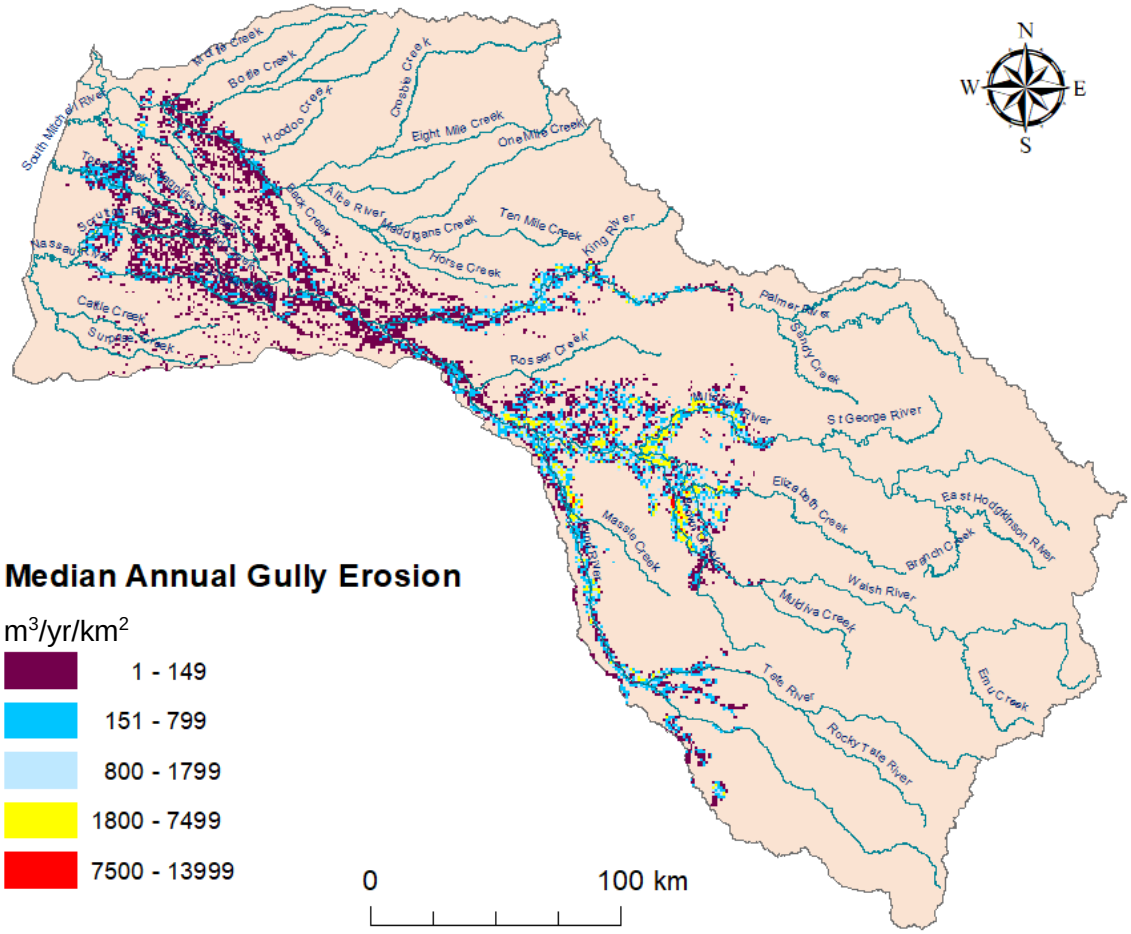


Figure 14: Median annual gully erosion ($m^3/yr/km^2$) in the Mitchell catchment, based on data collected between 2000 and 2004.

Table 11: Area of gullies (ha) and annual gully erosion volume (m^3/yr and t/yr based on a bulk density of 1,600kg/m^3) allocated across ecosystem types in the Mitchell catchment.

Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG	Estuary	MFT1.2	MFT1.3	MT2.1	Non-remnant	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
IUCN EFG Area (ha)	5962	10996	40972	5902	91612	18296	12248	26323	72205	5603698	435831	21049	56506	740341	25233	4785
Total area of gullies (ha) (ASTER imagery)	0.76		0.08		118.20	6.16	1.62		48.37	6647.43	901.30		1918.13	6922.11	95.57	2.98
% of EFG with gullies (ASTER imagery)	0.01		0.0002		0.13	0.03	0.01		0.07	0.12	0.21		3.39	0.93	0.38	0.06
Total area of gullies (ha) (Adjusted from Quickbird)	0.58		0.06		91.31	4.76	1.25		37.36	5134.84	696.21		1481.67	5347.02	73.82	2.31
% of EFG with gullies (Adjusted from Quickbird)	0.01		0.0001		0.10	0.03	0.01		0.05	0.09	0.16		2.62	0.72	0.29	0.05
Total annual erosion volume (m^3/yr) Median	118		19		21271	794	201		16954	1398504	161135		402192	1153934	10949	889
Total annual erosion volume (m^3/yr) 75th percentile	498		80		89782	3352	849		71562	5902948	680136		1697612	4870645	46213	3753
Total annual erosion volume (m^3/yr) 25th percentile	6		1		1147	43	11		914	75401	8688		21684	62215	590	48
Total annual erosion (t/yr) (assume	189		30		34033	1271	322		27127	2237606	257816		643507	1846295	17518	1423

1600 kg/m^3) Median																
Total annual erosion (t/yr) (assume 1600 kg/m^3) 75th percentile	797		127		143651	5363	1358		114499	9444717	1088218		2716179	7793032	73942	6005
Total annual erosion (t/yr) (assume 1600 kg/m^3) 25th percentile	10		2		1835	69	17		1463	120642	13900		34695	99544	944	77

3.2 Abiotic chemical state characteristics

3.2.1 Carbon datasets

3.2.1.1 Above-ground carbon stock

Dataset 1	Above-ground carbon biomass. Passive microwave-based global above-ground biomass carbon dataset (1993–2012) version 1.0
Purpose	To estimate the global above-ground carbon stocks.
Format	Raster, with 0.25-degree regular global grid. Downloadable in NetCDF format.
Extent	Global.
Temporal resolution	Annual average values for 1993–2012.
Custodian	Yi Liu University of New South Wales, yi.liu@unsw.edu.au Albert Van Dijk Australian National University, albert.vandijk@anu.edu.au
Notes	The annual average values for 1993-2012 were aggregated into a single raster based on the mean 20-year data. The estuarine region of the Mitchell catchment was excluded from the above-ground carbon dataset. Data was clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Zonal statistics were performed to derive averages by ecosystem type.
Access	http://www.wenfo.org/wald/global-biomass/
Citation	Liu, Y.Y., A.I.J.M. van Dijk, R.A.M. de Jeu, J.G. Canadell, M.F. McCabe, J.P. Evans and G. Wang. Recent reversal in loss of global terrestrial biomass. *Nature Climate Change*, 5, 2015. https://doi.org/10.1038/nclimate2581
Supporting papers	n.a.

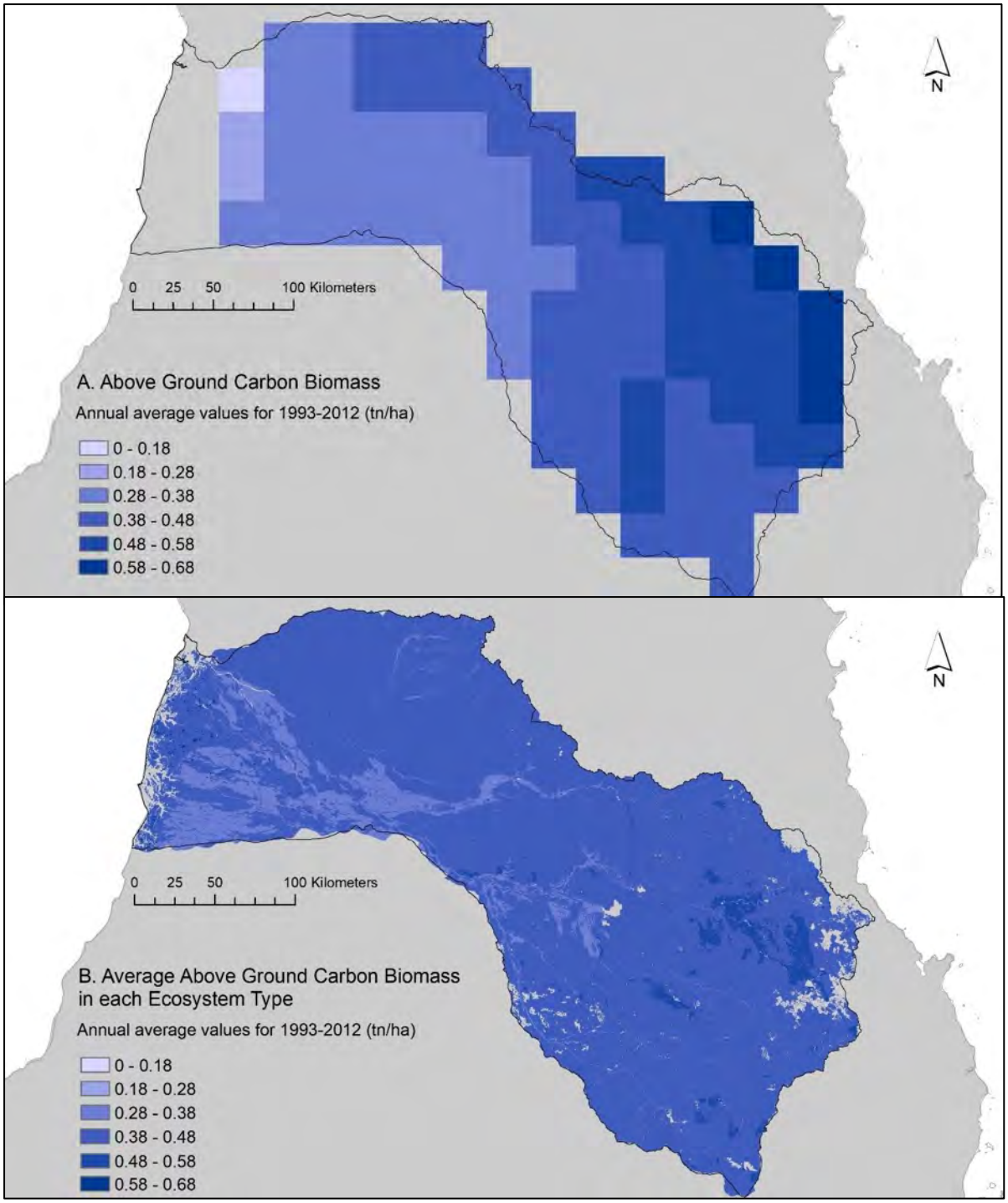


Figure 15: Mean annual above-ground carbon stocks (t C/ha) between 1993 and 2012 (top) and mean annual above-ground carbon stocks (t C/ha) in each ecosystem type (bottom).

Table 12: Above-ground carbon biomass (t C/ha) in each ecosystem type.

Ecosystem type	IUCN EFG	Area (ha)	Above-ground biomass carbon (t C/ha)				
			MIN	MAX	RANGE	MEAN	STD
Estuary	Estuary	5226	8.6	9.9	1.3	9.9	0.2
Intertidal forests and shrublands	MFT1.2	10996	8.5	9.9	1.4	9.9	0.2
Coastal saltmarshes and reedbeds	MFT1.3	40916	8.5	9.9	1.4	9.5	0.7
Coastal shrublands and grasslands	MT2.1	5902	8.5	9.9	1.4	9.1	0.7
Non-remnant	Non-remnant	91612	5.4	107.3	101.8	15.9	20.1
Tropical subtropical lowland rainforests	T1.1	18244	5.7	107.3	101.6	19.8	30.9
Tropical subtropical dry forest and thickets	T1.2	12248	6.5	107.3	100.8	10.5	8.4
Tropical subtropical montane rainforests	T1.3	26323	12.1	107.3	95.2	25.1	30.4
Seasonally dry tropical shrublands	T3.1	72205	6.0	21.7	15.7	8.4	1.5
Pyric tussock savannas	T4.2	5603684	5.1	107.3	102.1	9.0	4.5
Hummock savannas	T4.3	435831	6.1	19.5	13.4	9.2	1.8
Temperate woodlands	T4.4	21049	8.0	13.4	5.4	9.1	1.5
Semi-desert steppes	T5.1	56506	5.5	9.2	3.7	6.8	1.1
Subtropical-temperate forested wetlands	TF1.2	740341	5.1	107.3	102.1	7.3	2.4
Seasonal floodplain marshes	TF1.4	25233	5.1	107.3	102.1	7.8	2.9
Water	Water	4785	5.6	107.3	101.6	12.9	4.7

3.2.1.2 Above- and below-ground carbon

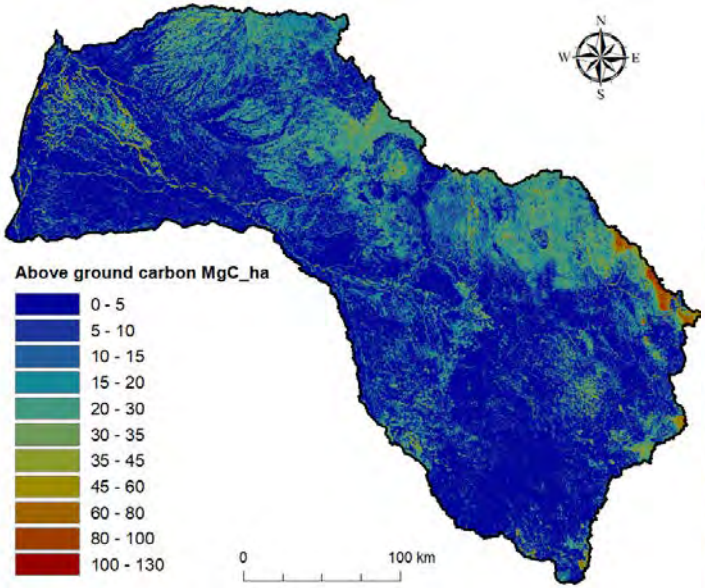
Dataset 2	Above- and below-ground carbon
Purpose	To report biomass carbon density estimates across a wide range of vegetation types in 2010 with quantified uncertainty.
Format	Raster (300m × 300m)
Extent	Global
Temporal resolution	2010
Custodian	Harmonized global maps of above and belowground biomass carbon density in the year 2010. Available at: https://doi.org/10.1038/s41597-020-0444-4
Notes	AGC and BGC and uncertainties were calculated from: Spawn, S.A., and H.K. Gibbs. 2020. Global Aboveground and Belowground Biomass Carbon Density Maps for the Year 2010. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1763
Access	Harmonized global maps of above and belowground biomass carbon density in the year 2010, available at: https://doi.org/10.1038/s41597-020-0444-4
Citation	Harmonized global maps of above and belowground biomass carbon density in the year 2010, available at: https://doi.org/10.1038/s41597-020-0444-4
Supporting papers	n.a

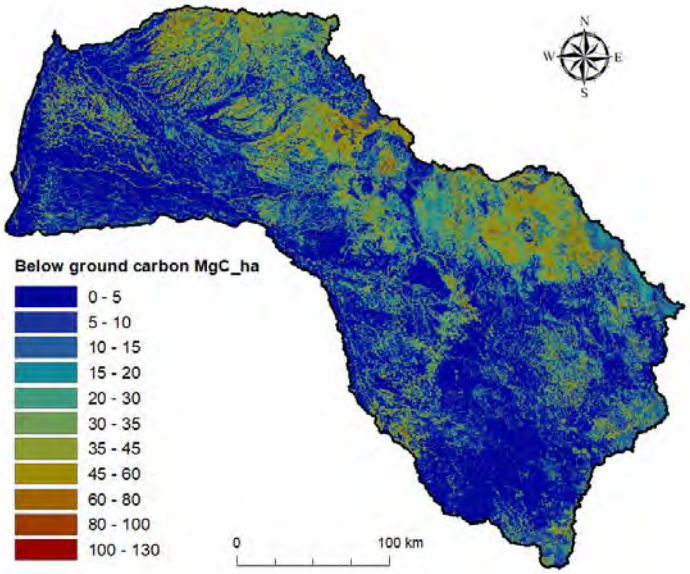
Table 13: Above-ground carbon (t C/ha) and total above-ground carbon storage (t C) per ecosystem type, across the Mitchell catchment in 2010 (from Spawn et al. (2020)).

Ecosystem type	IUCN EFG	Area (ha)	Above-ground carbon					
			Lower 95% confidence interval		Most likely estimate		Upper 95% confidence interval	
			Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)
Estuary	Estuary	5,226	6	31,011	9	46,753	13	68,850
Intertidal forests and shrublands	MFT1.2	10,996	9	95,481	14	149,871	19	213,008
Coastal saltmarshes and reedbeds	MFT1.3	40,916	3	124,395	4	169,327	6	230,768
Coastal shrublands and grasslands	MT2.1	5,902	16	96,457	18	103,818	19	111,917
Non-remnant	Non-remnant	91,612	5	447,579	6	561,818	8	687,999
Tropical subtropical lowland rainforests	T1.1	18,244	26	470,822	32	587,876	39	709,606
Tropical subtropical dry forest and thickets	T1.2	12,248	25	306,409	30	370,684	36	435,298
Tropical subtropical montane rainforests	T1.3	26,323	42	1,104,866	75	1,979,327	109	2,855,733
Seasonally dry tropical shrublands	T3.1	72,205	8	539,867	8	594,362	9	649,545
Pyric tussock savannas	T4.2	5,603,684	10	54,781,695	11	60,375,811	12	66,049,544
Hummock savannas	T4.3	435,831	6	2,631,168	7	2,868,840	7	3,107,990
Temperate woodlands	T4.4	21,049	5	107,608	6	119,482	6	131,403
Semi-desert steppes	T5.1	56,506	3	194,418	4	228,217	5	262,972
Subtropical-temperate forested wetlands	TF1.2	740,342	6	4,722,379	7	5,290,181	8	5,890,970
Seasonal floodplain marshes	TF1.4	25,233	7	169,041	8	194,531	9	223,381
Water	Water	4,785	6	26,514	6	29,008	7	33,101

Table 14: Below-ground carbon (t C/ha) and total below-ground carbon storage (t C) per ecosystem type, across the Mitchell catchment in 2010 (from Spawn et al. (2020)).

Ecosystem type	IUCN EFG	Area (ha)	Below-ground carbon					
			Lower 95% confidence interval		Most likely estimate		Upper 95% confidence interval	
			Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)
Estuary	Estuary	5,226	3	14,721	6	28,760	11	56,511
Intertidal forests and shrublands	MFT1.2	10,996	3	28,043	7	78,514	14	152,656
Coastal saltmarshes and reedbeds	MFT1.3	40,916	2	92,768	5	184,285	8	337,595
Coastal shrublands and grasslands	MT2.1	5,902	8	47,286	17	97,388	29	172,231
Non-remnant	Non-remnant	91,612	3	287,227	8	683,434	13	1,230,346
Tropical subtropical lowland rainforests	T1.1	18,244	7	129,655	19	349,822	36	659,552
Tropical subtropical dry forest and thickets	T1.2	12,248	9	104,340	23	284,911	42	508,418
Tropical subtropical montane rainforests	T1.3	26,323	2	60,322	19	505,219	37	965,564
Seasonally dry tropical shrublands	T3.1	72,205	6	430,203	14	1,033,302	25	1,775,726
Pyric tussock savannas	T4.2	5,603,684	7	38,282,633	17	97,634,298	30	168,405,960
Hummock savannas	T4.3	435,831	4	1,928,930	11	4,803,411	20	8,676,667
Temperate woodlands	T4.4	21,049	4	87,424	10	205,895	18	373,568
Semi-desert steppes	T5.1	56,506	3	160,311	7	372,418	12	654,531
Subtropical-temperate forested wetlands	TF1.2	740,342	5	3,415,425	11	7,811,064	19	13,977,531
Seasonal floodplain marshes	TF1.4	25,233	5	124,544	11	266,435	18	460,000
Water	Water	4,785	4	17,427	8	37,264	14	64,898





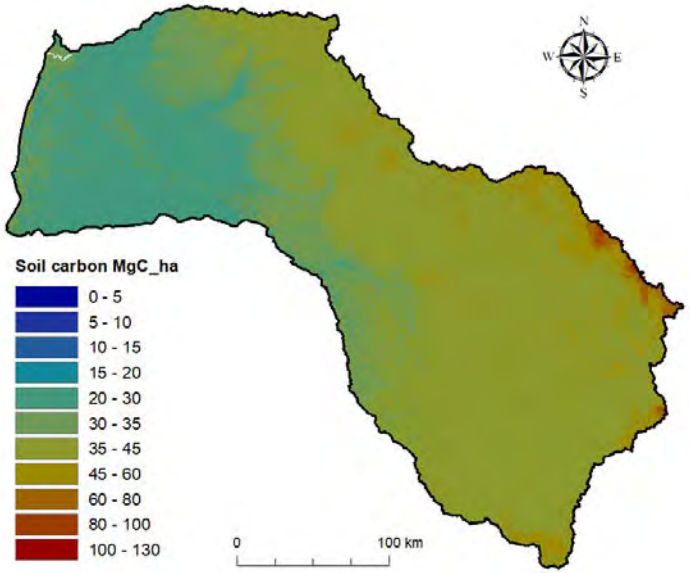


Figure 16: Mean estimates of above- and below-ground carbon density from Spawn et al. (2020) compared with mean estimated soil carbon density (to a depth of 30cm) from Viscarra Rossel et al. (2014) to illustrate relative magnitudes of carbon stocks in the three carbon pools.

3.2.1.3 Soil carbon

Dataset 3	Baseline map of Australian soil organic carbon stocks.
Purpose	To model and map soil carbon to a depth of 30cm for above-ground, below-ground and soil organic carbon.
Format	Raster (90m × 90m).
Extent	Continental Australia and Tasmania.
Temporal resolution	Produced in 2010.
Custodian	CSIRO Australia 2010
Notes	Data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Zonal statistics were performed to derive averages by ecosystem type.
Access	https://doi.org/10.4225/08/556BCD6A38737
Citation	Viscarra Rossel, R.; Webster, R.; Bui, E.; Baldock, J. (2014): Baseline map of Australian soil organic carbon stocks and their uncertainty. v2. CSIRO. Data Collection.
Supporting papers	Further description including map products are available on CSIRO website: https://www.csiro.au/en/News/News-releases/2014/Australian-soil-carbon-map.

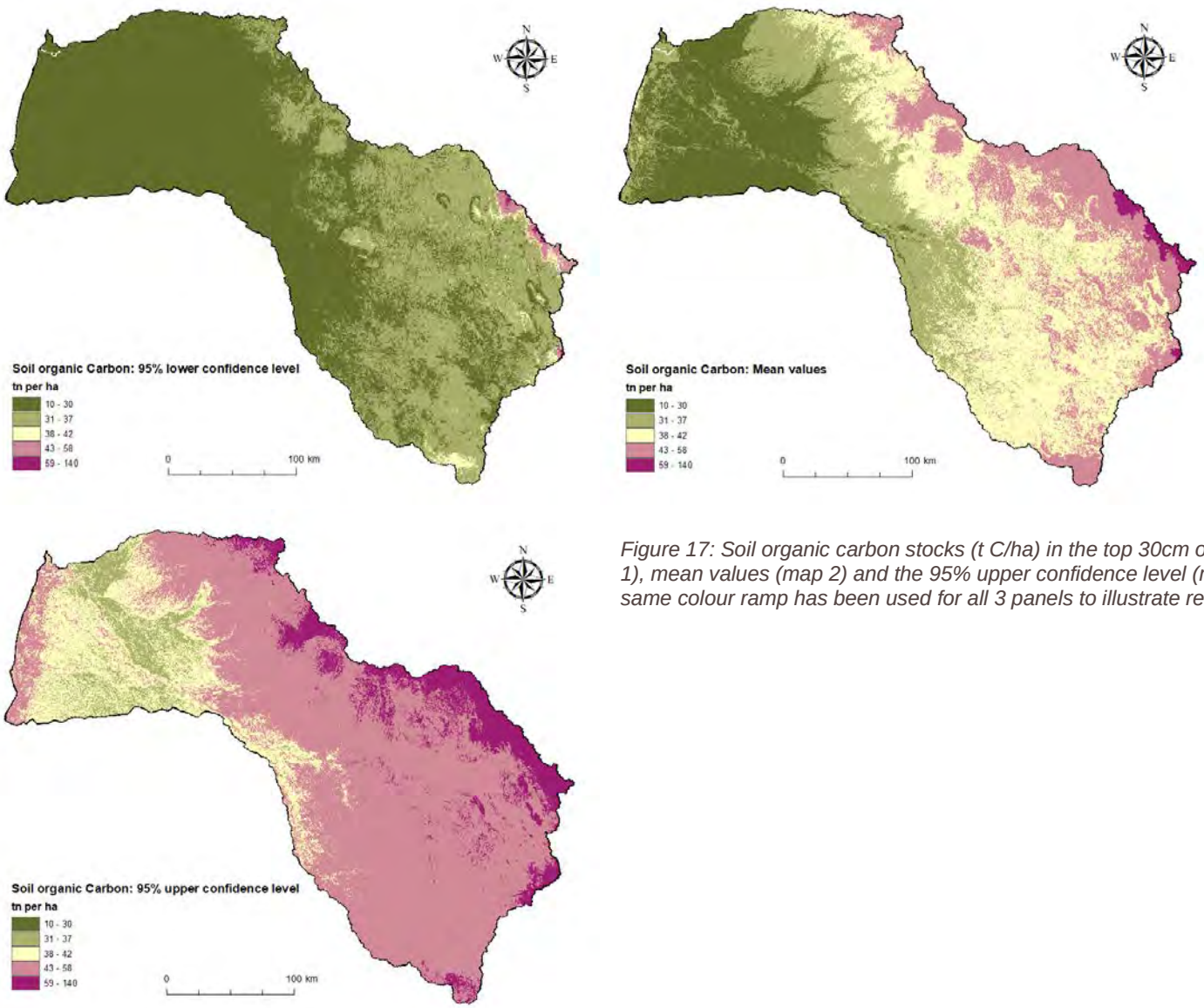


Figure 17: Soil organic carbon stocks (t C/ha) in the top 30cm of soil at the 95% lower confidence level (map 1), mean values (map 2) and the 95% upper confidence level (map 3) – from Viscarra Rossel et al. (2014) The same colour ramp has been used for all 3 panels to illustrate respective levels of soil carbon (t C/ha).

Table 15: Soil organic carbon (t C/ha) and total soil organic carbon storage (t C) in the top 30cm of soil per ecosystem type across the Mitchell catchment in 2010 (from Viscarra Rossel et al. (2014)).

Ecosystem type	IUCN EFG	Area (ha)	Soil organic carbon					
			Lower 95% confidence interval		Most likely estimate		Upper 95% confidence interval	
			Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)	Mean (t C/ha)	Sum (t C)
Estuary	Estuary	5,226	46	237,545	70	367,775	101	526,968
Intertidal forests and shrublands	MFT1.2	10,996	51	559,898	78	857,641	111	1,220,614
Coastal saltmarshes and reedbeds	MFT1.3	40,916	47	1,924,478	74	3,039,409	108	4,414,015
Coastal shrublands and grasslands	MT2.1	5,902	50	294,875	77	451,546	109	642,728
Non-remnant	Non-remnant	91,612	83	7,622,422	111	10,125,671	142	12,991,418
Tropical subtropical lowland rainforests	T1.1	18,244	56	1,028,906	84	1,528,288	117	2,128,959
Tropical subtropical dry forest and thickets	T1.2	12,248	84	1,025,465	113	1,380,000	146	1,788,533
Tropical subtropical montane rainforests	T1.3	26,323	128	3,365,096	186	4,890,215	255	6,702,073
Seasonally dry tropical shrublands	T3.1	72,205	77	5,547,317	103	7,427,586	133	9,591,612
Pyric tussock savannas	T4.2	5,603,684	71	395,398,744	97	542,293,996	127	713,190,540
Hummock savannas	T4.3	435,831	76	33,246,757	98	42,857,715	123	53,711,043
Temperate woodlands	T4.4	21,049	81	1,710,395	106	2,231,140	134	2,822,450
Semi-desert steppes	T5.1	56,506	60	3,397,302	81	4,587,813	106	5,963,867
Subtropical-temperate forested wetlands	TF1.2	740,342	56	41,372,376	79	58,249,517	106	78,097,186
Seasonal floodplain marshes	TF1.4	25,233	53	1,329,410	78	1,969,651	109	2,741,625
Water	Water	4,785	83	398,325	113	541,255	148	706,386

3.2.1.4 Blue carbon

Dataset 4	Coastal blue carbon
Purpose	Data on carbon stocks and sequestration rates in Australian tidal marshes, mangrove forests and seagrass meadows.
Format	Polygons.
Extent	Coastal Australia.
Temporal resolution	2019
Custodian	All Rights (including copyright) CSIRO 2019.
Notes	Data includes estimated carbon burial of the polygon in g/yr, estimated soil carbon stock of the polygon in grams and estimated (above + belowground) biomass stock of the polygon in grams.
Access	https://doi.org/10.25919/5d3a8acc9b598
Citation	Serrano, O.; Lovelock, C.; Atwood, T.; Macreadie, P.; Canto, R.; Phinn, S.; Arias-Ortiz, A.; Bai, L.; Baldock, J.; Bedulli, C.; Carnell, P.; Connolly, R.; Donaldson, P.; Esteban, A.; Ewers L., Carolyn J.; Eyre, B.; Hayes, M. A.; Horwitz, P.; Hutley, L.; Kavazos, C.; Kelleway, J.; Kendrick, G.; Kilminster, K.; Lafratta, A.; Lee, S. Y.; Lavery, P.; Maher, D.; Marbà, N.; Masque, P.; Mateo, Miguel A.; Mount, R.; Ralph, P.; Roelfsema, C.; Rozaimi, M.; Ruhon, R.; Salinas, C.; Samper-Villarreal, J.; Sanderman, J.; Sanders, C.; Santos, I.; Sharples, C.; Steven, A.; Cannard, T.; Trevathan-Tackett, S.; Duarte, C. (2019): *Australian vegetated coastal ecosystems as global hotspots for climate change mitigation*. v2. CSIRO. Data Collection.
Supporting papers	Serrano, O., Lovelock, C.E., Atwood, T.B., Macreadie, P.I., Canto, R., Phinn, S., Arias-Ortiz, A., Bai, L., Baldock, J., Bedulli, C. and Carnell, P., 2019. Australian vegetated coastal ecosystems as global hotspots for climate change mitigation. *Nature Communications*, 10(1), pp.1-10. https://doi.org/10.1038/s41467-019-12176-8

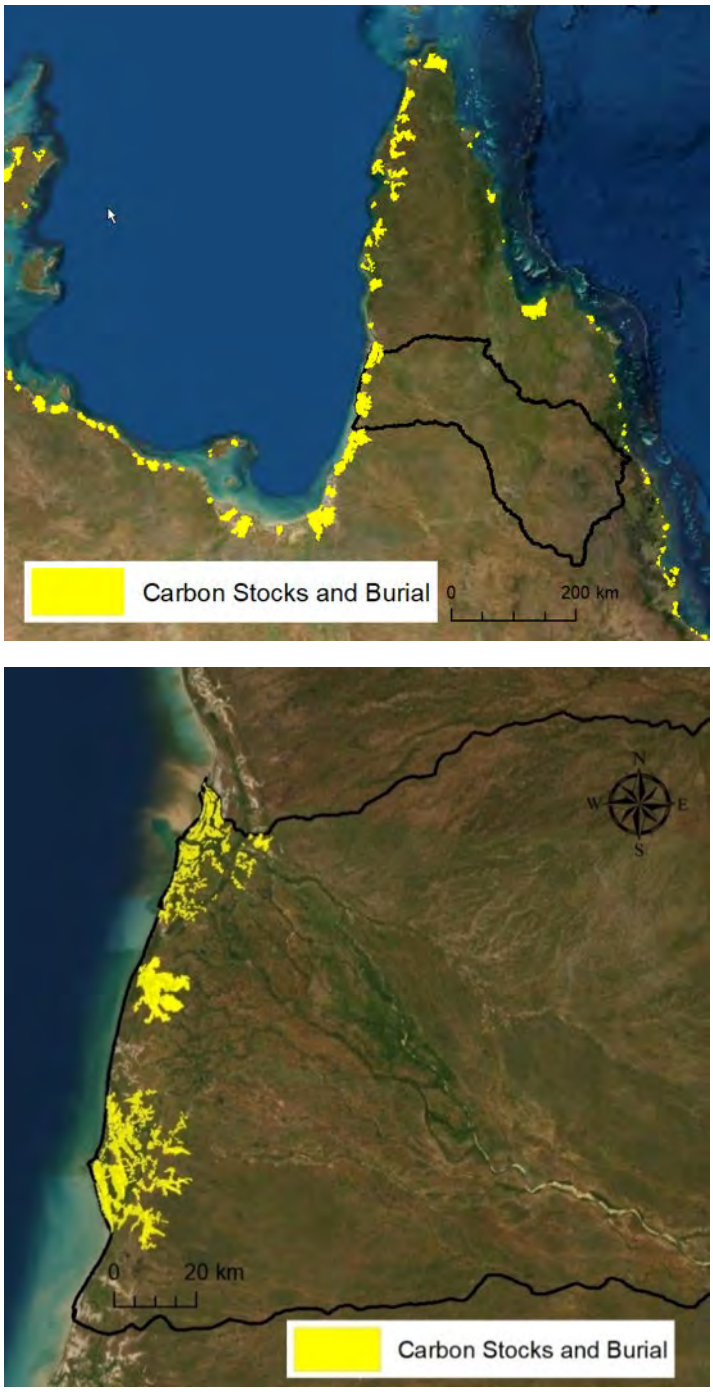


Figure 18: Blue carbon stocks dataset on Cape York and in the Gulf of Carpentaria (from Serrano et al. (2019). Bottom map is zoomed into the Mitchell catchment coastline. (Note: The mapping by Canto et al. 2016, listed the data in the Mitchell catchment as 'Tropical Bioregion' and Habitat as 'Saltmarsh'.)

Table 16: Total carbon burial rate (t C/yr), soil carbon stock in upper 1m of soil (t C) and total carbon stock in above-ground biomass (t C) by ecosystem type in the Mitchell catchment (from Serrano et al. (2019).

Ecosystem type	IUCN EFG	Area (ha)	Total area of blue carbon habitat (ha)	Total carbon burial rate (t C/yr)	Total carbon stock in upper 1m of soil (t C)	Total carbon stock in above ground biomass (t C)
Estuary	Estuary	5,226	114	43	18,747	167
Intertidal forests and shrublands	MFT1.2	10,996	1,174	445	193,568	1,722
Coastal saltmarshes and reedbeds	MFT1.3	40,916	23,677	8,973	3,907,436	34,751
Coastal shrublands and grasslands	MT2.1	5,902	114	43	18,808	167
Non-remnant	Non-rem	91,612	0	0	0	0
Tropical subtropical lowland rainforests	T1.1	18,244	312	118	51,277	456
Tropical subtropical dry forest and thickets	T1.2	12,248	0	0	0	0
Tropical subtropical montane rainforests	T1.3	26,323	0	0	0	0
Seasonally dry tropical shrublands	T3.1	72,205	0	0	0	0
Pyric tussock savannas	T4.2	5,603,684	6,104	2,311	1,006,252	8,949
Hummock savannas	T4.3	435,831	0	0	0	0
Temperate woodlands	T4.4	21,049	0	0	0	0
Semi-desert steppes	T5.1	56,506	0	0	0	0
Subtropical-temperate forested wetlands	TF1.2	740,342	213	81	35,287	314
Seasonal floodplain marshes	TF1.4	25,233	364	138	59,938	533
Water	Water	4,785	0	0	0	0

3.3 Biotic compositional state characteristics

3.3.1 Iconic species habitat

Dataset 1	Modelled potential habitat for selected threatened species – Queensland
Purpose	To provide an inventory of fauna, listed as critically endangered or endangered in the Queensland Nature Conservation (Animals) Regulation 2020, with potential habitat range in the Mitchell Catchment. This dataset provides baseline habitat areas against which future surveys can be evaluated.
Format	Vector shape files.
Extent	Queensland.
Temporal resolution	Continuously updated as new data become available.
Custodian	Department of Environment and Science, Queensland Government.
Notes	Modelled potential habitat shapefiles for selected threatened and priority species in Queensland has been created using MAXENT (v 3.3.3k). Potential habitat models aim to provide a guide to the distribution of potential habitat of selected threatened species in Queensland and are not intended as a substitute for field survey by skilled observers. Modelled potential habitat for selected threatened species in Queensland would typically be used to identify habitat for threatened species planning, management and recovery.
Access	Modelled potential habitat: https://www.data.qld.gov.au/dataset/modelled-potential-habitat-for-selected-threatened-species-queensland Nature Conservation (Animals) Regulation 2020: https://www.legislation.qld.gov.au/view/pdf/asmade/sl-2020-0136
Citation	State of Queensland (2021) Modelled potential habitat for selected threatened species – Queensland. Available at: https://www.data.qld.gov.au/dataset/modelled-potential-habitat-for-selected-threatened-species-queensland/resource/80e86f88-bb95-424e-9742-186e1318cd38.
Supporting papers	V.J. Neldner, M.J. Laidlaw, K.R. McDonald, M.T. Mathieson, R.I. Melzer, R. Seaton, W.J. F. McDonald, R. Hobson, and C.J. Limpus (2017). *Scientific review of the impacts of land clearing on threatened species in Queensland*. Queensland Government, Brisbane.

3.3.1.1 Critically endangered species

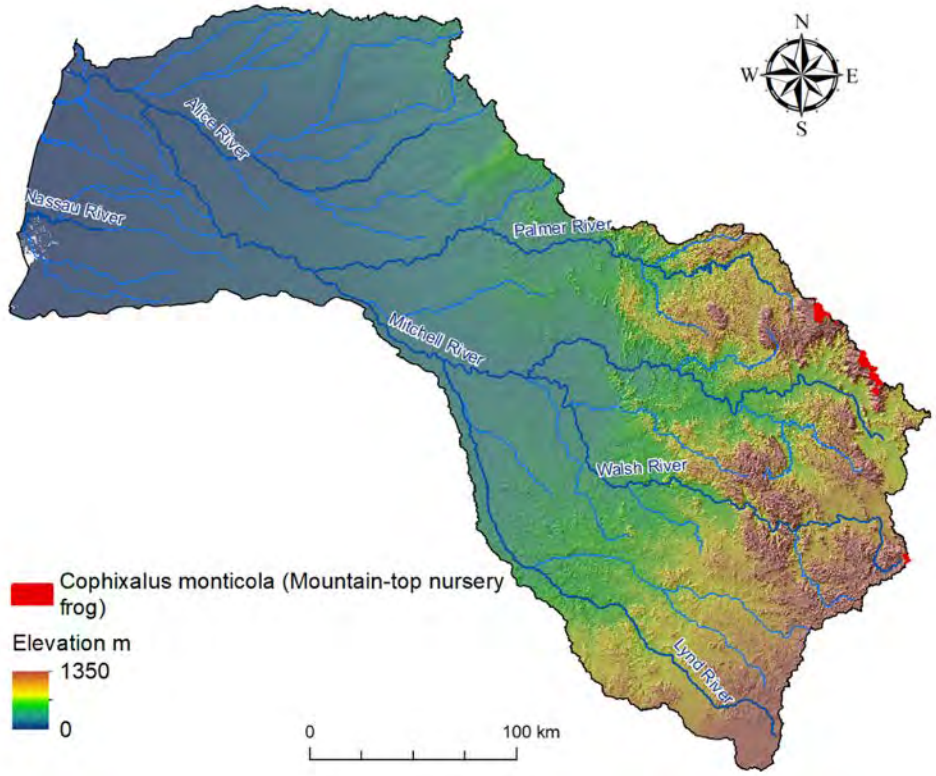


Figure 19: Modelled potential habitat distribution of Cophixalus monticola (mountain-top nursery frog) in the Mitchell catchment, Queensland, Australia.

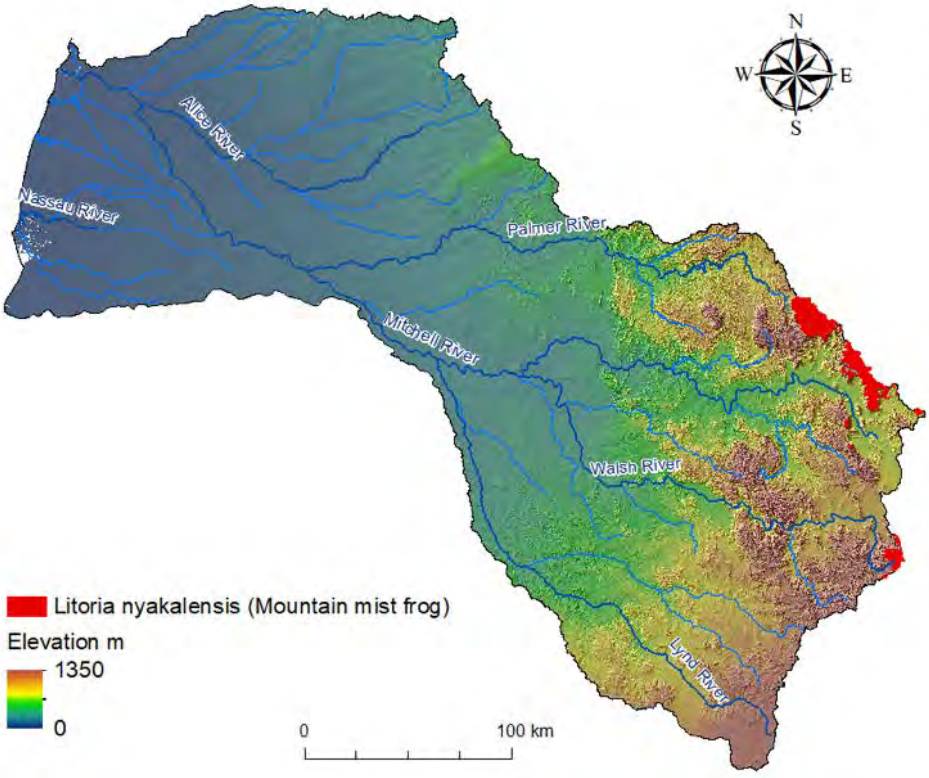


Figure 20: Modelled potential habitat distribution of Litoria nyakalensis (mountain mist frog) in the Mitchell catchment, Queensland, Australia.

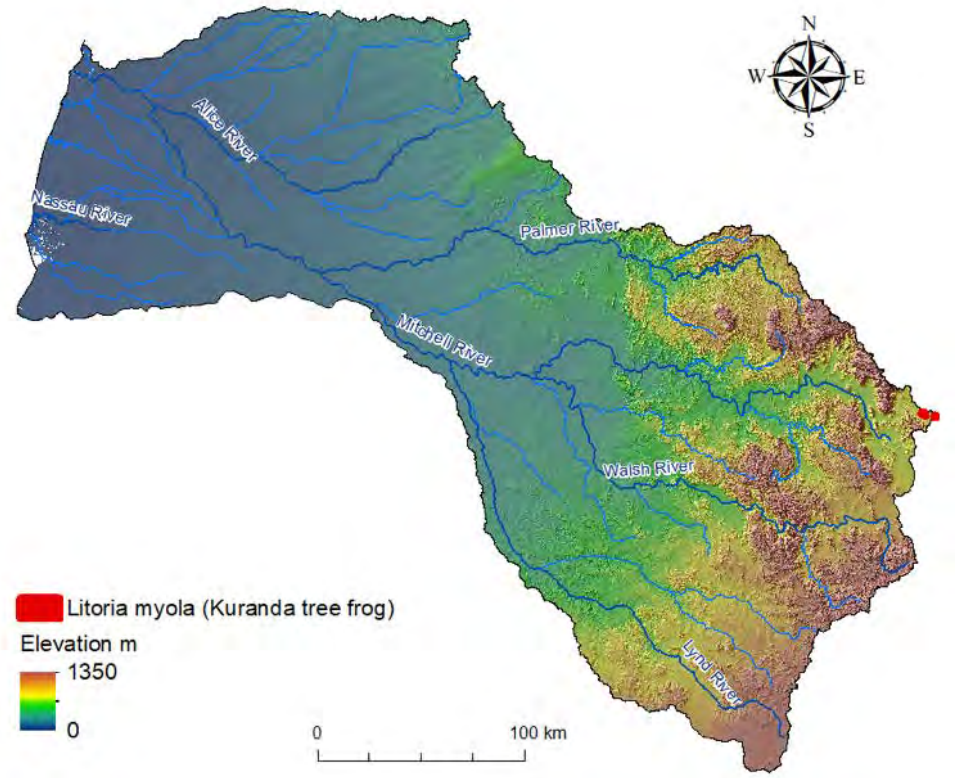


Figure 21: Modelled potential habitat distribution of Litoria myola (Kuranda tree frog) in the Mitchell catchment, Queensland, Australia.

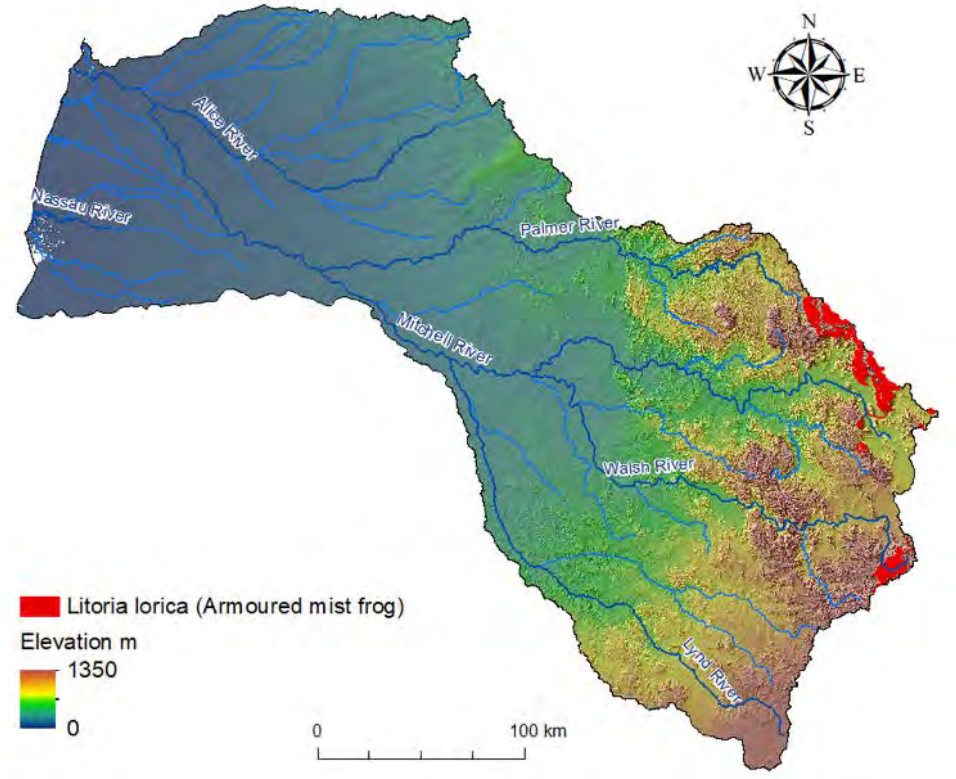


Figure 22: Modelled potential habitat distribution of Litoria lorica (armoured mist frog) in the Mitchell catchment, Queensland, Australia.

3.3.1.2 Endangered species

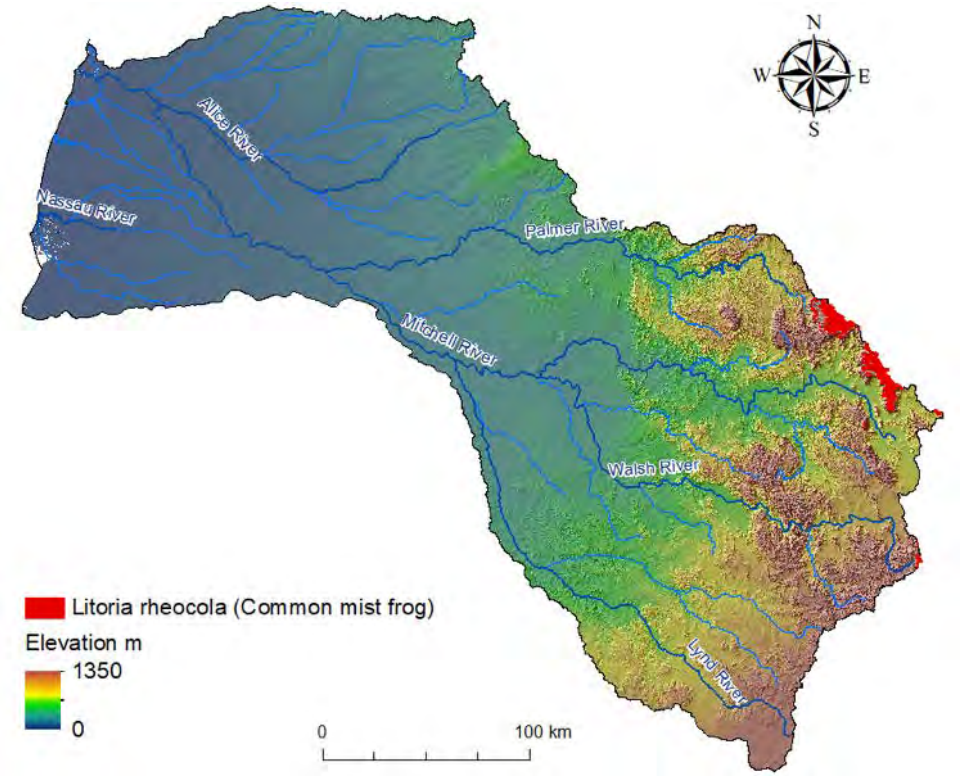


Figure 23: Modelled potential habitat distribution of Litoria rheocola (common mist frog) in the Mitchell catchment, Queensland, Australia.

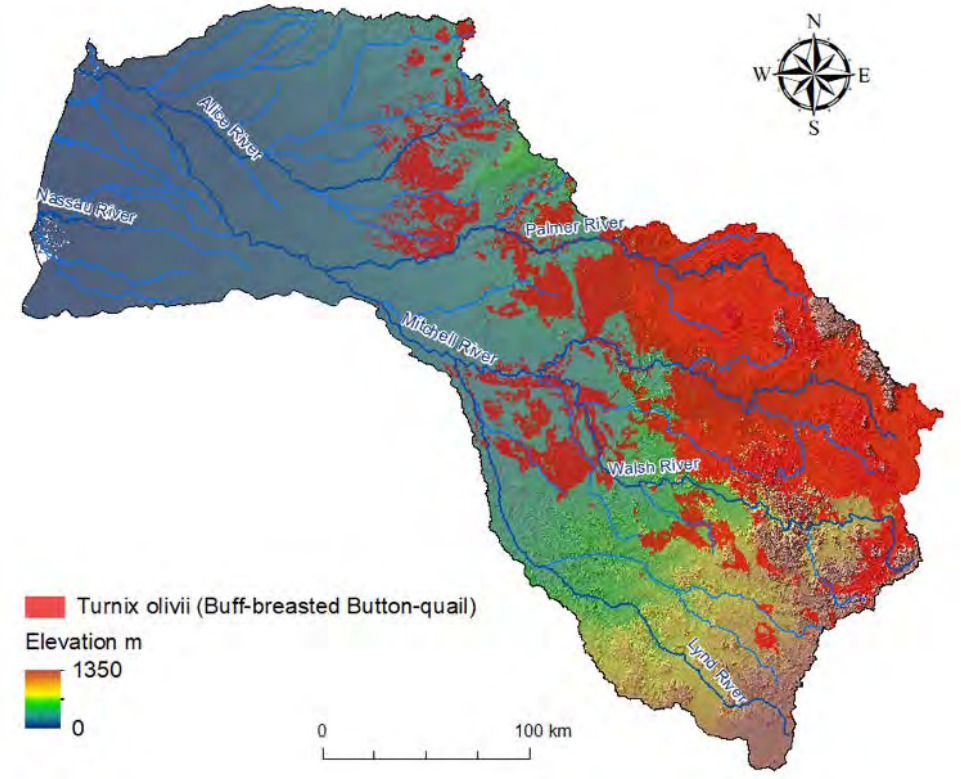


Figure 24: Modelled potential habitat distribution of Turnix olivii (buff-breasted button quail) in the Mitchell catchment, Queensland, Australia.

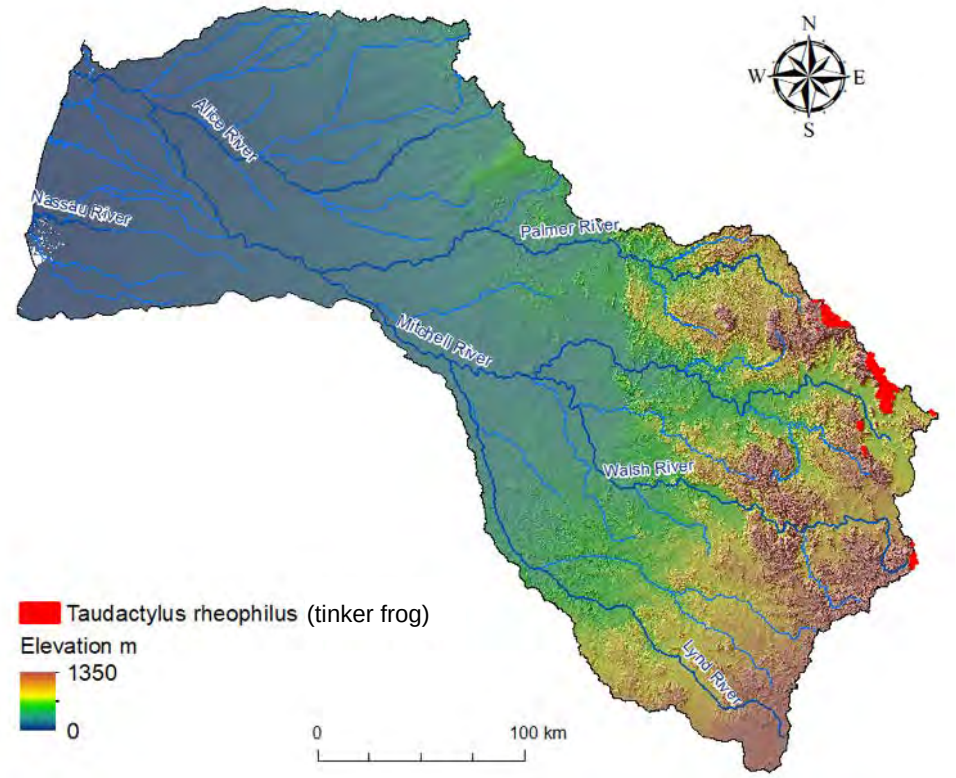


Figure 25: Modelled potential habitat distribution of Taudactylus rheophilus (tinker frog or tinkling frog) in the Mitchell catchment, Queensland, Australia.

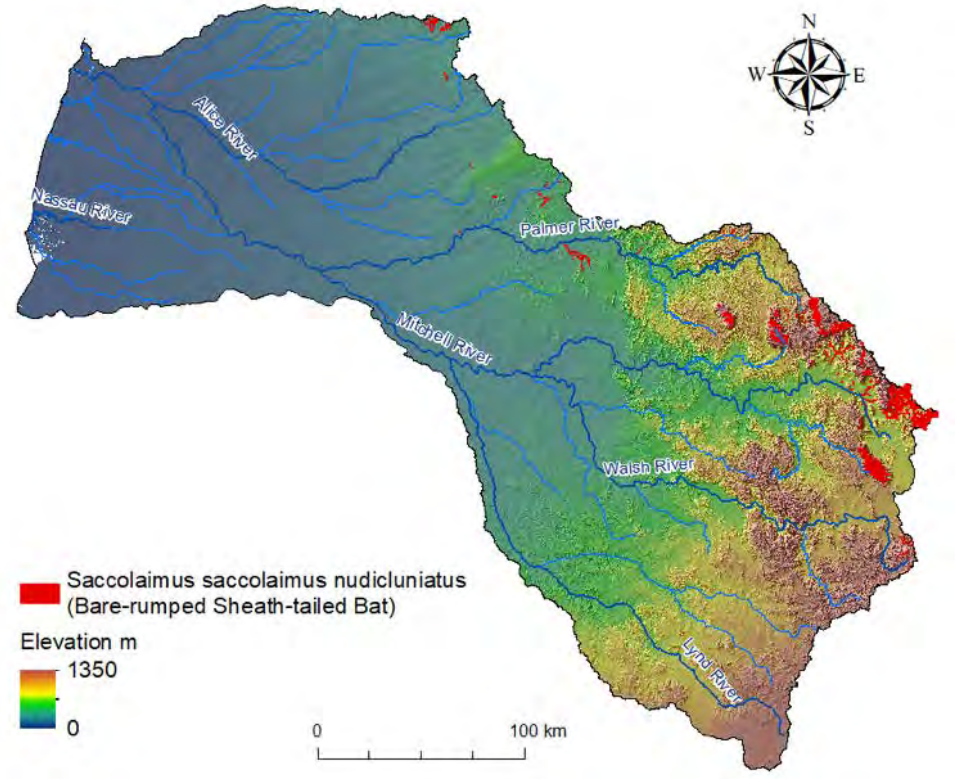


Figure 26: Modelled potential habitat distribution of Saccolaimus saccolaimus nudicluniatus (bare-rumped sheath-tailed bat) in the Mitchell catchment, Queensland, Australia.

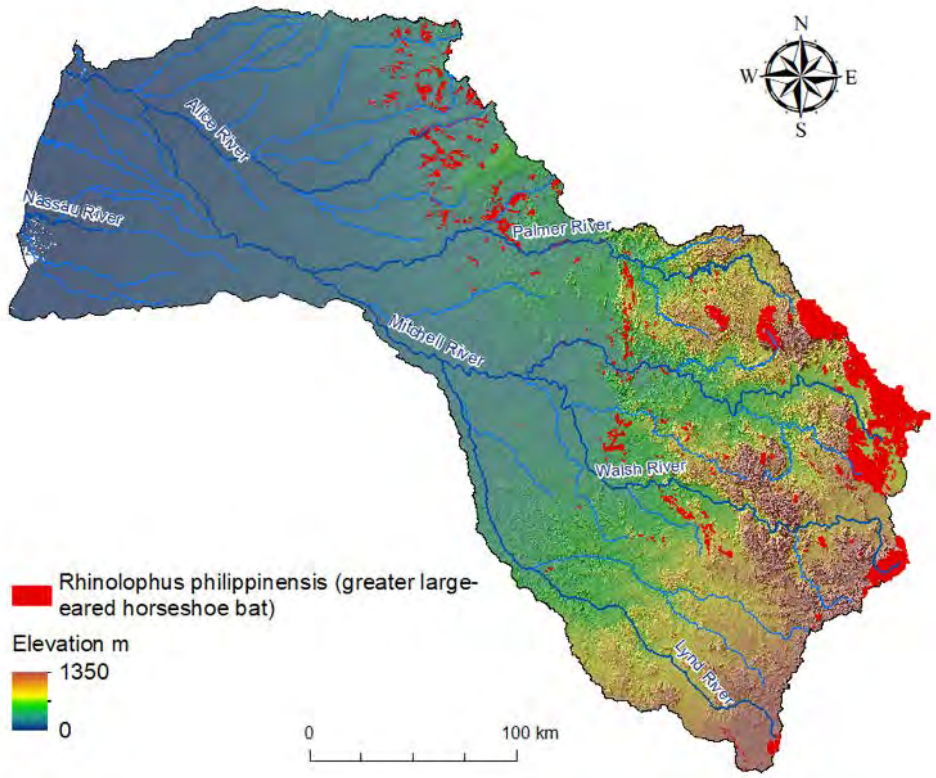


Figure 27: Modelled potential habitat distribution of Rhinolophus philippinensis (greater large-eared horseshoe bat) in the Mitchell catchment, Queensland, Australia.

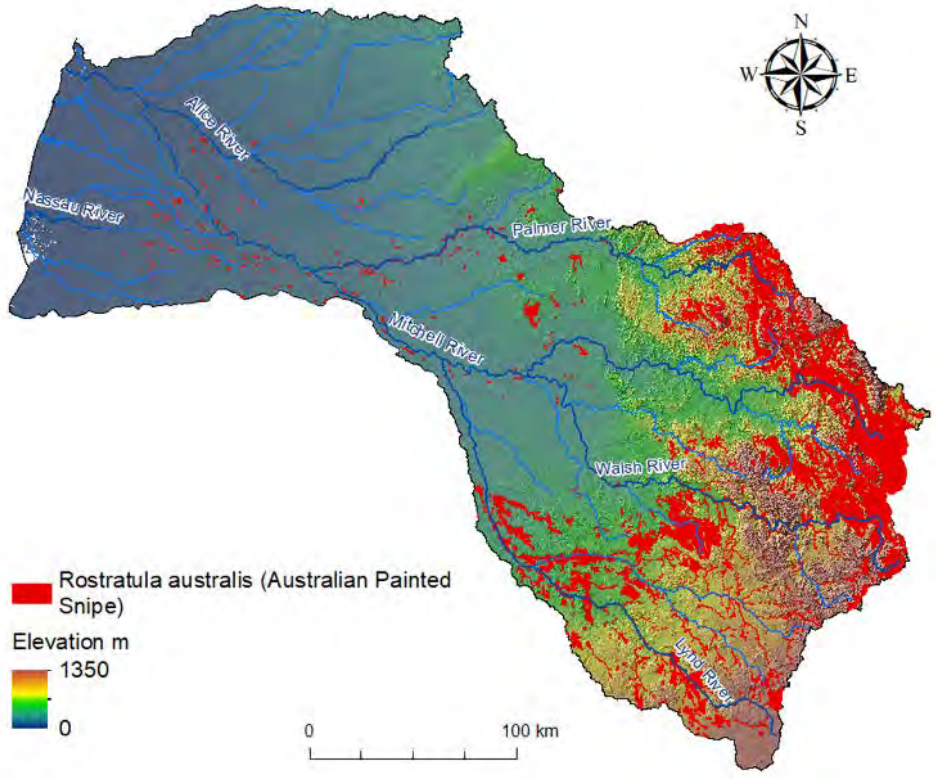


Figure 28: Modelled potential habitat distribution of Rostratula australis (Australian painted snipe) in the Mitchell catchment, Queensland, Australia.

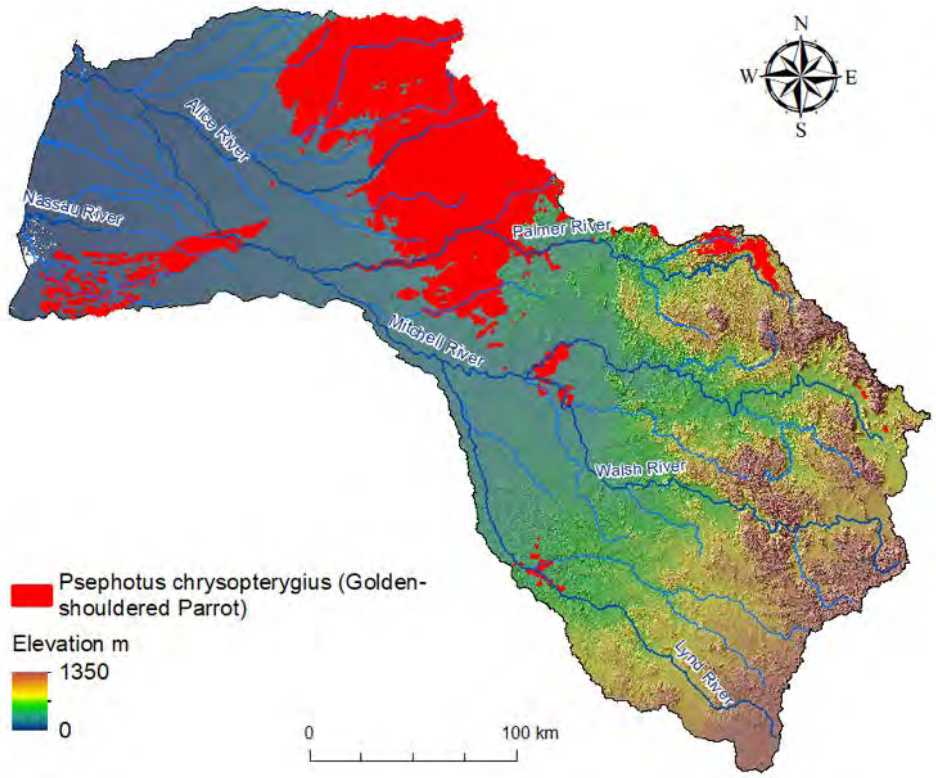


Figure 29: Modelled potential habitat distribution of Psephotus chrysopterygius (golden-shouldered parrot) in the Mitchell catchment, Queensland, Australia.

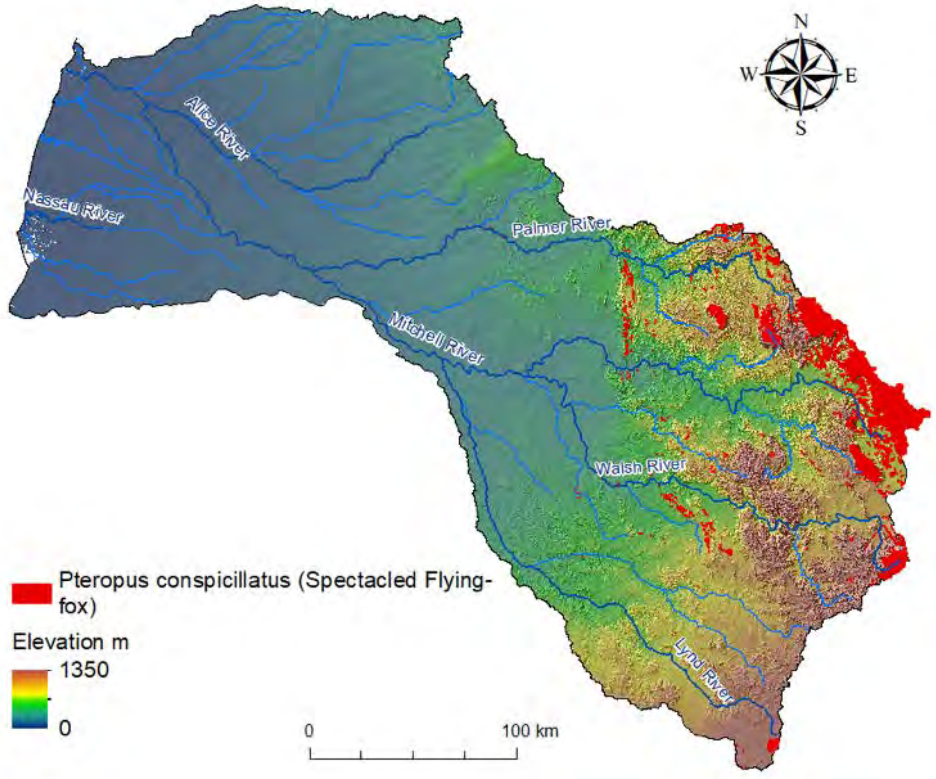


Figure 30: Modelled potential habitat distribution of Pteropus conspicillatus (spectacled flying-fox) in the Mitchell catchment, Queensland, Australia.

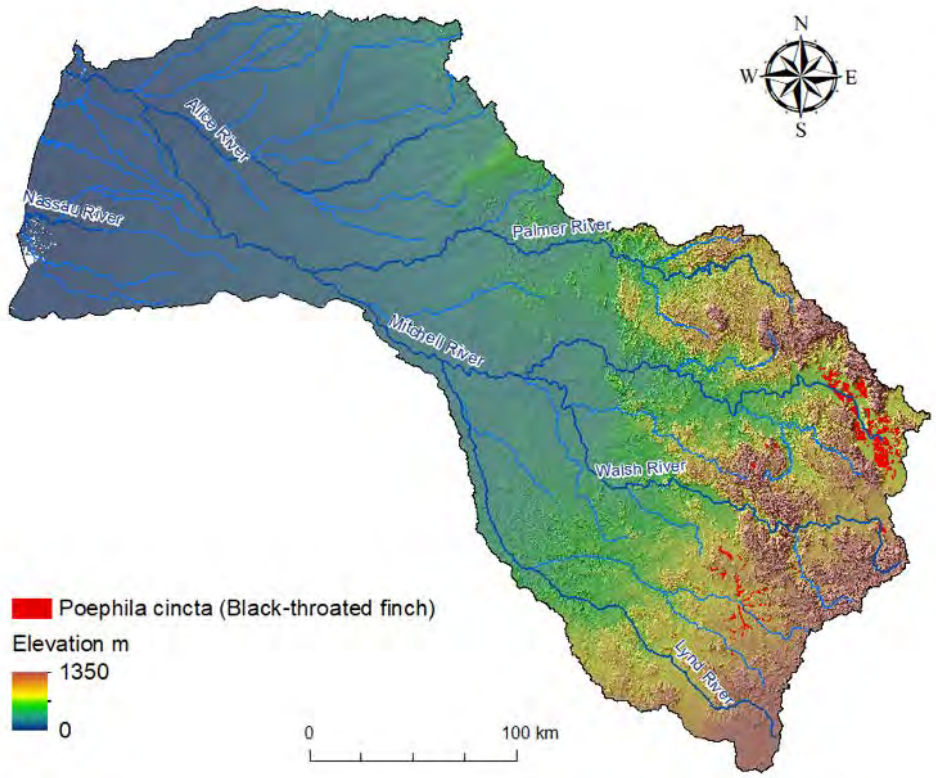


Figure 31: Modelled potential habitat distribution of Poephila cincta (black-throated finch) in the Mitchell catchment, Queensland, Australia.

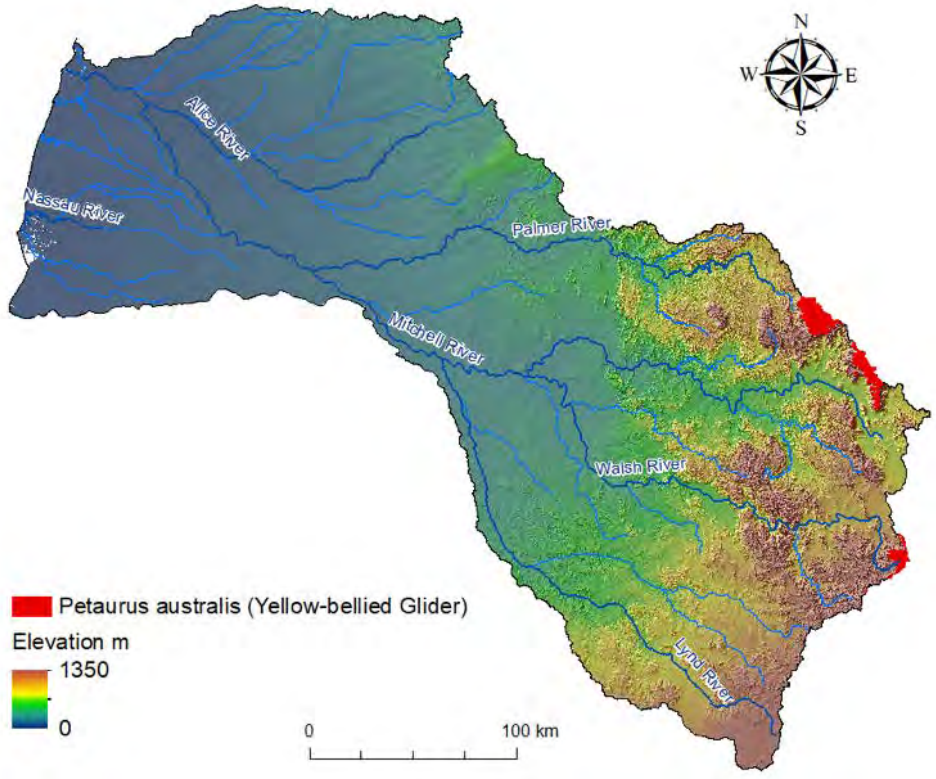


Figure 32: Modelled potential habitat distribution of Petaurus australis (yellow-bellied glider) in the Mitchell catchment, Queensland, Australia.

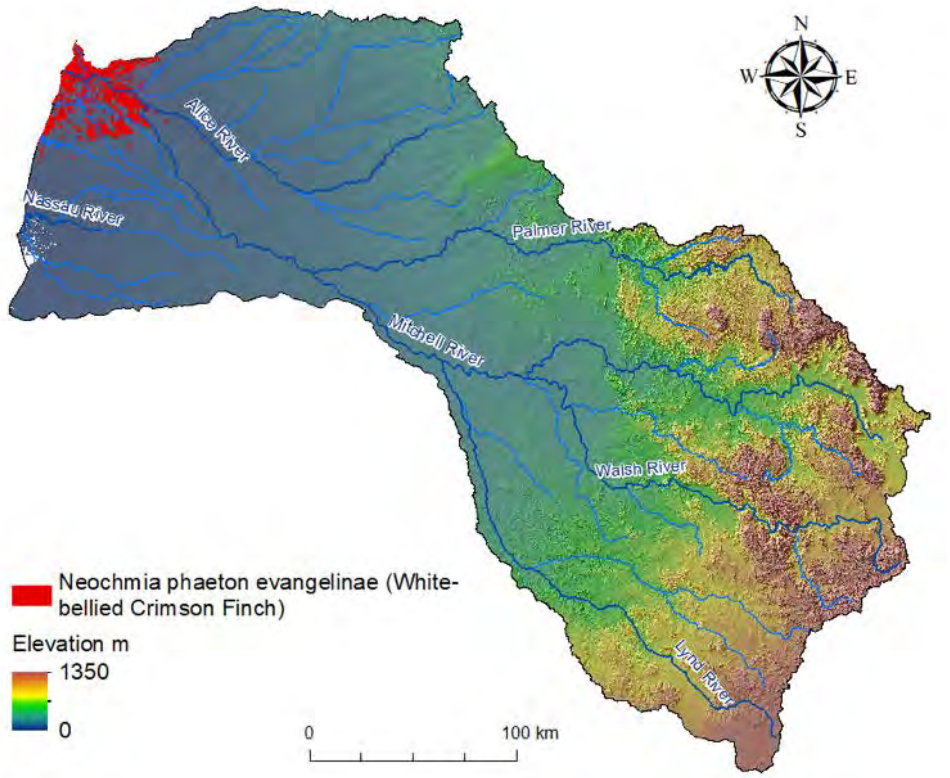


Figure 33: Modelled potential habitat distribution of Neochmia phaeton evangelinae (white-bellied crimson finch) in the Mitchell catchment, Queensland, Australia.

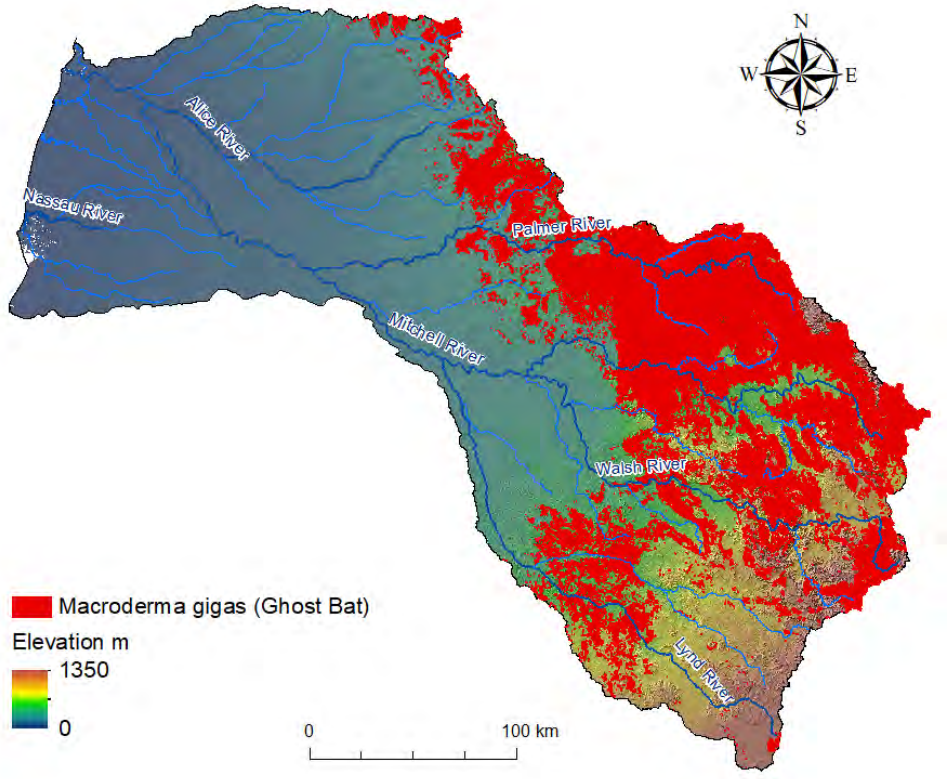


Figure 34: Modelled potential habitat distribution of Macroderma gigas (ghost bat) in the Mitchell catchment, Queensland, Australia.

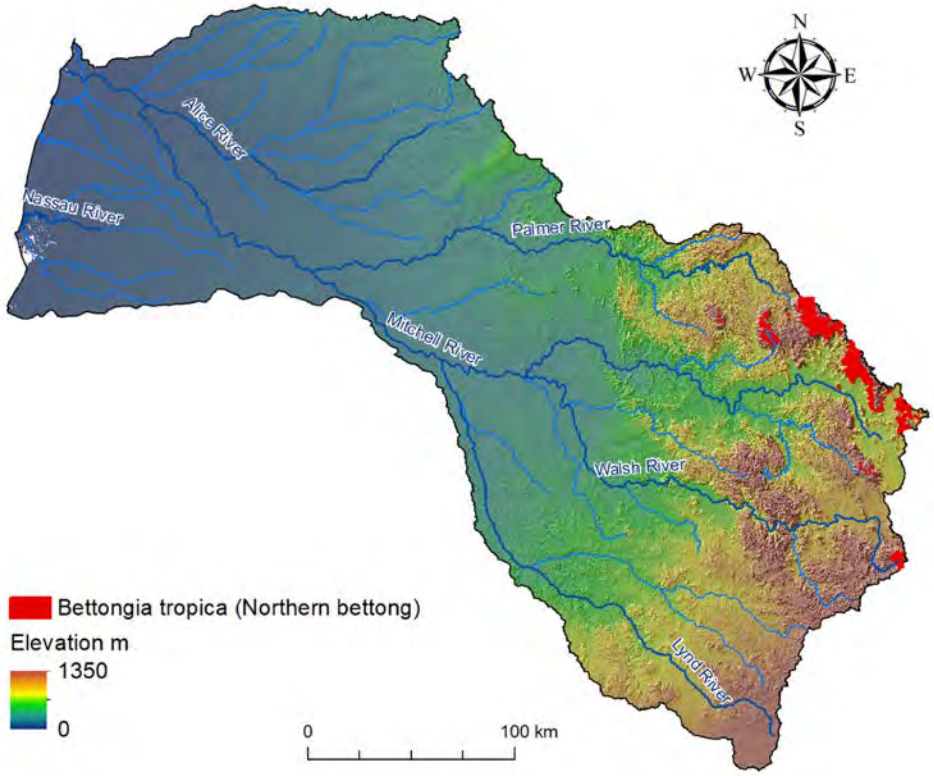


Figure 35: Modelled potential habitat distribution of Bettongia tropica (northern bettong) in the Mitchell catchment, Queensland, Australia.

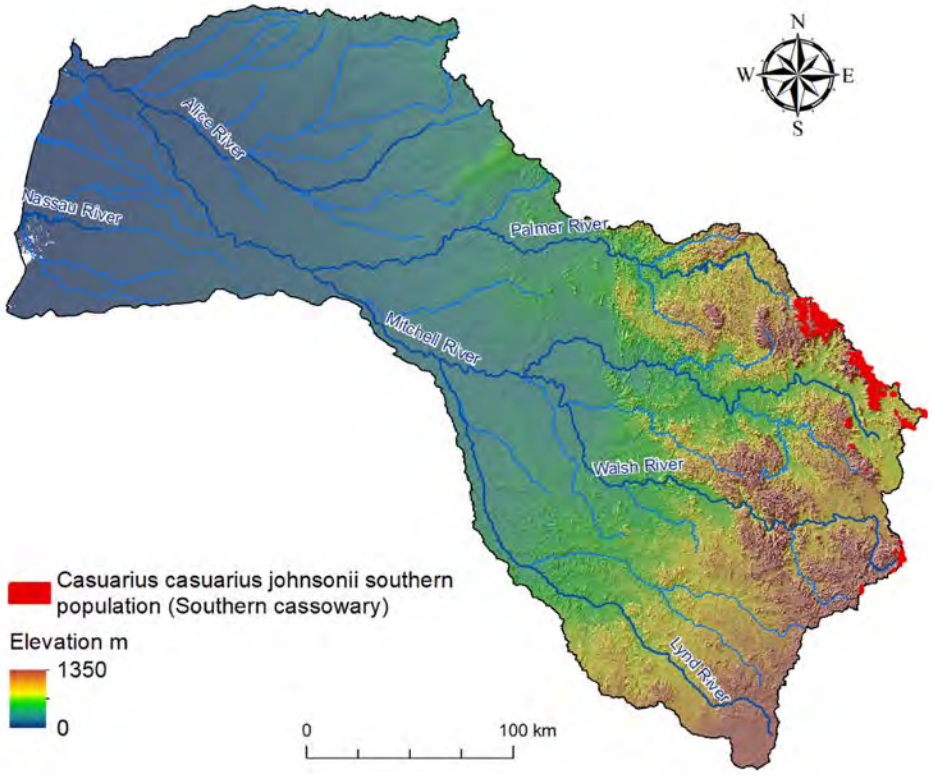


Figure 36: Modelled potential habitat distribution of Casuarius casuarius johnsonii southern population (southern cassowary) in the Mitchell catchment, Queensland, Australia.

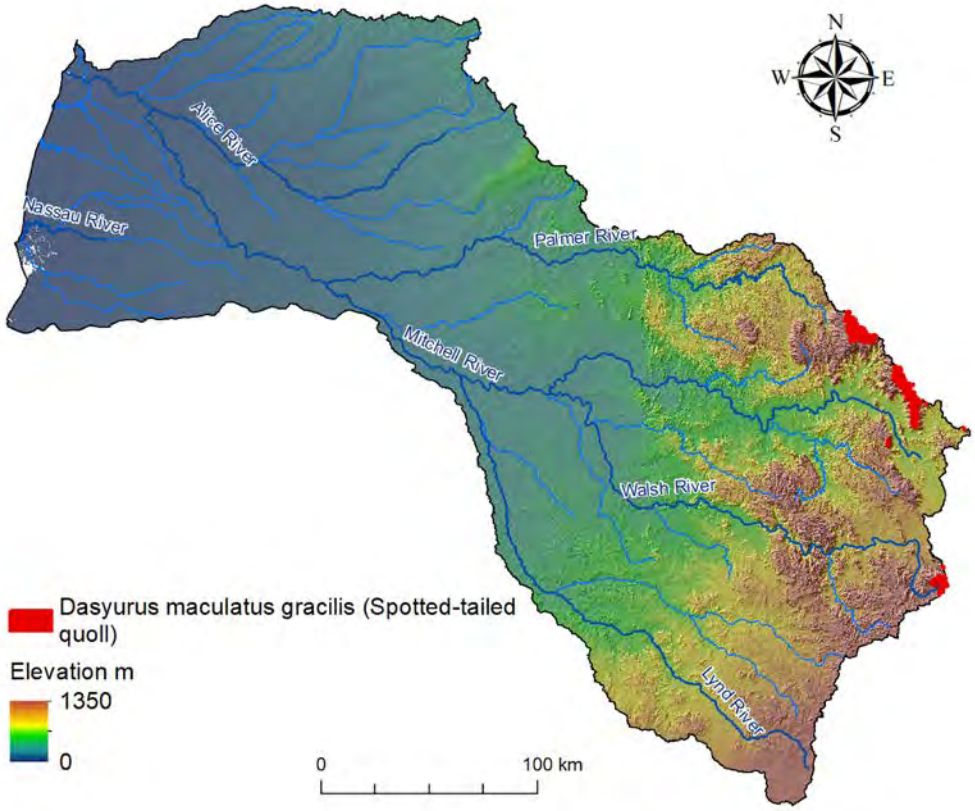


Figure 37: Modelled potential habitat distribution of Dasyurus maculatus gracilis (spotted-tailed quoll) in the Mitchell catchment, Queensland, Australia.

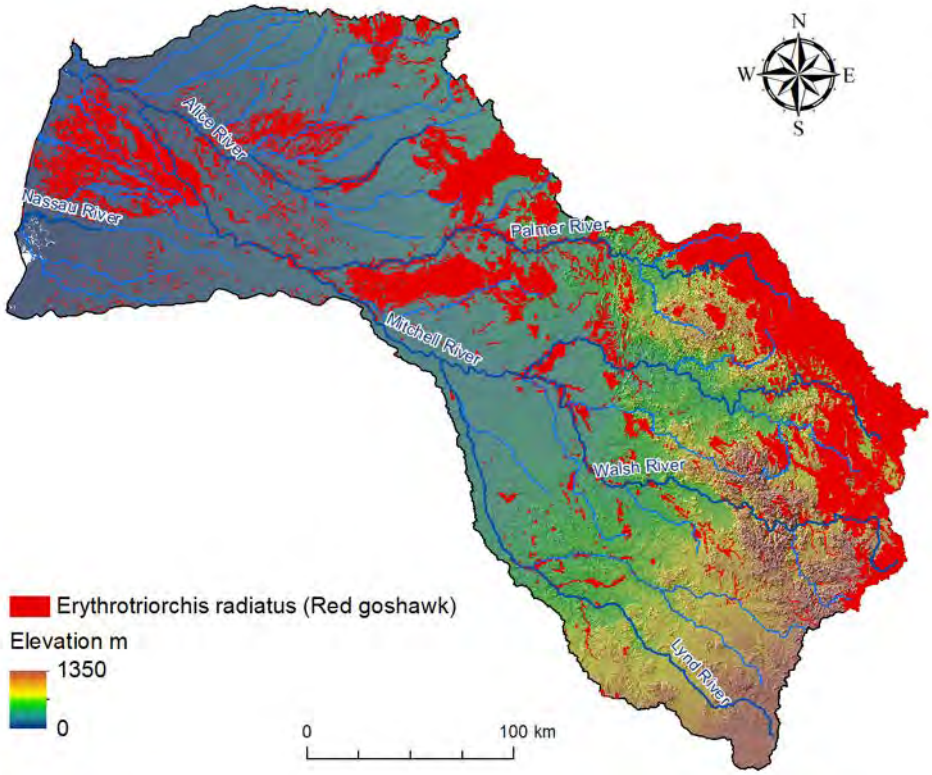


Figure 38: Modelled potential habitat distribution of Erythrotriorchis radiatus (red goshawk) in the Mitchell catchment, Queensland, Australia.

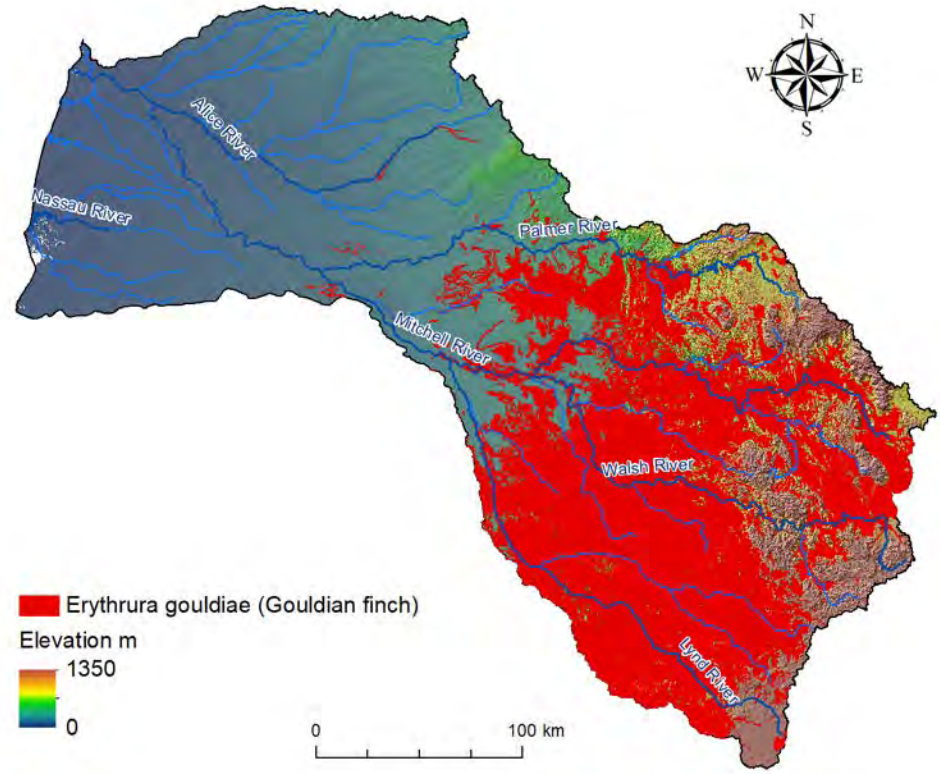


Figure 39: Modelled potential habitat distribution of Erythrura gouldiae (Gouldian finch) in the Mitchell catchment, Queensland, Australia.

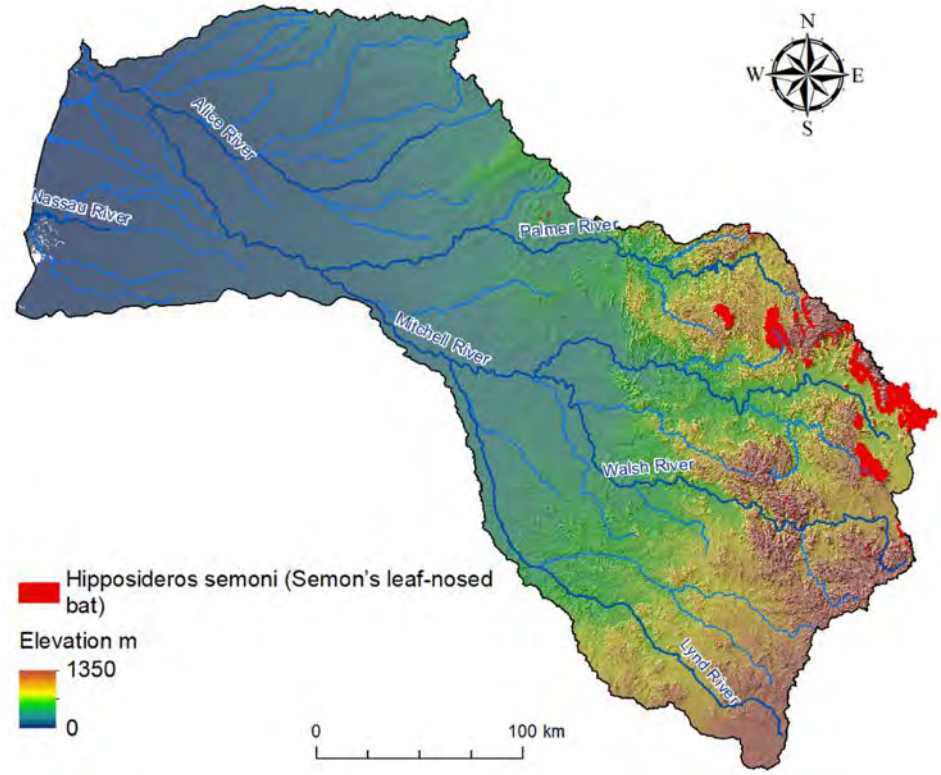


Figure 40: Modelled potential habitat distribution of Hipposideros semoni (Semon's leaf-nosed bat) in the Mitchell catchment, Queensland, Australia.

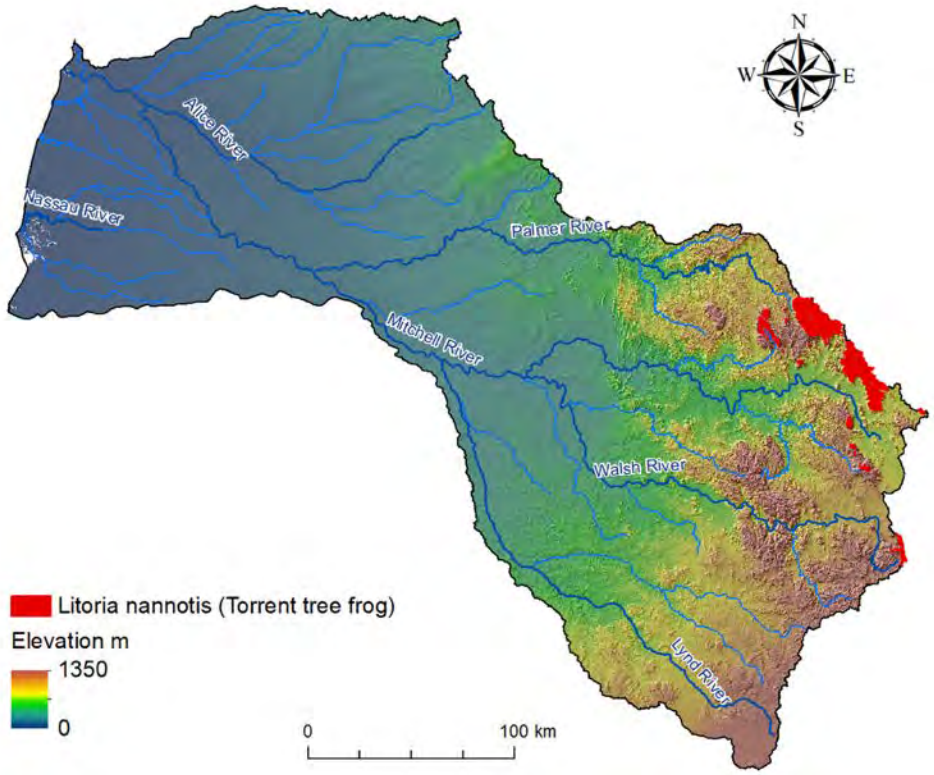


Figure 41: Modelled potential habitat distribution of Litoria nannotis (torrent tree frog) in the Mitchell catchment, Queensland, Australia.

Table 17: Area (ha) of modelled potential habitat of critically endangered species in each ecosystem type in the Mitchell catchment.

	Area (in ha) of modelled potential habitat of **critically endangered species** in the Mitchell catchment															
Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG		MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	
IUCN EFG Area (ha)	5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Mountain-top nursery frog (*Cophixalus monticola*)	0	0	0	0	0	0	104	4721	0	78	0	0	0	0	0	0
Armoured mist frog (*Litoria lorica*)	0	0	0	0	319	130	187	15585	159	27102	0	0	0	613	1	1
Kuranda tree frog (*Litoria myola*)	0	0	0	0	0	0	0	17	0	9	0	0	0	0	0	0
Mountain mist frog (*Litoria nyakalensis*)	0	0	0	0	451	259	200	17617	332	26324	0	0	0	64	8	0

Table 18: Area (ha) of modelled potential habitat of endangered species in each ecosystem type in the Mitchell catchment.

	Area (in ha) of modelled potential habitat of **endangered species** in the Mitchell catchment															
Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG		MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	
IUCN EFG Area (ha)	5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Northern bettong (*Bettongia tropica*)	0	0	0	0	299	9	5	818	17	20086	0	0	0	64	6	2
Southern cassowary – southern population (*Casuarius johnsonii*)	0	0	0	0	432	2	213	17031	16	3463	0	0	0	34	1	0
Spotted-tailed quoll – northern subspecies (*Dasyurus maculatus gracilis*)	0	0	0	0	14	0	158	14985	10	6832	0	0	0	1	2	0
Red goshawk (*Erythrotriorchis radiatus*)	46	21	95	139	38559	3516	5131	26055	5668	935763	77128	146	414	82880	9919	3186
Gouldian finch (*Erythrura gouldiae*)	0	0	0	0	63134	143	7748	26	14760	1588686	278678	4713	9109	95946	929	2125
Semon's leaf-nosed bat (*Hipposideros semoni*)	0	0	0	0	5346	812	351	7923	1457	46762	5	62	0	319	9	11
Torrent treefrog (*Litoria nannotis*)	0	0	0	0	13	20	260	18509	448	30517	0	0	0	153	4	0
Common mist frog (*Litoria rheocola*)	0	0	0	0	3	4	176	15986	19	7862	0	0	0	27	1	0
Ghost bat (*Macroderma gigas*)	0	0	0	0	22356	729	10709	11651	3580	1250364	78670	150	0	6990	35	3140
Crimson finch – white-bellied subspecies (*Neochmia phaeton evangelinae*)	1240	4559	2860	864	17	6745	0	0	0	11261	0	0	0	15808	1997	1
Yellow-bellied glider – northern subspecies (*Petaurus australis unnamed subsp.*)	0	0	0	0	42	0	150	10940	143	21075	0	0	0	39	8	0
Black-throated finch - white-rumped subspecies (*Poephila cincta*)	0	0	0	0	1510	0	147	0	0	12102	51	0	0	625	6	138
Golden-shouldered parrot (*Psephotus chrysopterygius*)	0	0	0	0	963	0	0	0	9885	769299	5243	0	34	54148	1199	54
Spectacled flying fox (*Pteropus conspicillatus*)	0	0	0	0	11637	847	7020	19531	1564	93931	519	75	0	4679	336	282
Greater large-eared horseshoe bat (*Rhinolophus philippinensis*)	0	0	0	0	7463	560	8530	21814	2033	134670	87	42	0	593	29	80

Australian painted snipe (*Rostratula australis*)	0	0	0	0	48560	146	517	376	263	301701	23717	118	60	40427	4332	3851
Bare-rumped sheath-tail bat (*Saccolaimus nudicluniatus*)	0	0	0	0	4488	754	73	5452	46	15192	4	0	0	4101	40	23
Northern tinker frog (*Taudactylus rheophilus*)	0	0	0	0	4	0	166	15771	4	656	0	0	0	0	0	0
Buff-breasted button quail (*Turnix olivii*)	0	0	0	0	43546	836	4778	5276	7524	1142515	129293	2162	1198	40225	403	4059

3.3.2 Species richness

Dataset 2	IUCN Species Richness v3
Purpose	This dataset contains distribution information on species assessed under The IUCN Red List of Threatened Species™. The maps are developed as part of a comprehensive assessment of global biodiversity in order to highlight taxa threatened with extinction, and thereby promote their conservation.
Format	Raster (5km × 5km).
Extent	Global.
Temporal resolution	Current
Custodian	© International Union for Conservation of Nature and Natural Resources.
Notes	This dataset includes all assessed species of amphibians, birds and mammals (all Red List Categories). The raw IUCN data has been rasterised and summed across all species to show the total number of species potentially occurring in each pixel.
Access	https://www.iucnredlist.org/resources/files/18c66507-a8cc-4118-acf0-8f3c06706513
Citation	IUCN Red List Version 2020 v3, *The IUCN Red List of Threatened Species*. Version 3. https://www.iucnredlist.org
Supporting papers	n.a.

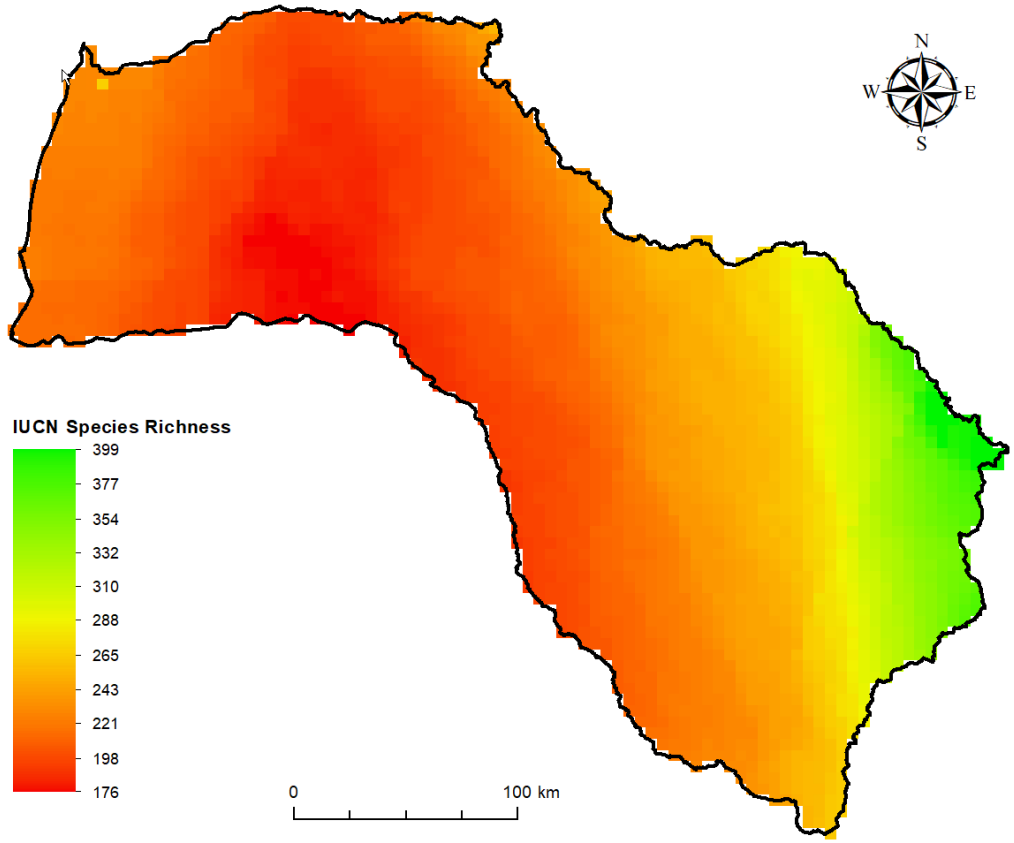


Figure 42: Map showing the IUCN species richness across the Mitchell catchment.

Table 19: IUCN species richness statistics (min, max, range, mean, STD, variety, majority, minority, median) by ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Area (ha)	IUCN Species Richness								
			MIN	MAX	RANGE	MEAN	STD	VARIETY	MAJORITY	MINORITY	MEDIAN
Estuary	Estuary	5,226	216	267	51	229.2	12.3	18	228	217	228
Intertidal forests and shrublands	MFT1.2	10,996	216	267	51	227.1	9.3	17	228	226	227
Coastal saltmarshes and reedbeds	MFT1.3	40,916	215	267	52	223.3	6.1	18	221	232	223
Coastal shrublands and grasslands	MT2.1	5,902	214	267	53	221.1	9.0	15	216	220	216
Non-remnant	Non-remnant	91,612	178	399	221	324.8	56.4	187	393	215	347
Tropical subtropical lowland rainforests	T1.1	18,244	184	397	213	230.4	36.9	36	228	392	224
Tropical subtropical dry forest and thickets	T1.2	12,248	200	399	199	261.6	32.7	84	250	272	250
Tropical subtropical montane rainforests	T1.3	26,323	309	399	90	383.1	17.9	31	392	350	393
Seasonally dry tropical shrublands	T3.1	72,205	186	399	213	229.4	31.1	123	209	399	222
Pyric tussock savannas	T4.2	5,603,684	176	399	223	236.4	44.9	215	199	335	224
Hummock savannas	T4.3	43,5831	191	365	174	242.6	50.5	152	199	326	218
Temperate woodlands	T4.4	21,049	238	360	122	264.8	29.4	40	246	252	251
Semi-desert steppes	T5.1	56,506	178	235	57	197.6	13.7	45	196	235	196
Subtropical-temperate forested wetlands	TF1.2	74,0341	176	399	223	208.0	27.5	210	180	392	205
Seasonal floodplain marshes	TF1.4	25,233	178	399	221	216.8	25.1	99	221	257	220
Water	Water	4,785	179	395	216	348.2	53.8	101	378	321	374

Table 20: IUCN threatened species richness statistics (min, max, range, mean, STD, variety, majority, minority, median) by ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Area (ha)	IUCN Species Richness of threatened species								
			MIN	MAX	RANGE	MEAN	STD	VARIETY	MAJORITY	MINORITY	MEDIAN
Estuary	Estuary	5,226	2	8	6	3.7	1.5	5	3	2	3
Intertidal forests and shrublands	MFT1.2	10,996	2	8	6	3.5	1.2	5	3	2	3
Coastal saltmarshes and reedbeds	MFT1.3	40,916	2	8	6	3.3	1.1	5	3	8	3
Coastal shrublands and grasslands	MT2.1	5,902	2	8	6	3.3	1.6	5	2	8	3
Non-remnant	Non-remnant	91,612	1	13	12	5.4	2.8	12	5	8	5
Tropical subtropical lowland rainforests	T1.1	18,244	1	13	12	3.6	2.3	8	3	8	3
Tropical subtropical dry forest and thickets	T1.2	12,248	1	13	12	3.3	2.0	10	2	10	3
Tropical subtropical montane rainforests	T1.3	26,323	4	13	9	10.9	2.2	8	12	7	12
Seasonally dry tropical shrublands	T3.1	72,205	1	13	12	2.0	1.1	10	2	12	2
Pyric tussock savannas	T4.2	5,603,684	1	13	12	2.5	1.7	13	1	10	2
Hummock savannas	T4.3	435,831	1	9	8	3.0	1.3	7	2	9	3
Temperate woodlands	T4.4	21,049	2	6	4	3.8	0.7	5	4	2	4
Semi-desert steppes	T5.1	56,506	1	2	1	1.4	0.5	2	1	2	1
Subtropical-temperate forested wetlands	TF1.2	740,341	1	13	12	1.6	1.0	13	1	10	1
Seasonal floodplain marshes	TF1.4	25,233	1	13	12	2.3	1.3	12	3	9	2
Water	Water	4,785	1	12	11	5.9	1.8	10	7	11	7

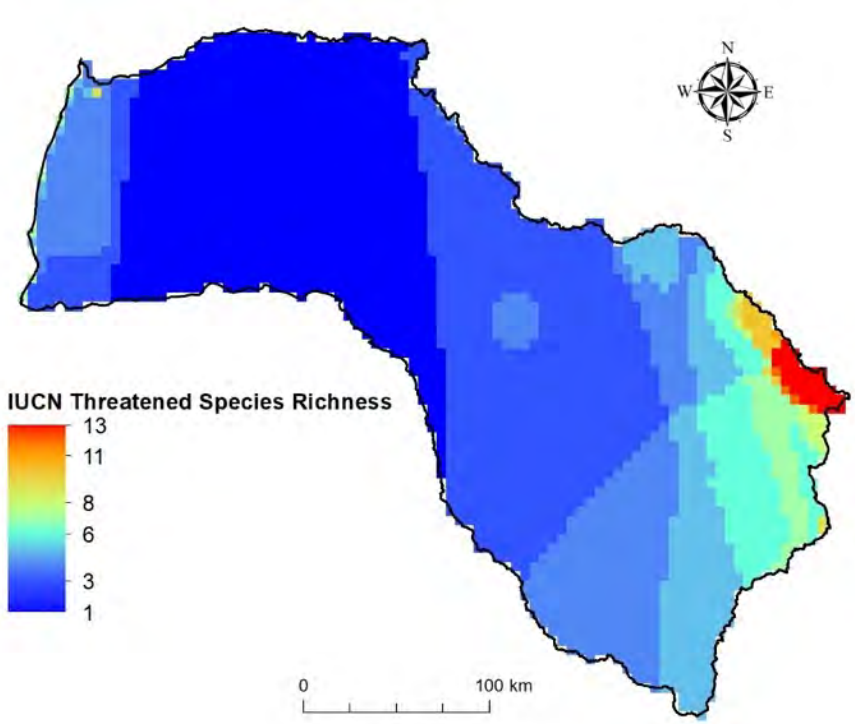


Figure 43: Map showing the IUCN threatened species richness across the Mitchell catchment, Queensland, Australia.

3.3.3 Pest animals and weeds

Dataset 3	Pest Central (weed and pest animal).
Purpose	To maintain a spatial and temporal record of pest animal management activities in Queensland.
Format	Vector.
Extent	Queensland.
Temporal resolution	Publication 2017-10-05, updated every 4–10 years.
Custodian	© State of Queensland (Department of Agriculture and Fisheries) 2021
Notes	The Pest Central pest animal and weed datasets contain detailed spatial information on pest animal and weed management activities in Queensland.
Access	https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/pest-mapping/distribution-maps
Citation	Department of Agriculture and Fisheries, pest distribution maps. Queensland Government. https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/pest-mapping/distribution-maps
Supporting papers	Further information and pest distribution maps are available in the website: https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/pest-mapping/distribution-maps

Dataset 4	Annual Pest Distribution Survey Series
Purpose	The dataset provides consistent coverage of pest distribution information across the State of Queensland. The data are intended for policy and planning decision-making at a State-wide level. They are not intended for use at a local to regional scale.
Format	Vector grid 0.167 × 0.167 degree.
Extent	Queensland.
Temporal resolution	Publication: 2013-03-20, updated every 4 -10 years.
Custodian	© State of Queensland (Department of Agriculture and Fisheries) 2021
Notes	The annual pest distribution survey is a spatial dataset containing broad-scale distribution information on pest plants and animals in Queensland.
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={FB6BC905-8D0F-45CD-950D-10E5758681D8}
Citation	Department of Agriculture and Fisheries, Annual pest distribution survey series. Queensland Spatial Catalogue- QSpatial, Queensland Government. https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={FB6BC905-8D0F-45CD-950D-10E5758681D8}
Supporting papers	n.a.

Dataset 5	WildNet wildlife records
Purpose	The dataset provides consistent coverage of pest distribution information across the State of Queensland. The data are intended for policy and planning decision-making at a State-wide level. They are not intended for use at a local to regional scale.
Format	Vector.
Extent	Queensland.
Temporal resolution	Publication: 2021-09-11. Data updated from 1770-01-10 **to** 2018-05-21.
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	The annual pest distribution survey is a spatial dataset containing broad-scale distribution information on pest plants and animals in Queensland.
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={40D75ED6-3959-41EB-A5C8-E563FA5B66CA}
Citation	Department of Environment and Science. WildNet wildlife records – published – Queensland. Queensland Spatial Catalogue- QSpatial, Queensland Government. https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={40D75ED6-3959-41EB-A5C8-E563FA5B66CA}
Supporting papers	n.a.

Table 21: Presence of priority weed species in the Mitchell catchment, indicating the area (in hectares) in which each invasive species has been reported to be present within each ecosystem functional group. Grey cells indicate unsuitable ecosystem functional groups for each priority invasive species.

Weeds in the Mitchell catchment																
Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG	Estuary	MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
IUCN EFG Area (ha)	5,226	10,996	40,916	5,902	91,612	18,244	12,248	26,323	72,205	5,603,684	435,831	21,049	56,506	740,341	25,233	4,785
Asparagus fern		0	0	0	4519	53	265	10034	51	51831	0	824	0	1187	113	
Bellyache bush		0	0	0	15030	0	3519	0	8790	554729	21161	1695	10468	52656	521	
Broad leaf privet		0	0	0	1292	0	10	1122	265	15653	0	23	0	147	3	
Cabomba														1011	3	33
Camphor laurel		0	0	0	1292	0	10	1122	265	15653	0	23	0	147	3	
Cats claw creeper		0	0	0	1239	0	17	1310	39	25857	0	279	0	224	3	
Chinese apple		2034	6987	2153	11988	3743	4210	0	30477	1076513	29394	1011	13839	105189	5597	
Chinese privet		0	0	0	1191	0	10	1122	39	13101	0	23	0	117	3	
Fireweed		0	0	0	101	0	0	0	226	2552	0	0	0	30	0	
Gamba grass		0	0	0	49052	613	311	3431	2256	254142	54268	486	0	7025	1172	
Giant sensitive plant		0	0	0	5810	613	92	5260	5	10260	0	0	0	207	13	
Hymenachne														28742	4094	3678
Kosters curse		0	0	0	5809	613	85	1548	0	4784	0	0	0	166	13	

Lantana		0	0	0	70305	847	6274	25606	7179	989121	68812	6635	0	22942	1485	
Maderia vine		0	0	0	1191	0	10	1122	39	13101	0	23	0	117	3	
Miconia		0	0	0	10256	613	92	5260	27	18475	0	0	0	828	131	
Parkinsonia		6063	32458	5065	1931	10960	2444	0	16685	454141	10975	0	25423	190126	11670	
Parthenium		0	0	0	28276	794	2595	5792	61	116135	4567	509	0	2562	254	
Pond apple	0		0											0	0	0
Prickly acacia		117	3680	1286	2099	419	2444	0	16685	266886	10975	0	25423	74398	2169	
Prickly pear		0	0	0	31486	613	91	1822	54	67200	9819	486	0	2769	100	
Rat tail grass		0	0	0	67355	847	4082	24124	2814	626914	34962	509	11	26939	860	
Rubber vine		11211	40972	5962	79016	17502	12028	11355	72124	5545612	435831	21026	56506	737886	25099	
Sagittaria														11	0	67
Salvinia														2111	150	3552
Siam weed		0	0	0	11814	666	344	11393	51	139638	429	2387	0	2455	125	
Sicklepod		13	10	0	18284	766	1695	8322	16850	637529	16266	75	18256	73206	2526	
Singapore daisy		13	10	0	11856	613	103	6381	593	91028	30	23	0	6033	1908	
Thunbergia		0	0	0	12111	613	1156	2858	44	81016	0	824	0	925	135	
Tobacco weed		0	0	0	5810	613	86	5071	5	10259	0	0	0	207	13	
Water hyacinth														152546	10422	1006
Water lettuce														790	121	1042
Yellow oleander		0	0	0	10167	0	2392	0	3118	429785	12911	11193	0	9188	1111	

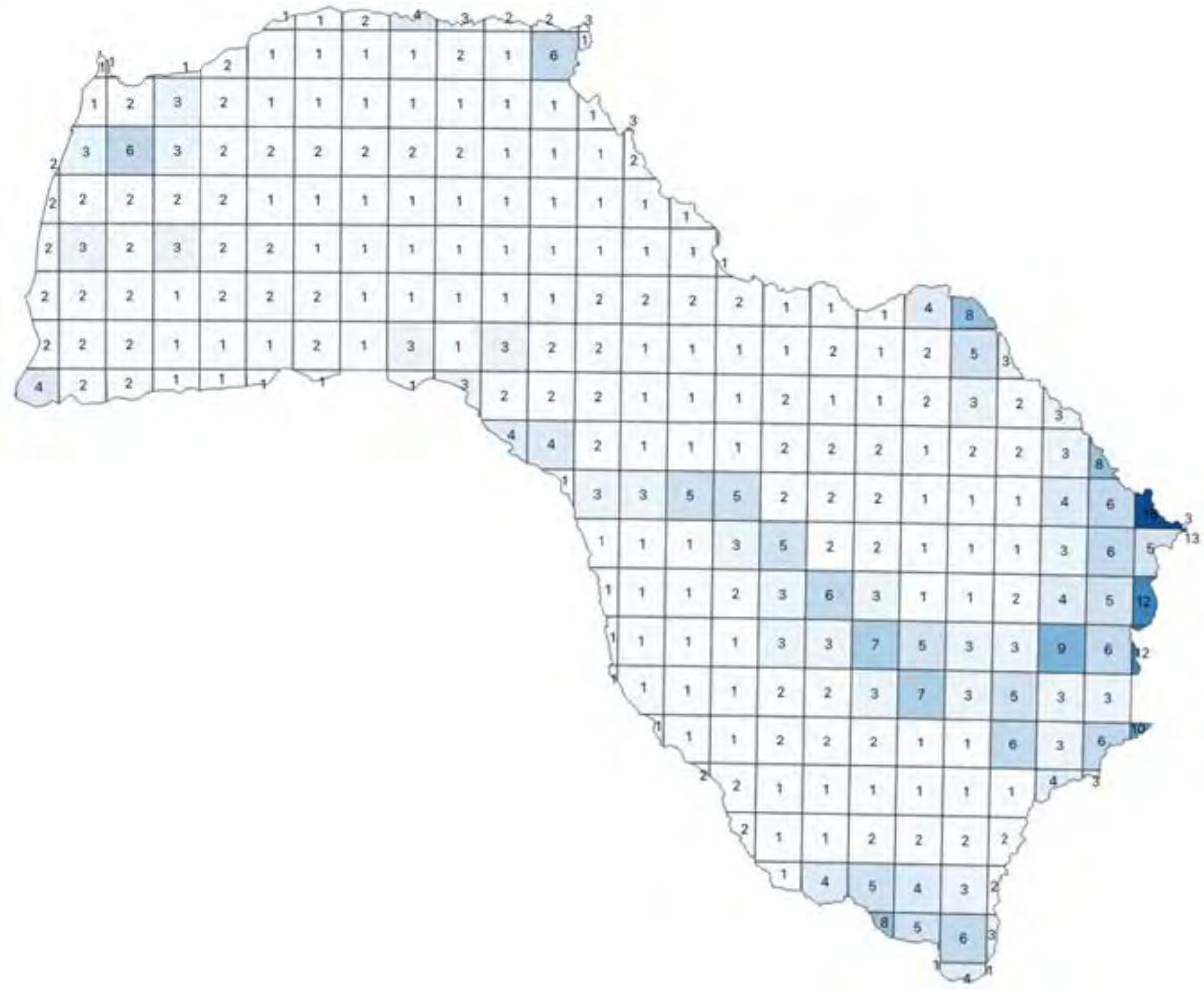


Figure 44: Number of weed species present per grid cell across the Mitchell catchment, Queensland, Australia. Size of one grid cell is 18.5km × 18.5km = 342.25km^2.

Table 22: Presence of pest animal species in the Mitchell catchment, indicating the area (in hectares) in which each invasive species has been reported to be present within each ecosystem functional group. Grey cells indicate unsuitable ecosystem functional groups for each priority invasive species.

Pest animals in the Mitchell catchment																
Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG		MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	
IUCN EFG Area (ha)	5,226	10,996	40,916	5,902	91,612	18,244	12,248	26,323	72,205	5,603,684	435,831	21,049	56,506	740,341	25,233	4,785
Cane toad		960	8646	1401	58782	5416	6257	22337	9238	1350868	59301	1902	26	114619	9752	3922
Feral Deer		0	0	0	5673	0	17	1310	61	53366	0	23	0	1306	133	
Feral cat		11211	40972	5962	91612	18296	12248	26323	72205	5601157	435831	21049	56506	739195	25233	
Feral Horse		8906	32848	3648	3311	13025	3737	0	13152	1999827	193077	3895	17436	527619	19788	
Feral Pig		11008	40533	5955	91612	18296	12248	26323	72205	5601523	435831	21049	56506	740341	25225	
Rabbit		0	0	0	78547	234	8201	14134	23111	1957421	358277	21049	1462	58831	1916	
Wild dog		11008	40533	5955	91612	18296	12248	26323	72205	5598981	435831	21049	56506	739195	25225	

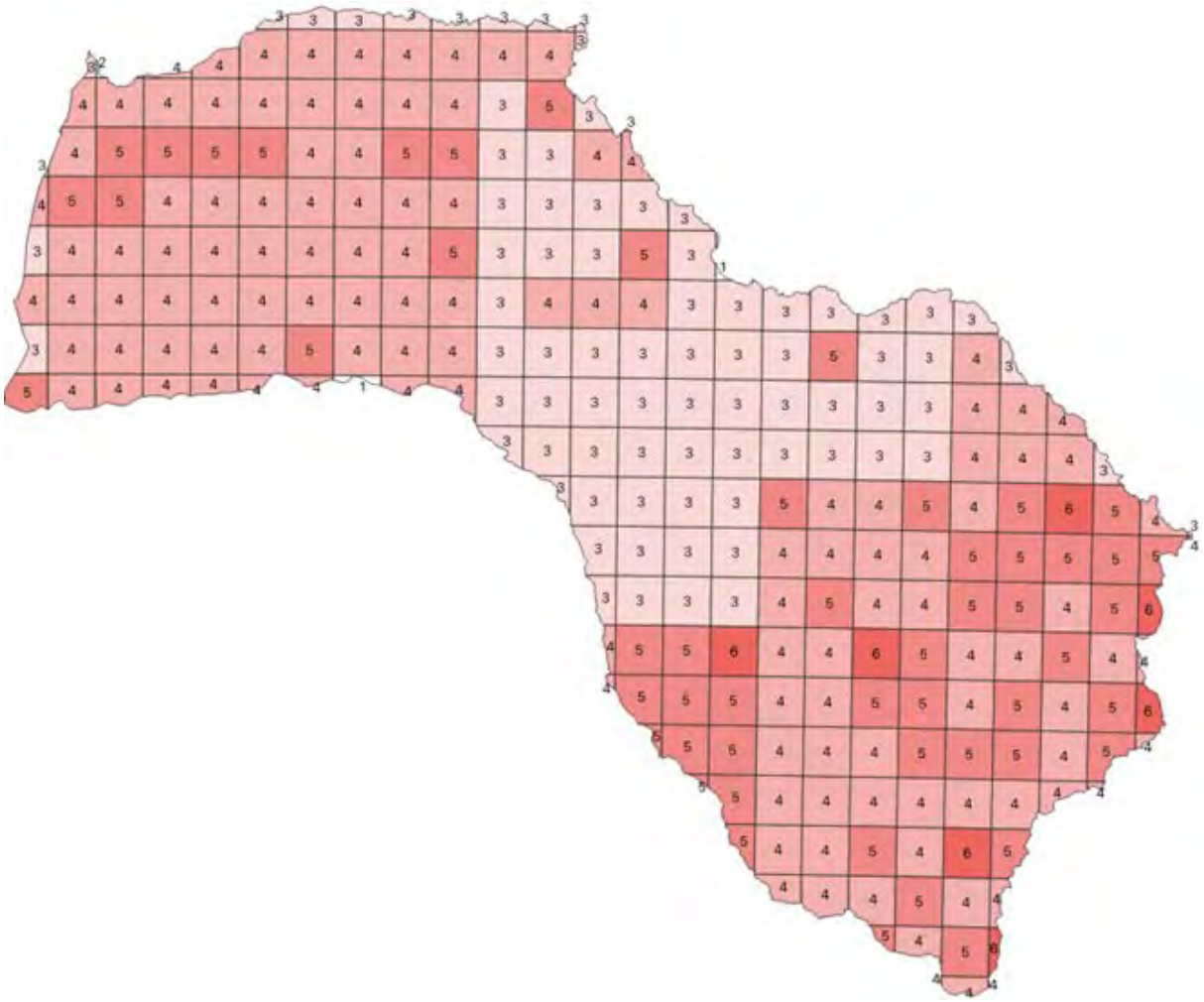


Figure 45: Number of animal pest species present per grid cell across the Mitchell catchment, Queensland, Australia. Size of one grid cell is 18.5km × 18.5km = 342.25km^2

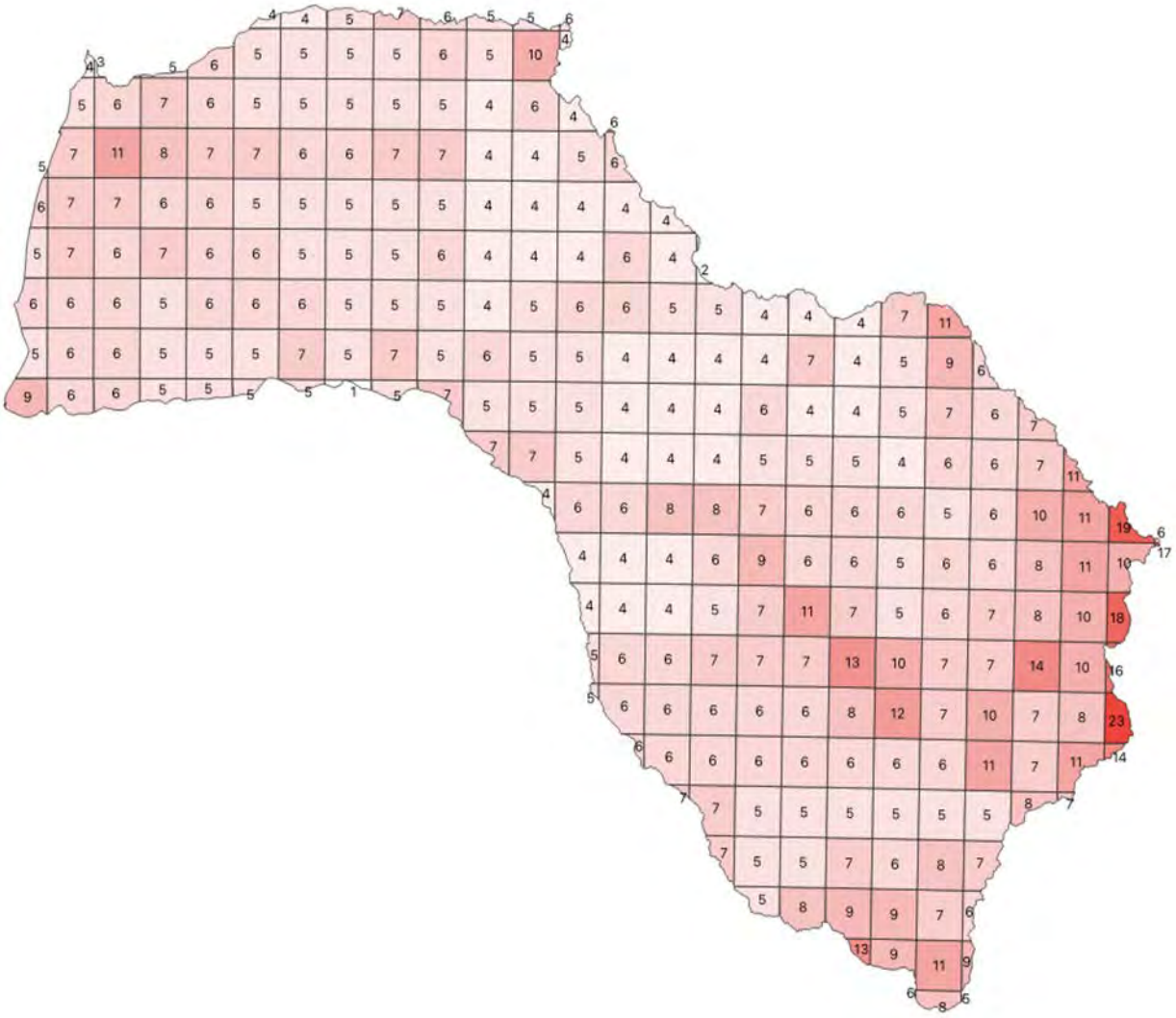
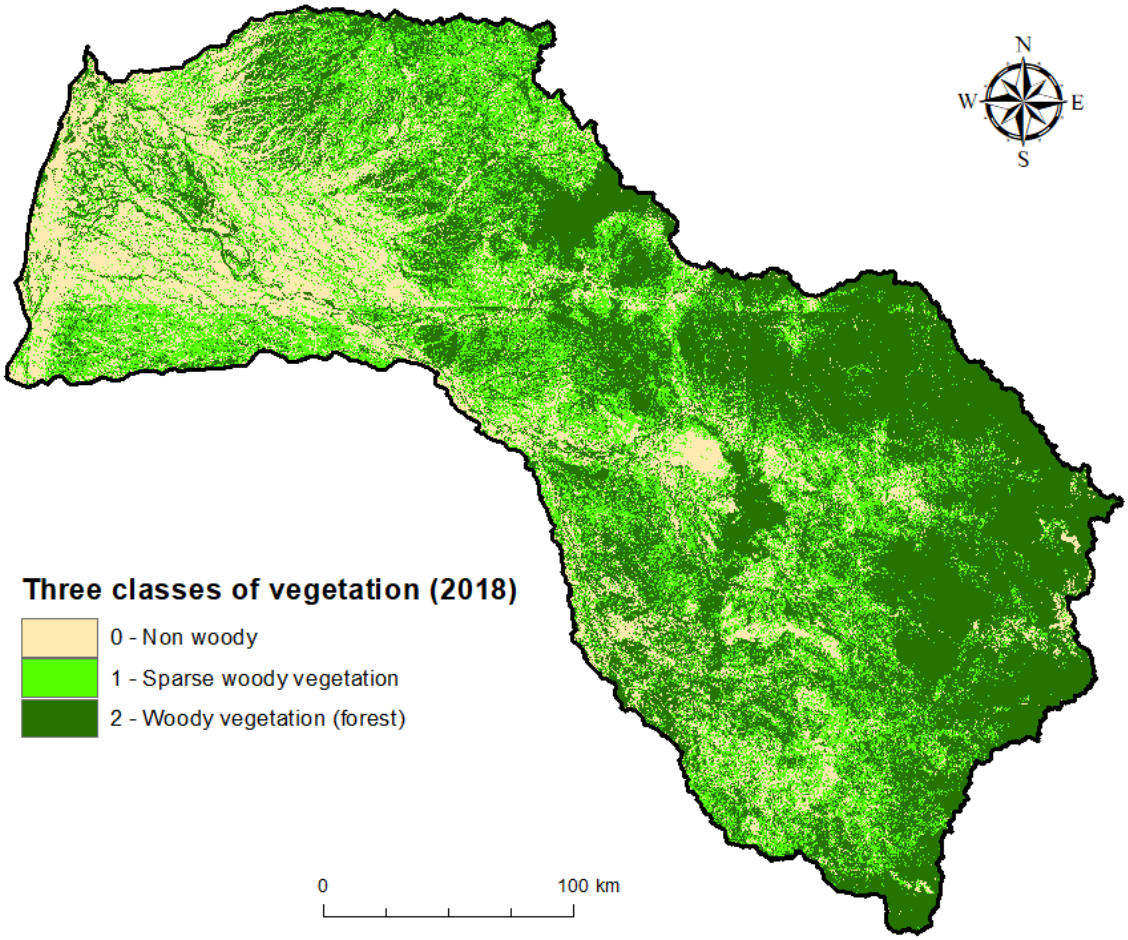


Figure 46: Total number of priority invasive species present per grid cell across the Mitchell River catchment. Maximum number of total priority invasive species calculated by Pest Central, Annual Pest Distribution Surveys, Queensland Weed Distribution Current, WildNet and Atlas of Living Australia datasets, available on QSpatial. Each grid cell is 18.5km × 18.5km = 342.25km^2

3.4 Biotic structural state characteristics

3.4.1 Woody vegetation

Dataset 1	National Forest and Sparse Woody Vegetation Data (Version 3.0) 2018
Purpose	Landsat satellite imagery is used to derive woody vegetation data that are classified into; forest, sparse woody and non-woody land cover across a time series from 1988 to 2018.
Format	Raster, 0.00025 degrees cell size (~ 25m × 25m)
Extent	Australia.
Temporal resolution	Date range; 3 January 1988 – 23 September 2018. Data available for 1988, 1989, 1991, 1992, 1995, 1998, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018. Updated annually.
Custodian	National GHG Inventory, Department of the Environment and Energy, Australian Government, ncas-gis-rs@industry.gov.au
Notes	A forest is defined as woody vegetation with a minimum 20% canopy cover and a minimum area of 0.2 ha. Sparse woody is defined as woody vegetation with a canopy cover between 5–19%. Data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Zonal statistics were performed to derive averages by ecosystem type.
Access	https://data.gov.au/data/dataset/national-forest-and-sparse-woody-vegetation-data-version-3-2018-release
Citation	Department of the Environment and Energy (2018). National forest and sparse woody vegetation data. Version 3.0. Commonwealth of Australia, Canberra.
Supporting papers	n.a.



Pixel value	Description
0	Non-woody
1	Sparse woody vegetation
2	Woody vegetation (forest)

Figure 47: Non-woody, sparse woody vegetation and woody vegetation (forest) across the Mitchell catchment (2018).

Table 23: Area (ha) of non-woody vegetation in each ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG	MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4		
IUCN EFG area (ha)	5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Area (ha) of non-woody vegetation in each ecosystem type in respective year																
1988	5370	2069	34638	1551	18433	1077	49	65	13599	585421	57555	472	35685	261267	10318	1498
1989	5337	2124	34125	1570	20807	1101	105	37	15157	697811	74049	731	38470	276896	11395	2770
1991	5172	1644	31728	1450	20618	916	110	15	15529	714778	77317	772	38298	291079	10650	2976
1992	5245	2055	35143	1679	23360	1177	140	21	18735	809240	84365	946	39317	311773	13932	3064
1995	5253	2297	35548	1697	24334	1220	141	20	19117	789217	88796	1080	39604	300134	13634	2608
1998	5382	2317	35631	1749	23974	1315	127	18	17361	736674	88184	883	38851	288957	14709	2693
2000	5364	1993	35124	1735	24224	1242	122	32	16896	644619	87830	815	36176	262573	13704	2906
2001	5328	1489	34584	1567	25255	968	118	32	16171	615170	82246	709	35299	243292	13172	2732
2004	5285	1417	34202	1501	23894	886	127	52	13002	560711	81957	745	34980	219786	12482	2824
2005	5210	1338	33665	1471	23626	867	127	63	12945	524339	82745	724	35309	210230	12100	2881
2006	5272	1650	36204	1677	24206	1090	92	71	13102	560648	84368	630	35383	223378	13319	3019
2007	5257	1654	36423	1705	25168	1115	81	78	14391	562184	82458	655	34273	231946	13655	3033
2008	5204	1610	36582	1698	24339	1105	80	87	15521	569123	81193	712	34200	239095	13918	3093
2009	5180	1617	36648	1715	24803	1143	91	62	16551	588678	81113	797	34756	245976	13923	3031
2010	5232	1809	36979	1738	26305	1250	99	70	17167	615683	82712	936	35228	252752	13475	3102

2011	5252	1872	37052	1752	27215	1286	128	158	17295	645126	87102	1267	35700	260512	13652	3366
2012	5298	1832	36757	1660	26709	1192	153	435	18470	628337	82417	1166	35617	250274	13352	3587
2013	5378	1817	35897	1540	26256	1131	170	172	20650	684735	77812	1197	36396	262623	13843	3634
2014	5304	1775	36020	1565	27847	1099	167	103	22355	766918	84424	1152	37537	284562	14651	3452
2015	5344	1790	36058	1544	29796	1119	202	90	24914	857563	101071	1251	37686	293432	15953	3493
2016	5446	1976	36273	1479	35047	1141	288	104	24356	886389	108312	1520	34453	269470	15405	3629
2017	5427	1946	36426	1512	34489	1221	302	95	28260	978852	113693	1588	36859	300791	16379	3539
2018	5445	2055	36737	1591	33972	1394	314	66	30149	1075089	115426	2009	37794	334125	17209	3487

Table 24: Area (ha) of sparse woody vegetation in each ecosystem type in the Mitchell catchment, Queensland, Australia.

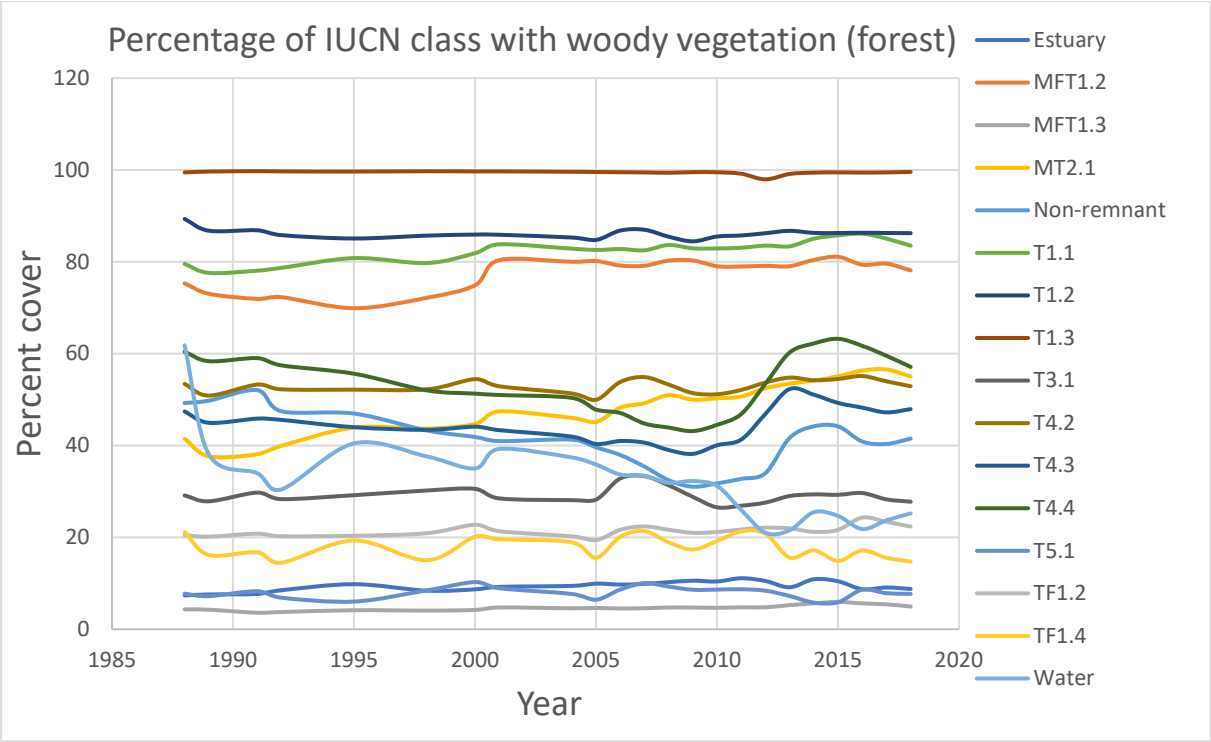
Ecosystem type		Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	
IUCN EFG		MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water	
Area (ha)		5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Area (ha) of sparse woody vegetation in each ecosystem type in respective year	1988	202	854	4552	1943	28032	2703	1264	31	37563	2024420	171604	7850	16442	327424	9577	330
	1989	223	1048	5092	2150	25173	3036	1522	12	36928	2054110	165827	8023	13959	314133	9757	194
	1991	383	1652	7761	2242	23264	3132	1505	9	35190	1902865	158592	7843	13524	295118	10355	185
	1992	267	1199	4282	1906	24736	2760	1606	18	33004	1866853	152776	8002	13309	278626	7643	265
	1995	191	1222	3714	1653	24219	2329	1693	29	32005	1890714	155289	8249	13494	289458	6722	242

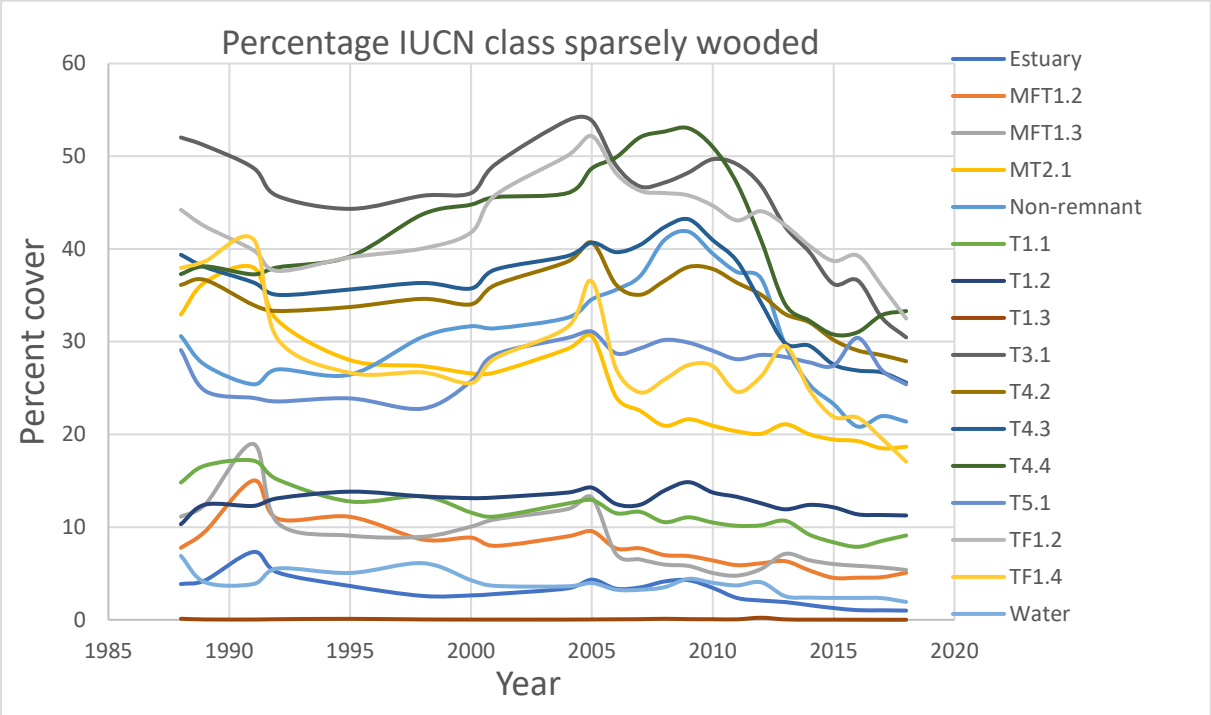
1998	135	953	3666	1615	27947	2430	1631	12	33026	1939751	158356	9207	12875	296553	6734	292
2000	138	975	4114	1569	28996	2112	1608	8	33233	1907096	155764	9425	14529	309283	6446	205
2001	146	877	4433	1575	28795	2033	1616	8	35460	2023651	164626	9595	16162	338969	7120	175
2004	178	990	4891	1725	29852	2289	1682	8	38896	2165641	171049	9690	17184	370733	7975	173
2005	227	1050	5396	1806	31655	2358	1746	12	38870	2279824	177278	10249	17565	386285	9211	190
2006	176	847	2906	1419	32607	2099	1531	16	35391	2025603	172830	10499	16240	356601	6835	156
2007	183	848	2664	1331	33964	2124	1521	20	33745	1964683	176275	10956	16552	342599	6188	155
2008	216	768	2439	1236	37512	1922	1707	30	34052	2048788	184541	11084	17057	340806	6537	168
2009	223	757	2377	1277	38343	2018	1819	20	34838	2133003	188268	11160	16892	338887	6935	212
2010	180	704	2069	1236	36169	1915	1683	17	35870	2120361	178476	10735	16399	330736	6909	191
2011	124	649	1951	1200	34360	1851	1625	15	35481	2037688	168673	9909	15884	318953	6205	178
2012	109	671	2246	1185	33718	1860	1540	60	33819	1964953	149014	8619	16144	326260	6628	194
2013	100	696	2914	1245	27152	1950	1460	12	30604	1847847	130019	7161	16019	315055	7453	122
2014	83	586	2630	1181	23254	1676	1519	6	28641	1797871	128840	6790	15689	298672	6250	115
2015	67	498	2461	1148	21313	1526	1486	5	26150	1691711	119980	6477	15497	286538	5525	113
2016	55	500	2385	1138	19083	1437	1393	4	26427	1627759	117182	6531	17184	290798	5503	113
2017	54	506	2312	1092	20125	1554	1385	3	23523	1599328	116305	6919	15208	266419	4930	112
2018	52	558	2201	1102	19582	1661	1379	2	21999	1563173	111488	7009	14352	240577	4303	92

Table 25: Area (ha) of woody vegetation in each ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type		Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	
	IUCN EFG	MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water	
	Area (ha)	5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Area (ha) of woody vegetation in each ecosystem type in respective year	1988	385	8281	1770	2448	45128	14512	10942	26183	21040	2993429	206651	12718	4379	151589	5339	2959
	1989	396	8033	1744	2222	45612	14156	10629	26232	20118	2851349	195935	12286	4077	149251	4082	1823
	1991	402	7909	1472	2250	47710	14244	10640	26255	21484	2985628	199901	12425	4684	154084	4230	1626
	1992	444	7951	1535	2358	43496	14355	10510	26241	20463	2927178	198669	12092	3881	149882	3659	1457
	1995	513	7686	1698	2592	43039	14743	10421	26232	21081	2923339	191725	11711	3409	150688	4879	1937
	1998	439	7935	1663	2579	39672	14547	10498	26250	21816	2926846	189270	10949	4781	154770	3791	1801
	2000	454	8237	1723	2638	38372	14938	10526	26240	22074	3051555	192216	10799	5802	168424	5085	1676
	2001	483	8838	1943	2800	37543	15291	10521	26241	20571	2964449	188939	10736	5045	158019	4942	1879
	2004	493	8797	1868	2716	37846	15118	10447	26220	20304	2876919	182804	10605	4342	149761	4778	1790
	2005	519	8816	1899	2664	36312	15067	10383	26205	20386	2799107	175787	10066	3632	143766	3922	1716
	2006	509	8708	1851	2847	34779	15103	10633	26194	23710	3017020	178612	9911	4883	160301	5081	1612
	2007	517	8702	1874	2906	32461	15053	10654	26182	24067	3076403	177078	9428	5681	165736	5391	1599
	2008	536	8826	1940	3008	29743	15264	10469	26163	22630	2985359	170077	9244	5250	160379	4780	1526
	2009	553	8830	1936	2950	28448	15131	10346	26198	20814	2881590	166429	9083	4858	155418	4377	1544
	2010	544	8691	1913	2968	29117	15127	10474	26192	19166	2867226	174623	9369	4880	156792	4851	1494
	2011	581	8684	1957	2990	30017	15155	10502	26107	19427	2920456	180035	9864	4922	160816	5377	1243

2012	549	8702	1958	3097	31165	15241	10562	25785	19913	3009981	204379	11255	4746	163746	5254	1006
2013	478	8692	2150	3157	38185	15212	10626	26095	20948	3070688	227979	12682	4091	162603	3939	1031
2014	569	8843	2311	3196	40491	15517	10570	26172	21206	3038481	222547	13098	3281	157046	4334	1220
2015	546	8916	2442	3250	40484	15647	10567	26185	21139	3053997	214760	13312	3324	160310	3757	1181
2016	456	8729	2303	3325	37462	15714	10574	26172	21418	3089123	210317	12989	4869	180013	4326	1044
2017	475	8752	2222	3338	36978	15517	10568	26182	20419	3025091	205813	12533	4439	173071	3926	1135
2018	459	8591	2022	3249	38038	15237	10563	26211	20054	2965009	208897	12022	4361	165579	3723	1207


Percentage of IUCN class with woody vegetation (forest)
Percent cover
Year
120
100
80
60
40
20
0
1985
1990
1995
2000
2005
2010
2015
2020
Estuary
MFT1.2
MFT1.3
MT2.1
Non-remnant
T1.1
T1.2
T1.3
T3.1
T4.2
T4.3
T4.4
T5.1
TF1.2
TF1.4
Water


Percentage IUCN class sparsely wooded
Percent cover
Year
60
50
40
30
20
10
0
1985
1990
1995
2000
2005
2010
2015
2020
Estuary
MFT1.2
MFT1.3
MT2.1
Non-remnant
T1.1
T1.2
T1.3
T3.1
T4.2
T4.3
T4.4
T5.1
TF1.2
TF1.4
Water

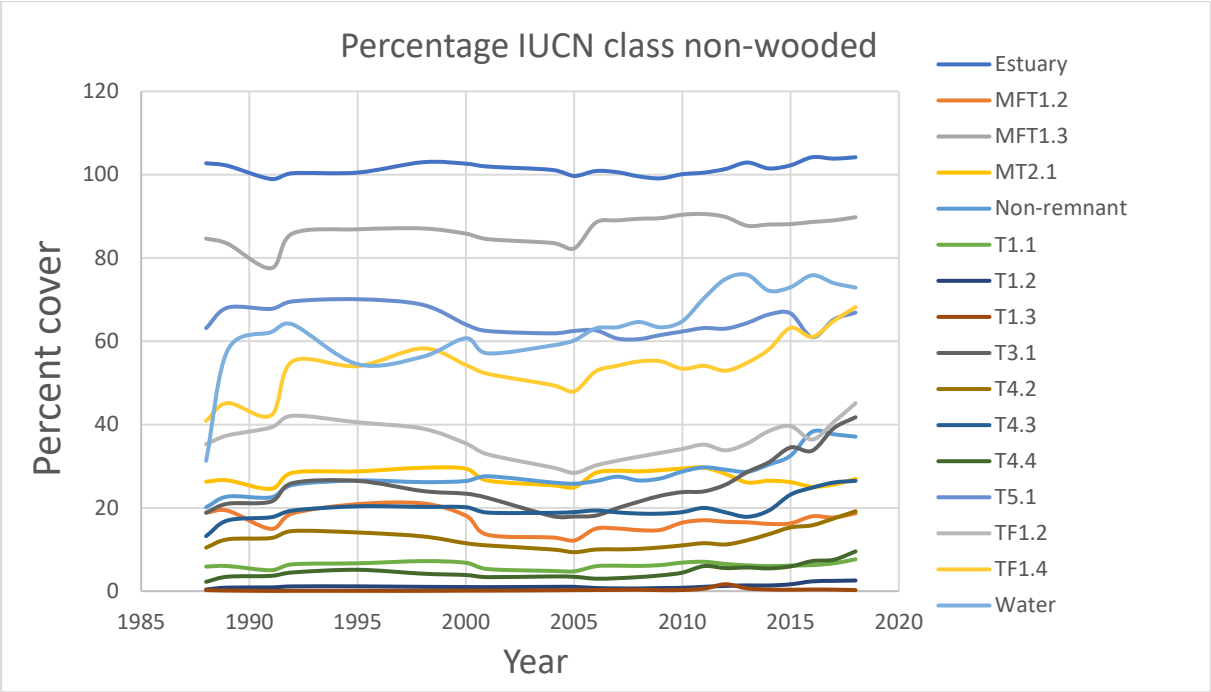


Figure 48: The percentage cover of three classes of vegetation across the Mitchell catchment: woody, sparsely woody and non-wooded vegetation (1988–2018).

3.4.2 Tree cover

Dataset 2	Mean tree cover
Purpose	Mean tree/ foliage cover.
Format	Raster (250m × 250m).
Extent	Australia.
Temporal resolution	1988 to 2017. Updated annually.
Custodian	© Centre for Water and Landscape Dynamics, Australian National University.
Notes	Dataset is based on temporal greenness patterns using MODIS satellite data. Data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Zonal statistics were performed to derive averages by ecosystem type.
Access	http://wenfo.org/ausenv/#/2020/Tree_Cover/
Citation	Van Dijk, A.I.J.M. and Rahman, J. (2019). *Synthesising multiple observations into annual environmental condition reports: the OzWALD system and Australia's Environment Explorer*. In Elsawah, S. (ed.) MODSIM2019, 23rd International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December 2019, pp. 884–890. ISBN: 978-0-9758400-9-2. https://doi.org/10.36334/modsim.2019.J5.vandijk
Supporting papers	n.a.

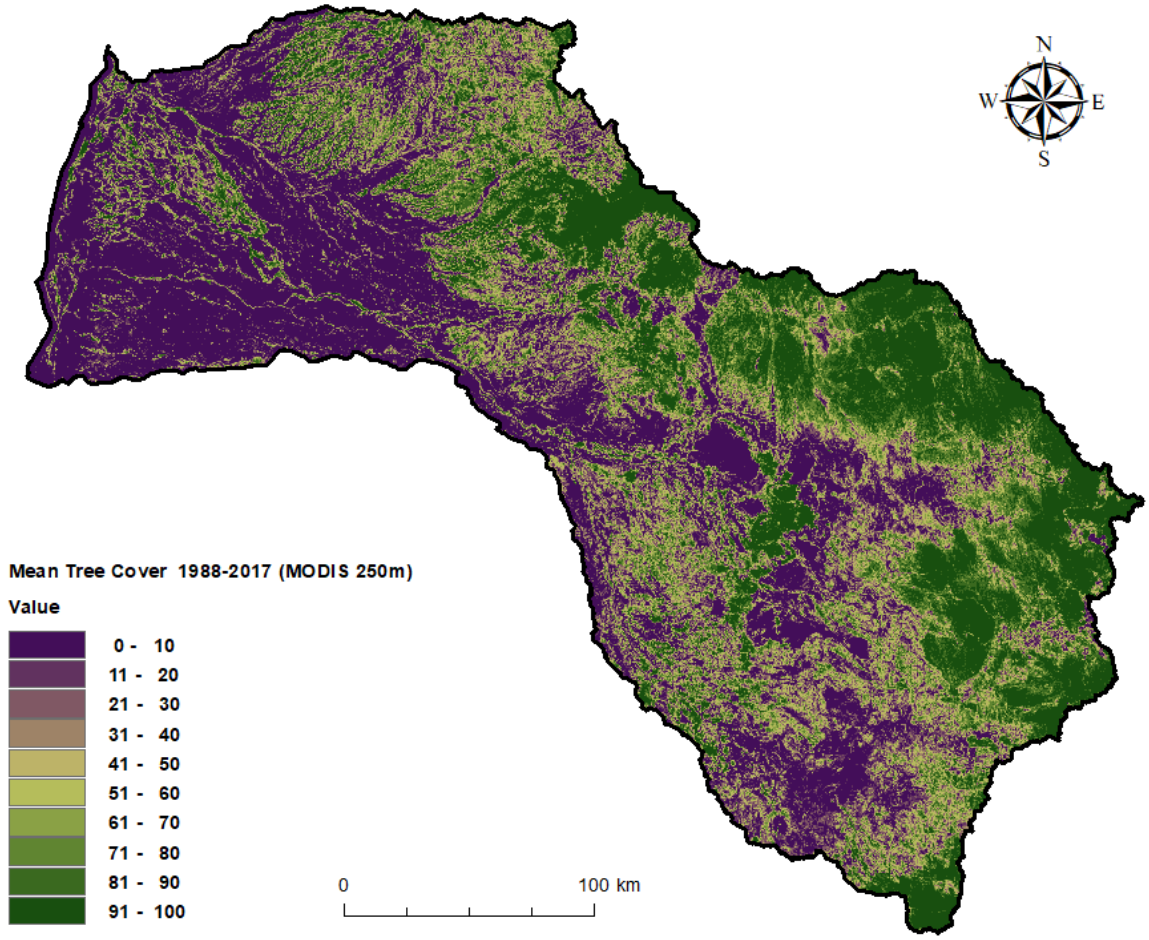


Figure 49: Mean tree cover (%) across the Mitchell catchment (1988–2017).

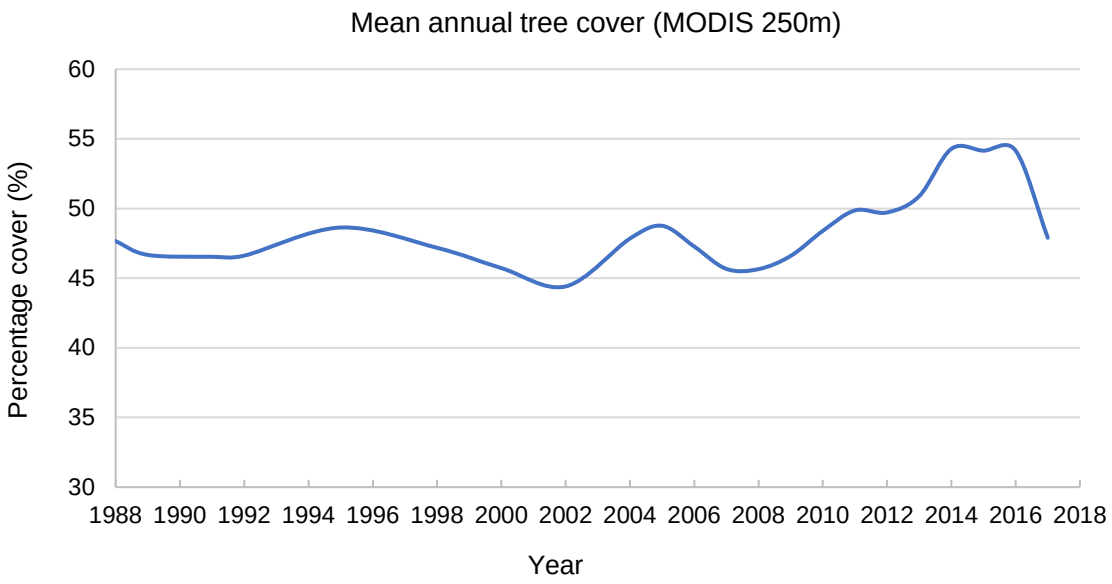


Figure 50: Mean tree cover (%) across the Mitchell catchment (1988–2018).

Table 26: Mean tree cover expressed as a percentage of EFG area for 2009, 2010, 2014 and 2017 per ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Area (ha)	Mean tree cover per year (%)			
			2009	2010	2014	2017
Estuary	Estuary	5226	22	22	24	19
Intertidal forests and shrublands	MFT1.2	10996	22	22	23	20
Coastal saltmarshes and reedbeds	MFT1.3	40916	16	16	18	16
Coastal shrublands and grasslands	MT2.1	5902	5	6	6	6
Non-remnant	Non-remnant	91612	61	63	72	69
Tropical subtropical lowland rainforests	T1.1	18244	17	17	19	16
Tropical subtropical dry forest and thickets	T1.2	12248	67	68	73	68
Tropical subtropical montane rainforests	T1.3	26323	99	98	100	99
Seasonally dry tropical shrublands	T3.1	72205	40	40	49	42
Pyric tussock savannas	T4.2	5603684	50	52	58	52
Hummock savannas	T4.3	435831	44	49	55	47
Temperate woodlands	T4.4	21049	44	52	74	53
Semi-desert steppes	T5.1	56506	27	27	34	23
Subtropical-temperate forested wetlands	TF1.2	740341	24	24	31	21
Seasonal floodplain marshes	TF1.4	25233	24	24	27	22
Water	Water	4785	60	60	69	71

3.4.3 Vegetation height

Dataset 3	Vegetation height and structure
Purpose	Vertical plant profiles for the Australian continent were derived through integration of ICESat GLAS waveforms with ALOS PALSAR and Landsat data products. Co-registered Landsat Foliage Projected Cover (FPC) and ALOS PALSAR L-band HH and HV mosaics were segmented to generate objects with similar radar backscatter and cover characteristics. Within these, height, cover, age class and L-band backscatter characteristics were summarised based on the ICE Sat and Landsat time-series and ALOS PALSAR datasets.
Format	Raster (30m × 30m).
Extent	Australia.
Temporal resolution	Single dataset in 2009 based on all available ICESat data between 2003 and 2009
Custodian	Copyright 2010-2020. Joint Remote Sensing Research Project (JRSRP). Rights owned by the JRSRP.
Notes	Data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Zonal statistics were performed to derive averages by ecosystem type.
Access	Accessed from http://auscover.org.au/purl/icesat-vegetation-structure on 12-12-2020
Citation	The vegetation height and structure data were obtained through Terrestrial Ecosystem Research Network (TERN) AusCover. (http://www.auscover.org.au). TERN is Australia's land-based ecosystem observatory delivering data streams to enable environmental research and management (TERN, http://www.tern.org.au). TERN is a part of Australia's National Collaborative Research Infrastructure Strategy (NCRIS, https://www.education.gov.au/national-collaborative-research-infrastructure-strategy-ncris).
Supporting papers	Armston, J., Scarth, P., Lucas, R., Lewis, P., Disney, M., Phinn, S. (2015). Validation of continental scale vertical plant profile mapping using waveform lidar airborne laser scanning. *Silvilaser* 2015, La Grande Motte, France, 28-30 September. Danaher, T., Scarth, P., Armston, J., Collet, L., Kitchen, J., and Gillingham, S. (2010). Ecosystem Function in Savannas: Measurement and Modelling at Landscape to Global Scales. Vol. Section 3. *Remote Sensing of Biophysical and Biochemical Characteristics in Savannas* How different remote sensing technologies contribute to measurement and understanding of savannas. Taylor and Francis, *Remote sensing of tree-grass systems: The Eastern Australian Woodlands*.

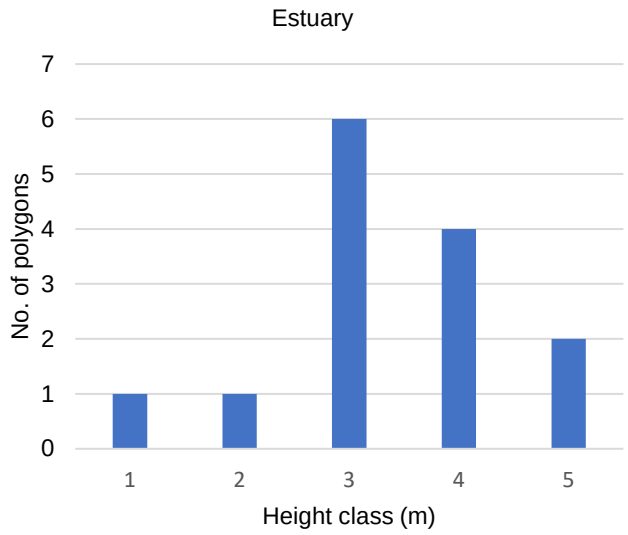


Figure 51: Vegetation height within ecosystem type: Estuary (mean 3.23m).

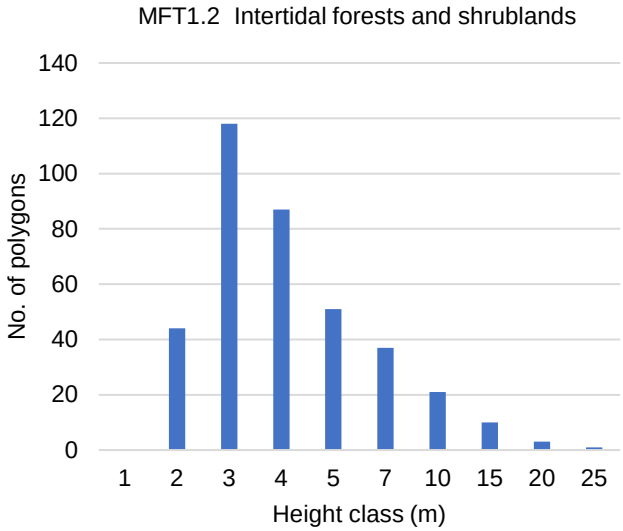


Figure 52: Vegetation height within ecosystem type: Intertidal forests and shrublands (mean 3.90m).

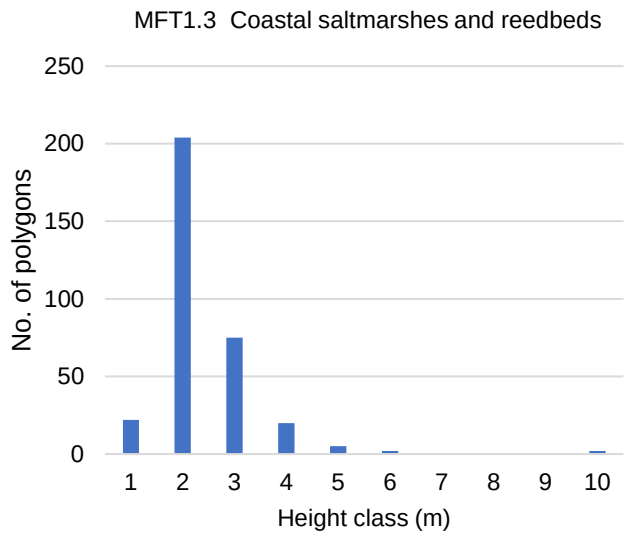


Figure 53: Vegetation height within ecosystem type: Coastal saltmarshes and reedbeds (mean 1.89m).

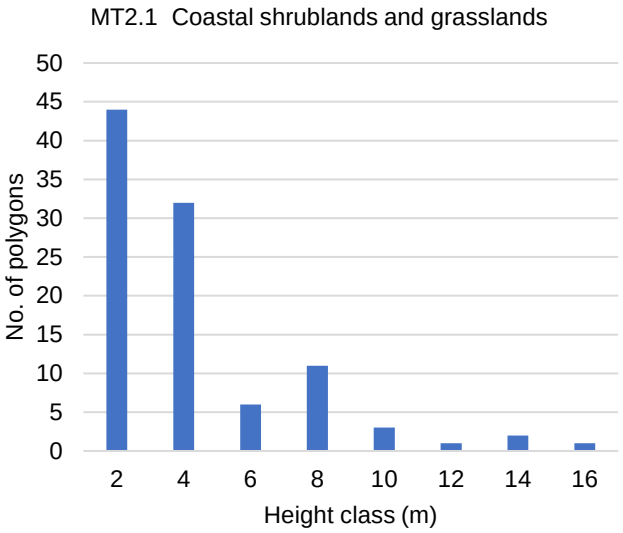


Figure 54: Vegetation height within ecosystem type: Coastal shrublands and grasslands (mean 3.42m).

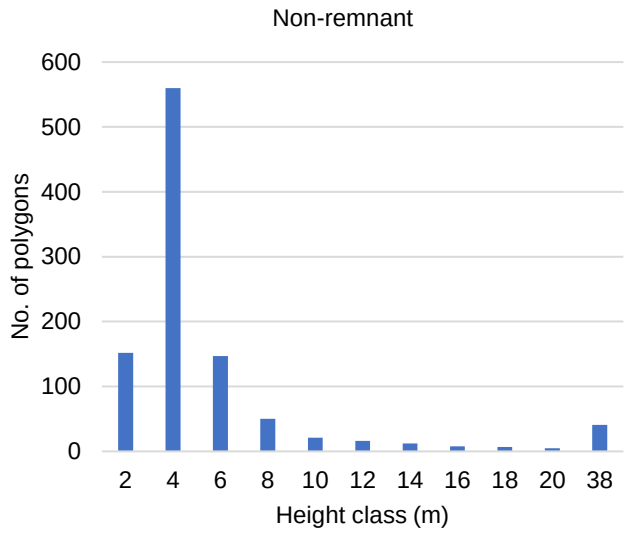


Figure 55: Vegetation height within ecosystem type: Non-remnant (mean 4.78m).

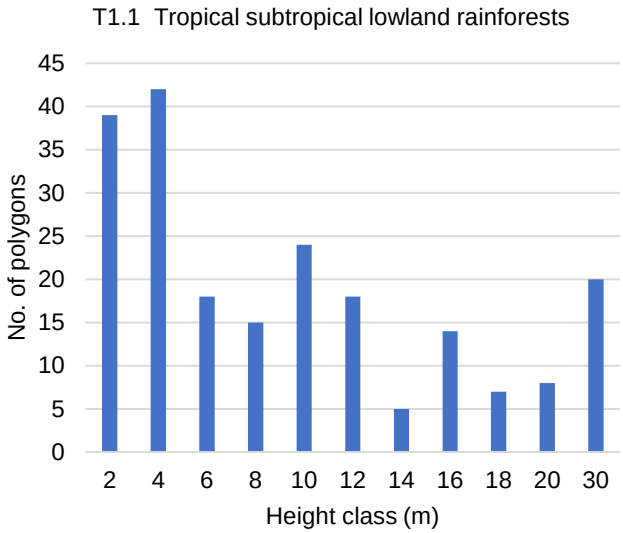


Figure 56: Vegetation height within ecosystem type: Tropical-subtropical lowland rainforests (mean 8.37m).

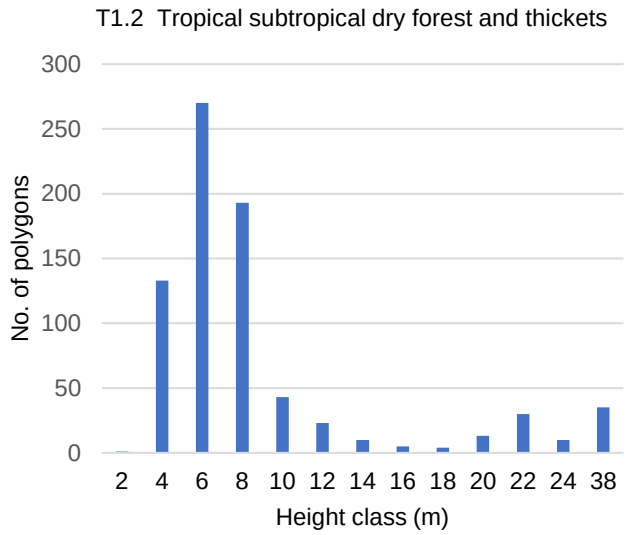


Figure 57: Vegetation height within ecosystem type: Tropical-subtropical dry forests and thickets (mean 8.27m).

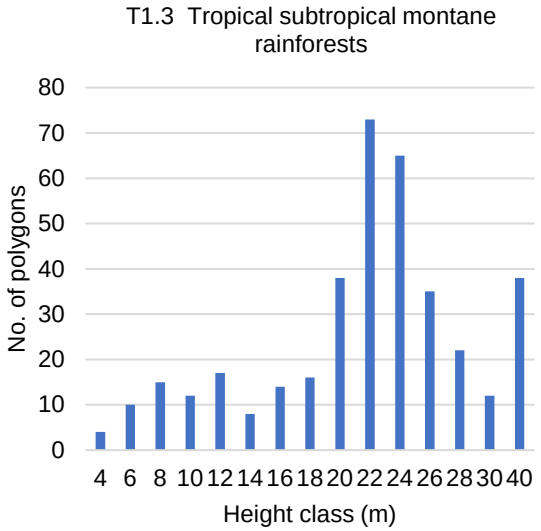


Figure 58: Vegetation height within ecosystem type: Tropical-subtropical montane rainforests (mean 19.37m).

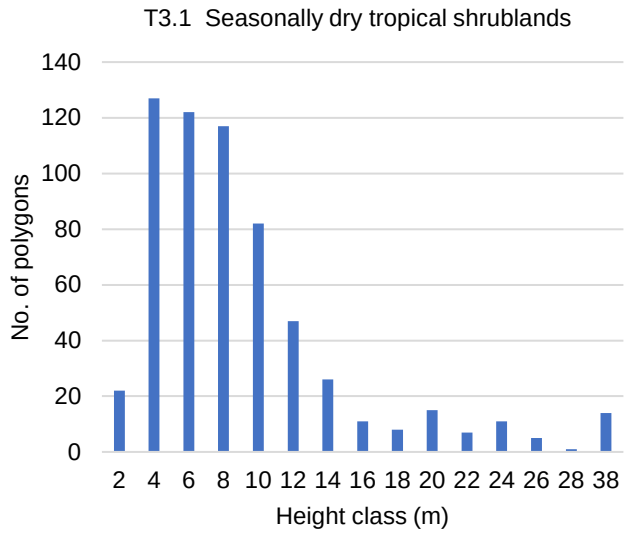


Figure 59: Vegetation height within ecosystem type: Seasonally dry tropical shrublands (mean 7.71m).

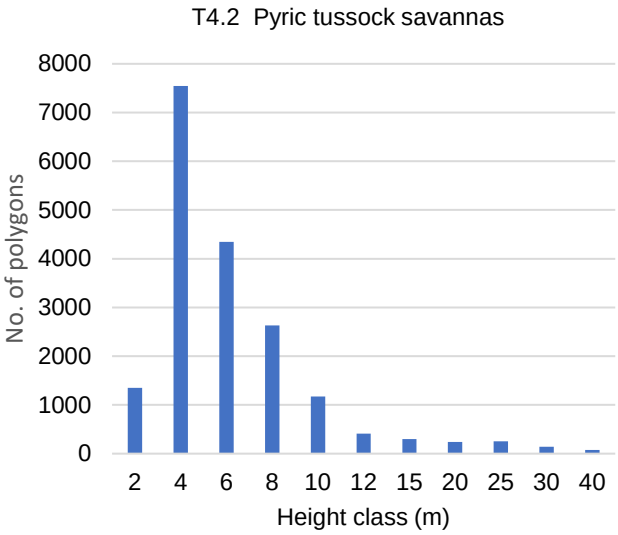


Figure 60: Vegetation height within ecosystem type: Pyric tussock savannas (mean 4.57m).

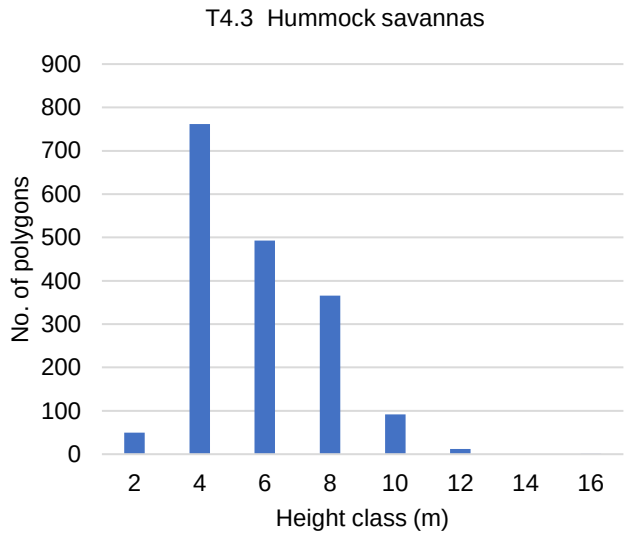


Figure 61: Vegetation height within ecosystem type: Hummock savannas (mean 3.35m).

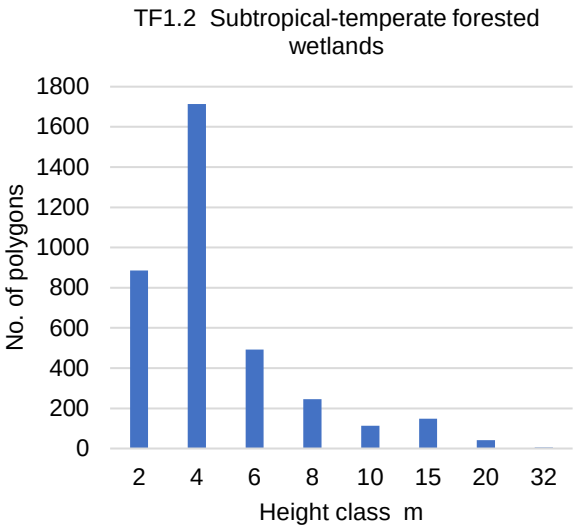


Figure 62: Vegetation height within ecosystem type: Subtropical/temperate forested wetlands (mean 4.11m).

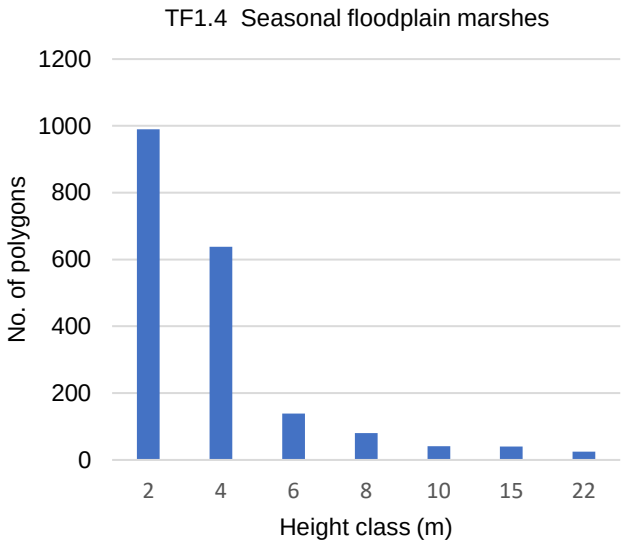


Figure 63: Vegetation height within ecosystem type: Seasonal floodplain marshes (mean 2.82m).

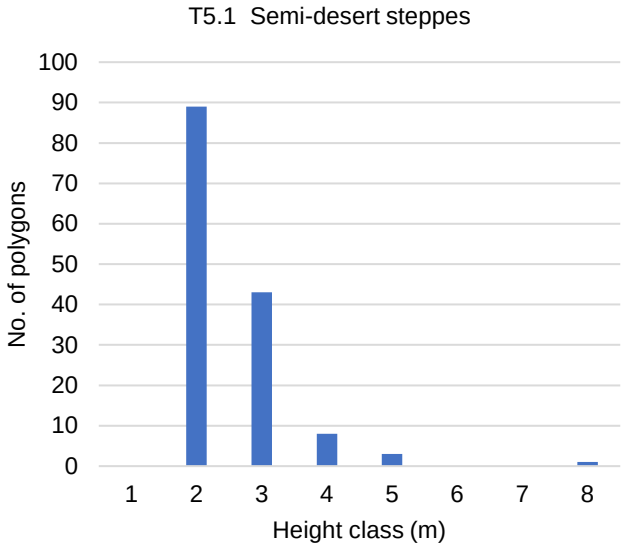


Figure 64: Vegetation height within ecosystem type: Semi-desert steppes (mean 3.28m).

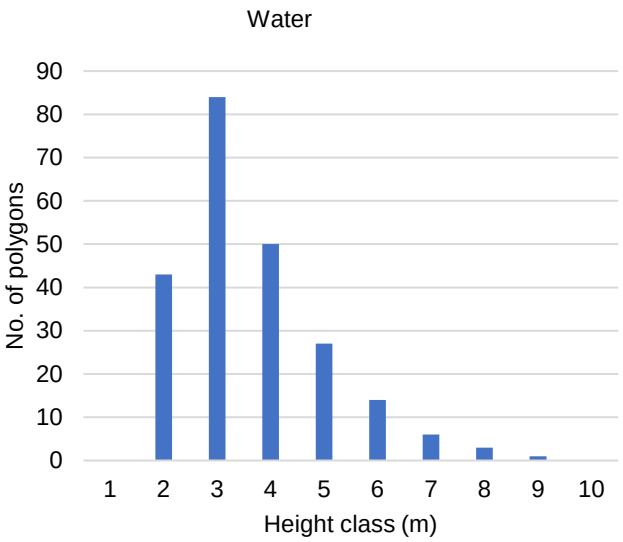


Figure 65: Vegetation height within ecosystem type: Water (mean 3.28m).

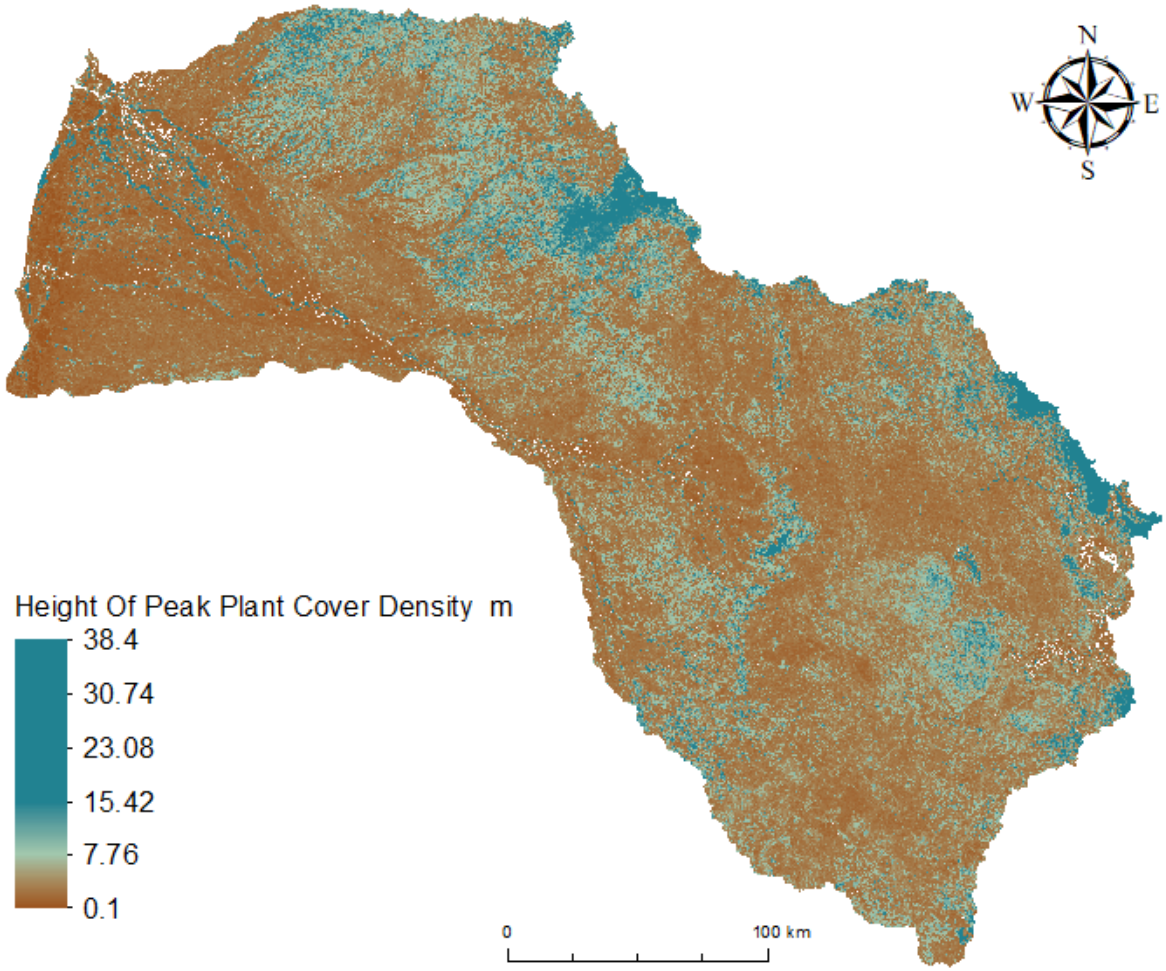


Figure 66: Height of peak plant cover density in metres.

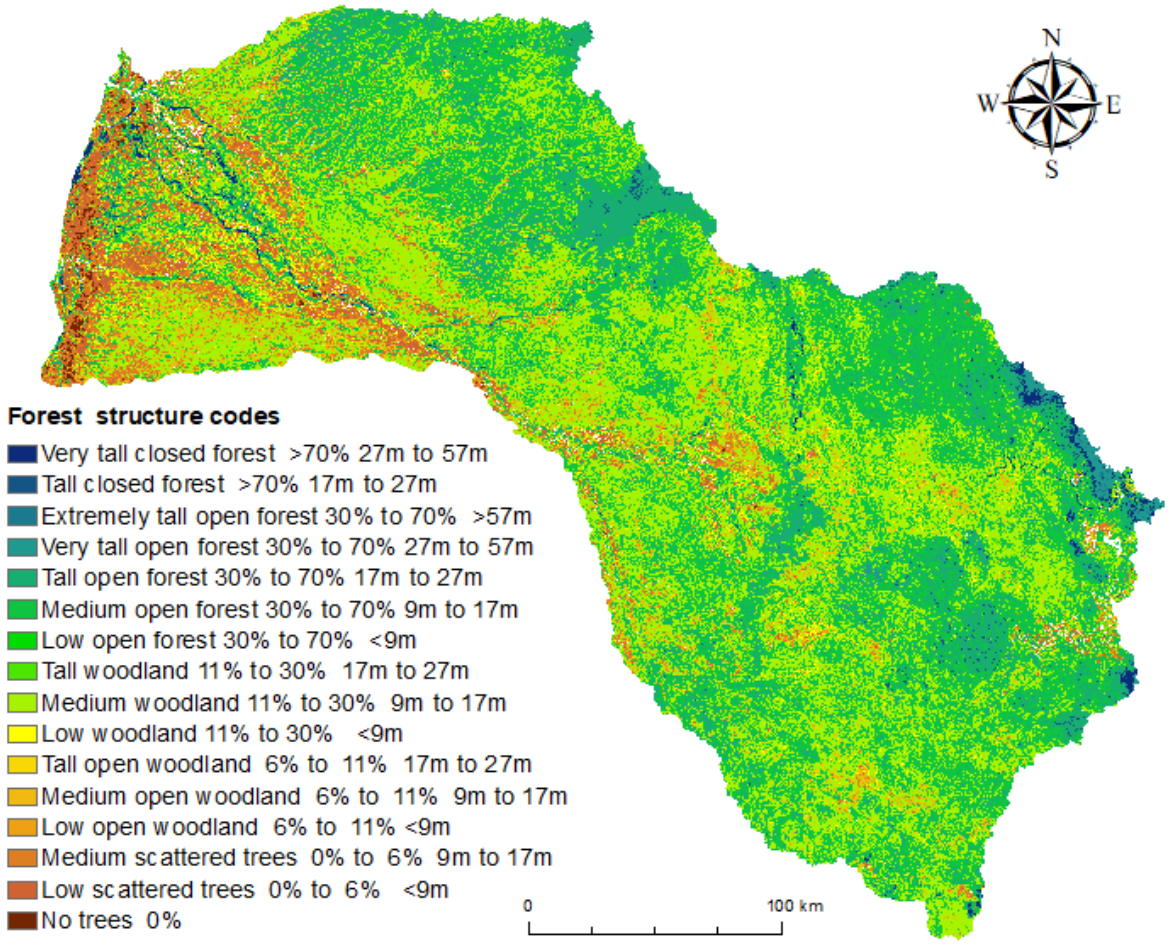


Figure 67: Forest structure based on 16 categories.

Table 27: Vegetation height (m) statistics by ecosystem type across the Mitchell catchment.

Ecosystem type	IUCN EFG	Area (ha)	Patch (polygon) size				Vegetation height within a patch (m)				
			No. of patches	Minimum area (ha)	Maximum area (ha)	Mean area (ha)	MIN	MAX	RANGE	MEAN	STD
Estuary	Estuary	5226	14	0.1	3938.1	425.8	0.1	28.1	28.0	3.4	3.2
Intertidal forests and shrublands	MFT1.2	10996	372	0.2	361.7	30.1	0.1	28.1	28.0	4.3	3.2
Coastal saltmarshes and reedbeds	MFT1.3	40916	330	1.1	2091.0	124.2	0.1	28.1	28.0	1.5	1.2
Coastal shrublands and grasslands	MT2.1	5902	100	0.7	778.3	59.6	0.1	26.2	26.1	6.4	6.6
Non-remnant	Non-remnant	91612	1042	0.0	30523.1	89.5	0.1	36.7	36.6	3.0	3.4
Tropical subtropical lowland rainforests	T1.1	18244	210	0.3	2016.2	87.1	0.1	36.7	36.6	11.6	8.2
Tropical subtropical dry forest and thickets	T1.2	12248	762	0.0	2161.6	16.1	0.9	36.7	35.8	8.0	5.5
Tropical subtropical montane rainforests	T1.3	26323	370	0.0	8389.7	71.1	1.1	38.4	37.3	22.3	5.5
Seasonally dry tropical shrublands	T3.1	72205	615	0.1	7585.5	117.4	0.1	38.4	38.3	3.9	2.8
Pyric tussock savannas	T4.2	5603684	18487	0.0	97778.8	303.1	0.1	38.4	38.3	4.5	3.2
Hummock savannas	T4.3	435831	1776	0.1	17396.1	245.4	0.1	25.1	25.0	3.7	2.2
Temperate woodlands	T4.4	21049	69	0.2	2853.3	305.1	0.9	14.6	13.7	3.9	1.8
Semi-desert steppes	T5.1	56506	144	0.9	5292.4	392.4	0.1	25.8	25.7	2.0	1.4
Subtropical-temperate forested wetlands	TF1.2	740341	3638	0.1	20182.7	203.5	0.1	36.7	36.6	3.3	3.0
Seasonal floodplain marshes	TF1.4	25233	1944	0.1	1374.8	13.0	0.1	31.4	31.3	2.5	2.5
Water	Water	4785	229	0.2	3214.1	20.9	0.1	33.7	33.6	3.4	2.0

3.4.4 Pasture biomass

Dataset 4	AussieGRASS pasture biomass
Purpose	AussieGRASS (Carter et al. 2000) is an Australian spatial representation of the pasture growth and water balance GRASP model (Rickert, et al. 2000) that is run with interpolated climate data (Jeffrey et al. 2001) and calibrated using satellite data and pasture biomass observations (Hassett et al. 2000). AussieGRASS was developed with the view to supporting sustainable management of Australia's rangelands.
Format	GIF, PDF and IMG files with cell size of 0.05 degrees
Extent	Australia.
Temporal resolution	2000 to 2021 (annually).
Custodian	© The State of Queensland (Department of Science, Information Technology and Innovation) 2016
Notes	Annual mean pasture biomass data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Field statistics were performed to derive annual mean values by ecosystem type.
Access	https://www.longpaddock.qld.gov.au/aussiegrass/
Citation	DSITI (2016). AussieGRASS Environmental Calculator – Metadata v1.6. State of Queensland, Department of Science, Information Technology and Innovation.
Supporting papers	Barnetson J, Phinn S, Scarth P. (2020) Estimating Plant Pasture Biomass and Quality from UAV Imaging across Queensland's Rangelands . *AgriEngineering*. 2020; 2(4):523-543. Cobon, D., Stone, G., Carter, J., McKeon, G., Zhang, B., Heidemann, H. (2020). Native pastures and beef cattle show a spatially variable response to a changing climate in Queensland, Australia , *European Journal of Agronomy*, Volume 114, March 2020, 126002 Cobon, D., Kouadio, L., Mushtaq, S., Jarvis, S., Carter, J., Stone, G., Davis, P. (2019). Evaluating the shifts in rainfall and pasture-growth variabilities across the pastoral zone of Australia during 1910–2010 . *Crop and Pasture Science*, 70(7):634-647.

Table 28: Mean total annual pasture biomass (kg DM/ha) for the years 2010, 2014, 2019 per ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Area (ha)	Mean Total Annual Biomass (kg DM/ha)		
			2010	2014	2019
Estuary	Estuary	5226	3296	2750	2527
Intertidal forests and shrublands	MFT1.2	10996	3081	2690	2490
Coastal saltmarshes and reedbeds	MFT1.3	40916	2942	2654	2501
Coastal shrublands and grasslands	MT2.1	5902	2789	2676	2589
Non-remnant	Non-remnant	91612	3493	3203	2987
Tropical subtropical lowland rainforests	T1.1	18244	2889	2383	2275
Tropical subtropical dry forest and thickets	T1.2	12248	2707	2432	2401
Tropical subtropical montane rainforests	T1.3	26323	1906	1690	1424
Seasonally dry tropical shrublands	T3.1	72205	2234	2279	2127
Pyric tussock savannas	T4.2	5603684	2201	2141	2077
Hummock savannas	T4.3	435831	2465	2729	2560
Temperate woodlands	T4.4	21049	2468	2376	2376
Semi-desert steppes	T5.1	56506	2752	2689	2411
Subtropical-temperate forested wetlands	TF1.2	740341	2431	2276	2089
Seasonal floodplain marshes	TF1.4	25233	2822	2493	2292
Water	Water	4785	3065	2932	3035

3.5 Biotic functional state characteristics

3.5.1 Fire datasets

3.5.1.1 Fire frequency

Dataset 1	North Australian MODIS fire frequency mapping 2000–2019
Purpose	Fire frequency in northern Australia for the period 2000–2019 based on data from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) satellite.
Format	Raster (250m × 250m).
Extent	The data extend across the WA rangelands, across the Northern Territory and across northern Queensland down to approximately 20 degrees south.
Temporal resolution	2000 to 2019. An annual summary is available with raster pixels identifying which month of the year a fire scar was detected.
Custodian	North Australia & Rangelands Fire Information (NAFI), Darwin Centre for Bushfire Research, Charles Darwin University. https://firenorth.org.au/nafi3/
Notes	The revisit time of the MODIS satellite is 1-2 days, allowing detection of fire scars very soon after occurrence, and soon after cloud cover clears. This high temporal resolution gives a significant advantage over Landsat fire scar mapping with a revisit time of 16 days at best. For a description of the NAFI operation procedures visit https://firenorth.org.au/nafi3/views/help/faq.pdf Fire frequency (MODIS) data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. A field calculator was used to quantify and total area (ha) and percentage (%) of fire scars by ecosystem type.
Access	https://firenorth.org.au/nafi3/
Citation	Russel-Smith J, Edwards A, and Murphy B (eds) 2015, *Managing fire for delivering carbon and greenhouse benefits in Australian savannas*, CSIRO Press, Melbourne.
Supporting papers	Goodwin, N. R., & Collett, L. J. (2014). Development of an automated method for mapping fire history captured in Landsat TM and ETM+ time series across Queensland, Australia. *Remote Sensing of Environment*, 148, 206–221.

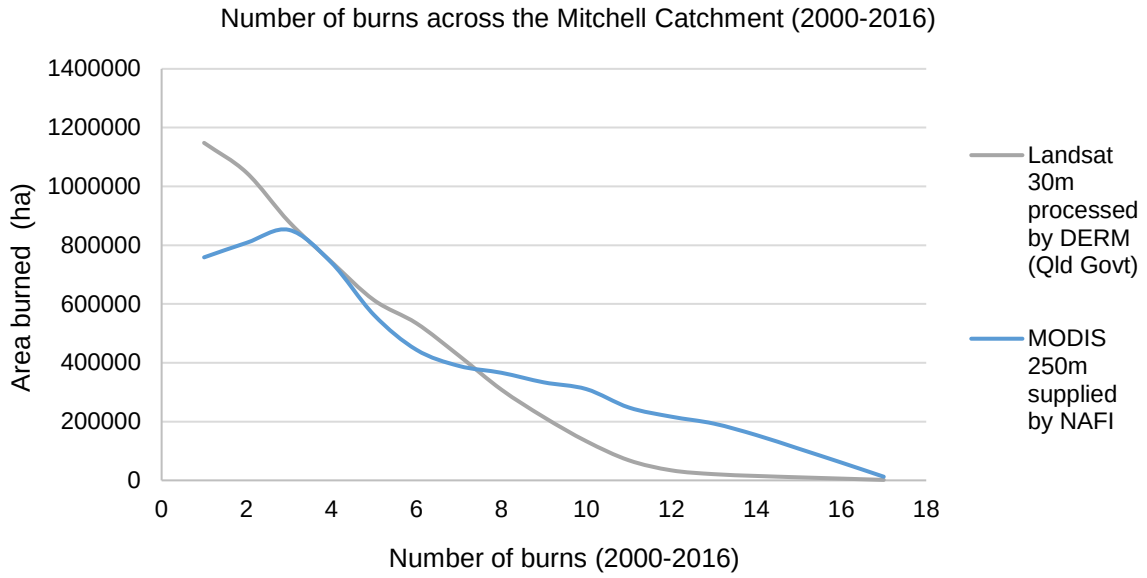


Figure 68: Number versus area of burns (ha) for two different datasets (Landsat processed by DERM and MODIS supplied by NAFI) across the Mitchell catchment (2000–2016).

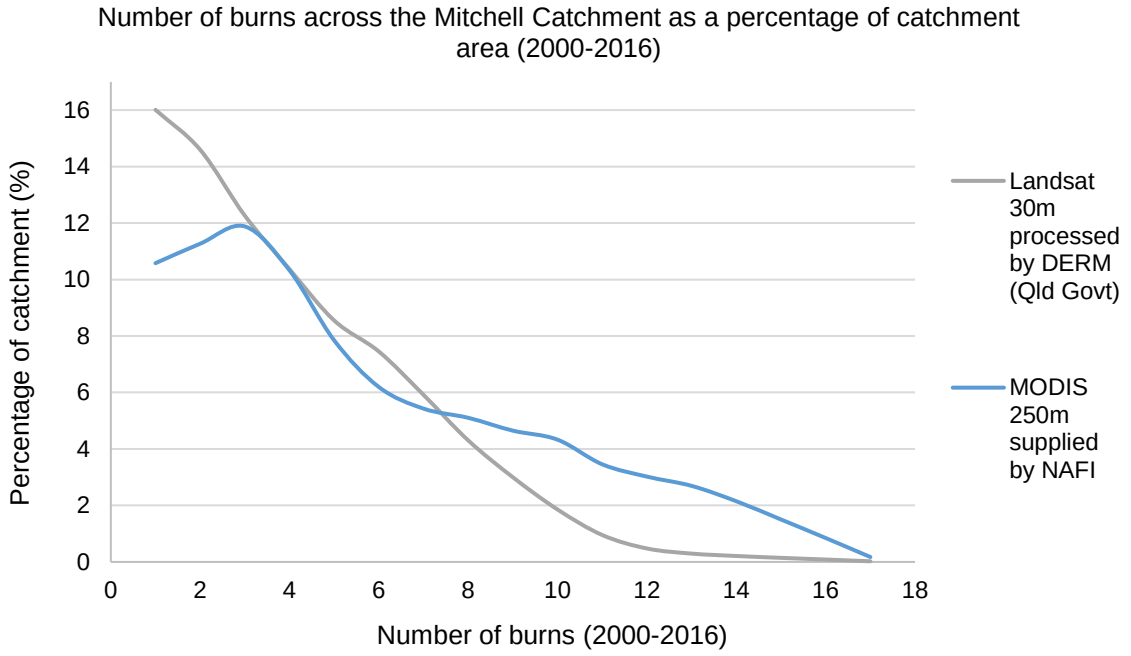


Figure 69: Number versus area of burns (as a % of the ecosystem type) for two different datasets (Landsat processed by DERM and MODIS supplied by NAFI) across the Mitchell catchment (2000–2016).

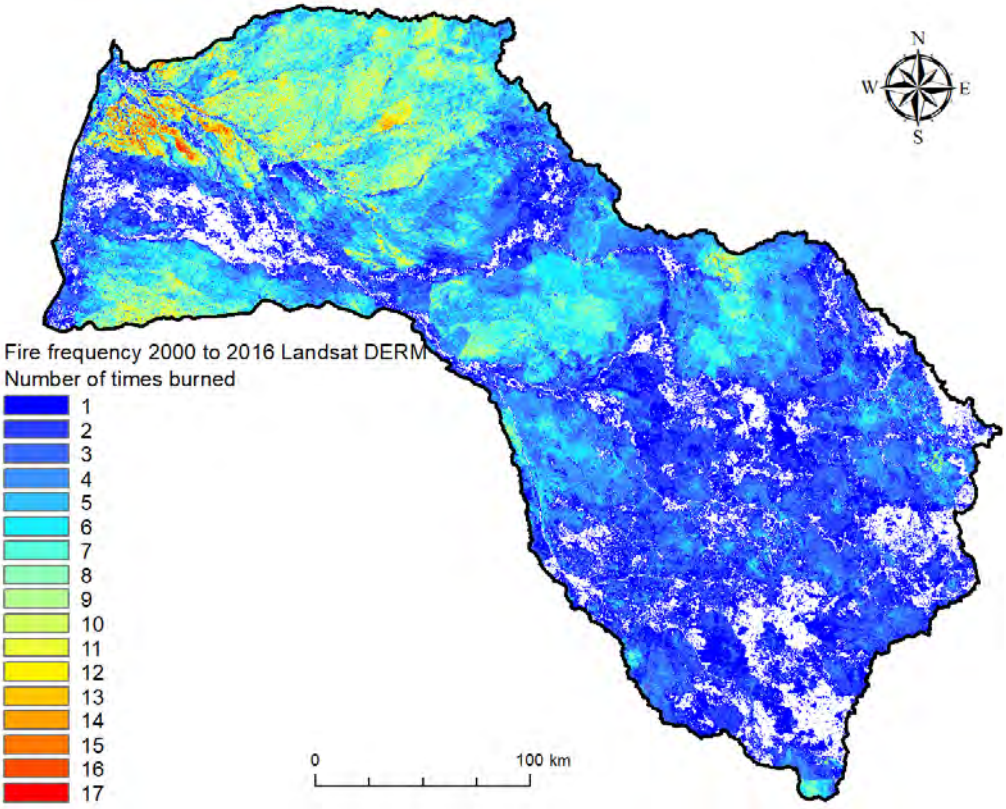


Figure 70: Fire frequency in the Mitchell catchment, from Landsat DERM (2000–2016).

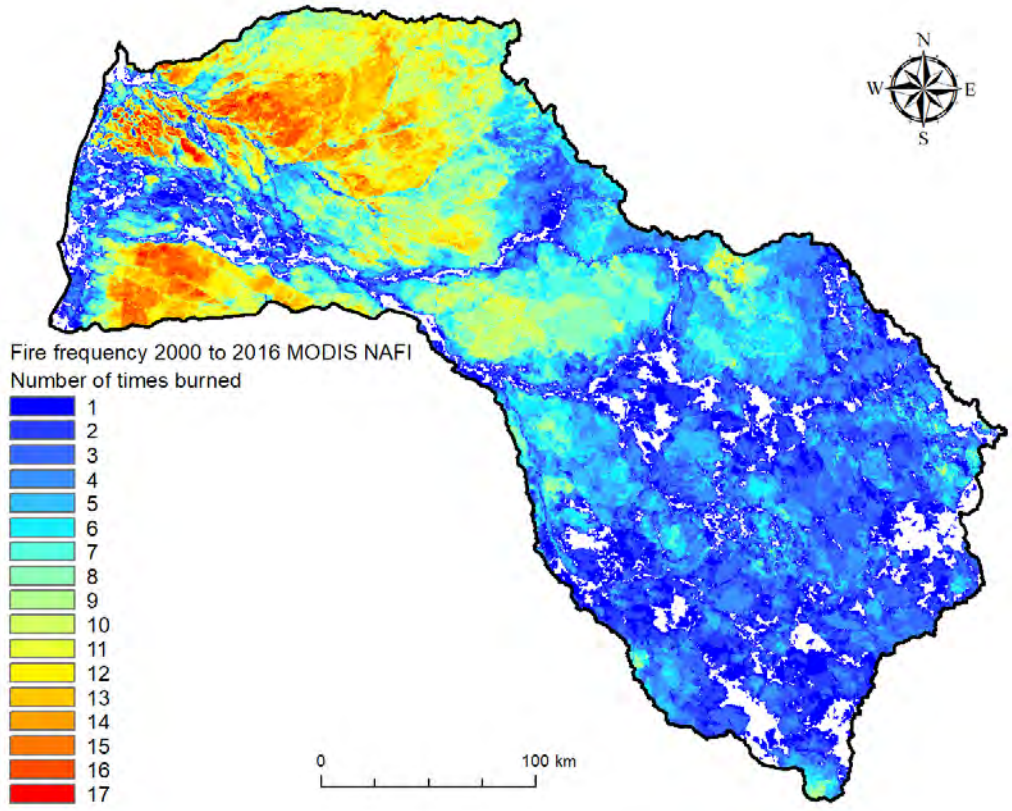


Figure 71: Frequency of burns across the Mitchell catchment, from MODIS NAFI (2000–2016).

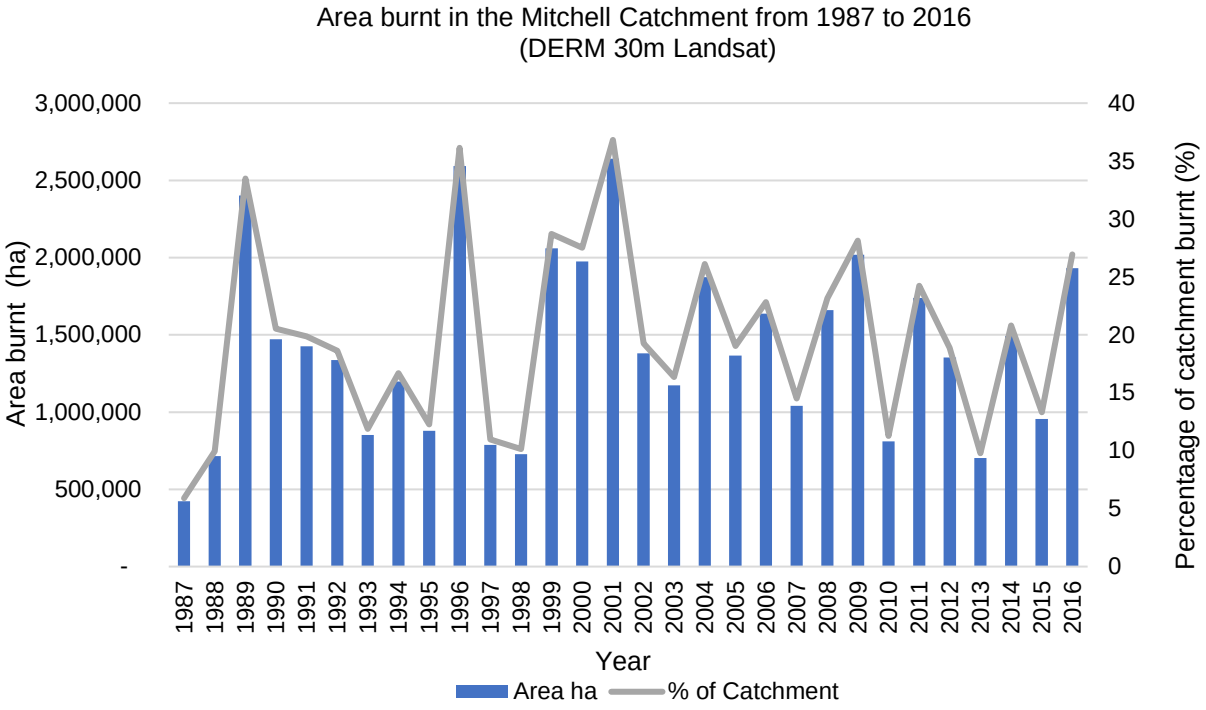


Figure 72: Total area burnt (ha) in the Mitchell catchment from DERM 30m Landsat (1987–2016).

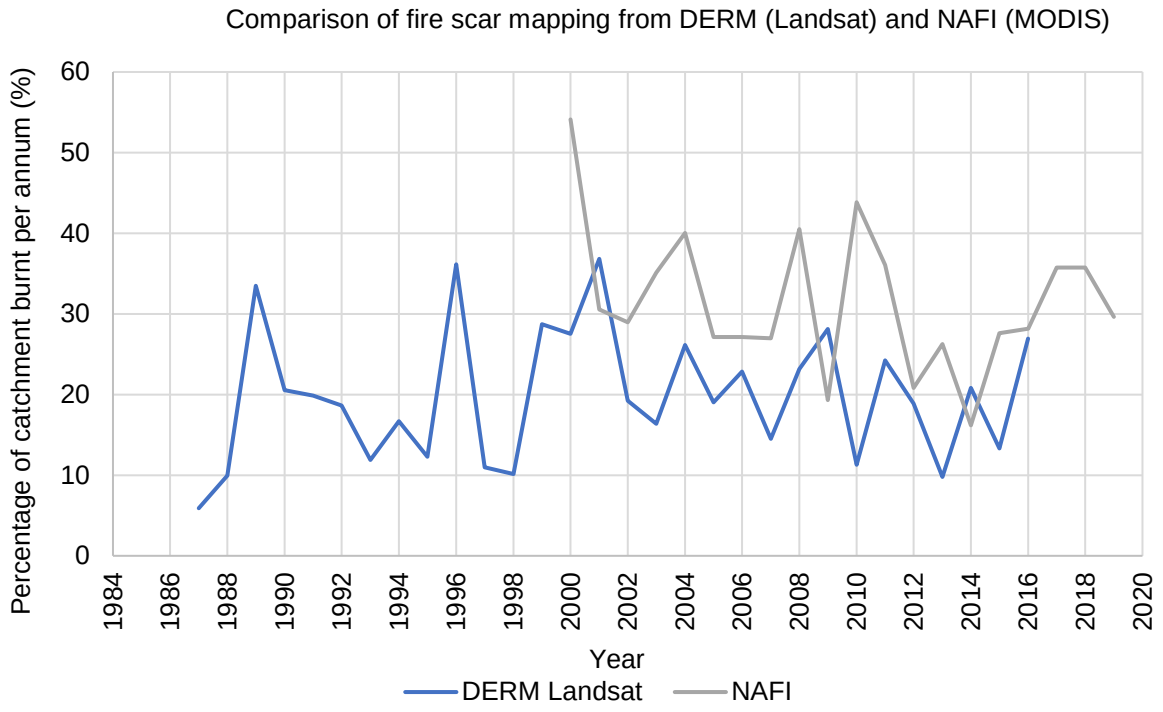


Figure 73: Comparison between fire scar mapping from DERM (Landsat 30m) and NAFI (MODIS).

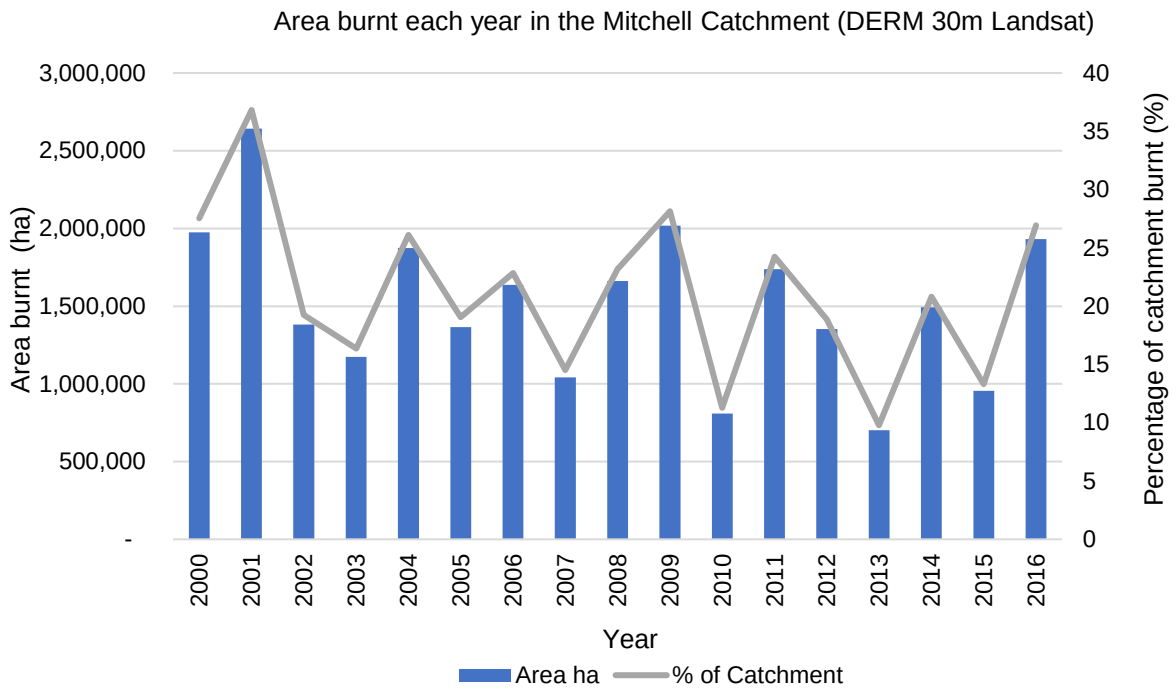


Figure 74: Total area burnt in the Mitchell catchment for DERM Landsat (2000–2016).

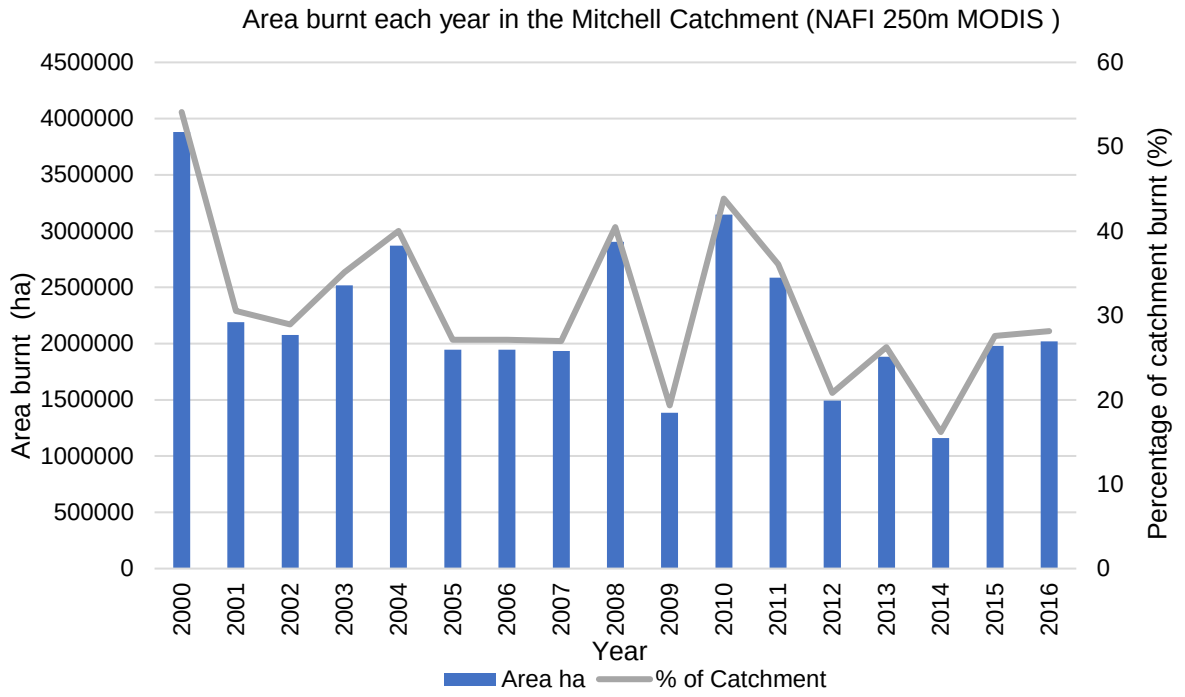


Figure 75: Total area burnt in the Mitchell catchment for NAFI (2000–2016).

3.5.1.2 Fire pressure

Dataset 2	Fire regimes for ecological health.
Purpose	Fire regime groups are groups of related Regional Ecosystems that share common fire management intent and are grouped for the purpose of practical fire management. These groups have been developed as part of the Department of Environment and Science, Queensland Parks and Wildlife Service Fire Management System to optimise the use of fire to maintain biodiversity, protect life and property, improve fire management and provide rangers and other land managers with the knowledge and ability to adapt fire management practices within a changing climate.
Format	Polygon.
Extent	Queensland wide. Data covering the Mitchell catchment were extracted from 4 bioregions: Cape York Peninsula, Gulf Plains, Wet Tropics, and Einasleigh Uplands.
Temporal resolution	Date of publication for the 4 bioregions covering the Mitchell catchment 2012.
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	Vegetation mapping at a map scale of 1:100,000 and 1:50,000 in part, is based on surveys of vegetation communities. Regional Ecosystem line work reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100,000 is 100 metres. These spatial data are derived from the Vegetation Management Act Regional Ecosystems Version 6.1 dataset (16 September 2011). The Fire Regime Group classification for each mapping area (polygon) is based on the primary vegetation unit (Regional Ecosystem) attribute for the polygon.
Access	Updated data available at http://qldspatial.information.qld.gov.au/catalogue/
Citation	Queensland Herbarium (2021) *Regional Ecosystem Fire Guidelines* (March 2021) (Queensland Department of Environment and Science: Brisbane).
Supporting papers	Fire regime groups – Cape York Peninsula was obtained from Queensland Government's Open Data Portal: https://www.data.qld.gov.au/dataset/fire-regime-queensland-series/resource/c0fcdafd-b5ab-41f5-9a8b-0facd5ec6730

Table 29: Fire pressure metrics expressed as area observed and percentage of area observed categorised into three categories: burnt too often, burnt within the recommended interval, and not burnt often enough. Fire pressure metrics were derived by comparing number of burns over a 20-year period based on MODIS fire frequency mapping for the years 2000 through to 2019 and the Queensland Government's Regional Ecosystem Fire Guidelines.

Ecosystem type	IUCN EFG	IUCN EFG area (ha)	Observed area (ha)	Burnt too often (observed area in ha)	Burnt within recommended interval (observed area in ha)	Not burnt often enough (observed area in ha)	Burnt too often (% observed area)	Burnt within recommended interval (% observed area)	Not burnt often enough (% observed area)
Estuary	Estuary	5226	717	86	562	69	11.97	78.35	9.69
Intertidal forests and shrublands	MFT1.2	10,996	10367	867	9493	6	8.37	91.57	0.06
Coastal saltmarshes and reedbeds	MFT1.3	40,916	513	20	222	271	3.84	43.35	52.08
Coastal shrublands and grasslands	MT2.1	5,902	2035	0	1184	851	0.01	58.18	41.80
Non-remnant	Non-remnant	91,612							
Tropical-subtropical lowland rainforests	T1.1	18,244	4128	2	2929	1197	0.04	70.96	29.00
Tropical-subtropical dry forests and thickets	T1.2	12,248	12162	9084	1301	1777	74.69	10.70	14.61
Tropical-subtropical montane rainforests	T1.3	26,323	26267	17784	8098	385	67.70	30.83	1.47
Seasonally dry tropical shrublands	T3.1	72,205	72037	48422	23152	2262	67.22	29.64	3.14
Pyric tussock savannas	T4.2	5,603,684	4943887	899747	1751048	2293092	18.20	35.42	46.38
Hummock savannas	T4.3	435,831	432733	48899	322521	61313	11.30	74.53	14.17
Temperate woodlands	T4.4	21,049	21040	190	20631	220	0.90	98.06	1.04
Semi-desert steppes	T5.1	56,506	56047	136	50596	5316	0.24	90.27	9.49
Subtropical/temperate forested wetlands	TF1.2	740,342	724786	132011	478380	114396	18.21	66.00	15.78
Seasonal floodplain marshes	TF1.4	25,233	21500	1615	15658	4227	7.51	72.83	19.66
Water	Water	4,785							

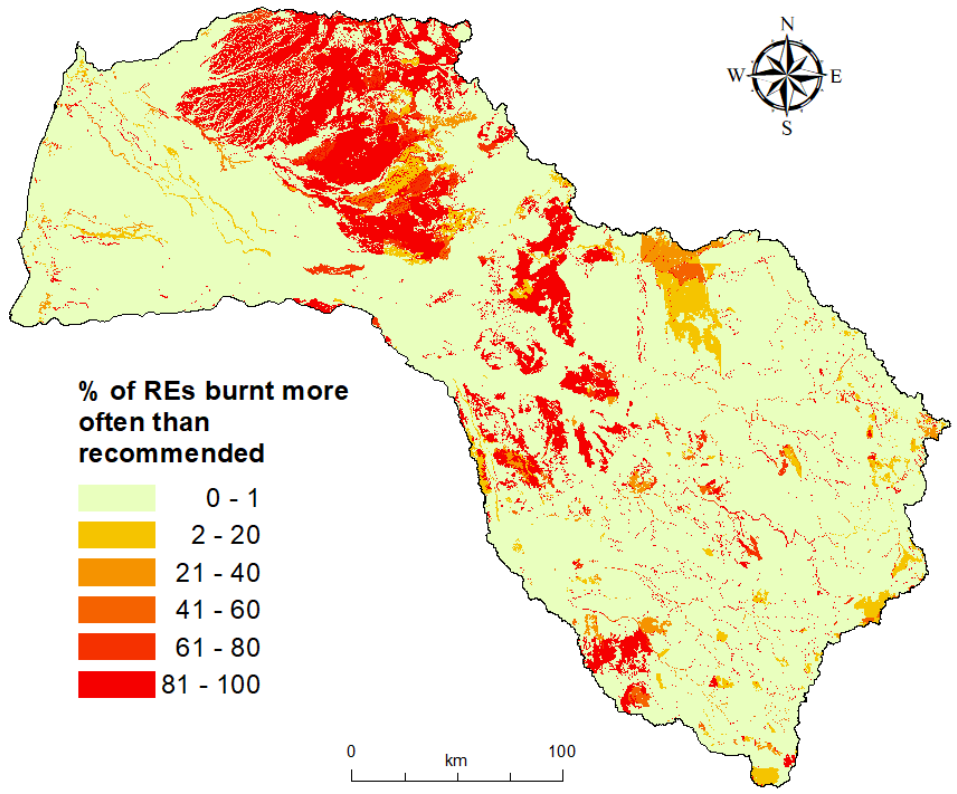


Figure 76: Burn frequency (%) more often than recommended in each ecosystem type.

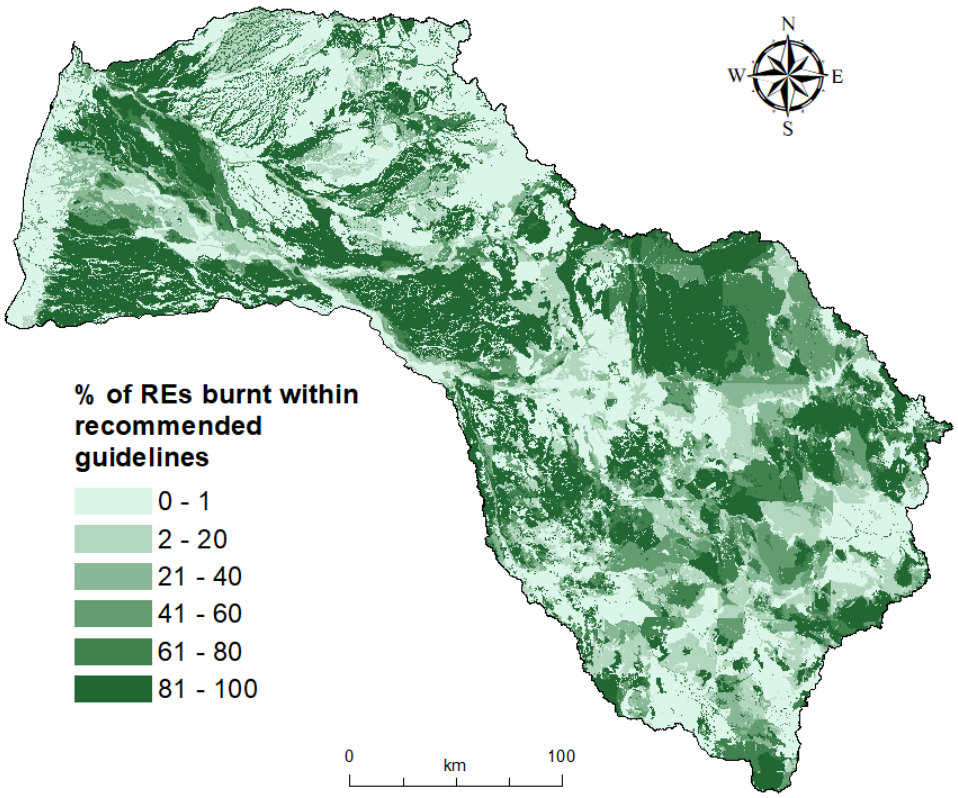


Figure 77: Burn frequency (%) occurring within the recommended guidelines in each ecosystem type.

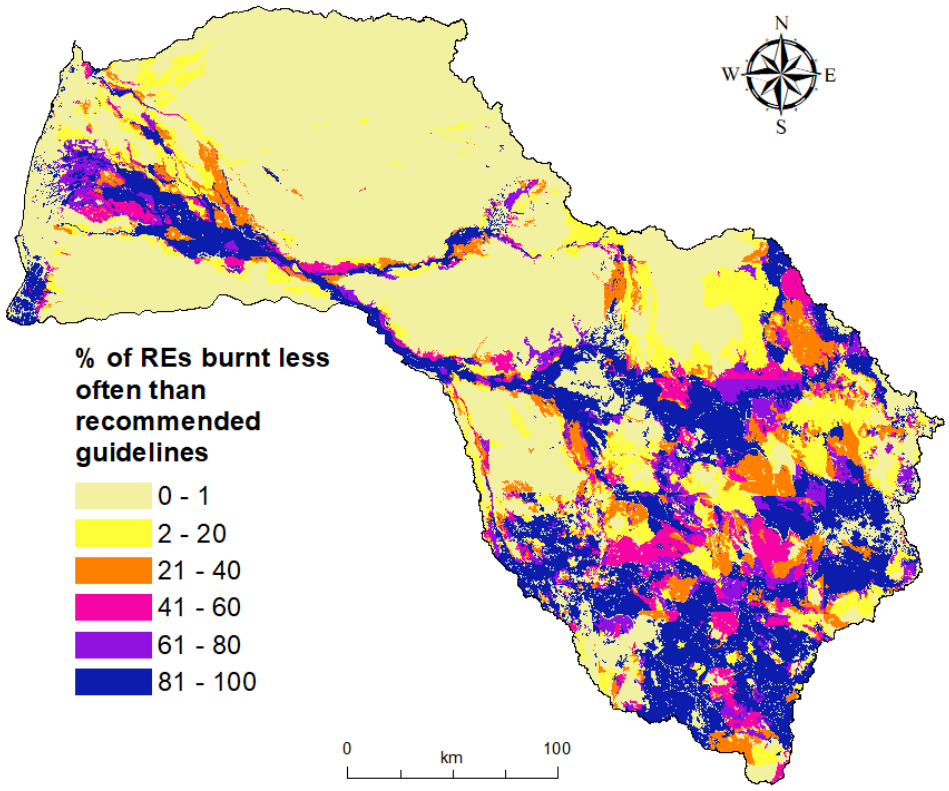


Figure 78: Burn frequency (%) occurring less often than recommended in each ecosystem type.

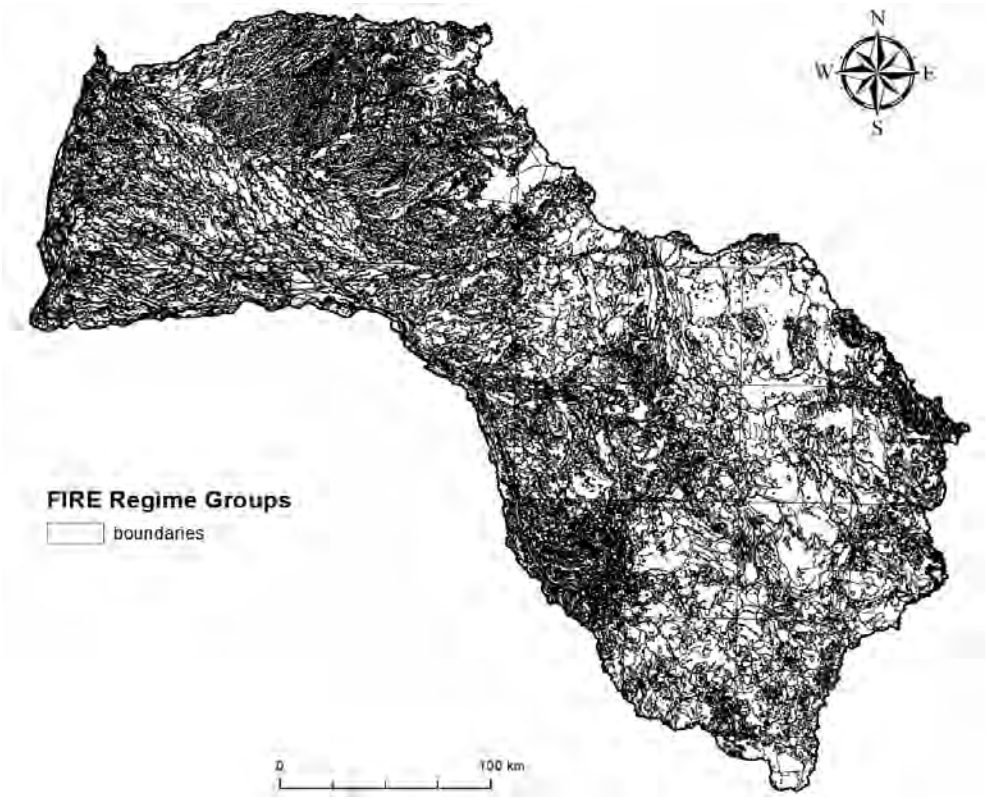


Figure 79: Delineation of fire regime groups across the Mitchell catchment.

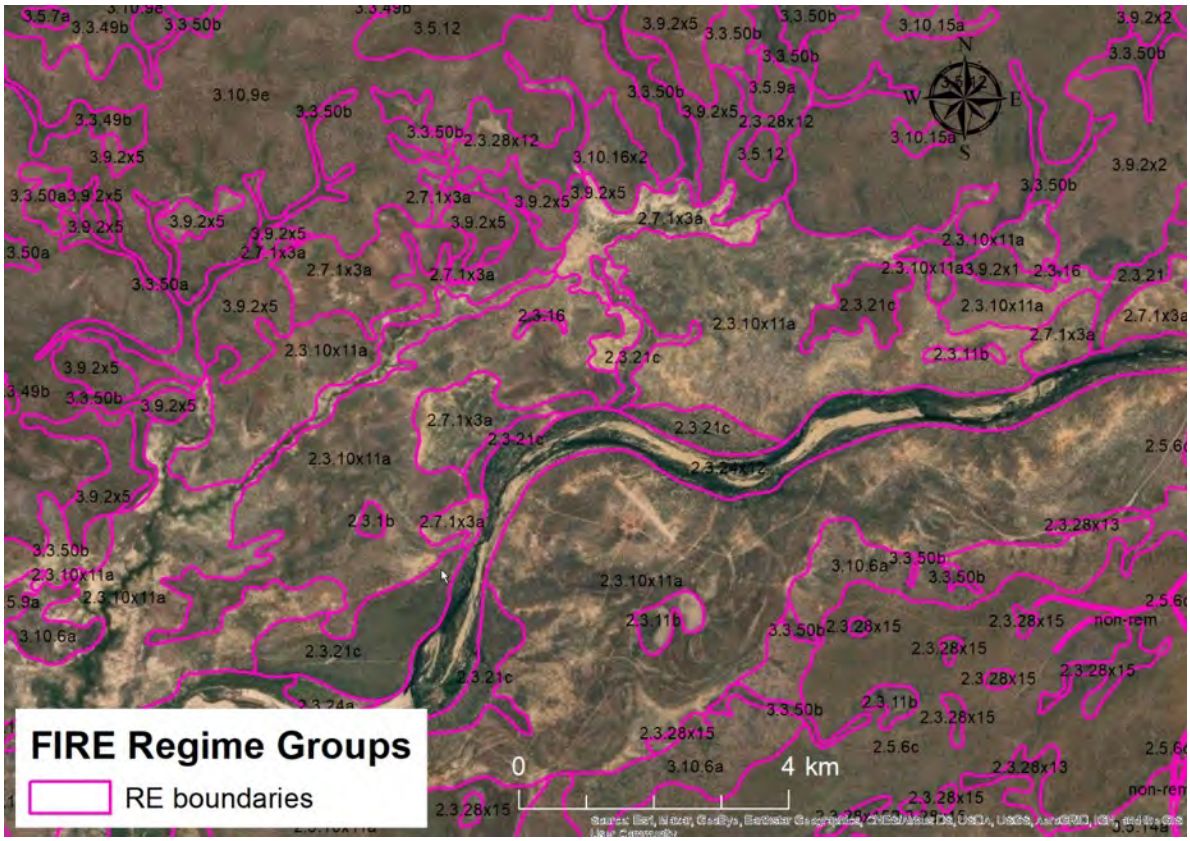


Figure 80: A zoomed-in example of the fire regime group boundaries (pink) in the Mitchell catchment.

3.5.1.3 Fire severity

Dataset 3	Fire severity – MODIS, north Australia coverage
Purpose	Fire severity describes the immediate impact of fire on vegetation. The MODIS Fire severity product provides two classes – non-severe and severe. Non-severe fires only impacted the understorey while severe fires impacted the tree canopy as well.
Format	Raster (250m × 250m).
Extent	North Australia.
Temporal resolution	2003–2010.
Custodian	AusCover facility of Terrestrial Ecosystem Research Network (TERN)
Notes	Validation data were collected along transects through visual observation from a low flying helicopter. In 2015 a total of 1,750 km of transects were covered, yielding a total of 749 fire severity validation points. Overall accuracy is 75%.
Access	http://data.auscover.org.au/xwiki/bin/view/Product+pages/Fire+Severity+MODIS
Citation	TERN AusCover. 2017. *Fire Severity - MODIS*, *North Australia coverage*. Obtained from http://data.auscover.org.au/xwiki/bin/view/Product+pages/Fire+Severity+ MODIS, made available by the AusCover facility (http://www.auscover.org.au) of the Terrestrial Ecosystem Research Network (TERN, http://www.tern.org.au). Accessed 12-12-2020
Supporting papers	Edwards, A. C., J., Russell-Smith and S. W. Maier (2015). Chapter 8. Measuring and Mapping Fire Severity in the Tropical Savannas. In *Carbon Accounting and Savanna Fire Management*. B. Murphy, A. Edwards, M. Meyer and J. Russell-Smith. Melbourne, Australia, CSIRO Publishing:169-181. http://trove.nla.gov.au/version/210578611 Oliveira S. L. J., Maier S. W., Pereira J. M. C., Russell-Smith J. (2015) Seasonal differences in fire activity and intensity in tropical savannas of northern Australia using satellite measurements of fire radiative power. *International Journal of Wildland Fire* 24, 249-260. Edwards, A. & Russell-Smith, J. & Maier, S.. (2018). A comparison and validation of satellite-derived fire severity mapping techniques in fire prone north Australian savannas: Extreme fires and tree stem mortality. *Remote Sensing of Environment*. 206. 287-299. 10.1016/j.rse.2017.12.038

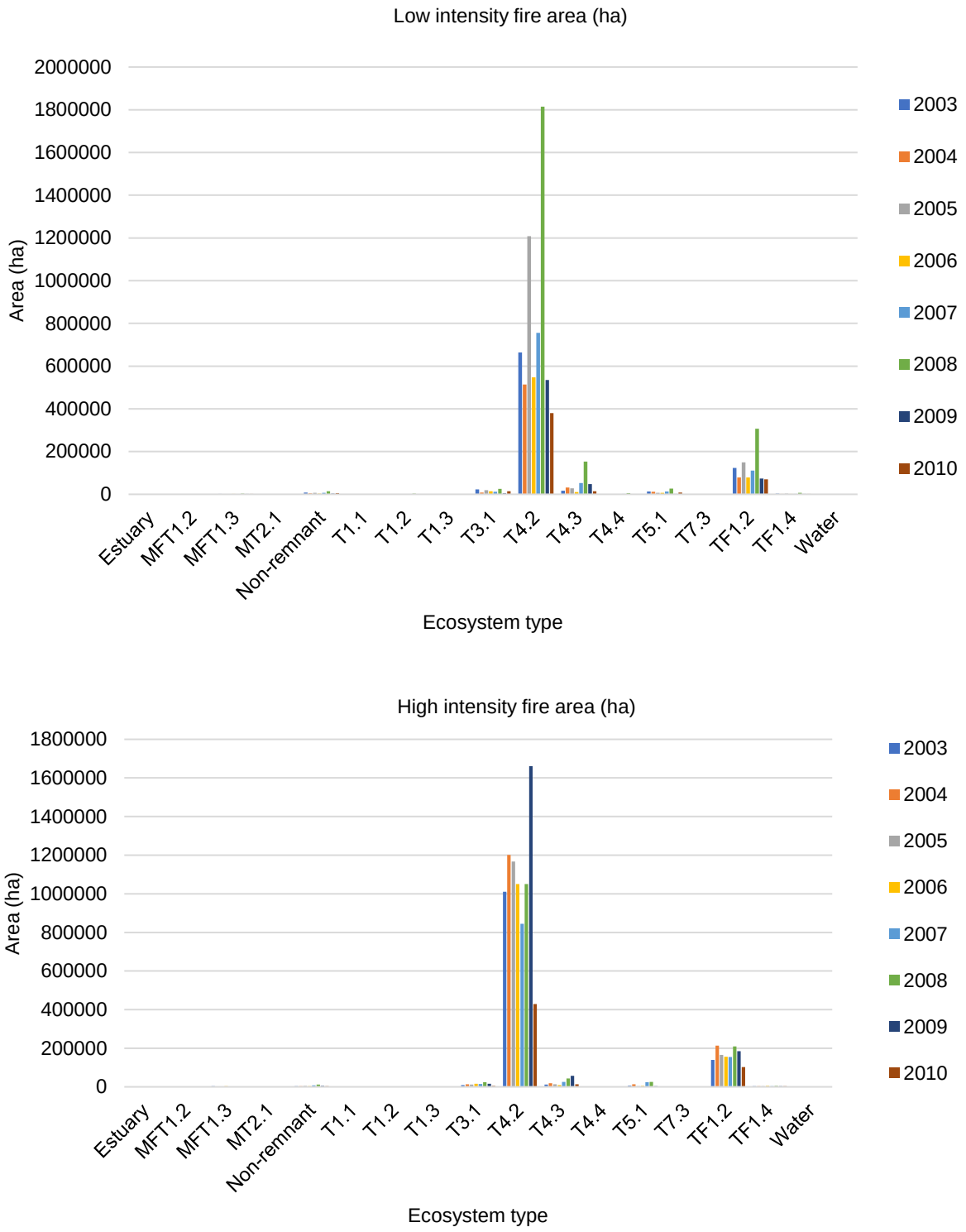


Figure 81: Low (top) and high (bottom) intensity burning (ha) across the ecosystem types (2003–2010).

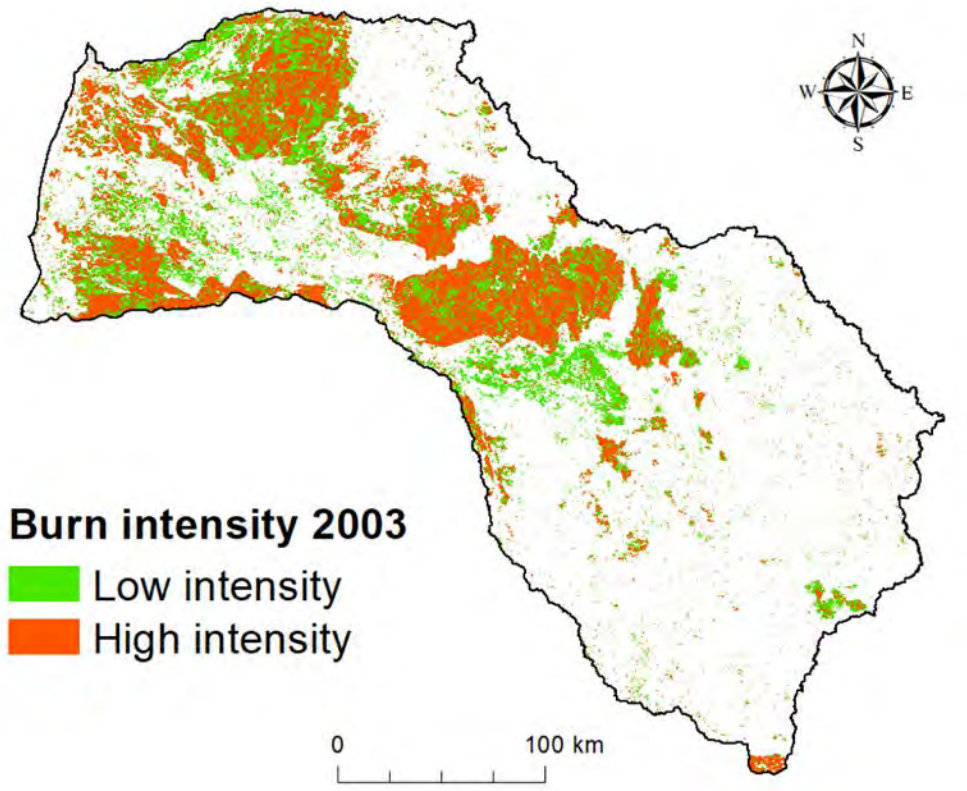


Figure 82: High and low intensity burn in 2003.

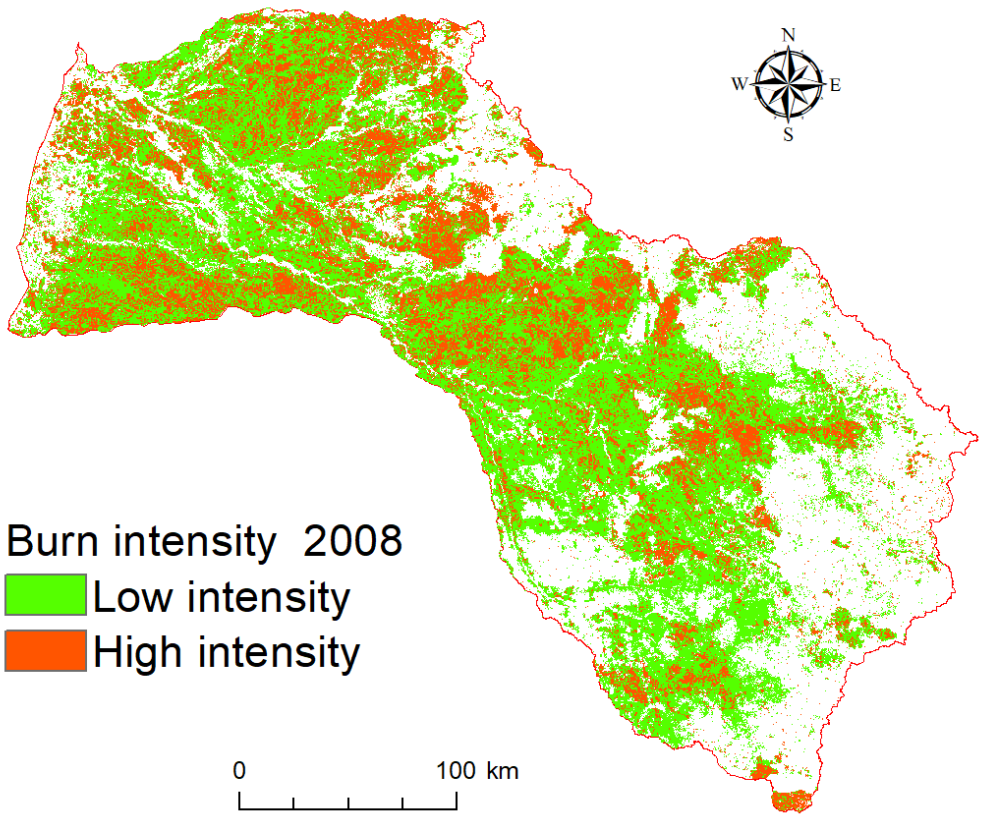


Figure 83: High- and low-intensity burn for the year 2008, which is the year with largest area of low-intensity burn.

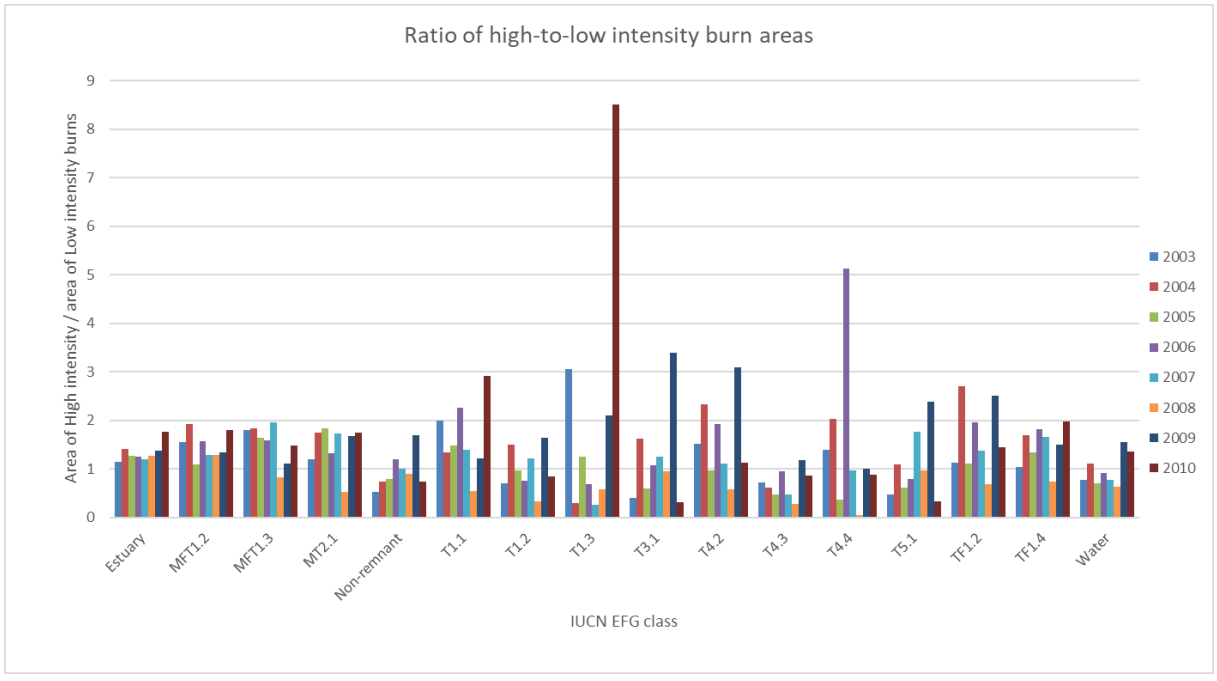


Figure 84: Ratio of high-intensity burn area to low-intensity burn area across ecosystem types (2003–2010).

Table 30: Area of low-intensity fire (ha) by ecosystem type for the years 2003 through to 2010.

Ecosystem type	IUCN EFG	IUCN EFG area (ha)	Area of low intensity fire (in ha)							
			2003	2004	2005	2006	2007	2008	2009	2010
Estuary	Estuary	5,226	794	618	606	591	548	504	578	359
Intertidal forests and shrublands	MFT1.2	10,996	534	293	378	425	338	315	396	216
Coastal saltmarshes and reedbeds	MFT1.3	40,916	1817	1254	855	2208	1183	3045	1465	1419
Coastal shrublands and grasslands	MT2.1	5,902	337	264	316	334	354	966	143	448
Non-remnant	Non-remnant	91,612	7699	4677	6826	3079	7153	14074	3171	5297
Tropical-subtropical lowland rainforests	T1.1	18,244	612	276	452	554	404	1007	459	193
Tropical-subtropical dry forests and thickets	T1.2	12,248	1334	391	1282	396	514	3363	573	425
Tropical-subtropical montane rainforests	T1.3	26,323	5	41	20	16	4	44	12	5
Seasonally dry tropical shrublands	T3.1	72,205	22677	8478	18772	14550	11469	25358	4517	14396
Pyric tussock savannas	T4.2	5,603,684	663446	513429	1208091	547568	755686	1814196	535126	380165
Hummock savannas	T4.3	435,831	17430	31463	27938	10224	53374	153823	47871	14603
Temperate woodlands	T4.4	21,049	136	467	533	403	1673	5924	887	1191
Semi-dessert steppes	T5.1	56,506	13101	11643	6856	6916	13477	27078	1790	7636
Subtropical/temperate forested wetlands	TF1.2	740,342	123748	78775	149354	79182	111543	307562	73306	70302
Seasonal floodplain marshes	TF1.4	25,233	3216	2092	3019	2474	2425	7027	2014	1672
Water	Water	4,785	211	103	340	84	201	353	122	52

Table 31: Area of high-intensity fire (ha) by ecosystem type for the years 2003 through to 2010.

Ecosystem type	IUCN EFG	IUCN EFG area (ha)	Area of high intensity fire (in ha)							
			2003	2004	2005	2006	2007	2008	2009	2010
Estuary	Estuary	5,226	918	872	767	741	654	638	792	636
Intertidal forests and shrublands	MFT1.2	10,996	831	562	413	666	436	404	531	391
Coastal saltmarshes and reedbeds	MFT1.3	40,916	3277	2305	1403	3494	2311	2532	1629	2102
Coastal shrublands and grasslands	MT2.1	5,902	406	46	580	443	613	519	240	781
Non-remnant	Non-remnant	91,612	4025	3476	5468	3681	7252	12553	5369	3958
Tropical-subtropical lowland rainforests	T1.1	18,244	1228	368	667	1250	563	545	560	564
Tropical-subtropical dry forests and thickets	T1.2	12,248	944	586	1246	301	622	1117	942	357
Tropical-subtropical montane rainforests	T1.3	26,323	14	12	26	11	1	26	24	38
Seasonally dry tropical shrublands	T3.1	72,205	9149	13791	11267	15560	14450	23972	15349	4659
Pyric tussock savannas	T4.2	5,603,684	1010624	1201524	1166409	1050410	844476	1050192	1660339	429152
Hummock savannas	T4.3	435,831	12465	19419	13310	9695	25784	43782	56860	12622
Temperate woodlands	T4.4	21,049	191	952	201	2066	1633	311	890	1053
Semi-dessert steppes	T5.1	56,506	6324	12802	4276	5507	23766	26192	4274	2608
Subtropical/temperate forested wetlands	TF1.2	740,342	139224	213104	165957	155362	154673	209694	184292	102475
Seasonal floodplain marshes	TF1.4	25,233	3350	3566	4051	4522	4013	5251	3029	3310
Water	Water	4,785	164	114	239	77	157	224	190	71

3.5.2 Pasture growth

Dataset 4	Annual pasture growth (AussieGRASS)
Purpose	Modelled estimates of the total pasture growth in a grid cell per annum.
Format	Raster with 0.05 º grid (approximately 5 × 5 km). Downloaded in NetCDF format.
Extent	Australia.
Temporal resolution	2000 to 2021 (Annually).
Custodian	The State of Queensland (Department of Science, Information Technology and Innovation) 2015.
Notes	Annual mean pasture growth data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. Field statistics were performed to derive annual mean values by ecosystem type.
Access	https://www.longpaddock.qld.gov.au/silo/gridded-data/
Citation	DSITI (2015). AussieGRASS Environmental Calculator – User Guide v1.5. State of Queensland, Department of Science, Information Technology and Innovation.
Supporting papers	n.a.

Table 32: Mean total annual pasture growth (kg DM/ha) for the years 2010, 2014, 2019 per ecosystem type in the Mitchell catchment, Queensland, Australia.

Ecosystem type	IUCN EFG	Area (ha)	Mean total annual pasture growth (kg DM/ha)		
			2010	2014	2019
Estuary	Estuary	5226	3824.6	2367.1	1987.6
Intertidal forests and shrublands	MFT1.2	10996	3265.3	2104.3	1737.8
Coastal saltmarshes and reedbeds	MFT1.3	40916	3381.4	2268.9	1816.0
Coastal shrublands and grasslands	MT2.1	5902	3233.6	2359.1	1772.9
Non-remnant	Non-remnant	91612	8021	3908	2679
Tropical subtropical lowland rainforests	T1.1	18244	3630.2	2374.3	1865.8
Tropical subtropical dry forest and thickets	T1.2	12248	5303.4	2856.4	2243.2
Tropical subtropical montane rainforests	T1.3	26323	3234.6	1277.5	1243.0
Seasonally dry tropical shrublands	T3.1	72205	4371.5	2198.1	2095.4
Pyric tussock savannas	T4.2	5603684	4639.2	2448.7	2143.7
Hummock savannas	T4.3	435831	5076.8	2795.8	2321.4
Temperate woodlands	T4.4	21049	5367.9	3055.0	2145.6
Semi-desert steppes	T5.1	56506	5472.6	2858.4	2711.2
Subtropical-temperate forested wetlands	TF1.2	740341	4930.1	2762.2	2382.3
Seasonal floodplain marshes	TF1.4	25233	4991.8	3025.2	2497.9
Water	Water	4785	4741.8	2956.5	2166.5

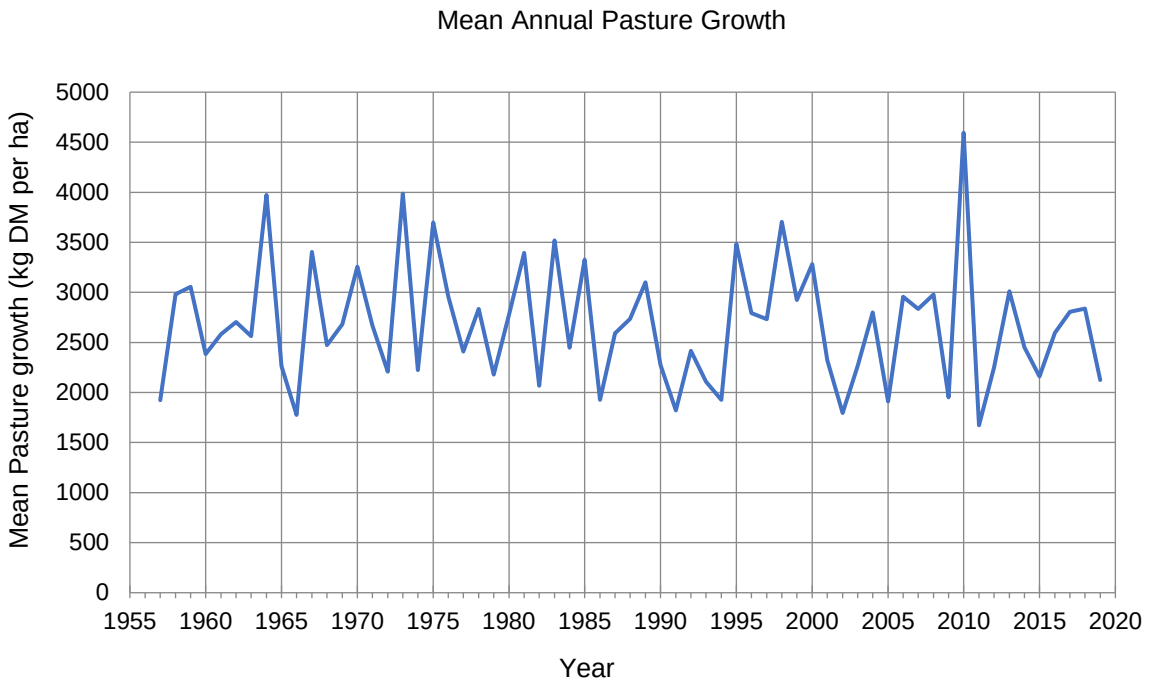


Figure 85: Mean total annual pasture growth (kg DM/ha) for 1955–2020 for the whole Mitchell catchment, Queensland, Australia.

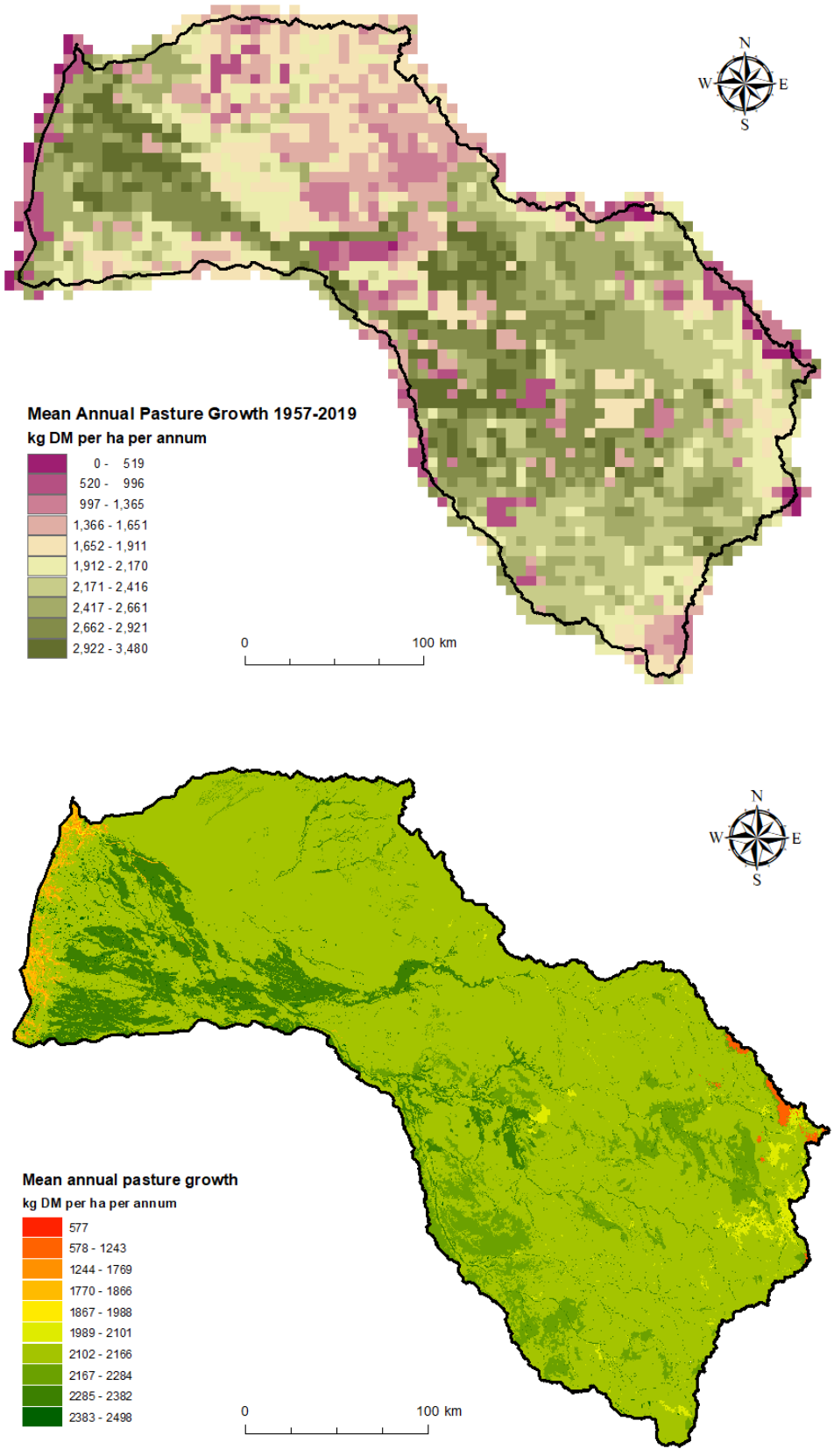


Figure 86: Long-term average of annual pasture growth (kg DM/ha) 1957–2019 (top) and mean values of pasture growth (kg DM/ha) per ecosystem type (bottom).

Table 33: Pasture growth (kg DM/ha) for each ecosystem type.

Ecosystem type	IUCN EFG	Area (ha)	Annual pasture growth 1951–2019 (kg DM/ha)				
			MIN	MAX	RANGE	MEAN	STD
Estuary	Estuary	5226	890.27	3242.24	2351.97	1987.59	809.45
Intertidal forests and shrublands	MFT1.2	10996	885.01	3242.24	2357.23	1737.78	815.72
Coastal saltmarshes and reedbeds	MFT1.3	40916	885.01	3242.24	2357.23	1815.97	846.66
Coastal shrublands and grasslands	MT2.1	5902	885.01	3242.24	2357.23	1772.85	797.87
Non-remnant	Non-remnant	91612	302.48	3480.06	3177.58	2101.22	510.45
Tropical subtropical lowland rainforests	T1.1	18244	509.99	3242.24	2732.25	1865.76	826.78
Tropical subtropical dry forest and thickets	T1.2	12248	436.90	3265.65	2828.75	2243.23	603.96
Tropical subtropical montane rainforests	T1.3	26323	302.48	2799.67	2497.19	1243.01	652.38
Seasonally dry tropical shrublands	T3.1	72205	396.30	3318.63	2922.33	2095.44	622.34
Pyric tussock savannas	T4.2	5603684	302.48	3480.06	3177.58	2143.68	575.82
Hummock savannas	T4.3	435831	417.18	3304.02	2886.84	2321.44	523.55
Temperate woodlands	T4.4	21049	1294.97	2841.14	1546.17	2145.60	305.15
Semi-desert steppes	T5.1	56506	871.05	3198.67	2327.62	2711.20	480.56
Subtropical-temperate forested wetlands	TF1.2	740341	302.48	3329.12	3026.64	2382.34	499.94
Seasonal floodplain marshes	TF1.4	25233	396.30	3443.58	3047.28	2497.95	522.72
Water	Water	4785	509.99	3480.06	2970.06	2166.46	311.20

3.5.3 Normalized difference vegetation index

Dataset 5	Normalized difference vegetation index (NDVI)
Purpose	Live green vegetation absorbs visible light (solar radiation) as part of photosynthesis. At the same time plants scatter (reflect) solar energy in the near infrared. This difference in absorption is quite unique to live vegetation and provides a measure of the greenness of the vegetation. NDVI is an index which measures this difference, providing a measure of vegetation density and condition. It is influenced by the fractional cover of the ground by vegetation, the vegetation density, and the vegetation greenness. It indicates the photosynthetic capacity of the land surface cover.
Format	Raster.
Extent	Australia.
Temporal resolution	1992 to current.
Custodian	Australian Bureau of Meteorology.
Notes	The data provide an overview of the status and dynamics of vegetation across Australia, providing a measure of the amount of live green vegetation. The satellite data come from the Advanced Very High Resolution Radiometer (AVHRR) instruments on board the National Oceanic and Atmospheric Administration (NOAA) series of satellites that are operated by the US (http://noaasis.noaa.gov/NOAASIS/ml/avhrr.html). Monthly NDVI is a composite of the NDVI values from cloud-free observations in the month from the operational afternoon NOAA satellite. There are, in the absence of cloud, usually one and sometimes two observations per day. The satellite data are processed initially onto a 0.01 x 0.01 degree grid and then averaged to a 0.05 x 0.05 degree grid.
Access	http://www.bom.gov.au/metadata/19115/ANZCW0503900404

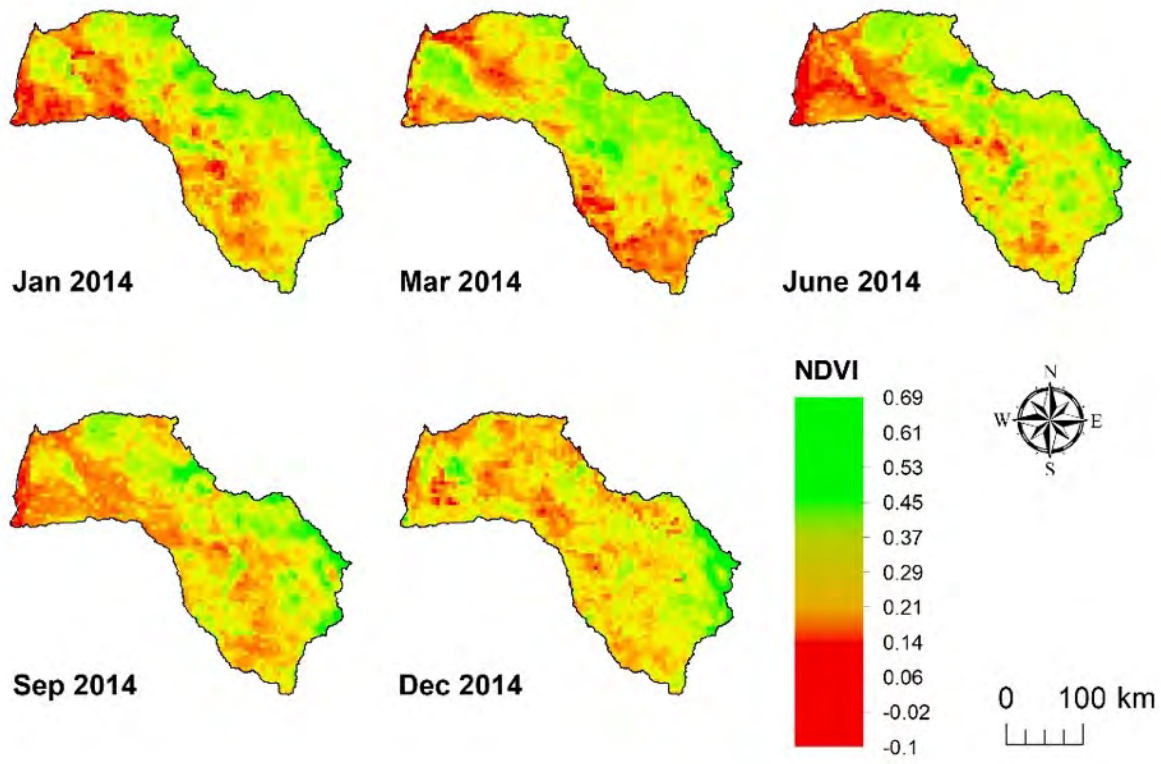


Figure 87: Monthly variation in NDVI (2014) in the Mitchell catchment, Queensland, Australia.

3.6 Landscape-level characteristics

3.6.1 Fire scars

Dataset 1	Fire scars (Landsat imagery)
Purpose	To quantify patterns of burning across the Mitchell catchment. To assess fire frequency from all sources and compare against the recommended burn regimes for Regional Ecosystems to determine if vegetation is burnt according to fire biological type.
Format	Raster (30m × 30m).
Extent	Queensland.
Temporal resolution	Annual summary of detected fire scars from 1987 to 2016. Landsat sensor re-visit time of 16 days, but observations may be hindered by cloud, cloud shadow and striping in the imagery.
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	These data sets are state-wide maps of fire scars (burnt areas) as captured in a yearly series by all available Landsat imagery over the period 1986 - 2012. Fire scars are automatically detected and mapped using dense time series of Landsat imagery acquired over the period 1986 - present. In these products, on average, over 80% of fire scars captured in Landsat imagery have been correctly mapped with less than 30% false fire rate. Data were clipped to the Mitchell catchment and projected to coordinate system GDA 2020 MGA 54. A field calculator was used to quantify and total area (ha) and percentage (%) of fire scars by ecosystem type.
Access	http://www.qld.gov.au/environment/land/vegetation/mapping/firescar/
Citation	Copyright State of Queensland (Department of Science, Information Technology and Innovation) 2010 - 2020. Rights owned by the Queensland Department of Science, Information Technology and Innovation (DSITI)
Supporting papers	Goodwin, N. R., & Collett, L. J. (2014). Development of an automated method for mapping fire history captured in Landsat TM and ETM+ time series across Queensland, Australia. *Remote Sensing of Environment*, 148, 206–221.

Table 34: Fire scars (Landsat imagery): Area burnt (ha/yr) for the years 2010, 2014, 2018 and 2019 per ecosystem type in the Mitchell catchment, Qld, Australia.

Ecosystem type	IUCN EFG	Area (ha)	Fire scars							
			Area burnt (ha/yr)				Percentage of ecosystem type burnt (%/yr)			
			2010	2014	2018	2019	2010	2014	2018	2019
Estuary	Estuary	5226	676	273	299	446	12.9	5.2	5.7	8.5
Intertidal forests and shrublands	MFT1.2	10996	742	359	380	485	6.8	3.3	3.5	4.4
Coastal saltmarshes and reedbeds	MFT1.3	40916	4571	1629	2088	2036	11.2	4.0	5.1	5.0
Coastal shrublands and grasslands	MT2.1	5902	302	225	323	290	5.1	3.8	5.5	4.9
Non-remnant	Non-remnant	91612	9532	3494	7413	7299	10.4	3.8	8.1	8.0
Tropical subtropical lowland rainforests	T1.1	18244	1497	2591	1200	1305	8.2	14.2	6.6	7.2
Tropical subtropical dry forest and thickets	T1.2	12248	3055	482	3248	2756	24.9	3.9	26.5	22.5
Tropical subtropical montane rainforests	T1.3	26323	908	294	371	73	3.5	1.1	1.4	0.3
Seasonally dry tropical shrublands	T3.1	72205	37274	4143	18517	15473	51.6	5.7	25.7	21.4
Pyric tussock savannas	T4.2	5603684	2647359	951980	2054132	1742034	47.2	17.0	36.7	311
Hummock savannas	T4.3	435831	128819	31534	116090	32583	29.6	7.2	26.6	7.5
Temperate woodlands	T4.4	21049	6377	56	4363	182	30.3	0.3	20.7	0.9
Semi-desert steppes	T5.1	56506	12660	30	5496	4094	22.4	0.1	9.7	7.3
Subtropical-temperate forested wetlands	TF1.2	740341	282305	157850	341639	306008	38.1	21.3	46.2	41.3
Seasonal floodplain marshes	TF1.4	25233	7358	4314	6430	7035	29.2	17.1	25.5	27.9
Water	Water	4785	498	208	577	498	10.4	4.4	12.1	10.4

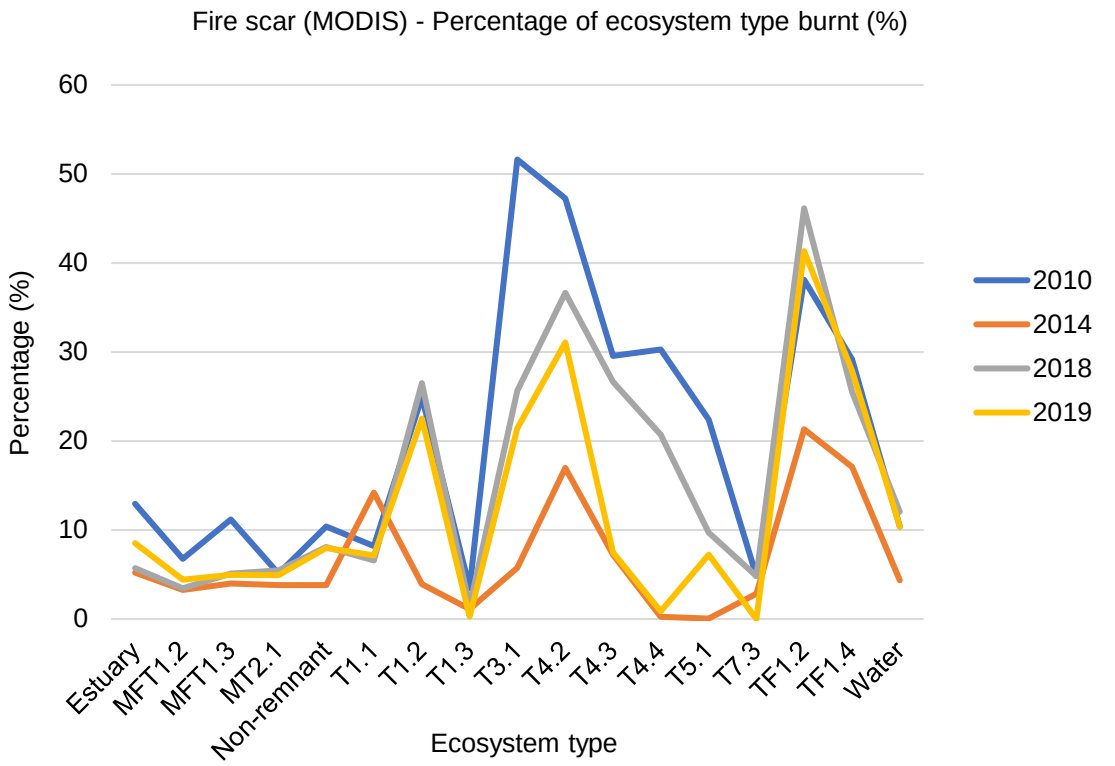


Figure 88: Percentage (%) of each ecosystem type burnt using fire scars (MODIS) for the years 2010, 2014, 2018, 2019.

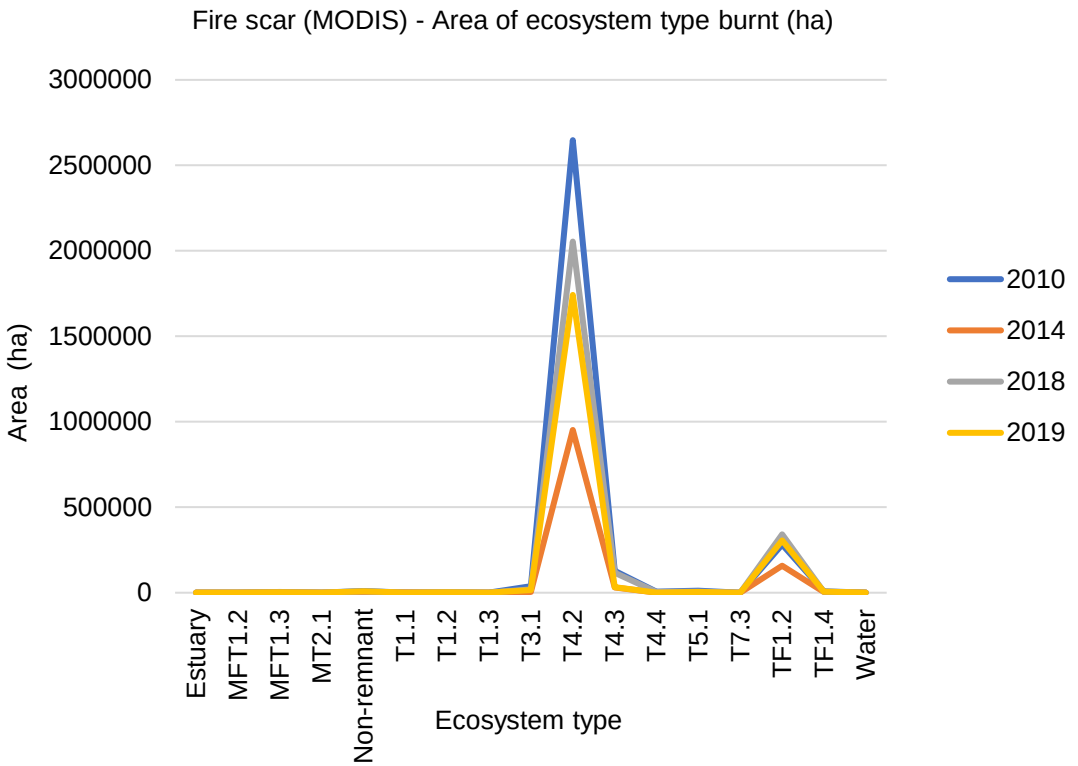


Figure 89: Area (ha) of each ecosystem type burnt using fire scars (MODIS) for the years 2010, 2014, 2018, 2019.

3.6.2 Fragmentation

Dataset 2	Version 4.0 Remnant 2017 Broad Vegetation Groups of Queensland (BVG).
Purpose	To delineate the ecosystem types pre- and post-clearing to quantify the mean patch size (ha) as an indicator of fragmentation.
Format	Polygons.
Extent	Queensland wide and allows comparison with the Australian National Vegetation Information System.
Temporal resolution	Pre-European and remnant, updates by the Queensland Herbarium on an on-going basis.
Custodian	© State of Queensland (Department of Science, Information Technology and Innovation) 2017.
Notes	Spatial data used were BVGs that were assigned to IUCN ecological functional groups (EFGs). Fragstats 4.2 was used to quantify the fragmentation using the mean patch area metric. The IUCN EFGs were converted into a raster (25m × 25m) and split by EFG group for both pre-clearing and post-clearing timeframes. These individual raster layers were used as input into the Fragstats 4.2 tool and the outcome of the mean patch size metric was used as an indicator of fragmentation.
Access	https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/broad-vegetation/
Citation	Queensland Herbarium (2016). *Remnant 2015 Broad Vegetation Groups of Queensland*. Version 3.0 (December 2016). State of Queensland (Department of Science, Information Technology and Innovation).
Supporting papers	Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). *The Vegetation of Queensland. Descriptions of Broad Vegetation Groups*. Version 4.0. Queensland Herbarium, Department of Environment and Science. McGarigal, K.; Marks, B. J. 1995. FRAGSTATS: spatial pattern analysis program for quantifying landscape structure. Gen. Tech. Rep. PNW-GTR-351. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 122 p https://doi.org/10.2737/PNW-GTR-351

Table 35: Mean patch size (ha) of each ecosystem type pre- and post-clearing in the Mitchell catchment, Queensland, Australia (calculated using the Fragstats 4.2 tool: only Mean Patch size metric is reported).

Ecosystem type	IUCN EFG	Area (ha)	Fragmentation		
			Pre-clearing Mean patch size (ha)	Post-clearing mean patch size (ha)	% remaining from pre-clearing
Estuary	Estuary	5226	73.42	62.75	85.47
Intertidal forests and shrublands	MFT1.2	10996	33.40	33.56	100.50
Coastal saltmarshes and reedbeds	MFT1.3	40916	136.80	137.48	100.49
Coastal shrublands and grasslands	MT2.1	5902	39.20	36.35	92.72
Non-remnant	Non-remnant	91612	-	80.98	-
Tropical subtropical lowland rainforests	T1.1	18244	103.07	103.07	100.00
Tropical subtropical dry forest and thickets	T1.2	12248	28.23	16.26	57.60
Tropical subtropical montane rainforests	T1.3	26323	158.97	110.58	69.56
Seasonally dry tropical shrublands	T3.1	72205	176.11	123.64	70.20
Pyric tussock savannas	T4.2	5603684	3665.86	2220.17	60.56
Hummock savannas	T4.3	435831	487.20	457.33	93.87
Temperate woodlands	T4.4	21049	364.18	362.88	99.64
Semi-desert steppes	T5.1	56506	429.46	406.53	94.66
Subtropical-temperate forested wetlands	TF1.2	740341	964.08	434.71	45.09
Seasonal floodplain marshes	TF1.4	25233	13.00	13.16	101.28
Water	Water	4785	-	20.72	-

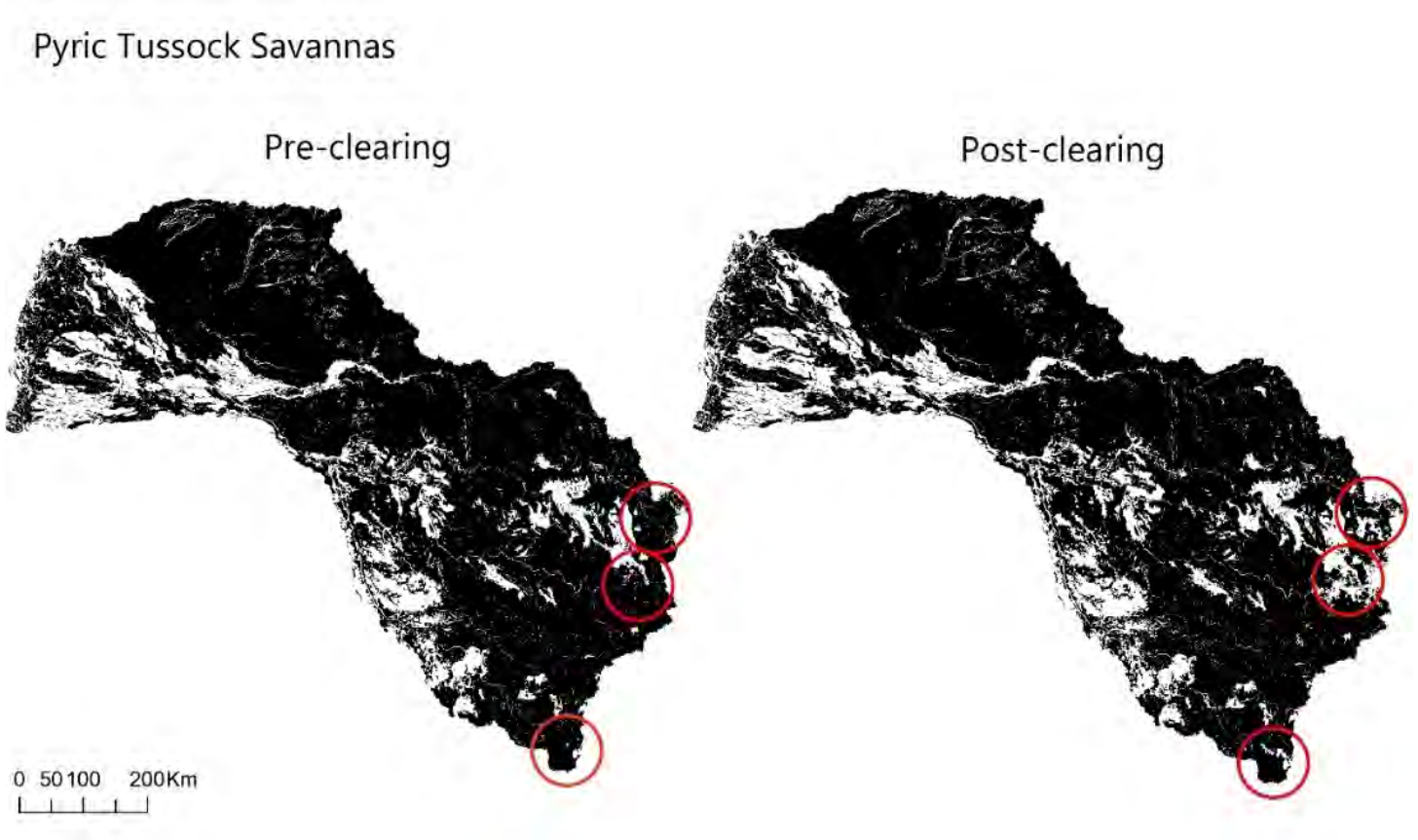


Figure 90: Extent of pyric tussock savannas in the Mitchell catchment pre- and post-clearing. Red circles indicate dominant areas of fragmentation or patch size decrease.

4. Supplementary information

4.1.1 Aquatic conservation assessment values

Dataset 1	Aquatic Conservation Assessment values, v1.1.
Purpose	Identifies conservation values for non-riverine and riverine catchments using the Aquatic Biodiversity Assessment and Mapping Methodology (AquaBAMM).
Format	Polygons and polylines.
Extent	The southern Gulf Catchments of Queensland.
Temporal resolution	Updated version published 30-08-2020.
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	The AquaBAMM is a comprehensive methodology developed by the Qld Department of Environment and Science (DES) for assessing the conservation values of wetlands in Queensland. The method uses available data including data resulting from expert opinion to produce an Aquatic Conservation Assessment (ACA) for the wetlands within a study area.
Access	https://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/
Citation	Department of Environment and Science, Queensland (2020) *Aquatic Conservation Assessments (ACA) and AquaBAMM*, WetlandInfo website, accessed 23 June 2021.
Supporting papers	Clayton, P.D., Fielder, D.P., Howell, S. and Hill, C.J. (2006). *Aquatic Biodiversity Assessment and Mapping Method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane.

Table 36: AquaBAMM score for total watercourse freshwater and estuarine areas (in ha) for each ecosystem type in the Mitchell catchment, Queensland, Australia. Note that the scores for the 'Low' category in AquaBAMM were missing from the data available for download.

Ecosystem type	IUCN EFG	Area (ha)	AquaBAMM score			
			Very high	High	Medium	Very low
Estuary	Estuary	5226	3974.2	987.4	0.0	0.0
Intertidal forests and shrublands	MFT1.2	10996	268.9	72.9	0.0	0.0
Coastal saltmarshes and reedbeds	MFT1.3	40916	183.4	61.9	0.0	0.0
Coastal shrublands and grasslands	MT2.1	5902	3.8	15.3	0.0	0.0
Non-remnant	Non-remnant	91612	306.1	39.7	6.5	4.0
Tropical subtropical lowland rainforests	T1.1	18244	219.0	2.6	0.0	0.0
Tropical subtropical dry forest and thickets	T1.2	12248	4.8	3.4	6.6	0.0
Tropical subtropical montane rainforests	T1.3	26323	5.9	0.0	0.0	0.0
Seasonally dry tropical shrublands	T3.1	72205	18.8	14.8	0.0	0.0
Pyric tussock savannas	T4.2	5603684	7385.3	2450.2	812.4	23.8
Hummock savannas	T4.3	435831	157.6	216.6	230.1	0.0
Temperate woodlands	T4.4	21049	9.9	30.7	0.0	0.0
Semi-desert steppes	T5.1	56506	87.5	8.9	1.2	0.0
Subtropical-temperate forested wetlands	TF1.2	740342	40107.9	9760.6	2795.2	55.6
Seasonal floodplain marshes	TF1.4	25233	666.2	19.8	0.0	0.0
Water	Water	4785	4.6	2.0	0.0	0.0

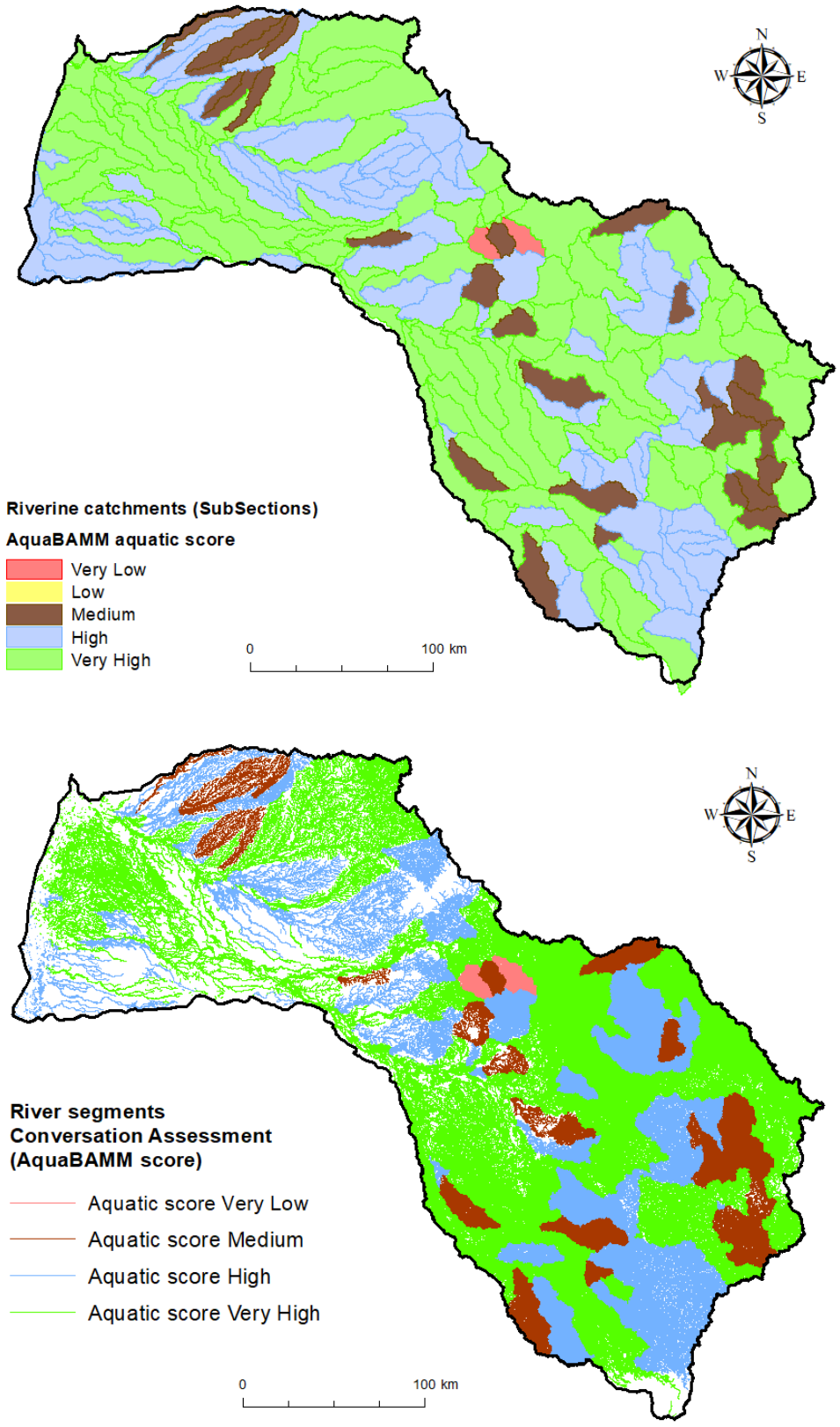


Figure 91: AquaBAMM scores across the Mitchell catchment divided by subcatchment (top) and river segment (bottom).

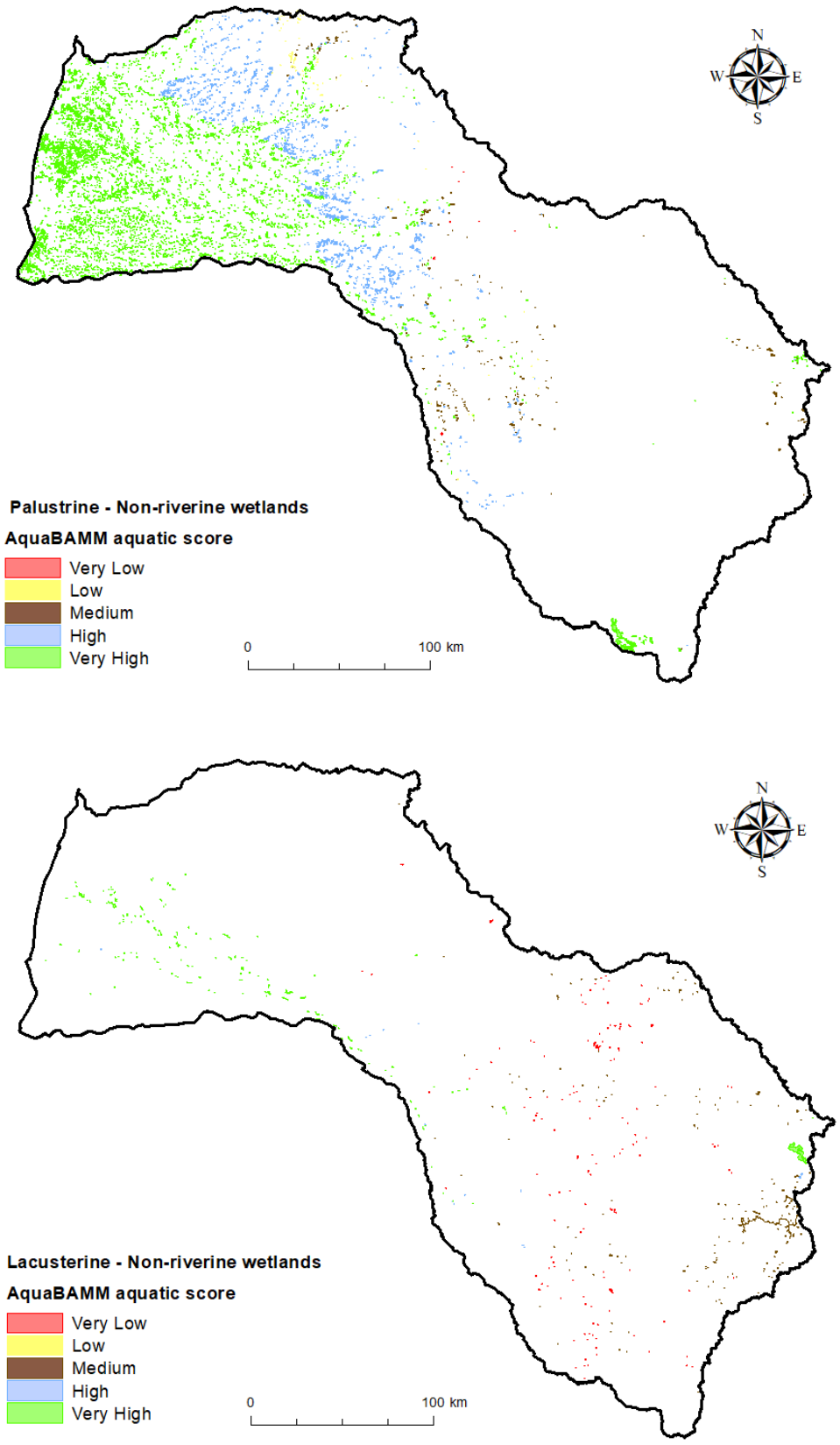


Figure 92: AquaBAMM scores across the Mitchell catchment in palustrine non-riverine wetlands (top) and lacustrine non-riverine wetlands (bottom).

Table 37: AquaBAMM score for watercourse areas (ha) in the Mitchell catchment, Queensland, Australia. The scores for the 'Low' category in AquaBAMM were missing from the data available for download.

Ecosystem type				AquaBAMM score for watercourse areas (ha)																
				Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	
IUCN EFG					MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
Area (ha)				5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Freshwater	Major	Non-Perennial	Very High	0.0	0.0	0.0	0.0	223.0	141.6	0.4	0.0	2.5	2226.2	42.5	0.0	35.8	24147.9	39.8	3.3
			High	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	453.6	85.7	4.5	0.1	4104.8	0.0	0.0
			Medium	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	59.1	21.5	0.0	0.0	1030.9	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
		Perennial	Very High	38.1	31.5	0.4	0.0	19.7	34.6	0.0	0.0	0.5	1115.1	33.3	0.0	3.5	10226.0	0.0	0.0
			High	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0001	26.1	11.2	0.0	0.0	368.5	0.0	0.0
			Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minor	Non-Perennial	Very High	0.0	2.5	42.8	0.0	54.2	28.9	4.4	5.9	15.7	3516.2	74.8	9.9	27.2	5130.2	312.0	1.3
			High	0.0	0.0	0.7	8.9	35.3	0.0	3.4	0.0	14.8	1952.4	119.6	26.1	8.5	5280.4	18.1	2.0
			Medium	0.0	0.0	0.0	0.0	1.9	0.0	6.6	0.0	0.0	748.7	207.3	0.0	1.2	1751.7	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	23.8	0.0	0.0	0.0	55.2	0.0	0.0
		Perennial	Very High	0.0	9.4	42.9	0.0	9.3	2.0	0.0	0.0	0.0	301.6	7.0	0.0	21.0	458.0	314.5	0.0

High	0.0	11.0	25.5	0.3	0.0	0.03	0.0	0.0	0.0	11.1	0.005	0.0	0.2	6.9	1.4	0.0
Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	1.3	0.0	0.003	12.5	0.0	0.0
Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Ecosystem type				AquaBAMM score for watercourse areas (ha)															
				Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	
IUCN EFG				MFT1.2	MFT1.3	MT2.1		T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water	
Area (ha)				5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Estuarine	Major	Non-Perennial	Very High	42.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	4.8	0.0	0.0
			High	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Perennial	Very High	3185.0	130.0	55.1	1.7	0.0	10.5	0.0	0.0	0.0	168.0	0.0	0.0	0.0	74.8	0.0	0.0
			High	725.8	23.2	17.6	5.8	0.0	1.6	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0
			Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Minor	Non-Perennial	Very High	81.0	9.6	3.9	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.7	0.03	0.0
			High	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Perennial	Very High	627.8	85.9	38.3	2.1	0.0	1.4	0.0	0.0	0.0	52.9	0.0	0.0	0.0	64.5	0.0	0.0
			High	261.6	38.7	18.2	0.3	0.0	1.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.3	0.0
			Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

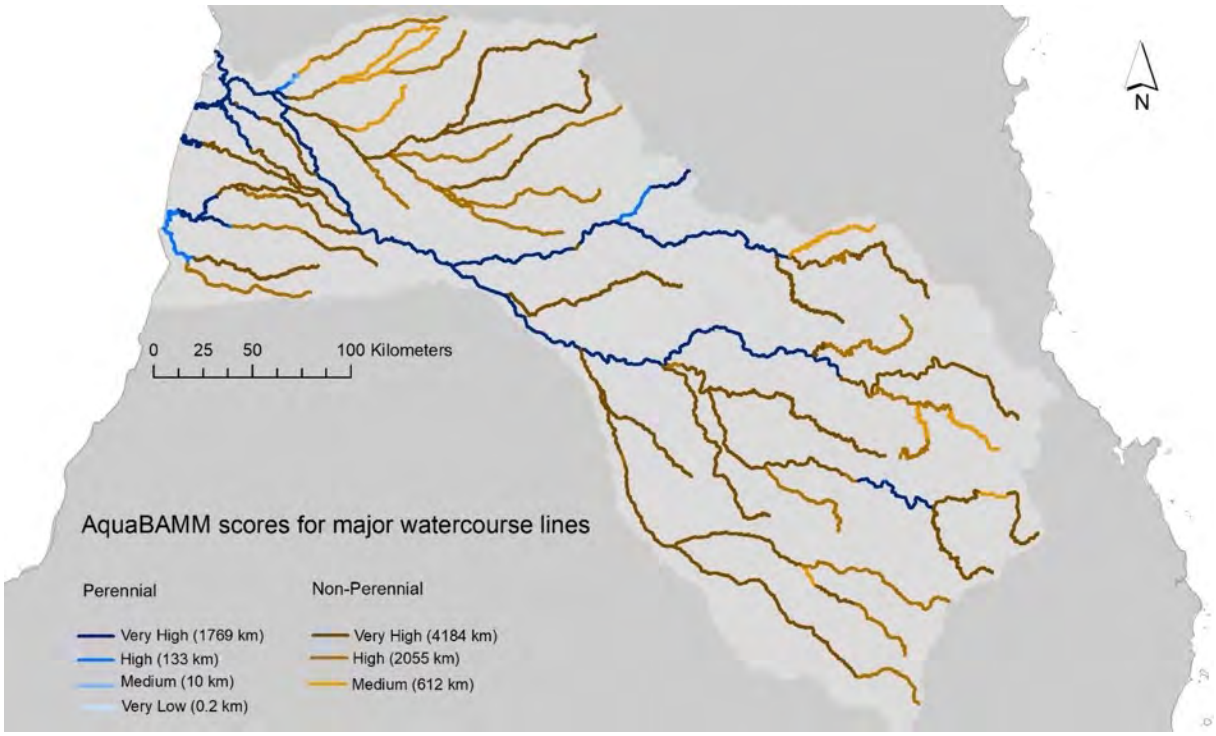


Figure 93: AquaBAMM score for major watercourse lines in the Mitchell catchment, Queensland, Australia.

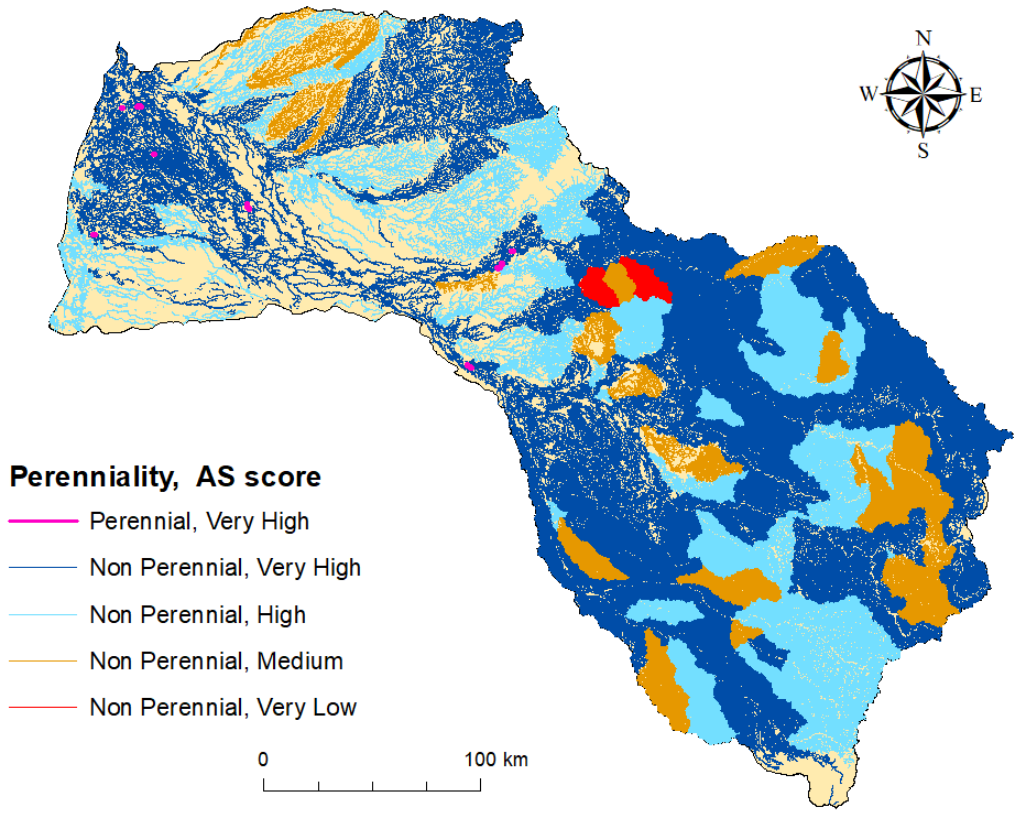


Figure 94: AquaBAMM score for minor watercourse lines in the Mitchell catchment, Queensland, Australia.

Table 38: AquaBAMM score for watercourse lines (km) in the Mitchell catchment, Queensland, Australia. The scores for the 'Low' category in AquaBAMM were missing from the data available for download.

Ecosystem type			AquaBAMM score for watercourse lines (km)																
			Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
IUCN EFG			Estuary	MFT1.2	MFT1.3	MT2.1	Non-rem	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
Area (ha)			5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
Major	Non-Perennial	Very High	2.9	0.8	3.8	0.0	24.4	34.3	0.1	0.0	0.4	730.3	3.1	0.0	2.6	1675.8	13.4	1.5
		High	0.02	2.0	5.4	0.0	0.5	0.4	0.0	0.0	42.0	531.8	7.1	0.0	0.0	729.5	3.5	0.0
		Medium	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	40.1	218.4	0.6	0.0	0.0	176.5	0.0	0.0
		Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Perennial	Very High	165.6	19.2	1.4	0.0	6.6	0.2	0.0	0.0	0.0	21.5	0.0	0.0	0.0	773.4	1.6	2.3
		High	51.3	0.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	37.9	0.0	0.0
		Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0
		Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Very Low	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minor	Non-Perennial	Very High	201.3	352.9	581.0	0.1	1377.5	153.0	171.4	1158.3	1075.0	79834.2	8381.2	119.0	732.0	10555.4	471.9	181.5
		High	89.3	232.3	624.2	18.9	165.9	11.5	30.7	0.0	595.8	42428.8	3057.9	383.8	63.4	3571.2	94.3	32.4
		Medium	0.0	0.0	0.0	0.0	205.9	0.0	6.2	12.9	484.6	17544.7	4696.1	44.0	27.0	1148.6	2.5	21.4
		Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Very Low	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1898.2	0.0	0.0	0.0	84.4	0.0	0.0
Perennial	Very High	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	10.2	0.0	0.0
	High	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Medium	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Very Low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

4.1.2 Protected areas

Dataset 2	Protected areas of Queensland
Purpose	To show the protected area estate as managed by QPWS (Queensland Parks and Wildlife Service) for areas managed under the Nature Conservation Act 1992 (National Park of various types, Regional Park, Forest Reserve), and areas managed under the Forestry Act 1959 (State Forest and Timber Reserve).
Format	Polygon
Extent	Queensland
Temporal resolution	Data were collected from 2003 to 2021
Custodian	© State of Queensland (Department of Environment and Science) 2020
Notes	n.a.
Access	http://qldspatial.information.qld.gov.au/catalogue/
Citation	State of Queensland (Department of Environment and Science) 2020. Updated data available at http://qldspatial.information.qld.gov.au/catalogue/ .
Supporting papers	n.a.

Table 39: Protected areas within the Mitchell catchment in each ecosystem type.

Ecosystem type		Estuary	Intertidal forests and shrublands	Coastal saltmarshes and reedbeds	Coastal shrublands and grasslands	Non-remnant	Tropical subtropical lowland rainforests	Tropical subtropical dry forest and thickets	Tropical subtropical montane rainforests	Seasonally dry tropical shrublands	Pyric tussock savannas	Hummock savannas	Temperate woodlands	Semi-desert steppes	Subtropical-temperate forested wetlands	Seasonal floodplain marshes	Water
	IUCN EFG	Estuary	MFT1.2	MFT1.3	MT2.1	Non-rem	T1.1	T1.2	T1.3	T3.1	T4.2	T4.3	T4.4	T5.1	TF1.2	TF1.4	Water
	Area (ha)	5226	10996	40916	5902	91612	18244	12248	26323	72205	5603684	435831	21049	56506	740341	25233	4785
National Park	Area (ha)	0	0	0	0	205	458	3118	19757	815	84684	18709	0	0	1231	6	0
	%	0	0	0	0	0.22	2.51	25.46	75.06	1.13	1.51	4.29	0	0	0.17	0.03	0
National Park - Cape York Aboriginal Land	Area (ha)	0	0	0	0	70	950	0	0	4020	320944	2321	0	0	36110	366	5
	%	0	0	0	0	0.08	5.21	0	0	5.57	5.73	0.53	0	0	4.88	1.45	0.10
State Forest	Area (ha)	0	0	0	0	7	0	0	5	0	7	0	0	0	0	0	0
	%	0	0	0	0	0.01	0	0	0.02	0	0.0001	0	0	0	0	0	0
Forest Reserve	Area (ha)	0	0	0	0	37	7	9	1110	12	4660	0	0	0	9	3	0
	%	0	0	0	0	0.04	0.04	0.07	4.22	0.02	0.08	0	0	0	0.001	0.01	0
Resources Reserve	Area (ha)	0	0	0	0	326	0	0	0	0	14984	0	0	0	213	0	18
	%	0	0	0	0	0.36	0	0	0	0	0.27	0	0	0	0.03	0	0.38
Nature Refuge	Area (ha)	249	1256	9754	1161	1225	3483	91	2774	6562	326317	2062	0	0	56393	9278	119
	%	4.77	11.42	23.84	19.67	1.34	19.09	0.75	10.54	9.09	5.82	0.47	0	0	7.62	36.77	2.49
Important Bird Area	Area (ha)	5082	10900	38415	5669	167	14787	356	22115	2298	162778	188	0	0	2062	6677	0
	%	97.24	99.13	93.89	96.04	0.18	81.05	2.91	84.01	3.18	2.90	0.04	0	0	0.28	26.46	0
Essential Habitat	Area (ha)	5	2379	1993	972	751	2220	3052	22502	716	80276	1867	56	60	2519	221	0
	%	0.09	21.63	4.87	16.46	0.82	12.17	24.92	85.48	0.99	1.43	0.43	0.26	0.11	0.34	0.88	0.0

4.1.3 Annual rainfall

Dataset 3	Annual rainfall
Purpose	To estimate the total annual rainfall across the Mitchell catchment over the period of records.
Format	Raster with 0.05 degrees grid (approximately 5 × 5 km). Downloaded in NetCDF format.
Extent	Australia.
Temporal resolution	1880 to 2020. Updated daily and aggregated to monthly and annual summaries.
Custodian	The Bureau of Meteorology. © The State of Queensland 2021.
Notes	Mean value of the annual rainfall from 1880 to 2020. 140 rasters have been merged into one, with mean value of each cell.
Access	https://www.longpaddock.qld.gov.au/silo/gridded-data/
Citation	Jeffrey, S.J., Carter, J.O., Moodie, K.B. and Beswick, A.R. (2001). Using spatial interpolation to construct a comprehensive archive of Australian climate data, *Environmental Modelling and Software*, 16(4), pp 309-330.
Supporting papers	n.a.

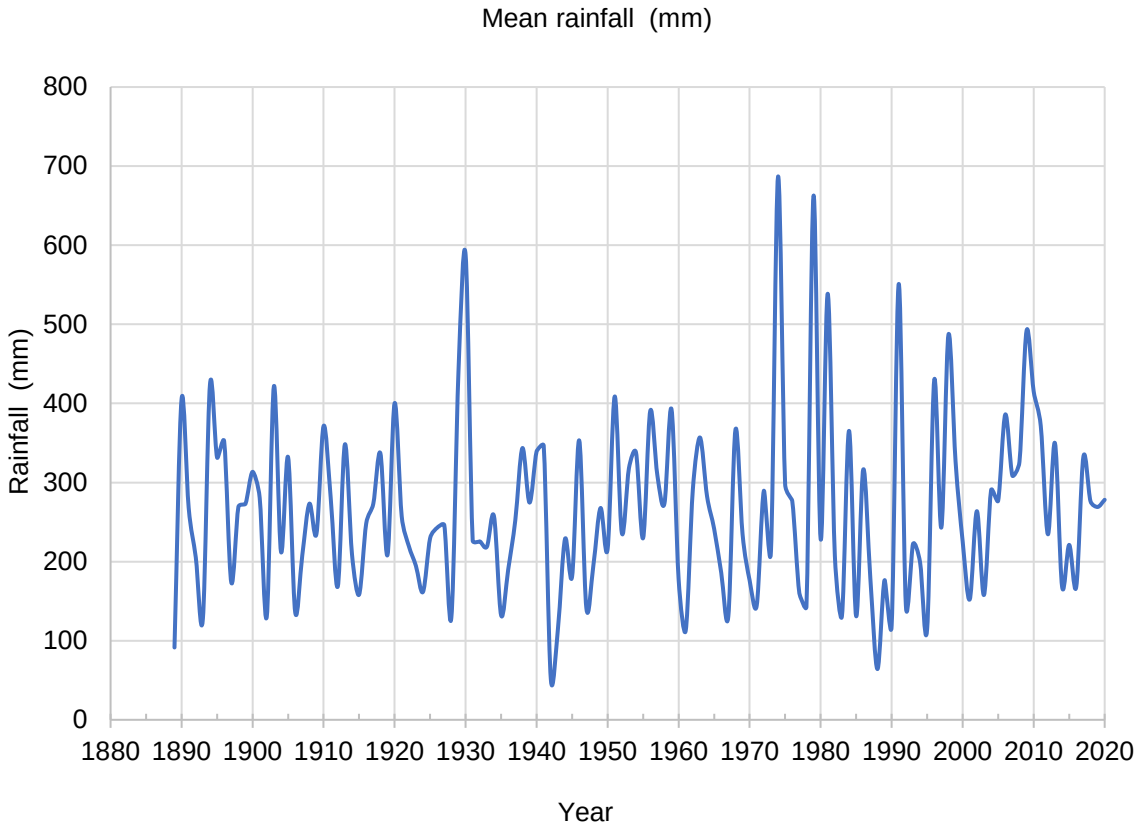


Figure 95: Mean rainfall (mm) across the Mitchell catchment (1880–2020).

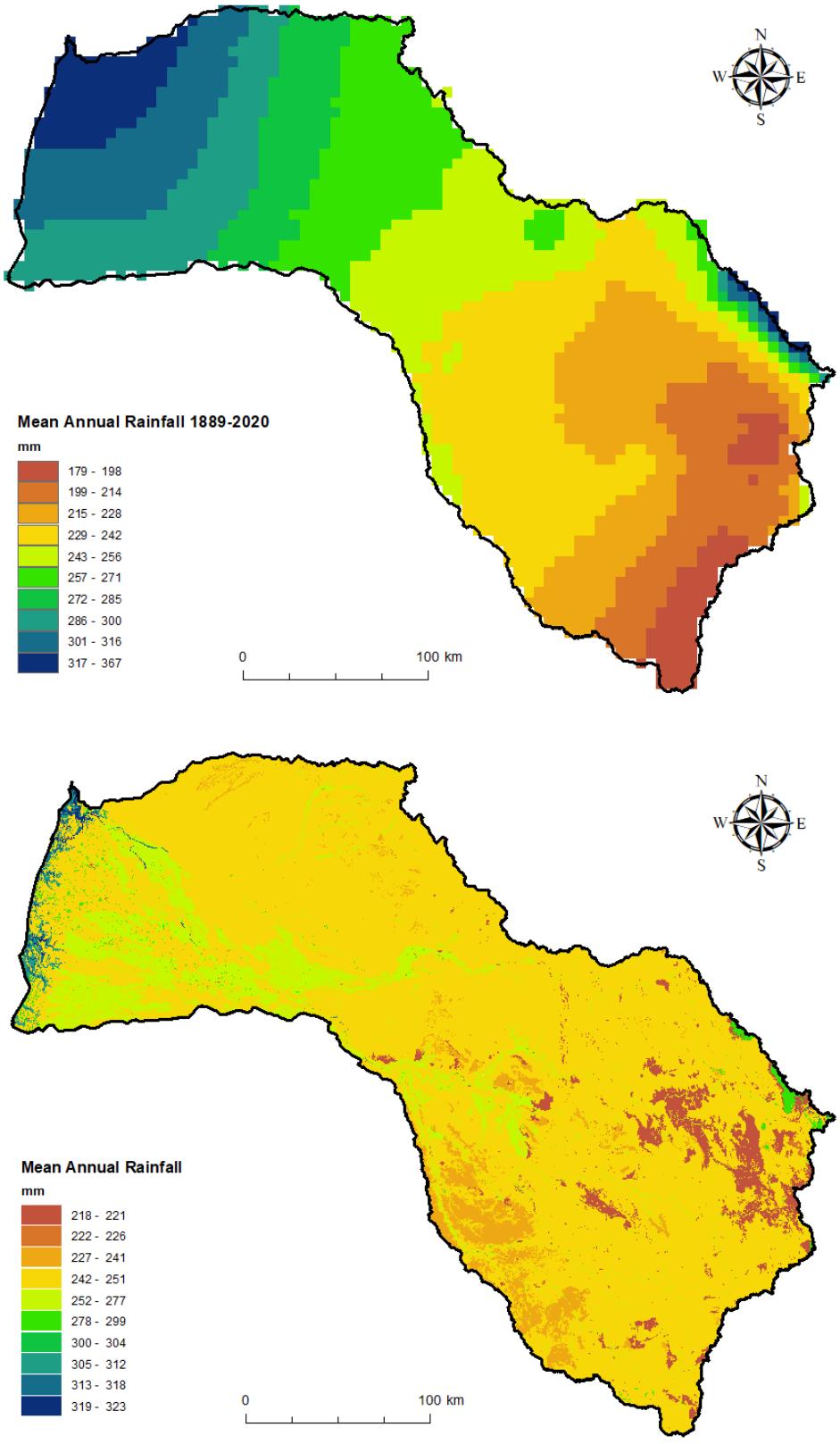


Figure 96: Mean annual rainfall (mm) across the Mitchell catchment (top) and mean annual rainfall (mm) per ecosystem type across the Mitchell catchment (bottom).

Table 40: Mean annual rainfall (mm) per ecosystem type.

Ecosystem type	IUCN EFG	Area (ha)	Annual rainfall (mm)				
			MIN	MAX	RANGE	MEAN	STD
Estuary	Estuary	5226	291.0	337.7	46.7	322.9	12.7
Intertidal forests and shrublands	MFT1.2	10996	291.0	337.7	46.7	321.2	13.8
Coastal saltmarshes and reedbeds	MFT1.3	40916	289.5	337.7	48.2	312.2	13.8
Coastal shrublands and grasslands	MT2.1	5902	289.5	339.6	50.1	304.0	13.3
Non-remnant	Non-remnant	91612	176.3	351.3	175.0	221.1	30.5
Tropical subtropical lowland rainforests	T1.1	18244	256.8	339.0	82.3	317.5	15.0
Tropical subtropical dry forest and thickets	T1.2	12248	175.8	367.4	191.6	223.3	29.2
Tropical subtropical montane rainforests	T1.3	26323	194.6	377.9	183.3	298.6	36.4
Seasonally dry tropical shrublands	T3.1	72205	190.7	338.6	147.9	247.7	28.3
Pyric tussock savannas	T4.2	5603684	175.8	367.4	191.6	251.4	34.6
Hummock savannas	T4.3	435831	179.7	281.0	101.3	228.4	15.0
Temperate woodlands	T4.4	21049	178.4	228.4	50.0	200.8	11.5
Semi-desert steppes	T5.1	56506	232.6	278.7	46.2	249.0	13.5
Subtropical-temperate forested wetlands	TF1.2	740342	180.0	338.6	158.6	276.9	29.3
Seasonal floodplain marshes	TF1.4	25233	182.4	335.0	152.6	296.9	30.8
Water	Water	4785	178.9	323.0	144.2	225.5	12.6

5. Environmental pressures

5.1.1 Fire frequency

Please refer to Section 3.4.1 for information on fire datasets.

5.1.2 Ground cover disturbance index

Dataset 2	Ground cover disturbance index
Purpose	The GCDI is an index which assesses aspects of rangeland biodiversity condition.
Format	Raster (25m × 25m).
Extent	Queensland.
Temporal resolution	Data inputs for the GCDI model were: - SLATS Ground Cover Index for the years 1988, 1991, 1992, 1994, 1997, 1999, 2001, 2003, 2004, 2006 and 2007 - Foliage Projective Cover imagery for 2006 - Regional Ecosystem mapping Version 6.0B, and any draft Regional Ecosystem mapping available at 17/9/2009.
Custodian	© State of Queensland (Department of Environment and Science) 2020.
Notes	The GCDI analyses levels of ground cover within each RE, as different REs naturally have different ground cover percentages. Within each RE, by subregion, the mean and trend of the ground cover is calculated from 1988, with different combinations of mean and trend indicating the level of disturbance. GCDI can be calculated in areas with foliage projective cover less than 20%, i.e. where the satellites can see the ground cover layer through the trees. The GCDI method also requires RE mapping, and only applies in areas that are considered remnant.
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=ground+cover+disturbance+index
Citation	© State of Queensland (Department of Environment and Science) 2020. Updated data available at http://qldspatial.information.qld.gov.au/catalogue//
Supporting papers	Additional information on the Queensland Landcover and Trees Study (SLATS) programme which produced the Ground Cover Disturbance Index can be found at https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/slats

1988 – 2009 Ground Cover mean

1988 – 2009 Ground Cover trend: Disturbance Level	High Ground Cover	Above Mean Ground Cover	Below Mean Ground Cover	Low Ground Cover
Increasing trend	1 – Very Low (Benchmark)	5 - Low	9 - Medium	13 - High
Slight increase in trend	2 – Very Low (Benchmark)	6 - Low	10 - Medium	14 - High
Slight decrease in trend	3 - Low	7 - Medium	11 - High	15 – Very High
Decreasing trend	4 - Low	8 - Medium	12 - High	16 – Very High

Figure 97: Ground cover disturbance index: matrix of attribute values.

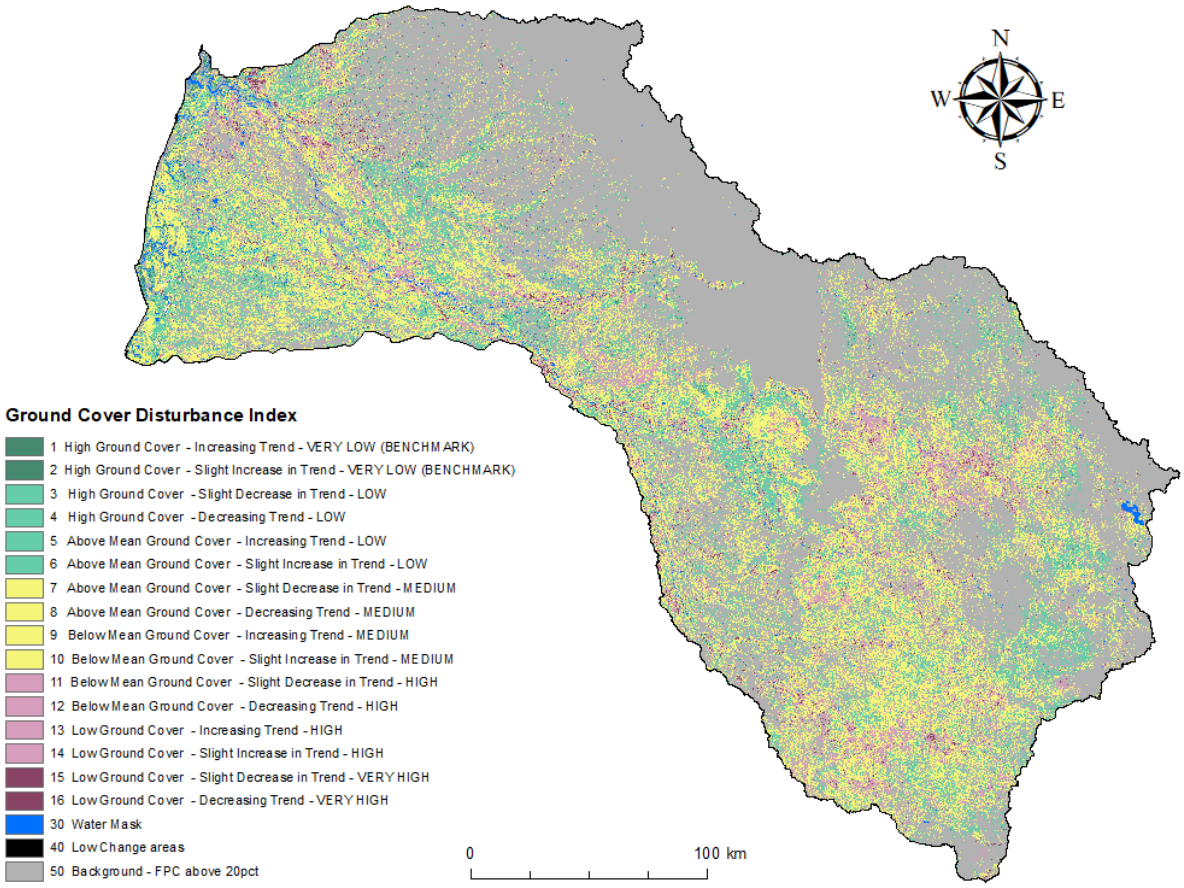


Figure 98: Spatial distribution of ground cover disturbance index in the Mitchell catchment. Indicator value is a combination of mean ground cover (1988–2009) with ground cover trend over the same period to produce a ground cover disturbance score ranging from 1 (high ground cover and increasing trend) to 16 (low ground cover and decreasing trend). Benchmark attribute values are 1 (high ground cover and increasing trend) and 2 (high ground cover and slight increase in trend).

Table 41: Ground cover disturbance index as a percentage of the area of each ecosystem type in the Mitchell catchment.

GCDI code	GCDI Description	Ecosystem type IUCN EFG	Estuary	Intertidal forests and shrublands MFT1.2	Coastal saltmarshes and reedbeds MFT1.3	Coastal shrublands and grasslands MT2.1	Non-remnant	Tropical subtropical lowland rainforests T1.1	Tropical subtropical dry forest and thickets T1.2	Tropical subtropical montane rainforests T1.3	Seasonally dry tropical shrublands T3.1	Pyric tussock savannas T4.2	Hummock savannas T4.3	Temperate woodlands T4.4	Semi-desert steppes T5.1	Subtropical-temperate forested wetlands TF1.2	Seasonal floodplain marshes TF1.4	Water
1	High Ground Cover - Increasing Trend - VERY LOW (BENCHMARK)		0	2	23	1	0	0	0	0	0	0	0	0	0	0	0	0
2	High Ground Cover - Slight Increase in Trend - VERY LOW (BENCHMARK)		0	1	7	1	0	0	0	0	0	0	0	0	0	0	0	0
3	High Ground Cover - Slight Decrease in Trend - LOW		0	1	6	2	0	0	0	0	1	1	2	0	1	1	1	0
4	High Ground Cover - Decreasing Trend - LOW		0	2	8	1	1	1	2	0	7	5	8	6	13	6	4	0
5	Above Mean Ground Cover - Increasing Trend - LOW		0	1	15	6	1	1	1	0	3	3	3	3	7	5	4	0
6	Above Mean Ground Cover - Slight Increase in Trend - LOW		0	1	4	5	1	1	2	0	5	4	5	5	9	7	5	0
7	Above Mean Ground Cover - Slight Decrease in Trend - MEDIUM		0	0	2	6	1	3	4	0	14	7	9	10	12	10	8	0
8	Above Mean Ground Cover - Decreasing Trend - MEDIUM		0	1	3	3	2	3	3	0	20	9	12	12	17	14	14	0
9	Below Mean Ground Cover - Increasing Trend - MEDIUM		0	0	3	5	1	1	2	0	5	5	6	10	10	9	5	0
10	Below Mean Ground Cover - Slight Increase in Trend - MEDIUM		0	0	2	1	0	0	2	0	3	2	4	5	4	3	3	0
11	Below Mean Ground Cover - Slight Decrease in Trend - HIGH		0	0	3	1	0	0	1	0	3	2	4	3	3	2	3	0
12	Below Mean Ground Cover - Decreasing Trend - HIGH		0	0	3	1	0	0	1	0	2	1	4	2	3	2	6	0
13	Low Ground Cover - Increasing Trend - HIGH		0	0	0	1	2	1	2	0	3	4	5	11	7	6	2	1
14	Low Ground Cover - Slight Increase in Trend - HIGH		0	0	0	0	0	0	0	0	1	1	1	2	2	1	1	0
15	Low Ground Cover - Slight Decrease in Trend - VERY HIGH		0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0
16	Low Ground Cover - Decreasing Trend - VERY HIGH		0	0	1	0	0	0	0	0	0	0	1	1	4	2	3	0

30	Water Mask	106	23	9	3	1	2	0	0	0	0	0	0	1	2	30	89
40	Low Change areas	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
50	Background - FPC above 20pct	7	68	8	62	89	86	79	100	35	53	35	29	5	28	12	9

5.1.3 Land use after tree clearing

Dataset 3	State-wide landcover and trees study 1988 to 2018 Queensland.
Purpose	The state-wide landcover and trees survey (SLATS) has been analysing and reporting on change (loss) of woody vegetation since 1988 using Landsat imagery. The vegetation change has been attributed to change classes representing what the replacement land cover is or if the vegetation change was due to natural causes.
Format	Polygons.
Extent	Queensland.
Temporal resolution	1988–2018.
Custodian	© The State of Queensland (Department of Environment and Science) 2018
Notes	For all of Queensland, all areas identified as undergoing vegetation change in this era have been attributed a change class. Areas of change where heavy cloud or cloud shadow exist in the Landsat image are not likely to have been identified. This is usually identified and attributed as 'Missed clearing from previous era' in subsequent SLATS analysis.
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/search.page
Citation	
Supporting papers	Queensland Department of Environment and Science. 2018. *Statewide Landcover and Trees Study (SLATS): Overview of Methods*. DES, Brisbane https://www.qld.gov.au/__data/assets/pdf_file/0032/91877/statewide-landcover-trees-study-overview-methods.pdf

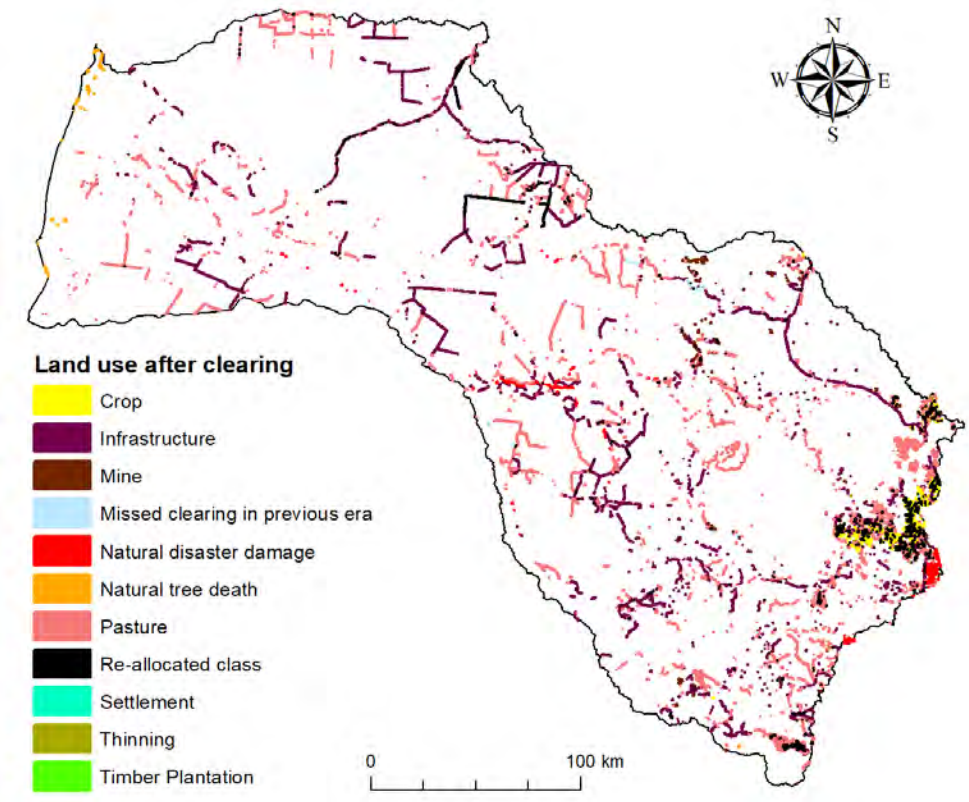


Figure 99: Land-use change (according to QLUMP) after clearing of trees across the Mitchell catchment. Outlines have been widened to allow easier visualisation.

Table 42: Replacement land cover (ha) after clearing of woody vegetation across the Mitchell catchment. The values (ha) reported for the replacement land cover are the sum of all replacement land cover extents that have occurred in the clearing periods 1998–1991, 1991–1995, 1995–1997, 1997–1999, and then annually from 1999–2000 through to 2017–2018.

Ecosystem type	IUCN EFG	IUCN EFG Area (ha)	Replacement land cover after woody vegetation clearing (ha)												
			Crop	Infrastructure	Mine	Missed clearing in previous era	Natural disaster damage	Natural tree death	Pasture	Re-allocated class	Settlement	Thinning	Timber Plantation	Total land cover	% of IUCN EFG
Estuary		5226	0	0	0	0	0	7	0	0	0	0	0	7	0.137
Intertidal forests and shrublands	MFT1.2	10,996	0	0	0	0	0	183	0	0	0	0	0	183	1.66
Coastal saltmarshes and reedbeds	MFT1.3	40,916	0	0	0	0	0	11	0	0	0	0	0	11	0.028
Coastal shrublands and grasslands	MT2.1	5,902	0	1	0	0	0	0	0	0	0	0	0	1	0.022
Non-remnant		91612	7129	548	429	24	2	0	12959	1168	1	18	114	22392	24.44
Tropical-subtropical lowland rainforests	T1.1	18,244	4	0	0	0	0	6	2	0	0	0	0	11	0.062
Tropical-subtropical dry forests and thickets	T1.2	12,248	1	6	0	0	0	0	23	0	0	0	0	30	0.247
Tropical-subtropical montane rainforests	T1.3	26,323	3	1	0	0	2	0	8	0	0	0	0	13	0.048
Seasonally dry tropical shrublands	T3.1	72,205	0	31	0	0	1	0	54	1	0	0	0	88	0.121
Pyric tussock savannas	T4.2	5,603,684	538	4591	302	43	532	28	5536	264	0	43	3	11879	0.212
Hummock savannas	T4.3	435,831	7	120	32	0	0	0	192	2	0	0	0	353	0.081
Temperate woodlands	T4.4	21,049	0	13	0	0	0	0	9	0	0	0	0	23	0.108
Semi-desert steppes	T5.1	56,506	0	37	0	0	1	0	22	0	0	0	0	61	0.107
Subtropical/temperate forested wetlands	TF1.2	740,341	77	433	39	8	114	0	438	7	0	2	1	1120	0.151
Seasonal floodplain marshes	TF1.4	25,233	1	1	0	0	0	4	35	0	0	0	0	4	0.163
Water		4,785	19	156	4	0	0	0	48	5	0	0	0	232	4.849

Table 43: Woody vegetation clearing, measured as clearing rates (ha), across the Mitchell catchment, for the clearing periods 1998–1991, 1991–1995, 1995–1997, 1997–1999, and then annually from 1999–2000 through to 2017–2018.

Ecosystem type	IUCN EFG	IUCN EFG Area (ha)	1988-1991	1991-1995	1995-1997	1997-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Estuary		5,226	0	0	0	0	0	0	0	0	0	0	0	0
Intertidal forests and shrublands	MFT1.2	10,996	0	0	0	0	0	0	0	0	0	0	0	0
Coastal saltmarshes and reedbeds	MFT1.3	40,916	0	0	0	0	0	0	0	0	0	0	0	0
Coastal shrublands and grasslands	MT2.1	5,902	0	0	1	0	0	0	0	0	0	0	0	0
Non-remnant		91,612	5118	1550	3557	2174	1014	69	175	305	266	129	400	1504
Tropical-subtropical lowland rainforests	T1.1	18,244	2	0	0	2	0	0	0	0	0	0	0	0
Tropical-subtropical dry forests and thickets	T1.2	12,248	0	17	1	2	0	0	0	0	0	3	0	1
Tropical-subtropical montane rainforests	T1.3	26,323	1	1	5	1	0	0.	0	1	0	0	2	0
Seasonally dry tropical shrublands	T3.1	72,205	3	0	1	4	6	0	0	0	0	1	1	37
Pyric tussock savannas	T4.2	5,603,684	1005	449	1519	633	480	85	706	200	239	600	1091	770
Hummock savannas	T4.3	435,831	44	25	25	7	2	4	19	16	1	29	12	8
Temperate woodlands	T4.4	21,049	6	0	0	0	1	0	1	4	2	0	2	2
Semi-desert steppes	T5.1	56,506	20	0	3	1	7	0	5	0	0	0	0	2
Subtropical/temperate forested wetlands	TF1.2	740,341	121	10	171	46	144	2	42	10	34	59	19	50
Seasonal floodplain marshes	TF1.4	25,233	0	0	35	0	0	0	0	0	0	0	0	0
Water		4,785	145	9	36	16	5	0	0	0	0	0	0	0

Ecosystem type	IUCN EFG	IUCN EFG Area (ha)	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Estuary		5,226	0	0	0	0	0	0	0	0	7	0	0
Intertidal forests and shrublands	MFT1.2	10,996	0	0	0	0	0	0	0	0	183	0	0
Coastal saltmarshes and reedbeds	MFT1.3	40,916	0	0	0	0	0	0	0	0	11	0	0
Coastal shrublands and grasslands	MT2.1	5,902	0	0	0	0	0	0	0	0	0	0	0
Non-remnant		91,612	165	273	171	27	145	143	272	161	2202	1154	251
Tropical-subtropical lowland rainforests	T1.1	18,244	0	0	0	0	0	1	0	0	6	0	0
Tropical-subtropical dry forests and thickets	T1.2	12,248	1	1	0	0	1	2	0	0	0	0	0
Tropical-subtropical montane rainforests	T1.3	26,323	0	1	0	0	0	1	1	0	0	0	0
Seasonally dry tropical shrublands	T3.1	72,205	1	14	6	1	3	2	2	1	0	3	0
Pyric tussock savannas	T4.2	5,603,684	736	642	386	240	349	355	191	193	240	306	202
Hummock savannas	T4.3	435,831	48	34	6	1	16	0	5	9	8	25	8
Temperate woodlands	T4.4	21,049	0	0	0	0	0	0	0	0	1	1	2
Semi-desert steppes	T5.1	56,506	2	0	3	1	10	0	2	0	0	1	4
Subtropical/temperate forested wetlands	TF1.2	740,341	30	20	32	124	62	10	21	31	20	17	39
Seasonal floodplain marshes	TF1.4	25,233	0	0	0	0	0	0	0	0	4	0	1
Water		4,785	0	0	1	0	0	0	4	2	2	5	1

5.1.4 Fragmentation

Please refer to Section 3.5.2 for further information.

5.1.5 Invasive species (pest animals and weeds)

Please refer to Section 3.3.3 for further information.

5.1.6 River disturbance index

Dataset 6	River disturbance index
Purpose	A method for assessing anthropogenic river disturbance. The grid-based spatial modelling procedure computes indices of disturbance for individual stream sections. These indices rank streams along a continuum from near-pristine to severely disturbed.
Format	Polylines with associated look-up table (Environmental Stream Attributes v.1.1.1 (August, 2012))
Extent	Australia.
Temporal resolution	1998
Custodian	AHGF Network Stream; © Commonwealth of Australia (Bureau of Meteorology) 2014
Notes	Original source data detailed in Stein et al. 1998 updated with 1. Catchment Scale Land Use Mapping for Australia Update April 2009 (CLUM Update 04/09), 2. Geodata TOPO 250K series 2 (Geoscience Australia, 2003), 3. Integrated Vegetation Cover (BRS, 2009). The national dataset of the stream network has 1,396,648 segments, of which 27,614 are contained in the Mitchell catchment. The highest disturbance index in the Mitchell is 0.595 compared to 0.941 nationally. The mean RDI value in the Mitchell is 0.04 compared to 0.102 nationally. For both datasets, the STD is larger than the means.
Access	http://www.bom.gov.au/water/geofabric/download.shtml
Citation	J.L Stein, J.A Stein, H.A Nix, Spatial analysis of anthropogenic river disturbance at regional and continental scales: identifying the wild rivers of Australia, *Landscape and Urban Planning*, Volume 60, Issue 1, 2002, Pages 1-25, ISSN 0169-2046, https://doi.org/10.1016/S0169-2046(02)00048-8. (https://www.sciencedirect.com/science/article/pii/S0169204602000488) Australian Hydrological Geospatial Fabric (AHGF) (Geofabric), http://www.bom.gov.au/water/geofabric/download.shtml
Supporting papers	Stein, J., M. Hutchinson and John A. Stein. (2013): A new stream and nested catchment framework for Australia. *Hydrology and Earth System Science.* 18, 1917-1933.

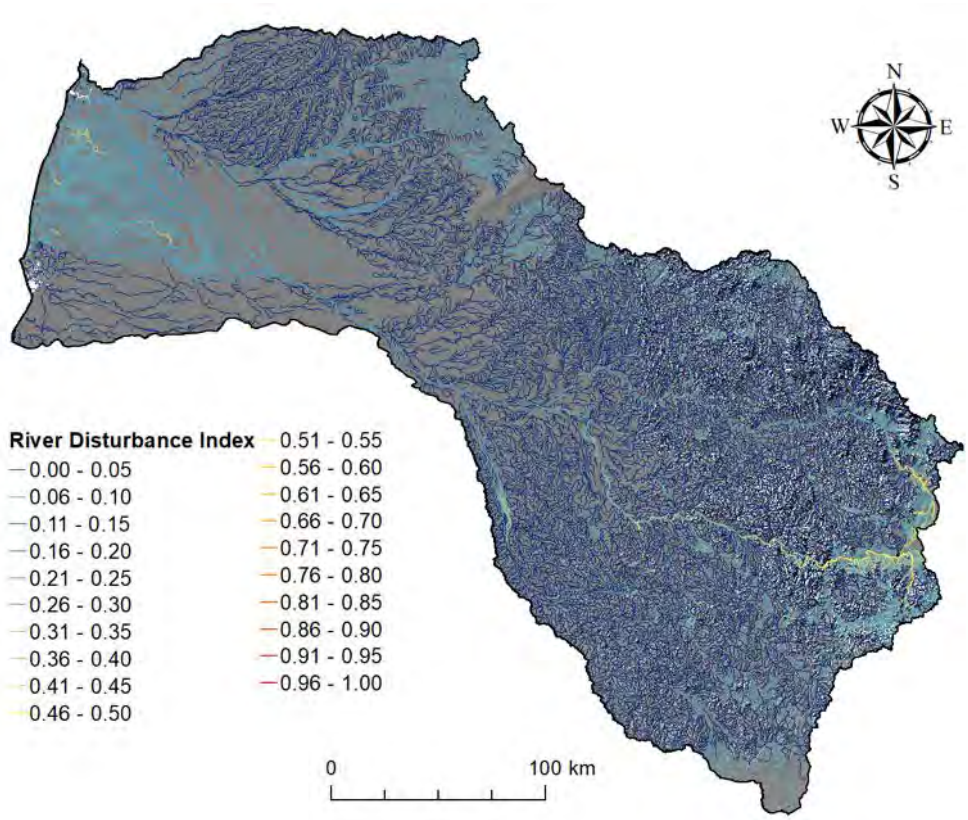


Figure 100: River disturbance index values within the Mitchell catchment (range from 0 to 0.595). Values in the lowest class, 0.00 to 0.05, have been shown in dark blue to indicate that the majority of the catchment has been mapped as having low disturbances.

Table 44: Comparison of river disturbance index between the Mitchell catchment and national datasets.

RDI Statistics	National	Mitchell
Count	1396648	27614
Minimum	0	0
Maximum	0.941	0.595
Mean	0.102	0.040
Standard Deviation	0.120	0.049

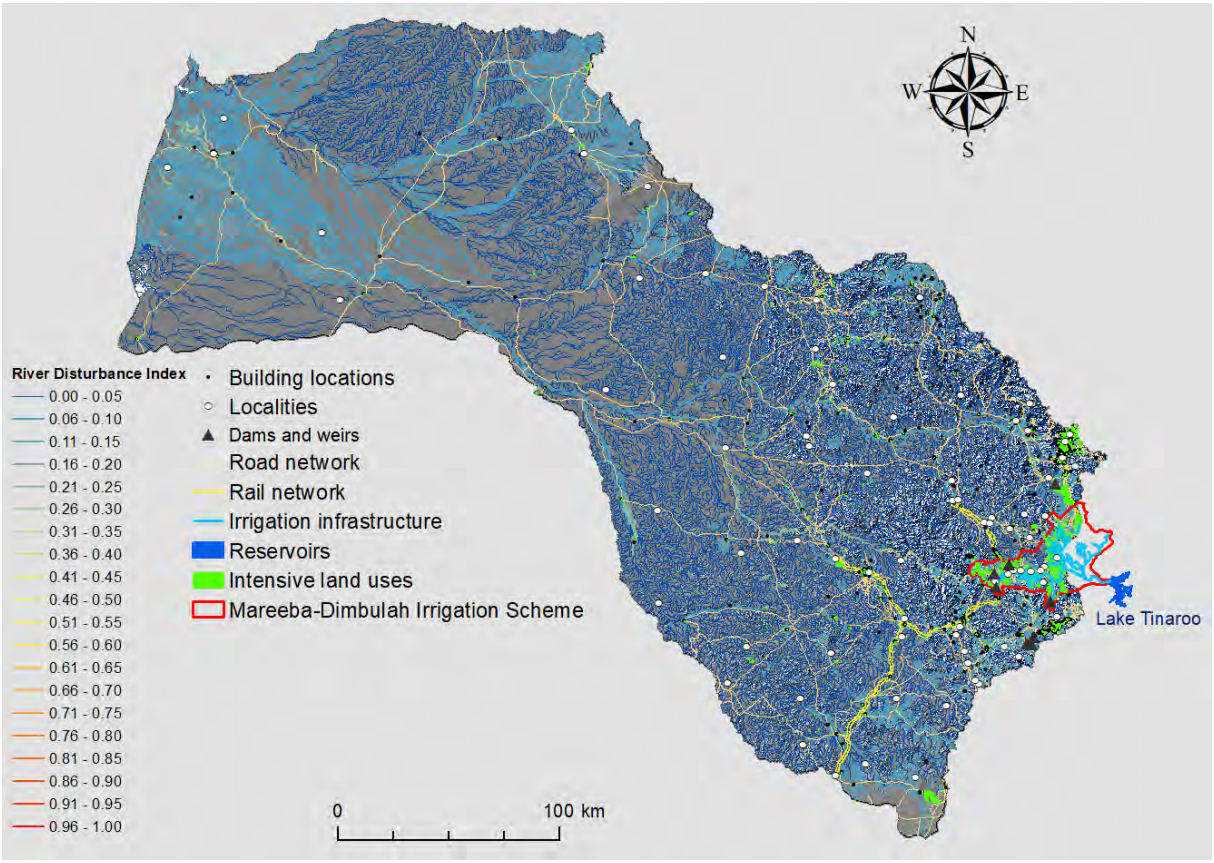


Figure 101: The Mareeba–Dimbulah Irrigation scheme, building locations, road networks, infrastructure and dams and weirs with the river disturbance index values across the Mitchell catchment.

Table 45: River disturbance index values assigned to the length of rivers (km) across the Mitchell catchment.

Ecosystem type	IUCN EFG	Area (ha)	River disturbance index						
			0–0.1	0.1–0.2	0.2–0.3	0.3–0.4	0.4–0.5	0.5–0.6	Total length (km)
Estuary	Estuary	5226	148.3	30.6	0.7	0.0	0.0	0.0	179.6
Intertidal forests and shrublands	MFT1.2	10996	203.9	35.1	5.6	0.0	0.0	0.0	244.6
Coastal saltmarshes and reedbeds	MFT1.3	40916	393.1	94.2	11.4	4.6	0.0	0.0	503.4
Coastal shrublands and grasslands	MT2.1	5902	10.9	0.1	0.0	0.0	0.0	0.0	11.0
Non-remnant	Non-remnant	91612	488.2	158.8	97.4	33.2	12.8	11.2	801.6
Tropical subtropical lowland rainforests	T1.1	18244	111.2	6.4	0.2	0.0	0.0	0.0	117.9
Tropical subtropical dry forest and thickets	T1.2	12248	54.6	2.6	0.1	0.0	0.0	0.0	57.3
Tropical subtropical montane rainforests	T1.3	26323	232.0	13.3	0.2	0.0	0.0	0.0	245.5
Seasonally dry tropical shrublands	T3.1	72205	861.7	5.3	0.0	0.0	0.0	0.0	866.9
Pyric tussock savannas	T4.2	5603684	43306.8	1723.6	183.6	37.9	9.2	4.8	45265.9
Hummock savannas	T4.3	435831	3597.2	29.2	1.2	0.0	0.7	0.0	3628.3
Temperate woodlands	T4.4	21049	167.6	10.9	0.0	0.0	0.0	0.0	178.6
Semi-desert steppes	T5.1	56506	324.2	1.9	14.4	0.0	0.0	0.0	340.5
Subtropical-temperate forested wetlands	TF1.2	740342	7706.0	415.9	127.2	45.4	33.9	20.4	8348.8
Seasonal floodplain marshes	TF1.4	25233	141.7	64.6	2.4	0.3	0.0	0.0	208.9
Water	Water	4785	28.6	3.9	16.2	7.2	8.1	11.3	75.3

6. Other datasets and maps

6.1 Cattle grazing

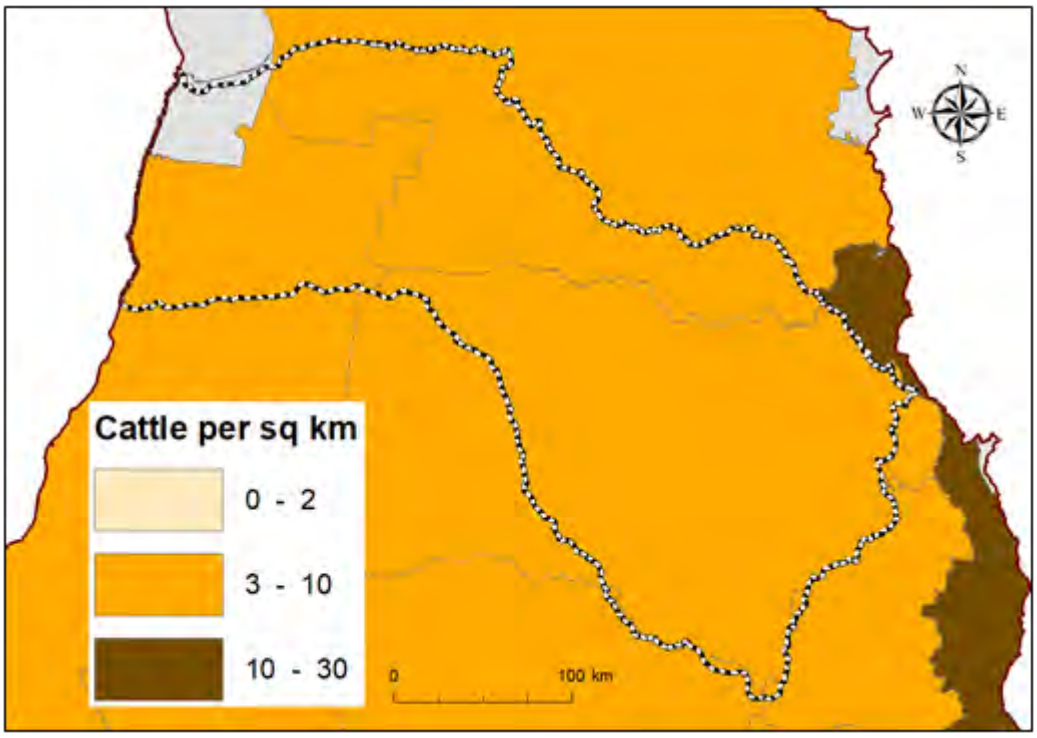


Figure 102: Global agricultural benchmark network results 2019 of values for general stocking rates per square kilometre. Adapted from Meat & Livestock Australia.

Table 46: Cattle population statistics for the Mitchell catchment.

Time period	NRM region	Total cattle population	Scale factor %	Cattle population in the Mitchell	Total cattle in the Mitchell
June 2010 to June 2011	Cape York	141794	41	58615	198609
	Northern Gulf Resource Management Group	933292	15	139994	
June 2015 to June 2016	Cape York	68272	41	28223	160811
	Northern Gulf Resource Management Group	883925	15	132589	
June 2017 to June 2018	Joint management area	53888	100	53888	190560
	Northern Gulf Resource Management Group	911148	15	136672	
June 2018 to June 2019	Joint management area	53085	100	53085	163410
	Northern Gulf Resource Management Group	735502	15	110325	

6.2 Irrigated cropping and horticulture

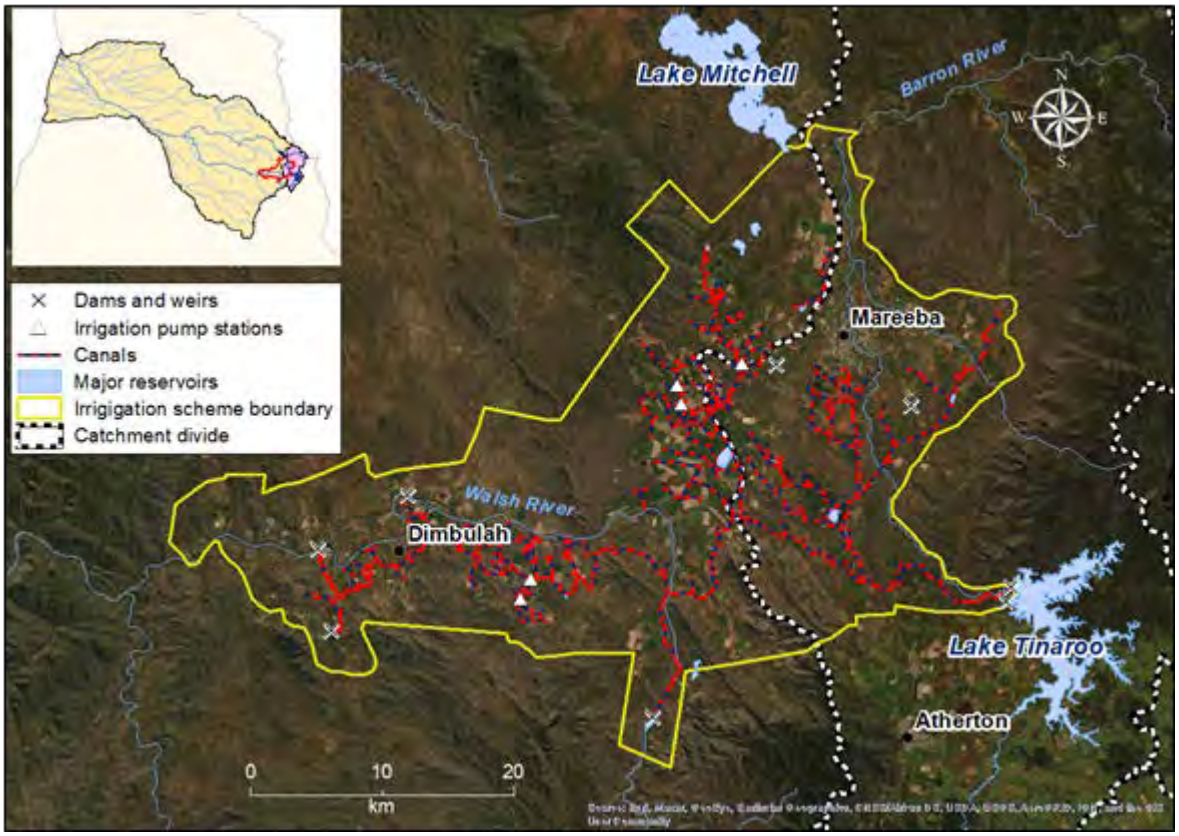
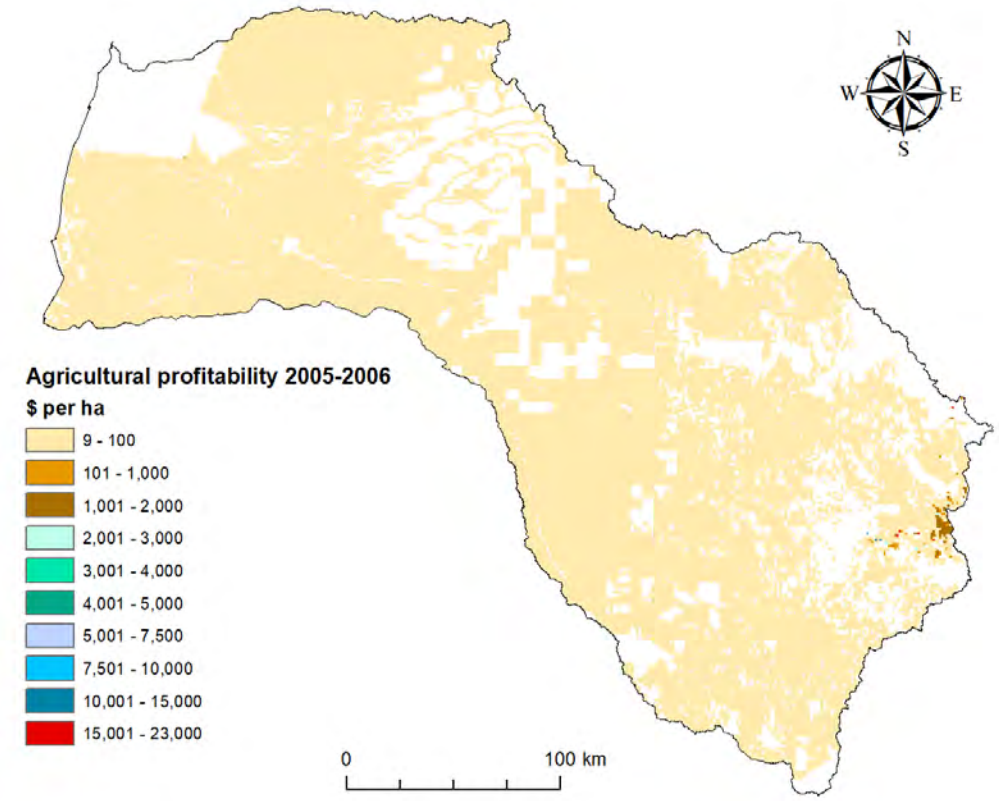


Figure 103: Mareeba–Dimbulah Water Supply Scheme involves an inter-basin water transfer from Lake Tinaroo in the Barron River catchment into the upper reaches of the Walsh sub-catchment, which joins the lower Mitchell River in mid-catchment. Base image is ESRI World Imagery.

6.3 Agricultural profitability

Dataset 3	Agricultural profitability
Purpose	The provided data represent a raster map of agricultural profit at full equity (PFE) for Australia for the year 2010/11.
Format	Raster (1km × 1km).
Extent	Australia.
Temporal resolution	2010–2011.
Custodian	All Rights (including copyright) CSIRO 2018.
Notes	The Australian National Outlook uses a suite of models including the Australian land use change model that relies on a map of agricultural profit at full equity (PFE). CSIRO has committed to conducting the Outlook every 3-5 years. This PFE map update is to support the most recent outlook. ABARES for the national land use map 2010-11, ABARES AgSurf Farm Survey data, Australian Bureau of Statistics Agricultural Census (2010-11) and various state departments which provide gross margin information on the production of specific agricultural commodities. The production of the map was funded through the CSIRO's Australian National Outlook project.
Access	https://data.gov.au/dataset/ds-dap-csiro%3A31557/details?q=
Citation	Marinoni, O.; Navarro Garcia, J. (2018): *Agricultural profit map for Australia for 2010-2011. v1*. CSIRO. Data Collection. https://doi.org/10.4225/08/5afa18c1d0385
Supporting papers	Additional information can be found in CSIRO website: https://data.csiro.au/collection/csiro:31557



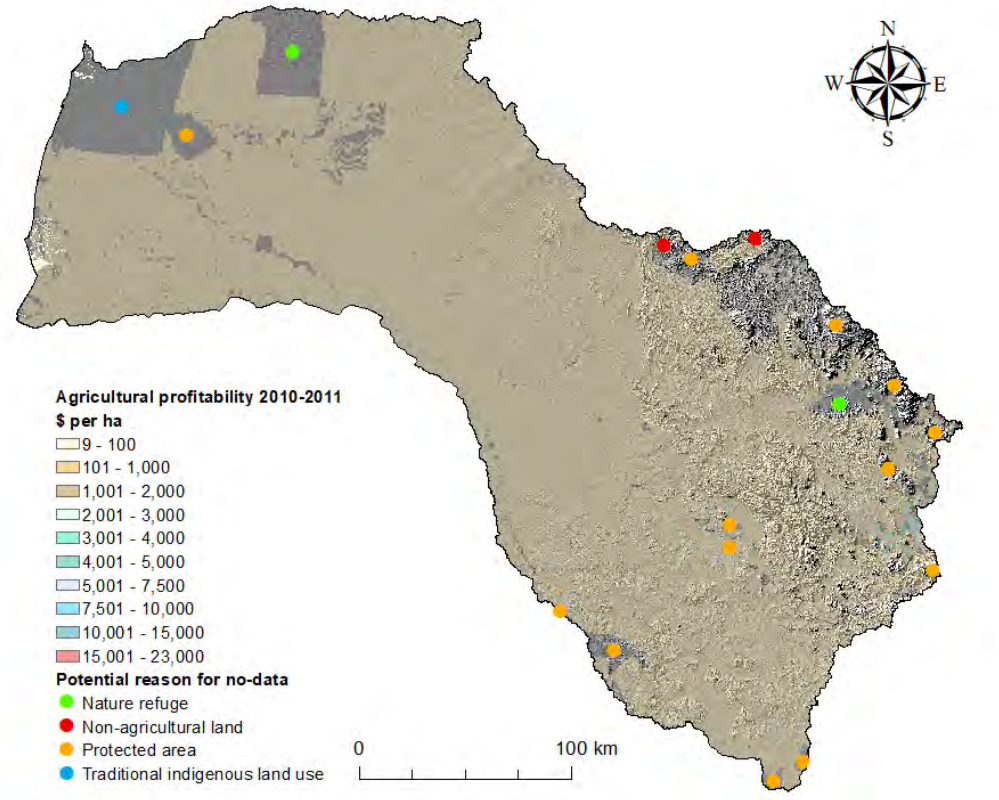


Figure 104: Agricultural profitability ($/ha) in the Mitchell catchment (2005–2006) and (2010–2011).

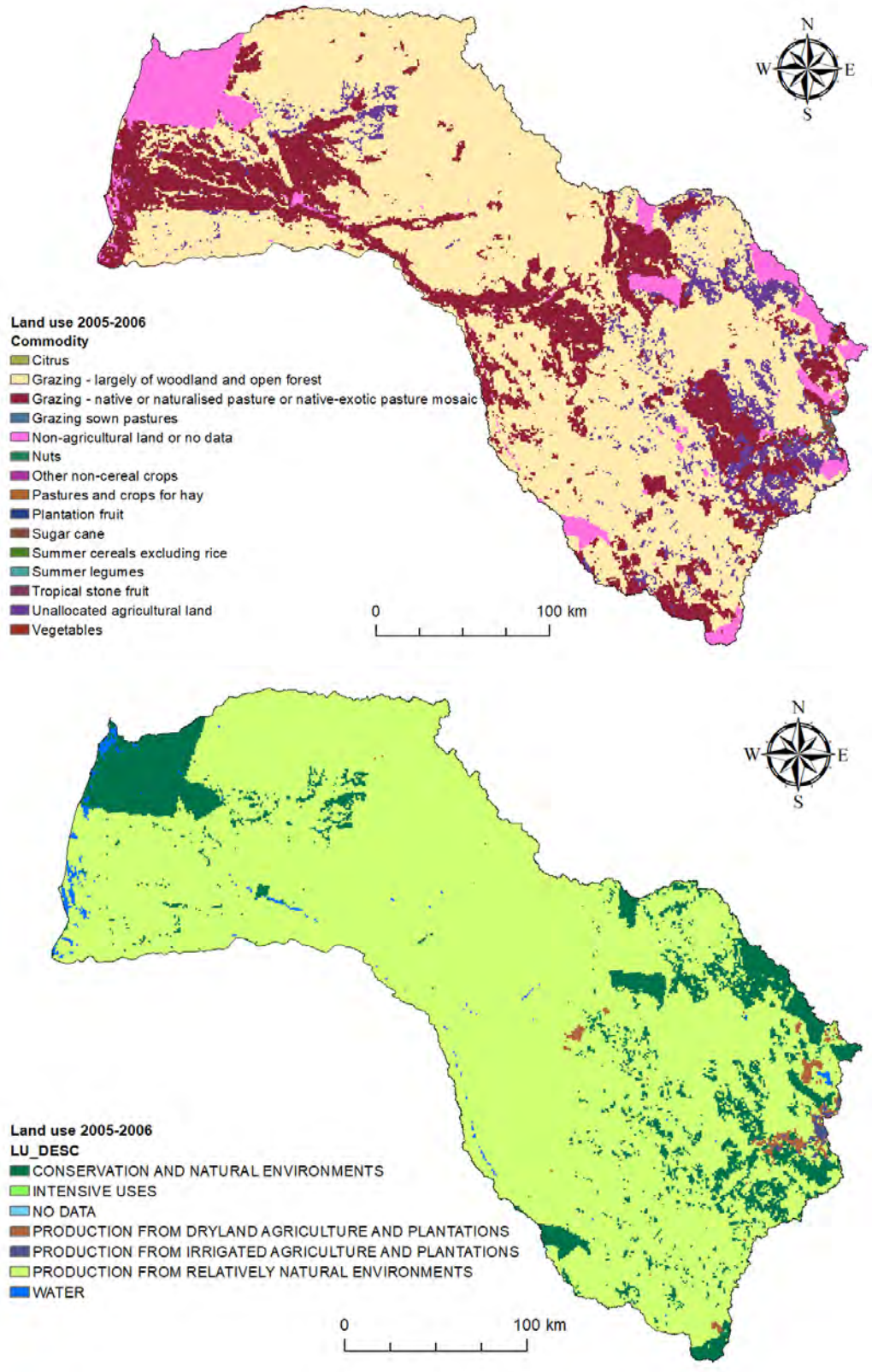


Figure 105: Land uses at primary level in 2005–2006.

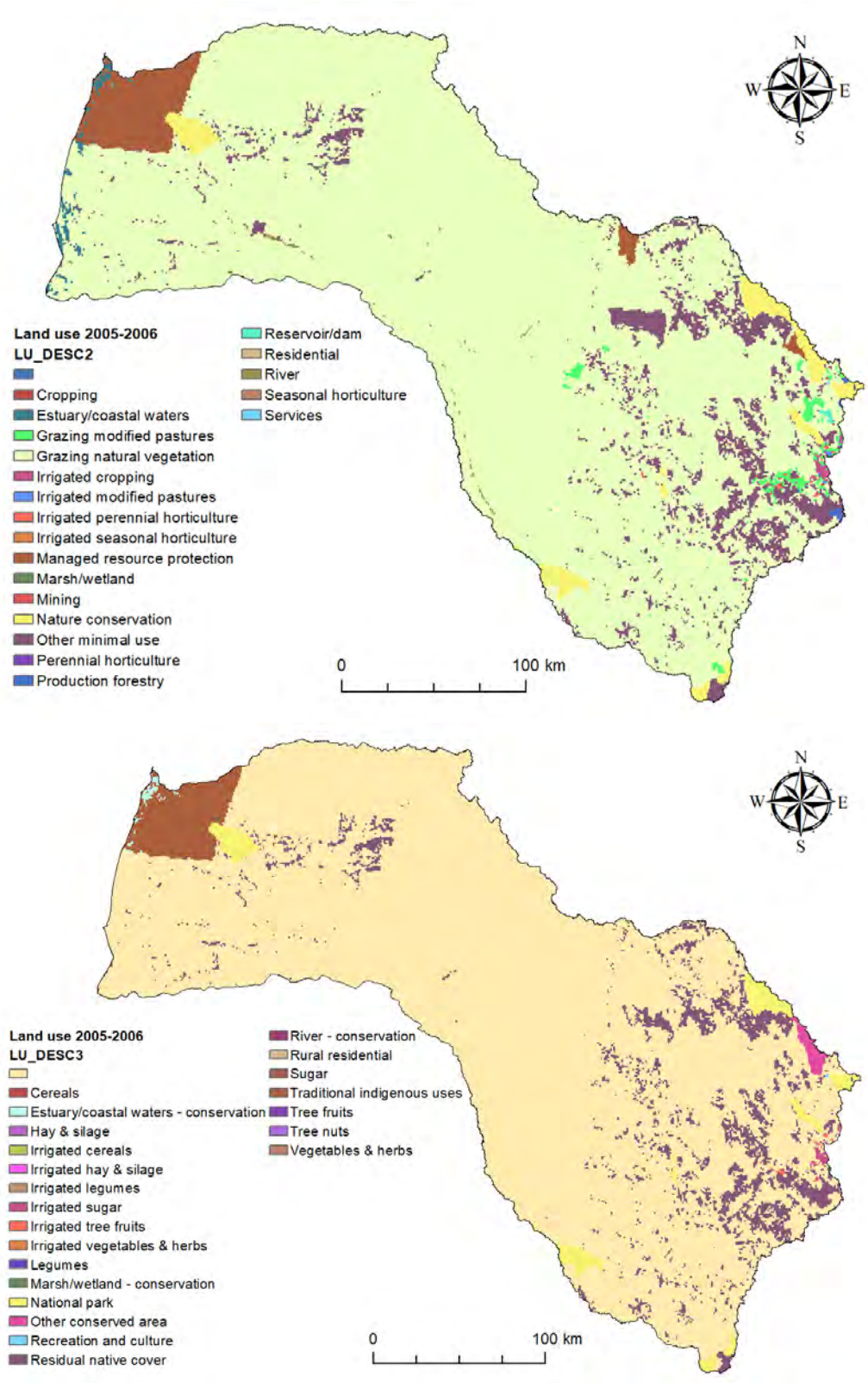


Figure 106: Land uses at secondary and tertiary levels in 2005–2006.

Table 47: The agricultural profitability ($/ha) of each ecosystem type within the Mitchell catchment including a range of statistics (profit area, % of ecosystem type, min, max, range, mean and STD).

Ecosystem type	IUCN EFG	Area (ha)	2006							2010							Mean of 2010-2011 minus 2005-2006
			Ag Profitability modelled area (ha)	% of EFG	MIN	MAX	RANGE	MEAN	STD	Ag Profitability modelled area (ha)	% of EFG	MIN	MAX	RANGE	MEAN	STD	
Estuary	Estuary	5226	1108	21	-9	-2	7	-5	2	998	19	18	18	0	18	0	23
Intertidal forests and shrublands	MFT1.2	10996	1857	17	-9	-2	7	-5	2	1799	16	18	18	0	18	0	23
Coastal saltmarshes and reedbeds	MFT1.3	40916	14955	37	-9	-2	7	-6	2	15410	38	18	18	0	18	0	24
Coastal shrublands and grasslands	MT2.1	5902	2984	51	-9	-2	7	-5	2	3840	65	18	18	0	18	0	23
Non-remnant	Non-remnant	91612	74836	82	-888	16118	17006	238	1601	82745	90	9	22111	22102	681	2194	443
Tropical subtropical lowland rainforests	T1.1	18244	5934	33	-9	15960	15969	35	767	6679	37	11	2108	2098	28	143	-7
Tropical subtropical dry forest and thickets	T1.2	12248	5072	41	-8	703	711	-2	20	7211	59	9	2527	2518	16	107	18
Tropical subtropical montane rainforests	T1.3	26323	130	0	-166	15960	16126	1377	4182	371	1	11	2553	2542	831	967	-546
Seasonally dry tropical shrublands	T3.1	72205	54317	75	-166	613	778	-2	14	62513	87	9	2086	2077	11	25	13
Pyric tussock savannas	T4.2	5603684	3908749	70	-887	16118	17005	-3	84	4792829	86	9	22111	22102	14	148	17
Hummock savannas	T4.3	435831	366813	84	-9	15960	15969	1	152	412581	95	9	13347	13337	11	46	10
Temperate woodlands	T4.4	21049	17675	84	-4	8	12	-1	1	20663	98	11	22	11	11	1	12
Semi-desert steppes	T5.1	56506	55585	98	-9	3	12	-1	2	55516	98	9	18	8	11	2	13
Subtropical-temperate forested wetlands	TF1.2	740341	623048	84	-724	16118	16841	-3	137	655412	89	9	22111	22102	17	143	21
Seasonal floodplain marshes	TF1.4	25233	19234	76	-9	1253	1261	-5	10	20108	80	9	2130	2120	18	37	23
Water	Water	4785	2136	45	-722	1253	1975	52	234	2170	45	9	13910	13901	296	1717	244

6.4 Gross value of agricultural production

Dataset 4	Gross Value of Agricultural Products per SA1
Purpose	To estimate the gross value of agricultural production (GVAP) per statistical area level 1 in Queensland. Data are based on Australian Bureau of Statistics 2015-16 census data brought forward using AgTrends GVAP for 2018-19.
Format	Polygons.
Extent	Australia.
Temporal resolution	Based on data from the 2015-2016 census. Updated with reference to Department of Agriculture and Fisheries 2018-19 Queensland AgTrends report.
Custodian	© State of Queensland (Department of Agriculture and Fisheries), 2019.
Notes	The regional economic profiles for agriculture dataset are based on Australian Bureau of Statistics census data from 2015-16, brought forward using DAF's 2018-19 Queensland AgTrends report. Figures contained in this dataset are modelled estimates only. The Queensland AgTrends publication is the point-of-truth for primary industries economic forecasts for Queensland and prevails in the event of any inconsistencies with this dataset. Additional information can be found at https://www.daf.qld.gov.au/strategic-direction/datafarm
Access	https://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=%22GVAP%20per%20SA1%20-%20Queensland%22
Citation	Methodology for production of GVAP can be found at: *Value of Agricultural Commodities Produced, Australia methodology*, Australian Bureau of Statistics, https://www.abs.gov.au/methodologies/value-agricultural-commodities-produced-australia-methodology/2019-20
Supporting papers	n.a.

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