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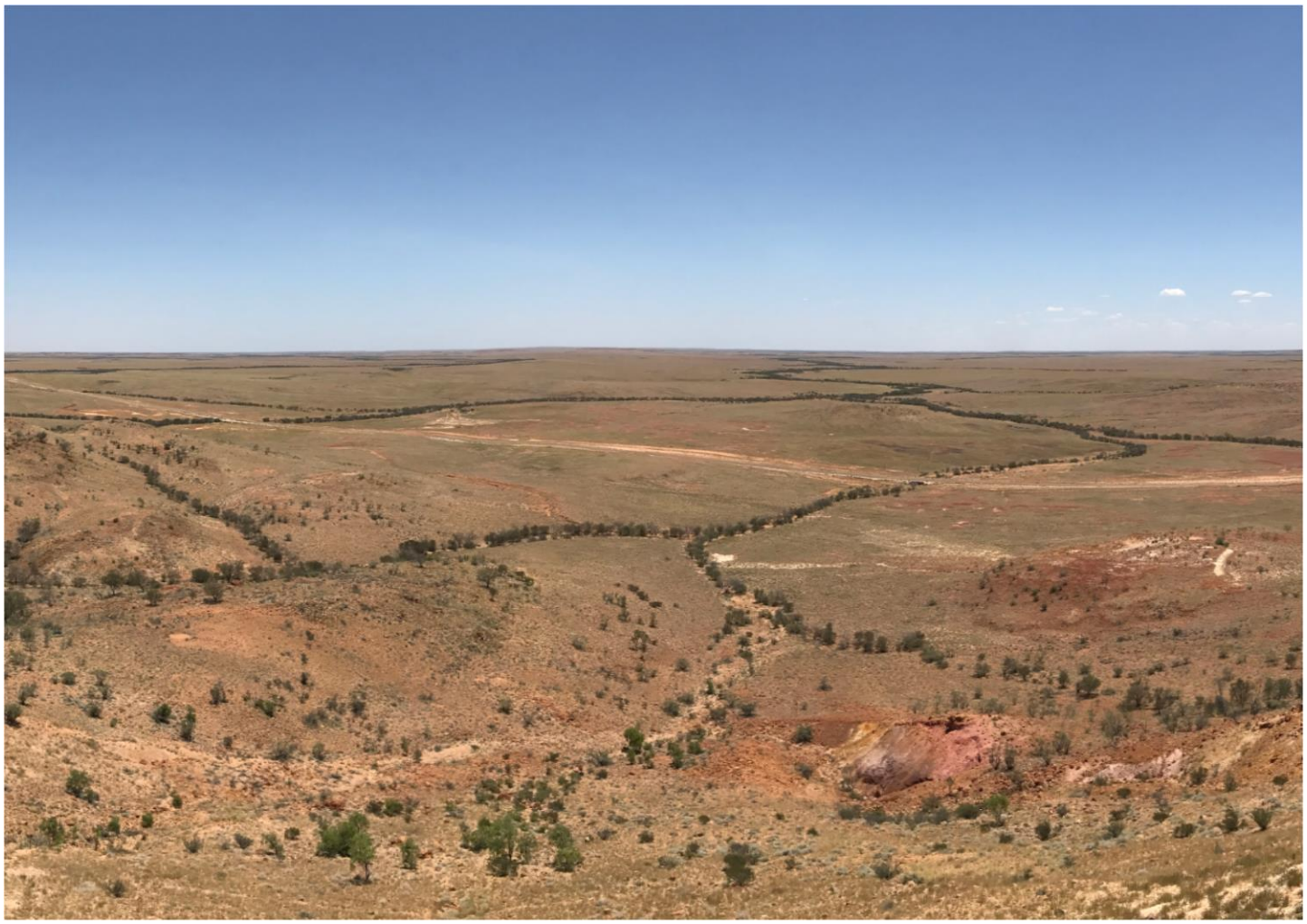

Land Use Summary 1999–2016

for the Desert Channels NRM Region

Remote Sensing Centre

May 2017

Queensland Government

Prepared by

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Use the Queensland Spatial Catalogue (QSpatial) to access land use datasets. Search for "land use mapping" in the search term field, after restricting your search to “Planning Cadastre” in the categories field. Metadata is also available from QSpatial.

Cover photo: Desert Channels, Queensland. Courtesy of Andrew Clark, DSITI.

Acknowledgements

The land use mapping is a product of the Australian Collaborative Land Use and Management Program, of which QLUMP is a partner, promotes the development of consistent information on land use and land management practices. This consortium of Australian, state and territory government partners is critical to providing nationally consistent land use mapping at both catchment and national scale, underpinned by common technical standards including an agreed national land use classification. More information on ACLUMP available at www.abares.gov.au/landuse

We would also like to acknowledge regional officers of the Department of Natural Resource and Mines (DNRM) throughout Queensland. The input from the regions has been extremely valuable with respect to their local knowledge and capacity to engage regional experts in compiling updated land use mapping.

Executive summary

The Queensland Land Use Mapping Program (QLUMP) has updated the land use mapping in the Desert Channels Natural Resource Management (NRM) Region to 2016. QLUMP has revised the 1999 mapping and derived land use change mapping for 1999–2016. Land use is classified under the Australian Land Use and Management (ALUM) classification.

Grazing native vegetation is the dominant land use class representing 89% of the Desert Channels NRM Region in 1999 and 88% in 2016. *Marsh/wetland* is the second most dominant land use representing 5% of the region in 1999 and 2016.

Analysis of the **net** primary land use changes between 1999 and 2016 shows:

- *Conservation and natural environments* increased by 905,893 hectares (ha) or 41%
- *Production from relatively natural environments* decreased by 909,193 ha or 2%
- *Production from dryland agriculture and plantations* increased by 44 ha or 118%
- *Production from irrigated agriculture and plantations* decreased by 38 ha or 4%
- *Intensive uses* increased by 2,849 ha or 13%
- *Water* increased by 442 ha or 0.01%.

Land use change mapping products are derived at the secondary level of the ALUM classification. For the 1999–2016 period, the total area of land use change within the Desert Channels NRM Region is **912,230 ha** or **1.8% of the region.** Of this, 907,531 ha (99.5%) is mapped as a decrease in land use intensity, whilst 4,698 ha (0.5%) is an increase.

Analysis of the 1999–2016 secondary land use change shows that a total of 910,514 ha has changed from *grazing native vegetation* in 1999 to:

- *managed resource protection*—with the establishment of numerous nature refuges including: Cravens Peak, Mulligan River, Ethabuka and Toko Range to the west of Boulia; Kynuna, south of Kynuna; Castlevale, north of Tambo; Lower Dinner Creek, south-west of Stonehenge; Blue Bush Channels, south-west of Winton; White Mountains regional park, north of Torrens Creek; Bellview, east of Barcaldine; and Gilmore, east of Windorah
- *nature conservation*—including new regional parks of: Lark Quarry, south of Winton; Elizabeth Springs, south-east of Boulia; and Combo, near Kynuna
- *production native forests*—Royton Timber Reserve
- new *cropping* south-west of Longreach and *irrigated cropping* south of Aramac, south-west of Winton and south-east of Torrens Creek
- *intensive animal production*—west of Mount Isa, north-west of Winton, south-west of Birdsville and north-west of Noccundra
- *manufacturing and industrial*—north of Longreach, north-east of Boulia and north of Birdsville
- *residential*—including: Longreach, Blackall, Tambo and Barcaldine
- *utilities*—new oil and gas developments north-west of Noccundra
- *mining*—including: Phosphate Hill mine south of Mt Isa; Osbourne mine north-east of Boulia; and Mt Dare mine south of Selwyn.

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Introduction

The Queensland Land Use Mapping Program (QLUMP) is part of the Australian Collaborative Land Use and Management Program (ACLUMP) coordinated by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). ACLUMP promotes nationally consistent land use information.

Land use and land management practices have a profound impact on Queensland's natural resources, agricultural production and the environment. The availability of consistent and reliable spatial information regarding land use is critical for sustainable natural resource management by Australian, Queensland and local governments, Natural Resource Management (NRM) regional groups, industry groups, community groups and land managers.

QLUMP has updated the land use mapping in the Desert Channels NRM Region to 2016. This report presents and summarises land use mapping including:

- a revised 1999 land use dataset including improvements and corrections to the original
- a 2016 land use dataset
- land use change dataset between 1999–2016
- summary statistics derived from the above spatial datasets
- results of the accuracy assessment of the 2016 land use dataset.

Methodology

Mapping is performed in accordance with ACLUMP guidelines. The methodology is accurate, reliable, cost-effective, and makes best use of available databases, satellite imagery and aerial photography.

The Australian Land Use and Management (ALUM) classification—version 8 (Figure 1, page 6) shows five primary classes, identified in order of increasing levels of intervention or potential impact of land use; water is included separately as a sixth primary class. Within the primary classes is a three-level hierarchical structure. Primary, secondary and tertiary levels broadly describe the potential degree of modification or impact of land use on the landscape.

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 infrastructure.

The secondary level in the three-level hierarchical structure is the minimum attribution level for land use mapping in Queensland—note that as an exception QLUMP consistently maps the land use classes of sugar and cotton (dryland and irrigated) to tertiary level. Under version 8 we have also mapped all intensive animal husbandry and residential land use classes to tertiary level.

The mapping scale is 1:50,000 with a minimum mapping unit of two hectares and a minimum mapping width of 50 metres for linear features.

The 1999 land use map was revised and improved in addition to compiling an updated land use map for 2016. This was achieved primarily by interpretation of Landsat 8 Operational Land Imager (OLI) and SPOT6/7 satellite imagery, high-resolution orthophotography, scanned aerial photography and inclusion of expert local knowledge. An ESRI ArcSDE geodatabase replication environment was used to overlay land use datasets on imagery and digitise or modify areas

previously omitted or incorrectly mapped in 1999. Land use change maps were then derived (at the secondary level of the ALUM classification) for the period 1999–2016.

Some land uses are difficult to differentiate using satellite imagery and existing databases, for example, dryland and irrigated agriculture. Therefore, local expert knowledge provided by state government regional staff, natural resource management groups, agricultural industries and landholders was an important component of the mapping methodology. Field surveys were also undertaken to verify areas of uncertainty.

The land use mapping methods used by QLUMP are described in full in the ABARES handbook: Guidelines for land use mapping in Australia: principles, procedures & definitions – Edition 4.

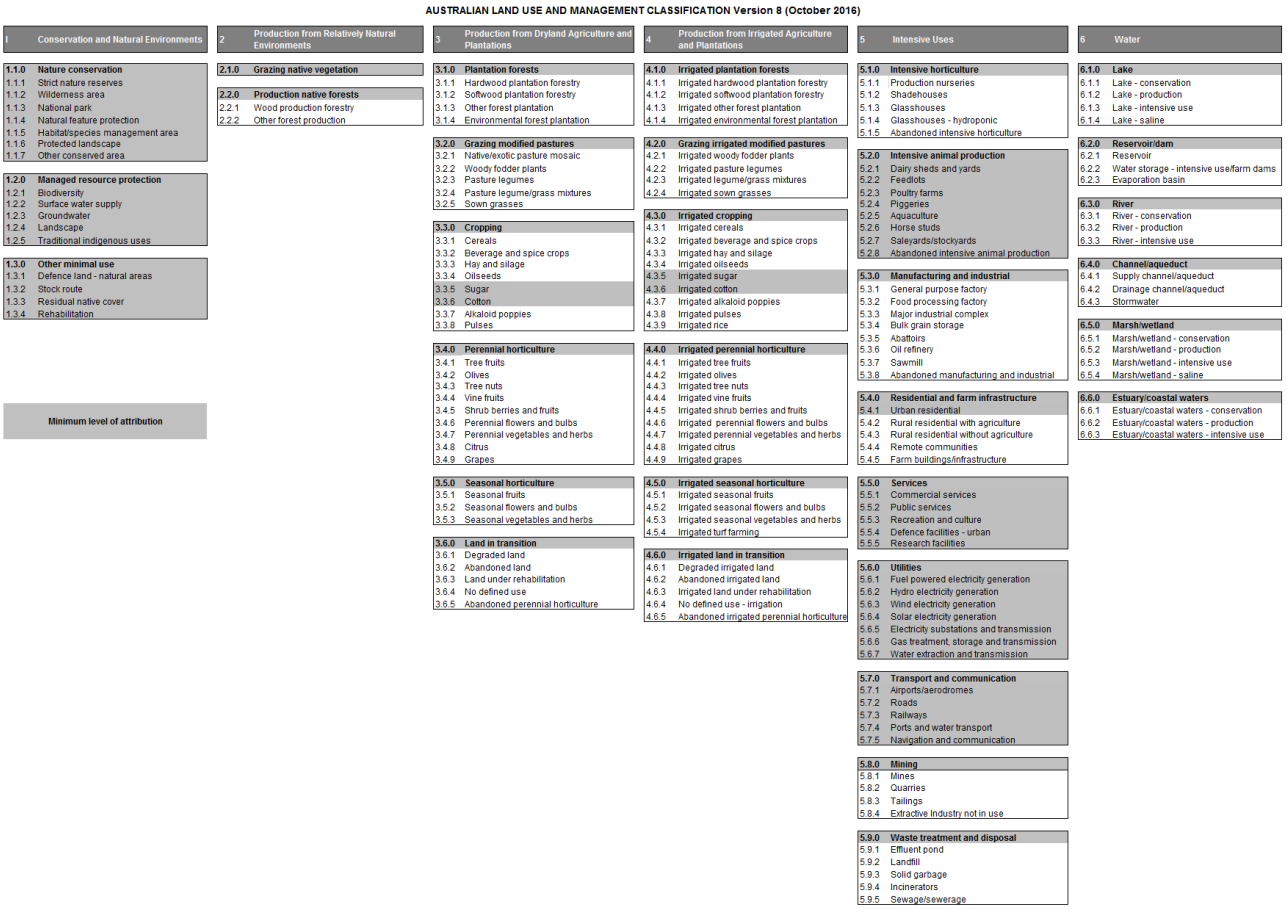


Figure 1: Australian Land Use and Management (ALUM) classification, Version 8

Data Limitations

Land use features that are narrow and linear such as roads, railways and rivers are not mappable at a scale of 1:50,000 with a specified minimum mapping width of 50 metres. As a result, the area estimates of these **linear features** represent only a small proportion of the actual area within the following land use classes: (Figure 2a)

- *transport and communication*
- *rivers*

Similarly, land uses that fall under the QLUMP minimum mapping area of two hectares are not explicitly mapped but aggregated into the surrounding land use class. This will have the effect of over-estimating the area of some land use classes, for example, *grazing native vegetation* where roads, drainage lines, and small dams are included (Figure 2b).

Livestock grazing occurs on a range of pasture types including native and exotic as well as mixtures of both. Identifying and separating these pasture types using imagery, aerial photography and field observation is difficult and unreliable. Therefore, the ALUM classification secondary land use classes of *grazing modified pastures* and *grazing irrigated modified pastures* have not been mapped explicitly from the *grazing native vegetation* class.

The distinction between (dryland) *cropping* and *irrigated cropping* was not always evident and it is likely there is some misclassification in these classes. QLUMP undertook field surveys and together with local knowledge confirmed areas of irrigation where possible. An areas proximity to water sources (watercourse or dam) was also used. In addition, areas mapped as *irrigated cropping* are potentially only irrigated on a supplementary basis and may not have been irrigated in 1999 or 2016 (Figure 2c and d).

The *rural residential* land use class is a source of possible thematic error. Properties on the fringes of suburban settlements, hobby farms and subdivisions in isolated localities with comparatively small lot sizes were mapped to this class. The use of the Queensland Valuation System (QVAS) data was helpful in mapping this class, based on whether or not the land owner was classified as a primary producer. Residential features greater than 0.2 hectares and less than 16 hectares were mapped as rural residential. This class may be misclassified with *grazing native vegetation* and *other minimal use*, especially on larger properties.

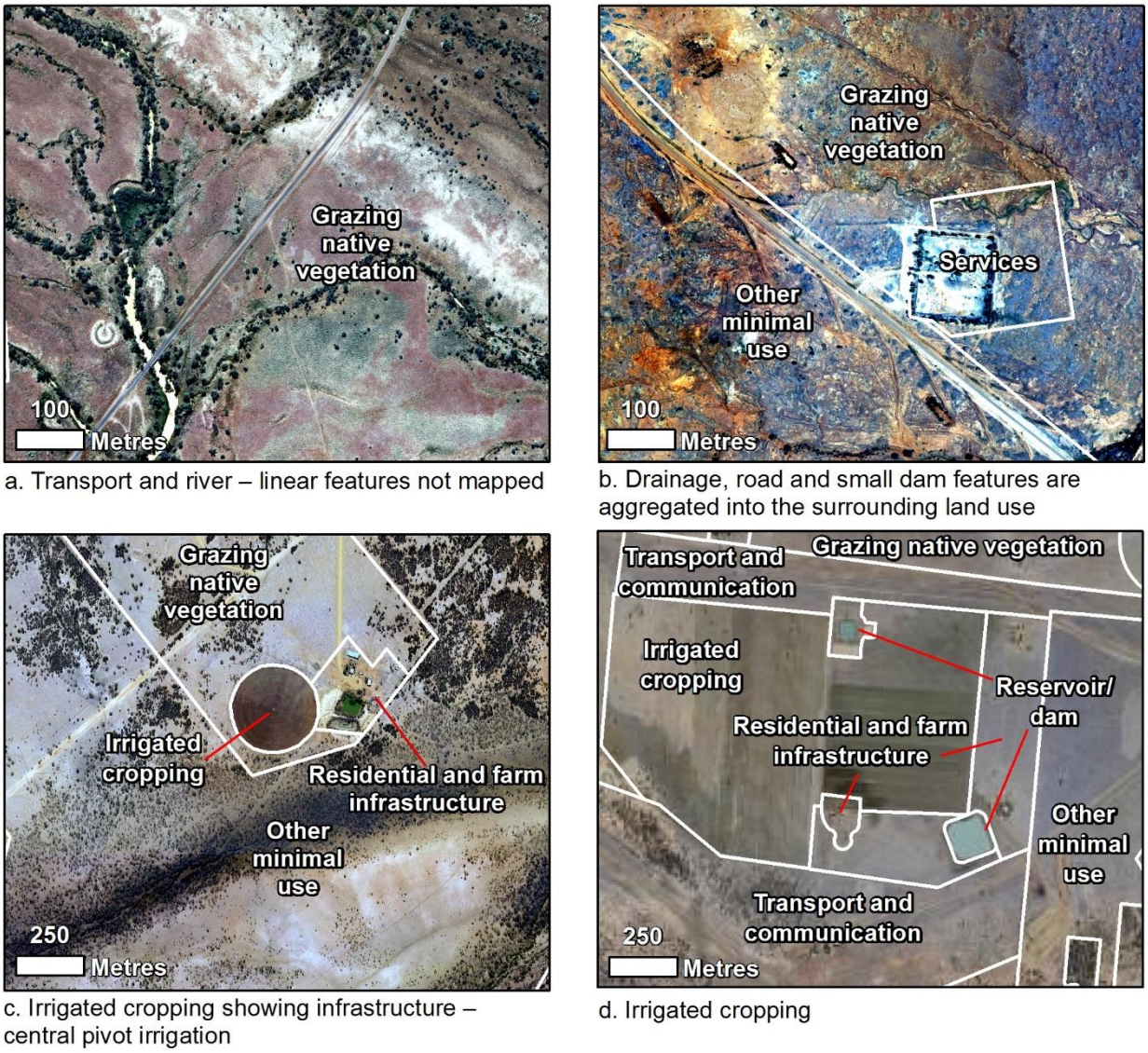
A combination of the Queensland Herbarium's wetlands datasets provided the basis for mapping *marsh/wetlands*, *lakes*, *rivers* and *reservoir/dams*. The ephemeral nature of many of these water features can lead to confusion as they may be present in one image and either absent or different in subsequent or earlier dated imagery. As a result, there may be errors, omissions and disagreement in the mapping of features such as farm dams, reservoirs, lakes, wetlands and other water features. The mapping of all *water* land use class features was greatly aided by the interpretation of 2016 Landsat 8 OLI satellite imagery.

The 1999 and 2016 land use datasets are a snapshot of what was interpreted as the primary land use in these years**.** However, effort was given to distinguish between an actual land use change and a rotation. For example, an area that is usually cropped, but is not used for that particular purpose in the year of interest, was still mapped as *cropping* in the 2016 dataset even though no crop was present in that year. This was not considered an actual land use change, but rather cropping rotation, as the primary land use for that field would still be *cropping.*

The 1999 land use mapping has been revised and improved through the interpretation of the most suitable imagery available. On occasion this was Landsat (30m), which causes uncertainty in

classifying the intensive land use classes. The minimum mapping unit (2 ha) also contributes to the uncertainty through the aggregation of otherwise individual land use features, particularly at cadastral parcel level. These limitations may therefore lead to omission and commission errors in the classification of the intensive land use classes in earlier mapping products and the land use change products.

The 2016 land use map was largely compiled from Landsat 8 OLI satellite imagery, acquired in winter 2016, supplemented by scanned aerial photography. The 1999 land use map was revised with Landsat 7 Enhanced Thematic Mapper Plus (ETM+) satellite imagery (30m) acquired in winter. This was also supplemented by scanned aerial photography where available.



a. Transport and river – linear features not mapped

b. Drainage, road and small dam features are aggregated into the surrounding land use

c. Irrigated cropping showing infrastructure – central pivot irrigation

d. Irrigated cropping

Figure 2: Examples (a–d) of land use features

Products

1999 and 2016 land use datasets

Land use datasets for the Desert Channels NRM Region are presented at the secondary level of the ALUM classification (Figure 1, page 6) in:

- the 1999 land use dataset—Figure 3
- the 2016 land use dataset—Figure 4

Summary statistics are presented for:

- 1999 land use—Table 1
- 2016 land use—Table 2

All statistics presenting the area of land use classes are reported in hectares (ha).

Grazing native vegetation and *marsh/wetland* are the dominant land use classes in the Desert Channels NRM Region.

Table 1 and Table 2 show that the *grazing native vegetation* land use class accounted for 89% of the Desert Channels NRM Region in 1999 and 88% in 2016. The *marsh/wetland* land use class accounted for 5% of the region in both 1999 and 2016.

Analysis of specific land use changes from one secondary class to another for 1999–2016 is presented on page 16.

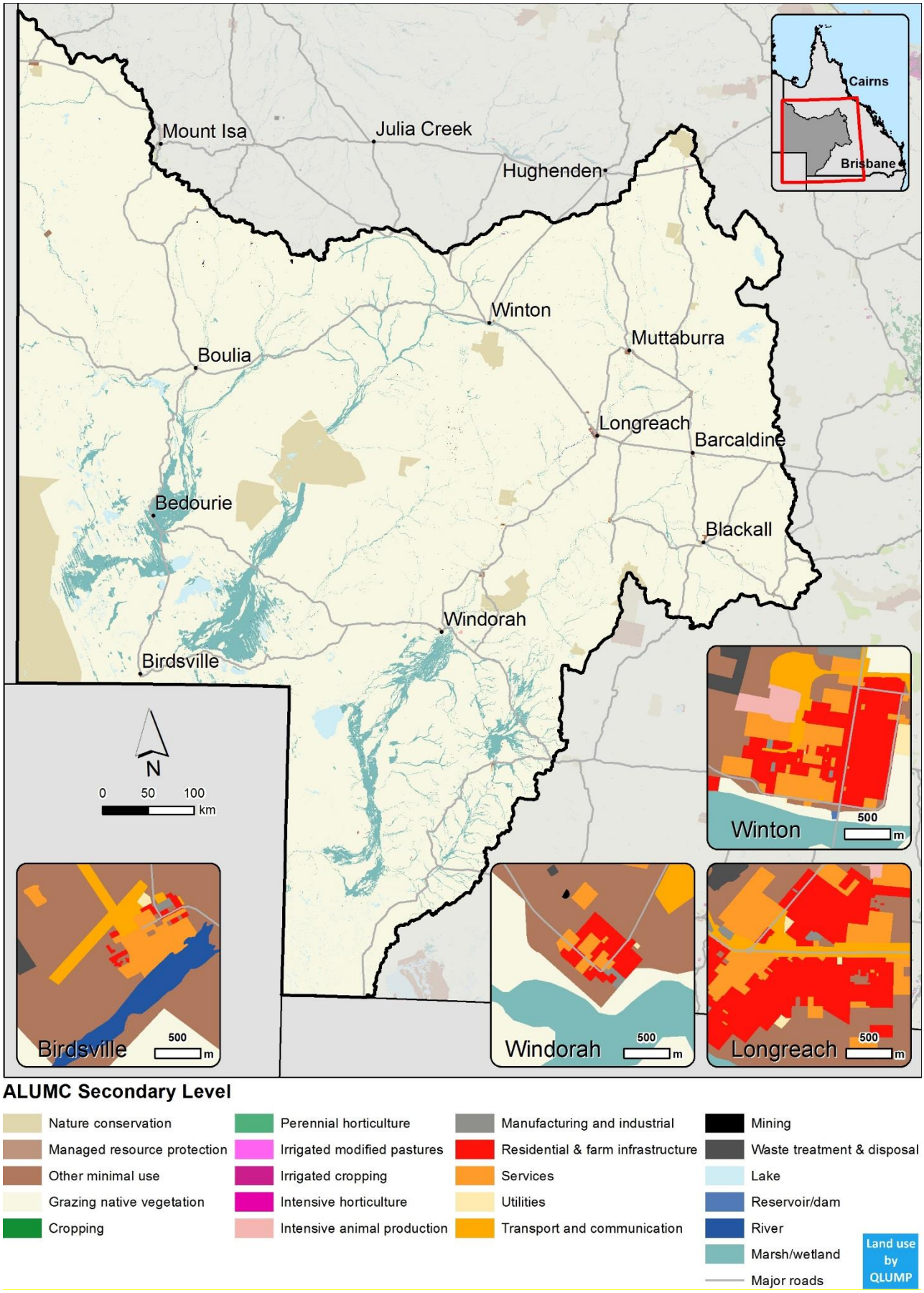


Figure 3: 1999 land use map for the Desert Channels NRM Region

Table 1: Summary statistics of land use in 1999 in the Desert Channels NRM Region

Land use code	Land use class	Area[2] (ha)	Area[2] (%)
1	**Conservation and natural environments**	**2,190,177**	**4.29**
1.1	Nature conservation	2,143,414	4.20
1.2	Managed resource protection	3	<0.01
1.3	Other minimal use	46,760	0.09
2	**Production from relatively natural environments**	**45,580,894**	**89.36**
2.1	Grazing native vegetation[1]	45,580,894	89.36
3	**Production from dryland agriculture and plantations**	**37**	**<0.01**
3.3	Cropping	33	<0.01
3.4	Perennial horticulture	4	<0.01
4	**Production from irrigated agriculture and plantations**	**914**	**<0.01**
4.2	Grazing irrigated modified pastures	123	<0.01
4.3	Irrigated cropping	791	<0.01
5	**Intensive uses**	**22,134**	**0.04**
5.1	Intensive horticulture	2	<0.01
5.2	Intensive animal production	1,505	<0.01
5.3	Manufacturing and industrial	220	<0.01
5.4	Residential and farm infrastructure	4,109	0.01
5.5	Services	4,555	0.01
5.6	Utilities	306	<0.01
5.7	Transport and communication	6,438	0.01
5.8	Mining	4,800	0.01
5.9	Waste treatment and disposal	199	<0.01
6	**Water**	**3,215,143**	**6.30**
6.1	Lake	540,653	1.06
6.2	Reservoir/dam	12,491	0.02
6.3	River	20,248	0.04
6.5	Marsh/wetland	2,641,751	5.18
Total		**51,009,298**	**100.00**

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]total figures for primary land use class may contain rounding errors.

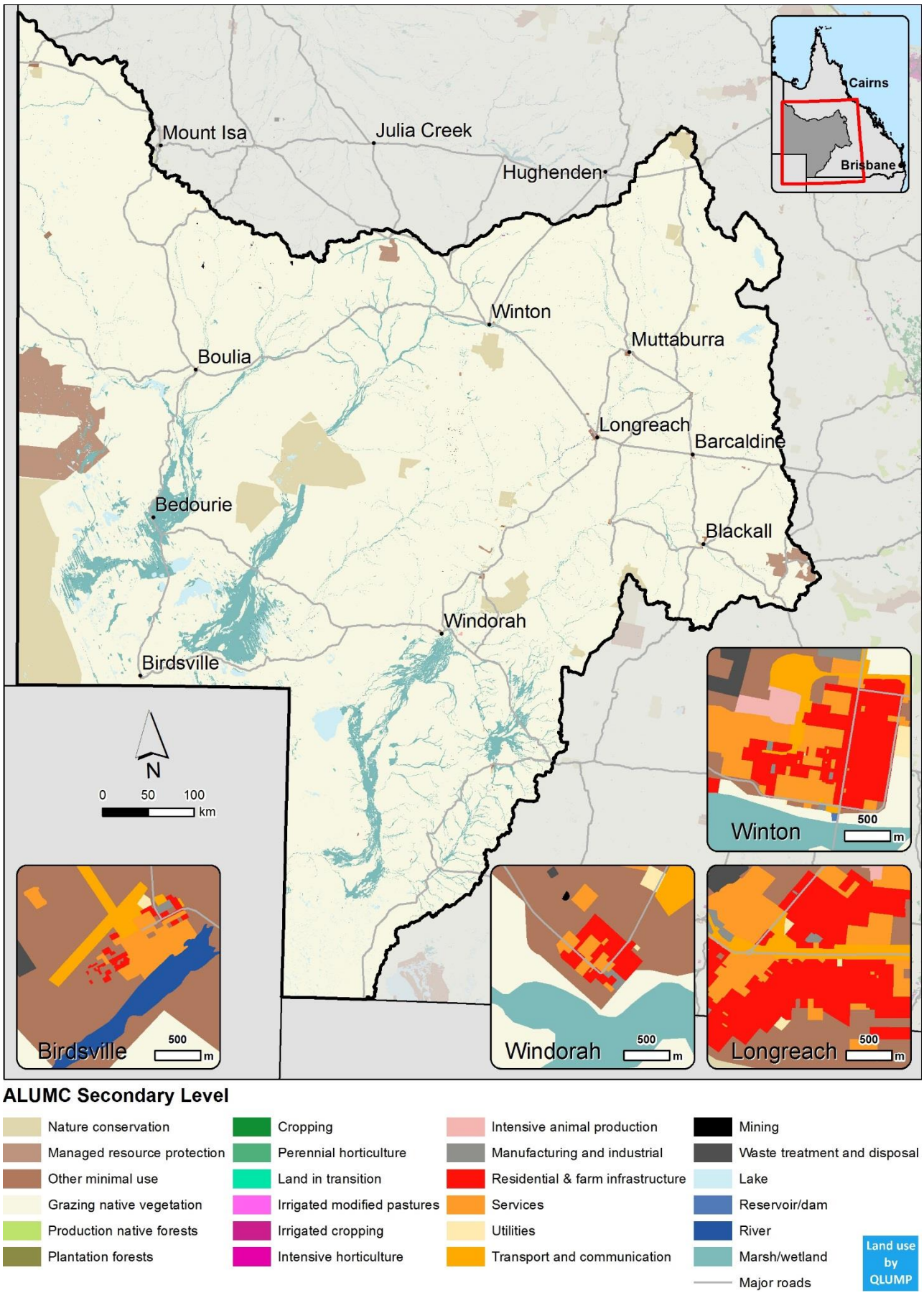


Figure 4: 2016 land use map for the Desert Channels NRM Region

Table 2: Summary statistics of land use in 2016 in the Desert Channels NRM Region

Land use code	Land use class	Area[2] (ha)	Area[2] (%)
1	**Conservation and natural environments**	**3,096,070**	**6.07**
1.1	Nature conservation	2,145,461	4.21
1.2	Managed resource protection	905,185	1.77
1.3	Other minimal use	45,424	0.09
2	**Production from relatively natural environments**	**44,671,701**	**87.58**
2.1	Grazing native vegetation[1]	44,671,399	87.58
2.2	Production native forests	303	<0.01
3	**Production from dryland agriculture and plantations**	**81**	**<0.01**
3.1	Plantation forests	2	<0.01
3.3	Cropping	65	<0.01
3.4	Perennial horticulture	12	<0.01
3.6	Land in transition	1	<0.01
4	**Production from irrigated agriculture and plantations**	**876**	**<0.01**
4.2	Grazing irrigated modified pastures	123	<0.01
4.3	Irrigated cropping	753	<0.01
5	**Intensive uses**	**24,983**	**0.05**
5.1	Intensive horticulture	2	<0.01
5.2	Intensive animal production	1,528	<0.01
5.3	Manufacturing and industrial	304	<0.01
5.4	Residential and farm infrastructure	4,606	0.01
5.5	Services	4,990	0.01
5.6	Utilities	530	<0.01
5.7	Transport and communication	6,494	0.01
5.8	Mining	6,292	0.01
5.9	Waste treatment and disposal	238	<0.01
6	**Water**	**3,215,585**	**6.30**
6.1	Lake	540,658	1.06
6.2	Reservoir/dam	12,976	0.03
6.3	River	20,248	0.04
6.5	Marsh/wetland	2,641,704	5.18
Total		**51,009,298**	**100.00**

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]total figures for primary land use class may contain rounding errors.

Overall (net) land use change

Figure 5 presents the overall (net) changes in land use within the Desert Channels NRM Region by primary land use class. The chart shows the net reduction or gain between 1999 and 2016, and sums to zero. Note y-axis is not to scale.

Analysis of the overall (**net**) land use summary for each land use map (1999 and 2016) by **primary land use class** shows that between 1999 and 2016 (Table 13):

- *Conservation and natural environments* increased by 905,893 ha or 41%
- *Production from relatively natural environments* decreased by 909,193 ha or 2%
- *Production from dryland agriculture and plantations* increased by 44 ha or 118%
- *Production from irrigated agriculture and plantations* decreased by 38 ha or 4%
- *Intensive uses* increased by 2,849 ha or 13%
- *Water* increased by 442 ha or 0.01%

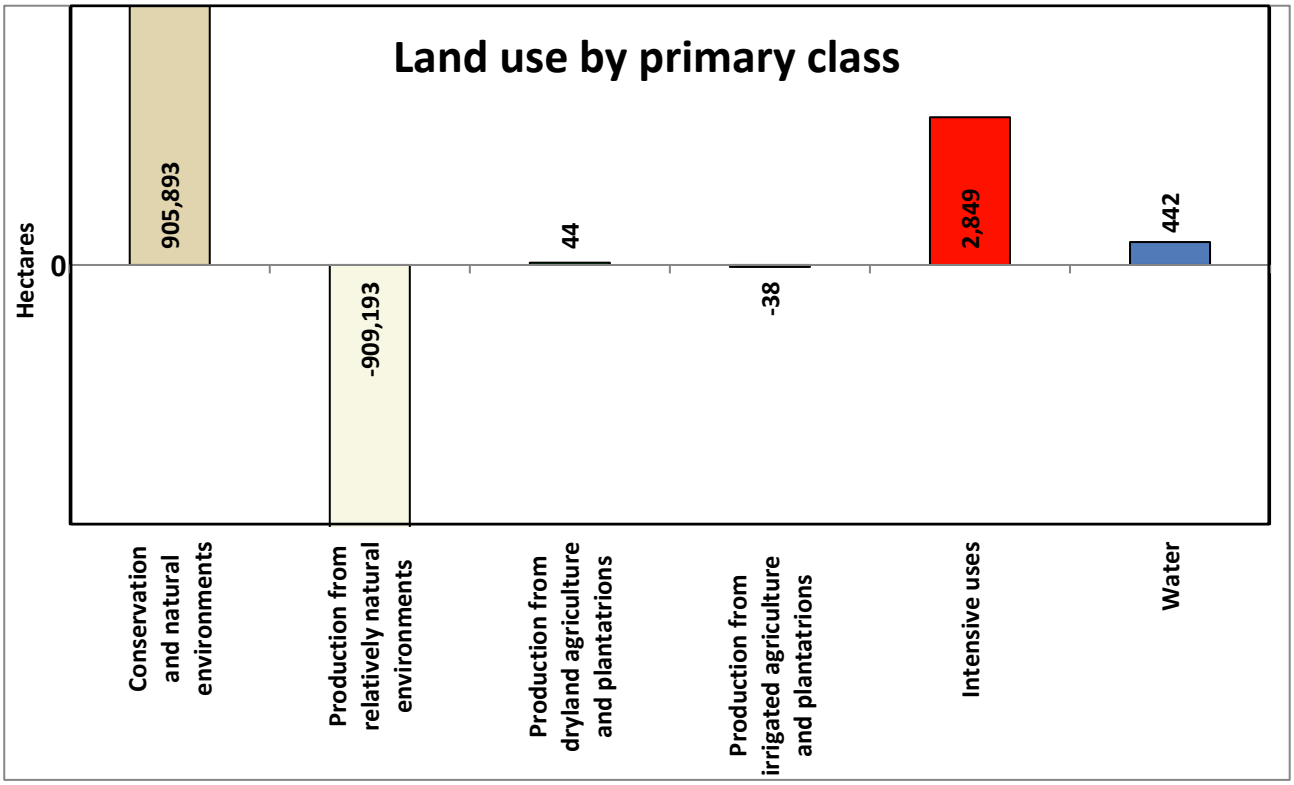


Figure 5: Net land use change by primary class (1999–2016) in the Desert Channels NRM Region

Further analysis of the **net** land use changes between 1999 and 2016 at the **secondary land use class** level shows (Table 3):

- *Managed resource protection* increased from 3 ha to 905,185 ha with the establishment of numerous nature refuges including: Cravens Peak, Mulligan River, Ethabuka and Toko Range to the west of Boulia; Kynuna, south of Kynuna; Castlevale, north of Tambo; Lower Dinner Creek, south-west of Stonehenge; Blue Bush Channels, south-west of Winton; White Mountains regional park, north of Torrens Creek; Bellview, east of Barcaldine; and Gilmore, east of Windorah.
- *Grazing native vegetation* decreased by 909,496 ha primarily due to the establishment of new nature refuges noted above, but also from changes to:
    - *nature conservation*—including new regional parks of: Lark Quarry, south of Winton; Elizabeth Springs, south-east of Boulia; and Combo, near Kynuna
    - *production native forests*—Royton Timber Reserve
    - new *cropping* south-west of Longreach and *irrigated cropping* south of Aramac, south-west of Winton and south-east of Torrens Creek
    - *intensive animal husbandry*—west of Mount Isa, north-west of Winton, south-west of Birdsville and north-west of Noccundra
    - *manufacturing and industrial*—north of Longreach, north-east of Boulia and north of Birdsville
    - *residential*—north of Longreach, Blackall, Tambo and Barcaldine
    - *utilities*—new oil and gas developments north-west of Noccundra
    - new *mining* activities including: Phosphate Hill south of Mount Isa; Osbourne Mine South of Selwyn and south-west of Gunpowder
    - *waste treatment and disposal*—near Tambo, Dajarra and north of Longreach.
- Within the *intensive uses* primary land use class, each of the secondary land use classes increased between 1999 and 2016, including:
    - *intensive animal production* by 23 ha
    - *manufacturing and industrial* by 84 ha—in Tambo, Birdsville and Longreach
    - *residential* by 496 ha—in Longreach, Barcaldine, Winton, Camooweal, Bedourie, Blackall, Illfracombe, Urandangi and Prairie
    - *services* by 435 ha—in Winton, Longreach, Boulia and Barcaldine
    - *utilities* by 224 ha—including new oil/gas facilities in the south of the region and a new solar farm in Windorah
    - *transport and communication* by 56 ha—including the expansion of airports at Boulia, Bedourie and Longreach
    - *mining* by 1,491 ha—including new quarries in Betoota, Birdsville and Muttaburra.
- *Reservoir/dam* increased by 485 ha—a feature count of individual dams shows that 105 were newly constructed, with a total of 2,188 individual features mapped in 2016.

Table 3: Net land use changes by primary and secondary class 1999–2016

Land use code	Primary land use class	1999 Area[2] (ha)	2016 Area[2] (ha)	Difference[2] (ha)	Difference (%)
1	**Conservation and natural environments**	**2,190,177**	**3,096,070**	**905,893**	**41.36**
1.1	Nature conservation	2,143,414	2,145,461	2,047	0.10
1.2	Managed resource protection	3	905,185	905,182	
1.3	Other minimal use	46,760	45,424	-1,336	-2.86
2	**Production from relatively natural environments**	**45,580,894**	**44,671,701**	**-909,193**	**-1.99**
2.1	Grazing native vegetation[1]	45,580,894	44,671,399	-909,496	-2.00
2.2	Production native forests	0	303	303	
3	**Production from dryland agriculture and plantations**	**37**	**81**	**44**	**118.78**
3.1	Plantation forests	0	2	2	
3.3	Cropping	33	65	32	97.84
3.4	Perennial horticulture	4	12	8	184.44
3.6	Land in transition	0	1	1	
4	**Production from irrigated agriculture and plantations**	**914**	**876**	**-38**	**-4.16**
4.2	Grazing irrigated modified pastures	123	123	0	0.00
4.3	Irrigated cropping	791	753	-38	-4.80
5	**Intensive uses**	**22,134**	**24,983**	**2,849**	**12.87**
5.1	Intensive horticulture	2	2	0	0.00
5.2	Intensive animal production	1,505	1,528	23	1.53
5.3	Manufacturing and industrial	220	304	84	38.23
5.4	Residential	4,109	4,606	496	12.07
5.5	Services	4,555	4,990	435	9.55
5.6	Utilities	306	530	224	73.28
5.7	Transport and communication	6,438	6,494	56	0.87
5.8	Mining	4,800	6,292	1,491	31.06
5.9	Waste treatment and disposal	199	238	39	19.59
6	**Water**	**3,215,143**	**3,215,585**	**442**	**0.01**
6.1	Lake	540,653	540,658	5	0.00
6.2	Reservoir/dam	12,491	12,976	485	3.88
6.3	River	20,248	20,248	0	0.00
6.5	Marsh/wetland	2,641,751	2,641,704	-48	0.00

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]total figures for primary land use class may contain rounding errors.

Land use change 1999–2016

Table 5 and Figure 6 show the land use changes within the Desert Channels NRM Region. Figure 6 has been presented relative to the **change in intensity** of the land use at the secondary level of the ALUM classification. For example, change from 2.1.0 (*grazing native vegetation*) to 3.3.0 (*cropping)* is an increase in land use intensity, whilst change from 2.1.0 (*grazing native vegetation*) to 1.1.0 (*nature conservation*) is a decrease. This is highlighted in the ALUM classification (Figure 1, page 6). Moving down and from left to right through the classification, the level of intervention or potential impact of land use increases.

For the 1999–2016 period at the secondary level of the ALUM classification, the total area of land use change within the Desert Channels NRM Region is **912,230 ha** or **1.8% of the region.** Of this, 907,531 ha (99.5%) is mapped as a decrease in land use intensity, whilst 4,698 ha (0.5%) is an increase (Table 4).

Table 4: 1999–2016 intensity and total change within the Desert Channels NRM Region

Land use change 1999–2016 Intensity	Area[1] (ha)	Area (%)
Increase	4,698	0.5
Decrease	907,531	99.5
Total	**912,230**	**1.8**

[1]total figures for primary land use class may contain rounding errors.

Summary statistics presenting the land use change at the secondary level for 1999–2016 are shown in Table 4. This table illustrates the land use changes between 1999 and the updated land use map for 2016. For example, 98 ha of *grazing native vegetation* land use in 1999 changed to *irrigated cropping* land use in 2016.

Analysis of the land use change <u>from</u> selected land use classes in 1999 shows:

- 910,514 ha of *grazing native vegetation* in 1999 changed to:
    - *managed resource protection* (905,182 ha)—with the establishment of new nature refuges including: Cravens Peak (226,707 ha), Ethabuka (203,398 ha), Mulligan River (181,913 ha), and Toko Range (155,790 ha)—west of Boulia; Kynuna (36,708 ha) south of Kynuna; Castlevale (93,909 ha) north of Tambo; Lower Dinner Creek (3,865 ha) south-west of Stonehenge; Blue Bush Channels (882 ha) south-west of Winton; White Mountains regional park (837 ha) north of Torrens Creek; Bellview (1,126 ha) east of Barcaldine; and Gilmore (41 ha) east of Windorah
    - *nature conservation* (1,872 ha)—with the establishment of Lark Quarry regional park south of Winton (1,007 ha), numerous camping and water reserves (714 ha), Elizabeth Springs regional park south-east of Boulia (101 ha) and Combo regional park (49 ha) near Kynuna
    - *production native forests* (303 ha) with the creation of the Royton Timber Reserve
    - *cropping* (55 ha) south-west of Longreach
    - *irrigated cropping* (98 ha)—including 51 ha south of Aramac, 31 ha south-west of Winton and 16 ha south-east of Torrens Creek

  - *residential* (366 ha)—including 164 ha north of Longreach; Blackall (75 ha), Tambo (30 ha) and Barcaldine (26 ha)
  - *utilities* (192 ha)—new gas and oil north of Noccundra (186 ha) and west of Urandangi (6 ha)
  - *mining* (1,497 ha)—including: Phosphate Hill (614 ha) south of Mt Isa; Osbourne mine (177 ha) north-east of Boulia; and Mt Dare mine south of Selwyn (143 ha)
  - *transport and communication* (68 ha)—as airports were expanded or built at Ilfracombe (22 ha), between Betoota and Birdsville (17 ha), between Longreach and Muttaburra (7 ha), north-west of Quilpie (7 ha), north of Muttaburra (6 ha), south of Jericho (3 ha), north-west of Adavale (3 ha) and between Blackall and Tambo (3 ha)
  - *waste treatment and disposal* (18 ha)—including Tambo (12 ha), Dajarra and north of Longreach
  - *reservoir/dams* (445 ha)
- 1,343 ha of *other minimal use* in 1999 changed to:
  - *nature conservation* (145 ha) with the establishment of an environmental reserve near Longreach
  - *grazing native vegetation* (744 ha)
  - *irrigated cropping* (106 ha)—near Blackall
  - *residential and farm infrastructure* (116 ha)—including: Longreach (45 ha); Barcaldine (23 ha); Winton (11 ha); Camooweal (12 ha); Bedourie (7 ha); Blackall (5 ha); Ilfracombe (6 ha); Urandangi (2 ha); and Prairie (2 ha)
  - *utilities* (33 ha)—including 27 ha of oil/gas facilities and a new *solar electricity generation* land use in Windorah (5 ha)
  - *transport and communication (*11 ha)—including the expansion of Boulia airport (5 ha), Bedourie airport (4 ha) and 1 ha in Longreach
  - *mining* (10 ha)—with new quarries established in Betoota (4 ha), Birdsville (4 ha) and Muttaburra (2 ha)
  - *waste treatment and disposal* (25 ha)—including 7 ha south-east of Jundah, 4 ha west of Muttaburra, 6 ha south-west of Ilfracombe, 4 ha north of Eromanga, 3 ha north of Longreach and 2 ha west of Birdsville
  - *reservoir/dams* (26 ha)

Analysis of the land use change to selected land use classes in 2016 shows:

- 905,182 ha of *managed resource protection* in 2016 changed, all of which came from the *grazing native vegetation* land use class in 1999—as discussed above with the establishment of nature refuges throughout the region.

- 2,064 ha of *nature conservation* in 2016 changed from:

    - *grazing native vegetation* (1,872 ha)—Lark Quarry regional park (1,007 ha), camping and water reserves (715 ha), Elizabeth Springs regional park (101 ha), and Combo regional park (49 ha)

    - *other minimal use* (145 ha) and *marsh/wetland* (48 ha)—as a new environmental reserve was established near Longreach

- 1,020 ha of *grazing native vegetation* in 2016 changed from:

    - *other minimal use* (744 ha)—from the removal of *residual native vegetation* east of Blackall

    - *irrigated cropping* (242 ha) south-east of Torrens Creek

    - *transport and communication* (20 ha) as an airport south of Aramac was abandoned

    - *cropping* (15 ha) with cessation in production south of Jericho.

Table 5: Summary statistics for land use change at secondary class for 1999–2016 in the Desert Channels NRM Region

Land use change 1999–2016		2016 land use (ha)																				
		Nature conservation	Managed resource protection	Other minimal use	Grazing native vegetation	Production native forests	Plantation forests	Cropping	Perennial horticulture	Land in transition	Irrigated cropping	Intensive animal production	Manufacturing and industrial	Residential & farm infrastructure	Services	Utilities	Transport and communication	Mining	Waste treatment and disposal	Lake	Reservoir/dam	**Total[1]**
1999 land use (ha)	Nature conservation													17								**17**
	Other minimal use	145			744						106		51	116	78	33	11	10	25		26	**1,343**
	Grazing native vegetation	1,872	905,182			303	2	55			98	23	33	366	357	192	68	1,497	18	5	445	**910,514**
	Cropping				15				8													**23**
	Irrigated cropping				242																	**242**
	Residential & farm infrastructure			1											1							**2**
	Utilities									1												**1**
	Transport & communication			3	20																	**23**
	Mining																				15	**15**
	Waste treatment and disposal			4																		**4**
	Marsh/wetland	48			0																	**48**
	Total[1]	**2,064**	**905,182**	**7**	**1,020**	**303**	**2**	**55**	**8**	**1**	**204**	**23**	**84**	**498**	**435**	**225**	**79**	**1,506**	**43**	**5**	**485**	**912,230**

[1]total figures may contain rounding errors.

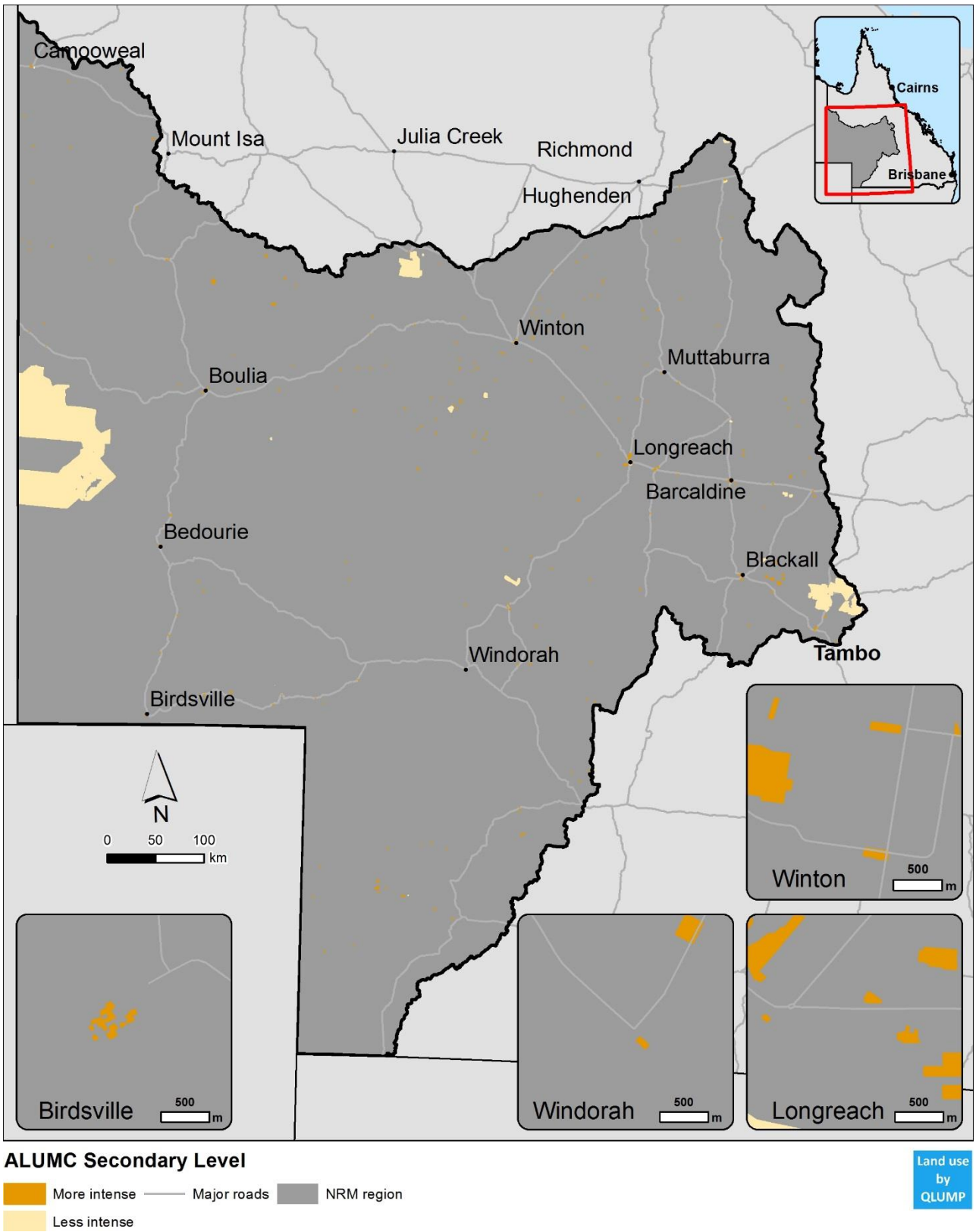


Figure 6: 1999–2016 land use change map at secondary class for the Desert Channels NRM Region

Data format and availability

Download land use datasets

Use the Queensland Spatial Catalogue QSpatial to access land use data sets. Search for **"land use mapping"** in the search term field then refine your results by selecting the **“Planning Cadastre”** filter from the choose categories field. Metadata is also available from QSpatial.

The dataset comprises an ESRI vector geodatabase (10.4.1) at a nominal scale of 1:50,000. Within this are three feature classes: 1999 improved land use, 2016 updated land use and 1999–2016 land use change. The feature classes are polygon datasets with attributes describing land use. Land use is classified according to the Australian Land Use and Management Classification (ALUMC) Version 8, October 2016. Note: a representation showing land use at secondary level is available when working within a geodatabase. Layer files are also available to present the land use mapping at primary, secondary or tertiary level.

Digital Data is supplied with a licence and by using the data you confirm that you have read the licence conditions included with the data and that you agree to be bound by its terms.

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View land use data online

The most current land use web map can be viewed online via the QLUMP website.

Map and feature services

Use the Queensland Spatial Catalogue QSpatial to access the web mapping services of the state-wide land use layer. Search for **"land use mapping"** in the search term field then refine your results by using the *choose content type* filter and selecting **“Service”**.

Request a land use map

It is possible to request a land use map from the QLUMP website based upon a specific location (lot on plan, street address or central latitude/longitude coordinates) in Queensland. The land use maps are emailed in portable document format (PDF).The maps present the most recent land use information available at the secondary level of the ALUMC.

Appendix A Accuracy assessment

The accuracy assessment provided reference data suitable for assessing the 2016 land use map. For each of the sample points, the true land use class was independently determined (this provided the reference data) based on desktop interpretation of the same imagery and ancillary datasets available to the mapper. These points were then compared to the mapped class (map data) and the information summarised in the error matrix. The accuracy is summarised in terms of total accuracy, Kappa and user's and producer's accuracies. Each accuracy parameter is reported using a point estimate and a 95% posterior interval. Accuracy figures are provided as probabilities between 0 and 1.

Total accuracy provides an estimate of the overall accuracy of the map, and can be expressed as the probability that a point is mapped correctly. However, the total accuracy may be misleading, particularly when a dominant class exists. The Kappa statistic attempts to overcome this problem by adjusting for chance agreement. A common rule of thumb suggests that a value of Kappa between 0.6 and 0.8 represents moderate agreement between the map and the ground truth, a value greater than 0.8 suggests strong agreement. Values less than 0.2 suggest the map is only marginally improved compared to a map produced by random allocation.

The user's and producer's accuracies summarise the map's accuracy on a per-class basis. User's accuracy for class A is the probability that a point mapped as A is truly in class A. If the user's accuracy of class A is estimated to be 0.84, then from a random sample of 100 points chosen from areas on the map in this class, approximately 84 would be found to be correct when checked in the field. Producer's accuracy for class B is the conditional probability that the map will show a site as class B given its true state is class B. If the producer's accuracy for class B were 0.84, then from a random sample of 100 points known to be in class B, approximately 84 would also be in class B according to the map. An accurate map should have both high user's and producer's accuracies.

The per-class estimates of accuracy are often not precise, as only part of the total sample points are used to estimate them. As a guide, if the upper bound of the interval for either user's or producer's accuracy is less than 0.5, this may indicate a true misclassification problem rather than inadequacies in sample size.

Points that differ between the map and the reference data may be due to positional or spatial errors. Inaccurate registration of datasets is an example of spatial error. Spatial errors influence thematic accuracy. Thematic errors are the incorrect labelling of an area due to difficulties in determining the true land use in that area, or by oversight or other operational errors. The purpose is to assess the thematic accuracy of land use data. However, as described above, the separation of spatial and thematic errors may be difficult and were not undertaken. As a result, the accuracy assessment reflects properties of the land use data as a whole.

Note: the revised 1999 land use and the land use change data were not accuracy assessed.

2016 land use dataset

The 2016 land use dataset was accuracy assessed with 406 points based on a stratified random sampling strategy, using the map classes (area and frequency) as the strata. The estimate of total accuracy is 0.91 (0.85, 0.96) and Kappa is 0.7 (0.55, 0.83). As the lower bound of the confidence interval for total accuracy is greater than 0.8, the mapping meets the ACLUMP specification.

Table 6 shows the error matrix for the accuracy assessment of the 2016 land use data. For the majority of classes, the reference data agreed with the map data. For example, *grazing native vegetation* had 70 sample points identified. For 65 of those points, the map data was also *grazing native vegetation* and therefore correct. For the five points where the map data was incorrect, one point was found to be *lake*, one point as *river* and three classified as *marsh/wetland.* Misclassifications reflect both thematic and spatial errors.

The matrix illustrates the difficulty in mapping (classification) of *grazing native vegetation* and *marsh/wetland* in the Desert Channels NRM Region. Of the 70 sample points identified in the *grazing native vegetation* land use class—three were assessed as *marsh/wetland*, and of the 70 points assessed in *marsh/wetland* land use class—six were assessed as *grazing native vegetation.*

The column 'Proportion' in Table 6 is the relative proportion in area of the classes that were assessed, not of the catchment as a whole. The areas of other classes that are not assessed, for example, *grazing irrigated modified pastures* are removed from the total area before the proportions are calculated. This column totals 100%.

Table 7 provides the user's and producer's accuracy for the 2016 Desert Channels NRM Region land use dataset. This demonstrates the majority of land use classes in the catchment have been mapped accurately. The largest assessable land use class in this catchment is *grazing native vegetation* which has been mapped with very high user's and producer's accuracies of 0.92 and 0.995 respectively. The error matrix (Table 6) provides more detail on the misclassifications.

Accuracy estimates based on samples with fewer than two points are not considered sufficiently reliable, and are presented as NA (not available) in the table, an example being *production native forests.*

The user's and producer's accuracy results should be interpreted individually for their respective classes. It should be noted that the classes with a small area in proportion to the total area assessed, and also a small sample size, will return a wide confidence interval. The overall accuracy shows a much tighter confidence interval as it effectively summarises the accuracy results for all the assessable classes.

Some classes with low accuracies have insufficient sample points to provide precise estimates. For example, the user's accuracy for *residential and farm infrastructure* is 0.766—however from the 95% interval (0.487, 0.942) it can be seen that more sample points would be required to confidently determine class accuracy.

Table 6: Error matrix for the Desert Channels NRM Region 2016 land use dataset

Map data	Reference data: Nature conservation	Managed resource protection	Other minimal uses	Grazing native vegetation	Production native forests	Plantation forests	Cropping	Perennial horticulture	Irrigated cropping	Intensive horticulture	Intensive animal production	Manufacturing & industrial	Residential & farm infra.	Services	Utilities	Transport & communication	Mining	Waste treatment & disposal	Lake	Reservoir/dam	River	Marsh/wetland	Total	Proportion (%)
Nature conservation	**19**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**20**	4.21
Managed resource protection	0	**20**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**20**	1.77
Other minimal uses	0	0	**12**	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	**15**	0.09
Grazing native vegetation	0	0	0	**65**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	**70**	87.58
Production native forests	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	<0.01
Plantation forests	0	0	0	1	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	<0.01
Cropping	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	<0.01
Perennial horticulture	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	<0.01
Irrigated cropping	0	0	0	0	0	0	0	0	**8**	0	0	0	0	0	0	2	0	0	0	0	0	0	**10**	<0.01
Intensive horticulture	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	**1**	<0.01
Intensive animal production	0	0	0	0	0	0	0	0	0	0	**9**	0	1	0	0	0	0	0	0	0	0	0	**10**	<0.01
Manufacturing and industrial	0	0	0	0	0	0	0	0	0	0	0	**8**	0	1	0	0	1	0	0	0	0	0	**10**	<0.01
Residential & farm infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	**9**	1	0	0	0	0	0	0	0	1	**11**	0.01
Services	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	0	0	0	0	0	0	0	0	**10**	0.01
Utilities	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**7**	0	0	0	0	0	0	2	**10**	<0.01
Transport and communication	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**9**	0	0	0	0	0	0	**10**	0.01
Mining	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**9**	0	0	1	0	0	**11**	0.01
Waste treatment and disposal	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**9**	0	0	0	0	**10**	<0.01
Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**68**	0	1	1	**70**	1.06
Reservoir/dam	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**28**	0	0	**29**	0.03
River	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**11**	3	**15**	0.04
Marsh/wetland	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	**57**	**70**	5.18
Total	**20**	**20**	**13**	**76**	**1**	**0**	**1**	**1**	**8**	**1**	**9**	**9**	**10**	**13**	**7**	**11**	**10**	**9**	**73**	**29**	**17**	**68**	**406**	**100**

Table 7: User's and producer's accuracy for the Desert Channels NRM Region 2016 land use dataset

Class	User's			Producers		
	Estimate	95% interval		Estimate	95% interval	
Nature conservation	0.921	0.758	0.989	0.998	0.862	1
Managed resource protection	0.968	0.838	0.999	0.998	0.742	1
Other minimal uses	0.76	0.524	0.923	0.916	0.092	0.995
Grazing native vegetation	0.92	0.842	0.969	0.995	0.99	0.998
Production native forests	NA	NA	NA	NA	NA	NA
Plantation forests	NA	NA	NA	NA	NA	NA
Cropping	NA	NA	NA	NA	NA	NA
Perennial horticulture	NA	NA	NA	NA	NA	NA
Irrigated cropping	0.744	0.454	0.933	0.17	0.002	0.982
Intensive horticulture	NA	NA	NA	NA	NA	NA
Intensive animal production	0.842	0.564	0.978	0.334	0.004	0.992
Manufacturing and industrial	0.747	0.449	0.929	0.073	0.001	0.877
Residential and farm infrastructure	0.766	0.487	0.942	0.554	0.011	0.978
Services	0.937	0.706	0.998	0.397	0.014	0.85
Utilities	0.645	0.354	0.88	0.112	0.001	0.964
Transport and communication	0.843	0.56	0.976	0.669	0.016	0.982
Mining	0.771	0.481	0.945	0.633	0.013	0.994
Waste treatment and disposal	0.843	0.577	0.975	0.078	0.001	0.947
Lake	0.962	0.9	0.991	0.455	0.175	0.791
Reservoir/dam	0.945	0.826	0.991	0.788	0.033	0.988
River	0.7	0.454	0.883	0.019	0.005	0.076
Marsh/wetland	0.807	0.709	0.885	0.545	0.318	0.826