



# A Biodiversity Planning Assessment for the Brigalow Belt Bioregion

Version 2.1  
Summary Report

Prepared by: Biodiversity Assessment, Conservation and Biodiversity Strategy, Department of Environment and Science.

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# Contents

1	Introduction .....	5
1.1	Biodiversity Planning Assessments .....	5
1.2	Brigalow Belt study area .....	6
2	Methods and implementation .....	9
2.1	BAMM .....	9
2.2	Datasets .....	10
2.3	Expert panels .....	10
2.4	Implementation .....	11
2.5	Assessment parameters .....	12
2.6	Transparency of results .....	15
2.7	Filter table .....	16
3	Results .....	19
3.1	Conservation value categories .....	19
3.2	Positional accuracy .....	19
3.3	BRB bioregion overall results .....	19
3.4	Diagnostic results.....	24
3.4.1	Overall diagnostic criteria results .....	24
3.4.2	Hit analysis.....	26
3.5	Expert panel results .....	27
3.5.1	Overall expert panel results .....	27
3.5.2	Criterion H (priority taxa habitat) results .....	29
3.5.3	Other expert panel criteria .....	29
3.5.4	Criterion I sub-criteria results .....	29
3.6	Assessment caveats and limitations .....	32
4	Summary and recommendations .....	33
5	References .....	34

Nb. This report should be read in conjunction with the accompanying Expert Panel Report - A Biodiversity Planning Assessment for the Brigalow Belt Bioregion: Expert Panel. Version 2.1 (DES 2018).

## List of tables

Table 1. Subregions of the Brigalow Belt bioregion.....	6
Table 2. BAMB criteria .....	9
Table 3. List of datasets used in the BRB BPA .....	10
Table 4. BAMB method changes implemented in BRB BPA Version 2.1 and SEQ BPA Version 4.1 .....	11
Table 5. Criterion C subregion thresholds implemented in BRB BPA.....	12
Table 6. Filter table used for the BRB BPA .....	17
Table 7. Diagnostic criteria hit analysis results. (Query number as per Table 6).....	26
Table 8. Criterion H (Priority taxa habitat) results as percentage of remnant vegetation.....	29
Table 9. Criteria I, J, K Biodiversity Significance results as percentage of remnant vegetation .....	29
Table 10. Criterion I sub-criteria results as percentage of remnant vegetation.....	29

## List of figures

Figure 1. The Brigalow Belt Bioregion .....	8
Figure 2. Interrogating the BPA results for a spatial unit in the GIS environment.....	15
Figure 3. Summary of overall biodiversity significance as a proportion of remnant vegetation .....	20
Figure 4. Overall biodiversity significance .....	21
Figure 5. Diagnostic and expert panel criteria results .....	23
Figure 6. Summary of biodiversity assessment diagnostic criteria results as a proportion of remnant vegetation.....	24
Figure 7. Diagnostic criteria biodiversity significance .....	25
Figure 8. Summary of biodiversity assessment expert panel criteria results .....	27
Figure 9. Expert panel criteria biodiversity significance .....	28
Figure 10. Criterion I special biodiversity values .....	31

# 1 Introduction

Queensland's Brigalow Belt bioregion is a nationally recognised biodiversity hotspot (DEE 2017) and is the largest bioregion in the State. This report describes the scientific methodology that underpins the Biodiversity Planning Assessments (BPA) and summarises the overall results of the BPA for the Brigalow Belt bioregion (BRB). BPAs are periodically repeated as new information becomes available, underlying data layers change and resources permit.

## 1.1 Biodiversity Planning Assessments

The Biodiversity Assessment and Mapping Methodology (BAMM, EHP 2014) provides a consistent approach for assessing biodiversity values at the landscape scale in Queensland. The BAMM is based on vegetation mapping produced by the Queensland Herbarium. It incorporates a range of biodiversity related data and is focused primarily on assessing terrestrial values. The Department of Environment and Science (DES) uses the methodology to generate BPAs for each of Queensland's bioregions.

The BAMM involves two stages. The first stage uses existing data to assess ecological concepts such as rarity, diversity, fragmentation, habitat condition, resilience, threats and ecosystem processes in a uniform and repeatable way across a bioregion. These criteria are used to filter available data and provide an initial determination of significance. This part of the assessment is generated using a geographic information system (GIS). The second stage uses expert opinion to refine the first-stage results and identify features such as wildlife corridors and areas with special biodiversity value, e.g. centres of endemism or wildlife refugia.

BPAs have been completed for 11 bioregions within Queensland. They provide a source of baseline conservation and ecological information to support natural resource management and planning processes. They can be used as an independent product or as an important foundation for adding and considering a variety of additional environmental and socio-economic elements (i.e. an early input to broader 'triple-bottom-line' decision-making processes).

The final BPA is a powerful decision support tool that can be broadly interrogated through a GIS platform. A BPA can apply to:

- Determining priorities for protection, regulation or rehabilitation of ecosystems;
- On-ground investment in ecosystems;
- Contributing to impact assessment of large-scale development; and
- Providing input to broader social and economic evaluation and prioritisation processes.

BPAs are used by DES staff, other government departments, local governments, environmental consultants and members of the community to support a range of planning or decision making processes. Information from BPAs has contributed to:

- Identifying significant ecological values when assessing tenure dealings;
- Identifying significant ecological values when assessing possible additions to the protected area estate;
- Identifying significant ecological values when assessing development applications;
- Core species habitat identification as part of the *Vegetation Management Act 1999* Essential Habitat and Essential Regrowth Habitat;
- Local government planning schemes;
- Development of regional plans;
- Development of Natural Resource Management Plans; and
- Community-based organisations' work to identify and prioritise areas of importance.

While the BAMM methodology does include aquatic biodiversity values, aquatic conservation values are specifically assessed by applying the Aquatic Biodiversity Assessment and Mapping Methodology (AquaBAMM, Clayton et al. 2006) to create Aquatic Conservation Assessments (ACA).

## 1.2 Brigalow Belt study area

Covering over a fifth of Queensland, the BRB extends from Townsville south to the border with New South Wales and comprises 38 subregions (Figure 1, Table 1, Young et al. 1999). The Great Dividing Range effectively divides the bioregion into northern and southern parts that are fringed by other ranges that enclose the major river basins of the Burdekin and Fitzroy in the north and Warrego-Condamine in the south.

**Table 1. Subregions of the Brigalow Belt bioregion**

Subregion	Preclear area (ha)	Percentage remnant remaining (as of 2015)
Townsville Plains	760333	69%
Basalt Downs	1274731	41%
Isaac - Comet Downs	2693397	21%
Nebo - Connors Ranges	449269	61%
South Drummond Basin	1009244	42%
Marlborough Plains	1179474	54%
Claude River Downs	1026214	52%
Woorabinda	749785	68%
Boomer Range	220541	43%
Mount Morgan Ranges	1275900	32%
Callide Creek Downs	301303	10%
Bogie River Hills	1054183	80%
Arcadia	715288	50%
Dawson River Downs	982807	10%
Banana - Auburn Ranges	1547555	32%
Buckland Basalts	281306	88%
Carnarvon Ranges	2263686	85%
Taroom Downs	652005	7%
Southern Downs	4264666	32%
Barakula	1301712	56%
Dulacca Downs	162442	15%
Weribone High	966510	26%
Cape River Hills	747993	84%
Tara Downs	511339	6%

Subregion	Preclear area (ha)	Percentage remnant remaining (as of 2015)
Eastern Darling Downs	1698175	14%
Inglewood Sandstones	1218916	59%
Moonie R. - Commoron Creek Floodout	750659	14%
Moonie - Barwon Interfluve	689530	11%
Warrambool - Moonie	574097	18%
Macintyre - Weir Fan	292674	12%
Culgoa - Bokhara	421418	36%
Narrandool	16687	29%
Beucazon Hills	95821	62%
Wyarra Hills	397935	87%
Northern Bowen Basin	1316957	60%
Belyando Downs	1772127	31%
Upper Belyando Floodout	466275	24%
Anakie Inlier	382284	68%
<b>TOTAL</b>	<b>36485242</b>	NA

BRB is characterised by brigalow *Acacia harpophylla* woodland, however other vegetation such as bluegrass *Dichanthium* tussock grassland and semi-evergreen vine thickets are also distinctive communities of the bioregion. The considerable climatic gradients over such large latitudinal and longitudinal extents when combined with soil and topographical variation results in a highly diverse flora and fauna (Young et al. 1999; McFarland et al. 1999). However, the bioregion has considerable modification especially over the past 70 years due to agriculture and mining. Remnant vegetation cover has been reduced to 41.5% (Accad et al. 2017) with communities on the more fertile soils being the most affected. Once covering 10 million hectares only 13% of brigalow now remains, scattered in patches across the BRB (Neldner et al. 2017). Most of the relatively undisturbed habitats are confined to the rugged parts of the landscape that have little development value. The broad-scale clearing has led to high numbers of extinct or threatened plants and animals. Threats, such as habitat loss, fragmentation, inappropriate fire regimes and feral plants and animals continue to erode the biodiversity values of the bioregion.

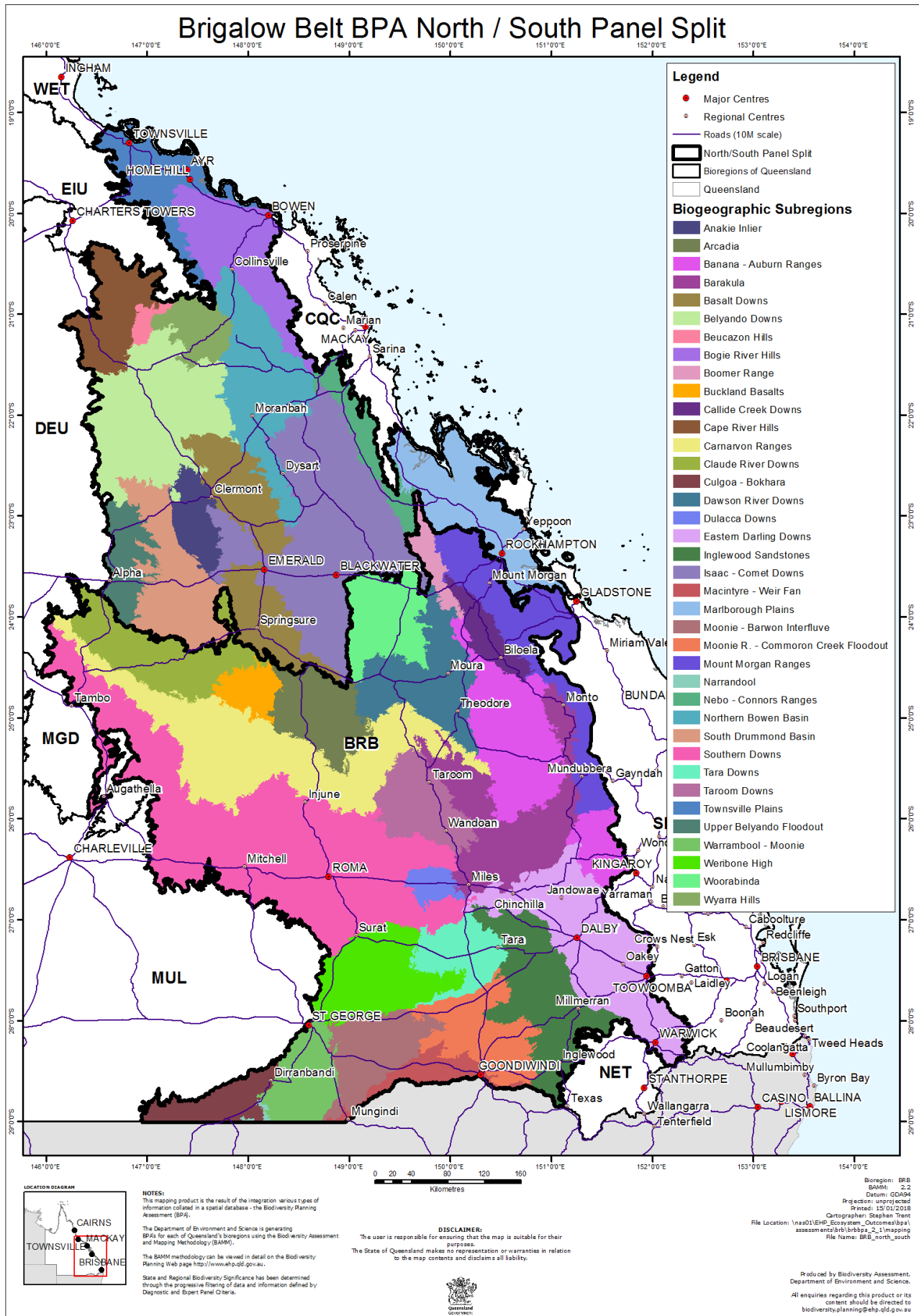


Figure 1. The Brigalow Belt Bioregion



## 2 Methods and implementation

### 2.1 BAMM

The BRB BPA was undertaken using BAMM version 2.2 (EHP 2014). Many factors contribute to the assessment of biodiversity values. The methodology focuses on consistent and reliable criteria that are transparent, objective and scientifically defensible (Table 2). The criteria are in two groups. The first group is based on existing data with bioregional coverage. These diagnostic criteria are used to filter available data and provide an initial determination of significance. This assessment is then refined using a second group of expert panel criteria.

**Table 2. BAMM criteria**

Diagnostic criteria	Expert panel criteria
For analysis of uniformly available data	Assessed by expert panel using non-uniform data
<b>A:</b> Habitat for EVNT taxa <b>B:</b> Ecosystem value: at two scales: B1: State B2: Regional B3: Local <b>C:</b> Tract size <b>D:</b> Relative size of regional ecosystem: at two scales: D1: State D2: Regional <b>E:</b> Condition <b>F:</b> Ecosystem diversity <b>G:</b> Context and connection (relationship to water, endangered ecosystems and physical connection between contiguous Remnant Units)	<b>H:</b> Habitat for priority taxa <b>I:</b> Special biodiversity values <b>J:</b> Corridors <b>K:</b> Threatening process (condition)

The seven diagnostic criteria in Table 2 use largely uniformly available information which can be queried to automatically generate significance classes based on individual or combinations of biodiversity values. While species data are included in the diagnostic criteria, it is acknowledged that fauna and flora surveys are far from complete in Queensland and that existing data do not provide a uniform coverage across any bioregion.

A filtering process is used to assess remnant units using Criteria A to G (Table 6). It can also be used as a series of questions applied to a particular site in the absence of a completed BPA. Although the various data layers are integrated in a BPA, each layer can be interrogated separately to ensure transparency and allow for any combination of criteria to be used in isolation from others in decision making.

Data for the expert panel criteria (H–K, Table 2) are primarily derived through elicitation of accumulated knowledge held by persons considered familiar with the biodiversity values of the bioregion. Such information may not be quantitative in nature nor widely available, e.g. in published reports. The expert's role is to propose additional features not identified through the diagnostic criteria. For inclusion in the BPA, the experts must describe the values, significance, and spatial extent of the proposed features.

## 2.2 Datasets

Typically, a BPA draws on a wide range of datasets with a wide range of formats. This will generally include published scientific documents, unpublished data (grey literature) and officially collated data from various Queensland Government sources including data from the Queensland Museum, Queensland Herbarium, and WildNet. A list of datasets used in the BRB BPA is included in Table 3.

**Table 3. List of datasets used in the BRB BPA**

Dataset	Version	Release date	Custodian
Regional Ecosystems	10.0	December 2016	DES—Queensland Herbarium
Species records - WildNet		November 2015	DES
Species records - Herbreccs		March 2016	DES—Queensland Herbarium
Species records - Corveg		November 2015	DES—Queensland Herbarium
Species records – Queensland Historical Fauna Database (QHFD)		April 2016	DES—Biodiversity Assessment
Ecological Communities of National Significance Database		November 2016	Australian Government Department of Environment and Energy
Protected Areas of Queensland		June 2015	DES
Nature refuges - Queensland		January 2017	DES
World Heritage Areas		March 2017	Australian Government Department of the Environment and Energy
Queensland Wetland Data – Wetland areas 2013	Version 4.0	September 2015	DES
RAMSAR		November 2002	DES
State Marine Parks		2014	DES
Fish Habitat Areas		September 2016	DES
Directory of Important Wetlands		January 2005	DES

## 2.3 Expert panels

Six expert panels were held in Toowoomba and Rockhampton in June 2017 to address flora, fauna and landscape ecological values. The findings from the BRB BPA expert panel process are reported in the accompanying expert panel report (DES 2018).

## 2.4 Implementation

The BAMB version 2.2 (EHP 2014) was followed in this assessment. Custom python scripts and ArcGIS ModelBuilder toolboxes were used to apply BAMB and create the BPA. A number of methodological updates implemented in the SEQ BPA version 4.1 were similarly implemented in this version of the BRB BPA and will form the basis for updating BAMB to version 3. The methodological changes are summarised below in Table 4.

**Table 4. BAMB method changes implemented in BRB BPA Version 2.1 and SEQ BPA Version 4.1**

Criterion	Change in BRB BPA Version 2.1 and SEQ BPA Version 4.1
A	Inclusion of non 1-to-1 habitat models - i.e. the inclusion of habitat models that do not necessarily spatially align/coincide with the boundary of remnant units.
B	<ol style="list-style-type: none"> <li>1. For the purpose of depicting B1 "Very High" significant wetlands, the base spatial unit was derived from the Queensland Wetland Program mapping product. "Significant wetlands" included those relatively natural wetlands which overlapped with RAMSAR, Directory of Important Wetlands, Fish Habitat Areas, and/or State Marine Parks (exclusive of General Use zones).</li> <li>2. EPBC listed threatened ecological communities were incorporated in criterion B1 and assigned a significance rating of "Very High".</li> </ol>
C	The method of tract delineation was reviewed and altered to account for pinch-points, edge effects and small gaps in tracts. Thresholds used to assign "Low", "Medium", "High" and "Very High" criterion C significant ratings were calculated at the subregion level.
H	<ol style="list-style-type: none"> <li>1. Revised the justifications for nomination of priority species.</li> <li>2. New category was incorporated - "Taxa particularly vulnerable to climate change."</li> <li>3. Altered the spatial implementation to be more consistent with Criteria A and reduced the disproportionate impact of priority species records on the overall biodiversity significance value.</li> </ol>
I	Addition of a new sub-criterion, Ik: Climate change refugia.

## 2.5 Assessment parameters

The tools used to produce a BPA calculate a number of criteria parameters based on the size distribution of remnant polygons. As a result, these will vary between bioregions/subregions and versions of a BPA.

Table 5 contains the thresholds calculated for criterion C (tract size)

**Table 5. Criterion C subregion thresholds implemented in BRB BPA**

Subregion	Low	Medium	High	Very High
11.1	<269.9	<491.3	<2418.9	>2418.9
11.10	<220.9	<355.9	<1222.1	NA
11.11	<245.4	<397.5	<1382.5	>1382.5
11.12	<184.1	<288.7	<921.5	NA
11.13	<233.9	<393.8	<1538	>1538
11.14	<298.4	<567.5	<3191.2	>3191.2
11.15	<240.1	<391	<1383.3	>1383.3
11.16	<246.8	<411.6	<1560.9	NA
11.17	<404.5	<765.9	<4188.7	>4188.7
11.18	<253.8	<418	<1525.6	>1525.6
11.19	<188.8	<303.8	<1044.3	>1044.3
11.2	<207.2	<334	<1151.9	NA
11.20	<162.6	<246.7	<717.2	>717.2
11.21	<157.4	<245.6	<775.6	>775.6
11.22	<229.8	<363.6	<1184.6	>1184.6
11.23	<186.3	<290.8	<915.2	NA
11.24	<140.6	<209.4	<578.7	NA
11.25	<146.8	<220.5	<624.1	>624.1
11.26	<214.6	<340.2	<1115.7	>1115.7
11.27	<211.7	<335.2	<1095.9	>1095.9
11.28	<280.6	<452.3	<1546	>1546
11.29	<198	<306.5	<940.1	>940.1
11.3	<167	<260.7	<822.8	NA
11.30	<99.5	<139.2	<324.3	>324.3
11.31	<135.7	<197.3	<510.3	>510.3
11.32	<224.2	<355.1	<1159.3	>1159.3

A Biodiversity Planning Assessment for the Brigalow Belt  
Bioregion – Summary Report Version 2.1

Subregion	Low	Medium	High	Very High
11.33	<132.9	<200.1	<570.8	>570.8
11.34	<142.6	<208.2	<544.3	>544.3
11.35	<177.3	<262.8	<713.2	>713.2
11.36	<59.8	<83.4	<194.1	>194.1
11.37	<291.8	<504.4	<2117.3	>2117.3
11.38	<287	<444	<1347.4	>1347.4
11.4	<164.1	<280.3	<1157.9	NA
11.5	<268.8	<442.8	<1613.4	NA
11.6	<218.5	<348.6	<1164.5	>1164.5
11.7	<254.3	<412.8	<1443.2	>1443.2
11.8	<297	<484.9	<1717.6	>1717.6
11.9	<205.7	<329.6	<1116.9	NA
4.4	<168	<254.2	<733.7	NA
6.1	<227.3	<363.5	<1220.9	>1220.9
6.2	<243.6	<392.2	<1340.7	>1340.7
6.3	<259.5	<415.6	<1397.6	NA
6.4	<215.9	<343.6	<1139.5	>1139.5
6.5	<154.9	<229.6	<625.4	NA
6.6	<244.7	<383.7	<1215.6	>1215.6
6.8	<149.4	<218.8	<576.7	NA
7.1	<231.4	<432.8	<2338.4	>2338.4
7.5	<19202.4	<38404.8	<57607.2	NA
8.2	<242.7	<452.6	<2414.2	>2414.2
8.3	<216.5	<351.2	<1231.5	NA
8.4	<259.3	<570.8	<5215.8	NA
8.5	<83.4	<155.3	<875.9	NA
8.6	<308.3	<607.3	<3810.3	NA
9.4	<138.2	<218.3	<716.9	NA
9.5	<321	<640.6	<4177	NA
10.2	<169.9	<263	<809.5	NA

A Biodiversity Planning Assessment for the Brigalow Belt  
Bioregion – Summary Report Version 2.1

<b>Subregion</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Very High</b>
10.3	<267	<451	<1771.4	NA
10.4	<256.6	<415.2	<1438.5	>1438.5
12.1	<208.9	<346.1	<1292.1	NA
12.10	<199.3	<353	<1619.4	NA
12.11	<16.3	<32.7	<49	>49
12.2	<185.9	<285	<851.3	>851.3
12.5	<180	<279.7	<868.5	>868.5
12.6	<175.1	<265	<764.1	>764.1
13.1	<156	<239	<715.5	>715.5
13.3	<143.5	<216.5	<620.1	>620.1

For criterion F (ecosystem diversity), the calculated buffer distance was 190.5 metres.

## 2.6 Transparency of results

After running the BAMB tool, BPA results are available at a range of levels, despite its initial presentation as a single score of biodiversity significance. The results are also available through the use of user-defined queries that may interrogate one or more levels within the assessment in any number of possible combinations. This transparency provides the BPA end user (e.g. scientists, resource managers and conservation organisations) with a unique level of flexibility for BPA interrogation, interpretation and presentation. Links between the BPA results and a GIS environment facilitate this interrogation and provide a means of visualising the BPA results (Figure 2).

This data access and interrogation flexibility enables investigation of how different data contribute to the overall conservation value, investigation of missing data and an ability to tailor the BPA output for a particular purpose.

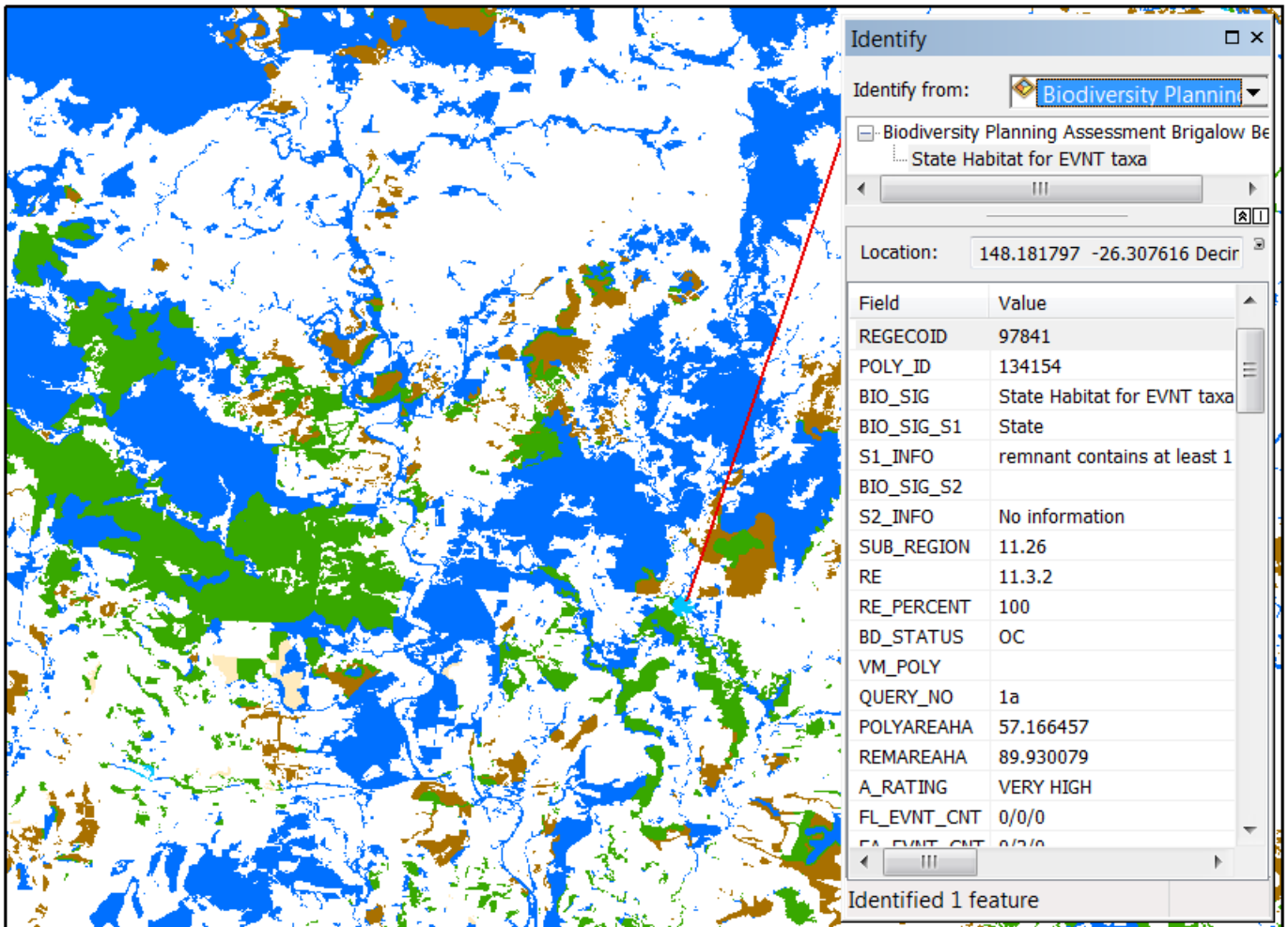


Figure 2. Interrogating the BPA results for a spatial unit in the GIS environment

## 2.7 Filter table

For each assessment unit, a single diagnostic biodiversity significance is derived by combining all of the diagnostic criteria scores/ratings. This diagnostic significance is then combined with the expert panel significance and the maximum value assigned as the overall biodiversity significance.

BAMM uses a criterion rating combination table (or filtering decision table) that provides an ordered series of decisions that are tested against the final criterion ratings for each spatial unit (Table 6). Each decision is a unique combination of criterion ratings that is associated with a final conservation significance category. The decisions are effectively a number of 'if-then' statements and are tested in sequence for each spatial unit. A score is assigned immediately when a match is achieved between the criterion rating combination of the decision and that of the assessment unit.

The filter table was not changed for the BRB BPA.



**Table 6. Filter table used for the BRB BPA**

Biodiversity significance of Remnant Units	Query No.	A: Essential habitat for EVNT spp.		B: Ecosystem value		C: Tract size		D: Relative size of ecosystem		E: Condition		F: Ecosystem diversity		G: Context & connection
<b>S: State</b>	<b>1</b>	A: very high	or	B1: very high		n/r		n/r		n/r		n/r		n/r
Or	<b>2</b>	n/r		B1: high		n/r	&	D1: very high		n/r		n/r		n/r
Or	<b>3</b>	n/r		B1: high	&	C: high	&	D1: high	&	E: very high <sup>1</sup>	or	F: very high <sup>1</sup>	or	G: very high <sup>1</sup>
Or	<b>4</b>	n/r		n/r		C: very high	&	D1: very high	&	E: very high		n/r		n/r
Or	<b>5</b>	n/r		n/r		n/r		D1: very high	&	E: very high <sup>1</sup>	or	F: very high <sup>1</sup>	or	G: very high <sup>1</sup>
<b>R: Regional</b>	<b>6</b>	A: high	or	B1: high		n/r		n/r		n/r		n/r		n/r
Or	<b>7</b>	n/r		B2: very high		n/r		n/r		n/r		n/r		n/r
Or	<b>8</b>	n/r		B2: high	&	C: very high	or	D2: very high		n/r		n/r		n/r
Or	<b>9</b>	n/r		n/r		C: very high	&	D2: very high	&	E: very high		n/r		n/r
Or	<b>10</b>	n/r		n/r		C: very high		n/r	&	E: very high	&	F: very high	or	G: very high
Or	<b>11</b>	n/r		B2: high	&	C: high	&	D2: high <sup>2</sup>	or	E: vh or high <sup>2</sup>	or	F: vh or high <sup>2</sup>	or	G: vh or high <sup>2</sup>
Or	<b>12</b>	n/r		n/r		n/r		D2: very high	&	E: vh or high <sup>2</sup>	or	F: vh or high <sup>2</sup>	or	G: vh or high <sup>2</sup>

A Biodiversity Planning Assessment for the Brigalow Belt Bioregion  
Summary Report Version 2.1

Biodiversity significance of Remnant Units	Query No.	A: Essential habitat for EVNT spp.		B: Ecosystem value		C: Tract size		D: Relative size of ecosystem		E: Condition		F: Ecosystem diversity		G: Context & connection
<b>L: Local</b>	<b>13</b>	n/r		B2: high		n/r		n/r		n/r		n/r		n/r
Or	<b>14</b>	n/r		B3: very high		n/r		n/r		n/r		n/r		n/r
Or	<b>15</b>	n/r		B3: high	&	C: very high	or	D3: very high		n/r		n/r		n/r
Or	<b>16</b>	n/r		n/r		C: very high	&	D3: very high	&	E: very high		n/r		n/r
Or	<b>17</b>	n/r		n/r		C: very high		n/r	&	E: vh or high <sup>2</sup>	or	F: vh or high <sup>2</sup>	or	G: vh or high <sup>2</sup>
Or	<b>18</b>	A: medium	or	B3: high	or	C: high	&	D3: high <sup>2</sup>	or	E: vh or high <sup>2</sup>	or	F: vh or high <sup>2</sup>	or	G: vh or high <sup>2</sup>
Or	<b>19</b>	n/r		n/r		n/r		D3: very high	&	E: vh or high <sup>2</sup>	or	F: vh or high <sup>2</sup>	or	G: vh or high <sup>2</sup>

Notes:

The assessment is progressive, i.e. a query is 'triggered' only if the preceding set has not been satisfied.

Criteria B & D vary according to the scale (State, Regional, Local)—all other criteria are independent of scale.

N/R: Not relevant.

VH: Very high

Very High<sup>1</sup>: A single 'Very High' score is not sufficient—at least two of the criteria marked as Very High<sup>1</sup> must be rated as Very High to qualify as significant.

High<sup>2</sup>: A single 'High' score is not sufficient— at least two of the criteria marked as High<sup>2</sup> must be rated as 'High' to qualify as significant.

'or': Options which apply only to the query immediately preceding the 'or' (i.e. A & B or C or D means A+B or A+C or A+D; A or B & C means A+C or B+C; A or B & C or D means A+C or A+D or B+C or B+D).

## 3 Results

### 3.1 Conservation value categories

The conservation value results are relative within each bioregion, but each value category has characteristics in common. BAMM uses combinations of criterion level scores to determine the final biodiversity significance. Based on these combinations, the following descriptions can be used to provide context for each level of biodiversity significance.

**State significance**—Areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed as being significant at national or international scales.

**Regional significance**—Areas assessed as being significant for biodiversity at the sub-bioregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.

**Local significance and or other values**—Areas assessed as not being significant for biodiversity at State or Regional scales. Local values are of significance at the local government scale.

**Non bioregional ecosystem**—A regional ecosystem outlier from an adjacent bioregion.

### 3.2 Positional accuracy

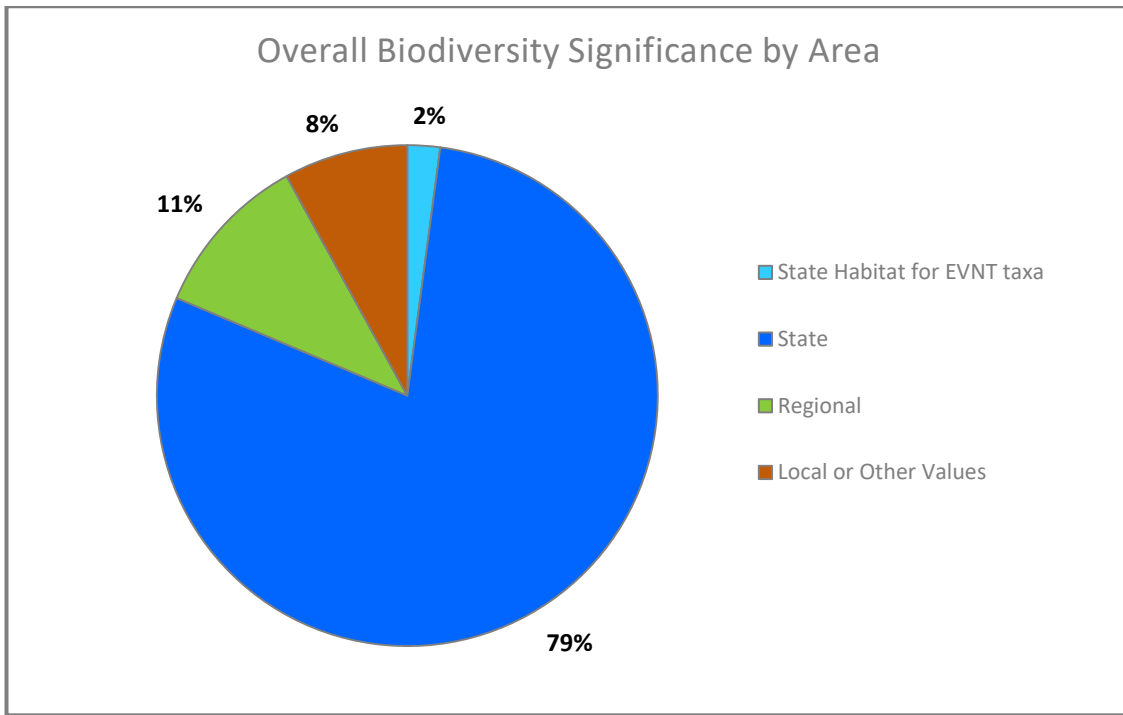
The positional accuracy of the BPA results is dependent on the accuracy of the input data and primarily the Herbariums Regional Ecosystem (RE) mapping Version 10.0 (December 2016), which is at a scale of 1:100,000 for the BRB. The RE data has a minimum remnant polygon area of five hectares or minimum remnant width of 75 metres. The precision of polygon boundaries or positional accuracy of line-work is 100 metres. Positional accuracies of other datasets are unknown, but at 1:100,000 scale, at least 100 metres should be anticipated.

### 3.3 BRB bioregion overall results

A summary of the BRB BPA results is provided below. Overall, 81%<sup>1</sup> (12.3 million ha) of remnant vegetation in the BRB bioregion was found to have biodiversity values that are of State significance of which 2% (320,000 ha) is State Habitat for EVNT taxa. Regional significance was attributed to 11% (1.6 million ha), with the remaining 8% of remnant vegetation being assigned Local or Other Values (Figure 3 and Figure 4).

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<sup>1</sup> Note that percentage area and area calculations mentioned throughout this report relate only to areas of remnant vegetation assessed by the BPA. Non-remnant areas (e.g. some significant wetlands types, threatened species habitat etc.) have been excluded for the purposes of the report.



**Figure 3. Summary of overall biodiversity significance as a proportion of remnant vegetation**

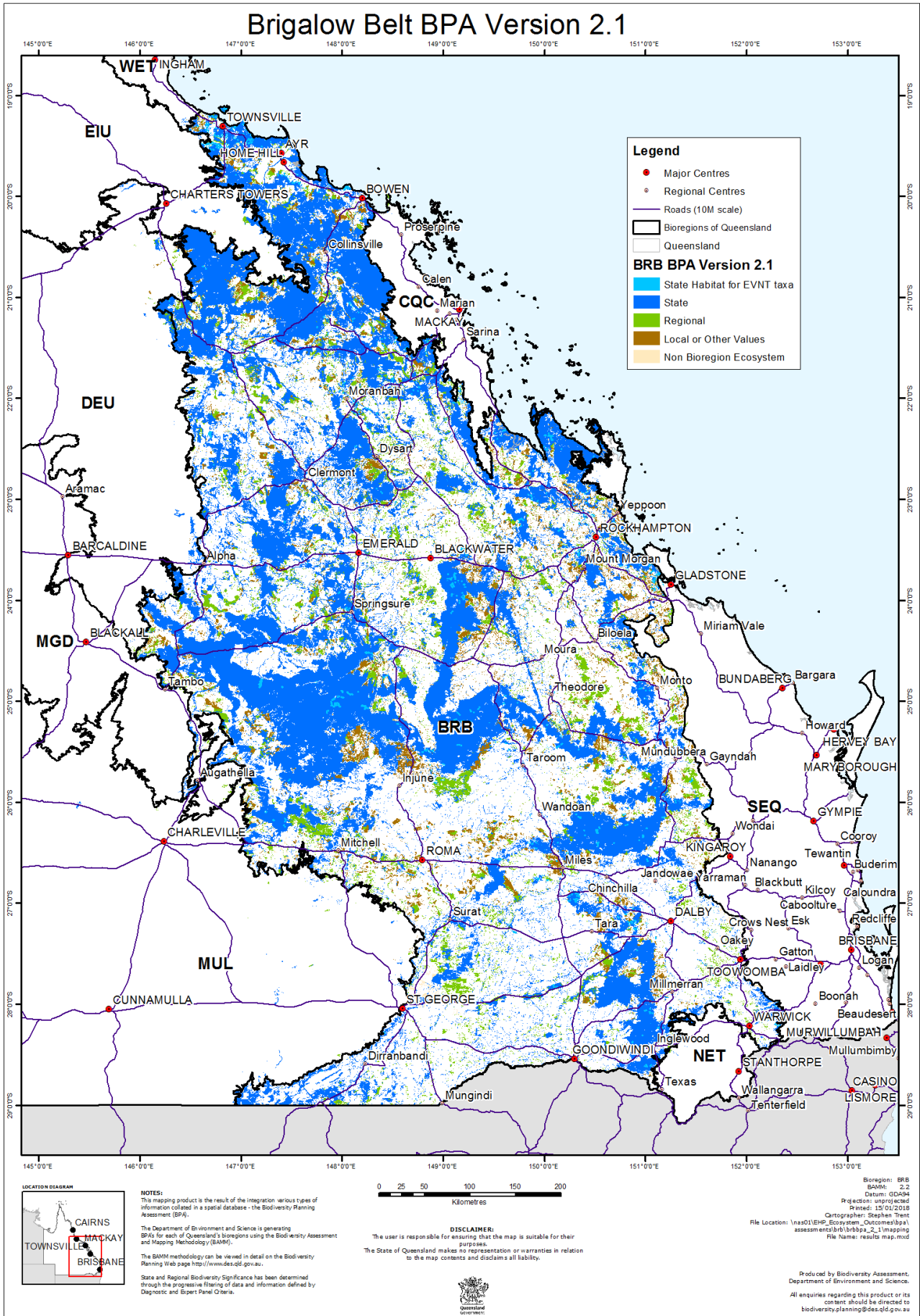


Figure 4. Overall biodiversity significance

As outlined in Table 2, the overall biodiversity significance is the result of a number of criteria which are assessed separately. Figure 5 shows the results for the individual criteria within the diagnostic and expert panel criteria

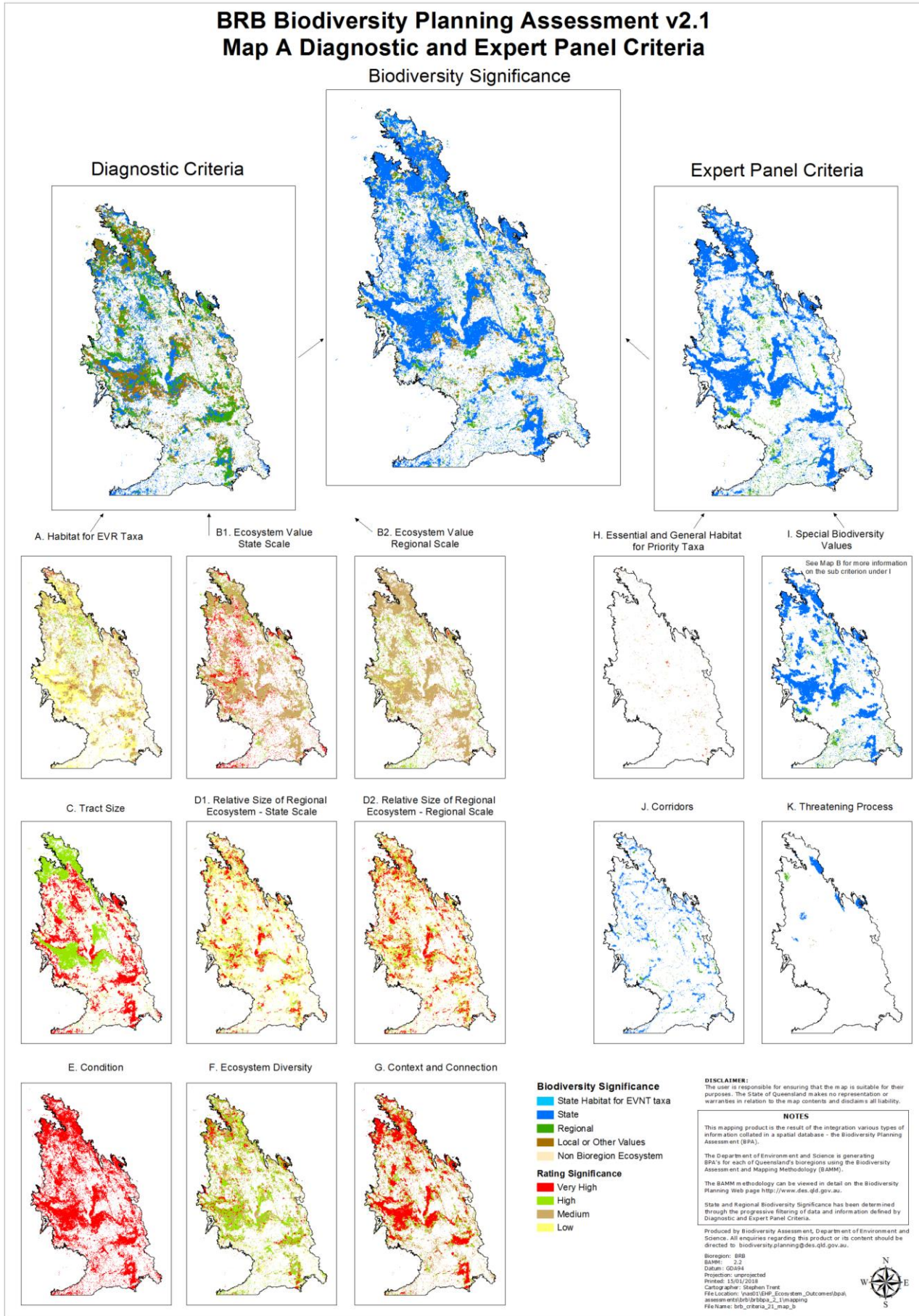


Figure 5. Diagnostic and expert panel criteria results

### 3.4 Diagnostic results

#### 3.4.1 Overall diagnostic criteria results

From the diagnostic criteria, 36% of the BRB bioregion remnant vegetation (5.5 million ha) was found to have biodiversity values that are of State significance. Regional significance was attributed to 35% (5.3 million ha), and Local or Other Values was attributed to 29% (4.5 million ha) of the BRB remnant vegetation (Figure 6 and Figure 7).

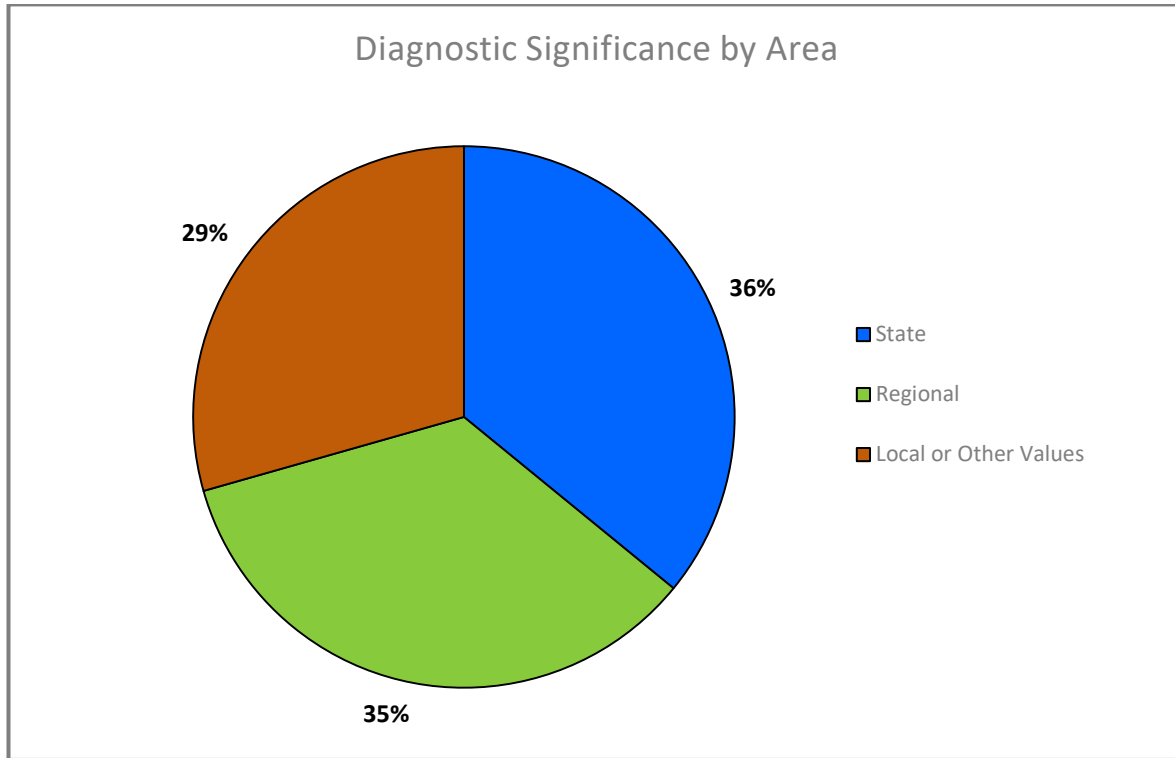


Figure 6. Summary of biodiversity assessment diagnostic criteria results as a proportion of remnant vegetation



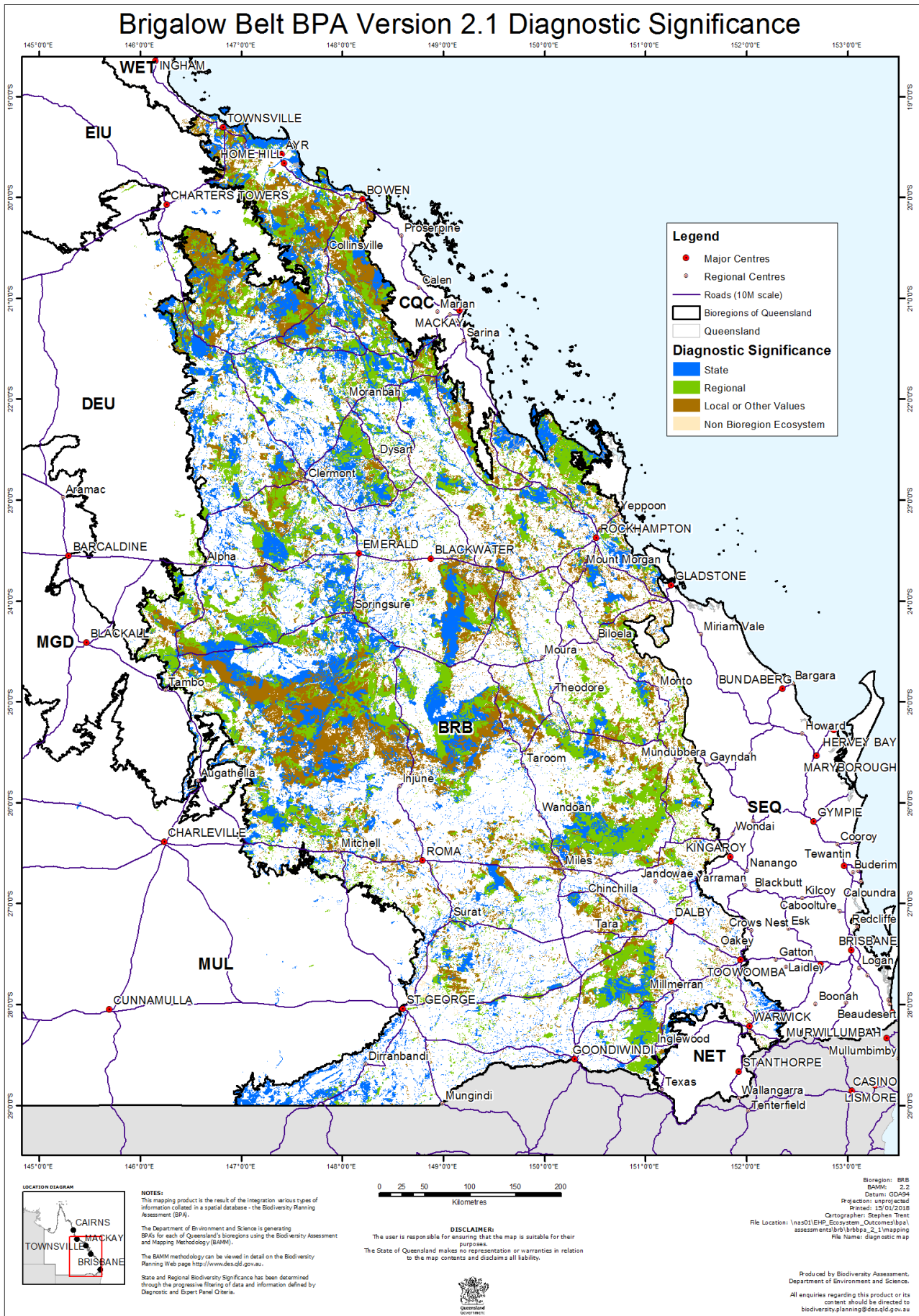


Figure 7. Diagnostic criteria biodiversity significance

### 3.4.2 Hit analysis

A hit analysis was performed to assess the extent in which each biodiversity criteria contributed to the State or Regional biodiversity significance. For this analysis, hits equate to the area of land assigned significance under the various individual or combinations of criteria as defined in the queries in Table 6 and Table 7. The results of the hit analysis for the diagnostic criteria are shown in Table 7.

**Table 7. Diagnostic criteria hit analysis results. (Query number as per Table 6)**

Query No. <sup>1</sup>	Area (ha)	Significance	Percentage of total area of remnant vegetation	Percentage of total query no. frequency
1a	319,769	State	2.1	6.4
1b	3,366,130	State	22.2	42.4
2a	236,106	State	1.6	0.7
3a	18,862	State	0.1	0.1
3b	12,551	State	0.1	<0.1
4a	733,311	State	4.8	0.8
5a	40,960	State	0.3	<0.1
5b	719,313	State	4.7	0.3
6a	269310	Regional	1.8	3.3
6b	1144308	Regional	7.5	12.9
7a	55411	Regional	0.4	0.5
8a	234432	Regional	1.5	1.1
8b	15522	Regional	0.1	0.1
9a	690036	Regional	4.5	0.9
10a	373964	Regional	2.5	2.3
10b	1272274	Regional	8.4	4.5
11b	1649	Regional	<0.1	<0.1
11c	1050	Regional	<0.1	<0.1
11f	2655	Regional	<0.1	<0.1
11g	34309	Regional	0.2	0.3
11i	420930	Regional	2.8	0.3
12c	120116	Regional	0.8	0.1
12d	627229	Regional	4.1	0.6

<sup>1</sup> - The variations (a - i) of the queries refer to specific combinations of the criteria within the query.

The results of the hit analysis reveal that the most widespread (by area) combination to trigger State significance is query 1b (22% or 3.4 million ha). This query is due to a Very High Criterion B1 rating, and reflects the presence of

Endangered REs, EPBC listed communities, Nationally Important Wetlands or World Heritage Areas. This result is expected given the significant and disproportionate rates of clearing that has occurred in the Brigalow Belt, especially in the lowlands areas and which has resulted in the reduced extent of many ecological communities (e.g. brigalow and tussock grassland).

The most widespread (by area) combination to trigger Regional significance is query 10b, with 8.4% (1.3 million ha) being triggered. This query is due to a combination of Very High ratings for Criteria C, E and G, indicating that the triggered remnant units are part of some of the largest tracts of vegetation remaining in the subregion and have high context and connectivity with adjoining ecosystems. This query was triggered for 4% of remnant vegetation.

The second most widespread combination to trigger Regional significance is query 6b, with 7.5% (1.1 million ha) being triggered. This query however, was the most commonly triggered decision that resulted in Regional significance, with 13% of all remnant units containing this value. This query is due to a High rating for criterion B1 (high conservation RE), indicating that the remnant unit contains an 'Of Concern' regional ecosystem.

## 3.5 Expert panel results

### 3.5.1 Overall expert panel results

Overall, 80% of the BRB remnant vegetation was assigned a significance rating by the expert panel. The expert panel attributed 71% (10.7 million ha) of the BRB bioregion with biodiversity values of State significance. Regional significance was attributed to 9% (1.4 million ha) (Figure 8 and Figure 9). Due to the changes in the way that Criterion H (priority species) has been implemented in recent BPAs, 0.5% (72,000 ha) has been attributed with Local significance by the expert panel. While there is a high level of confidence that the most important areas of the BRB bioregion were identified by consulting experts and using existing data, it is possible that not all areas were identified.

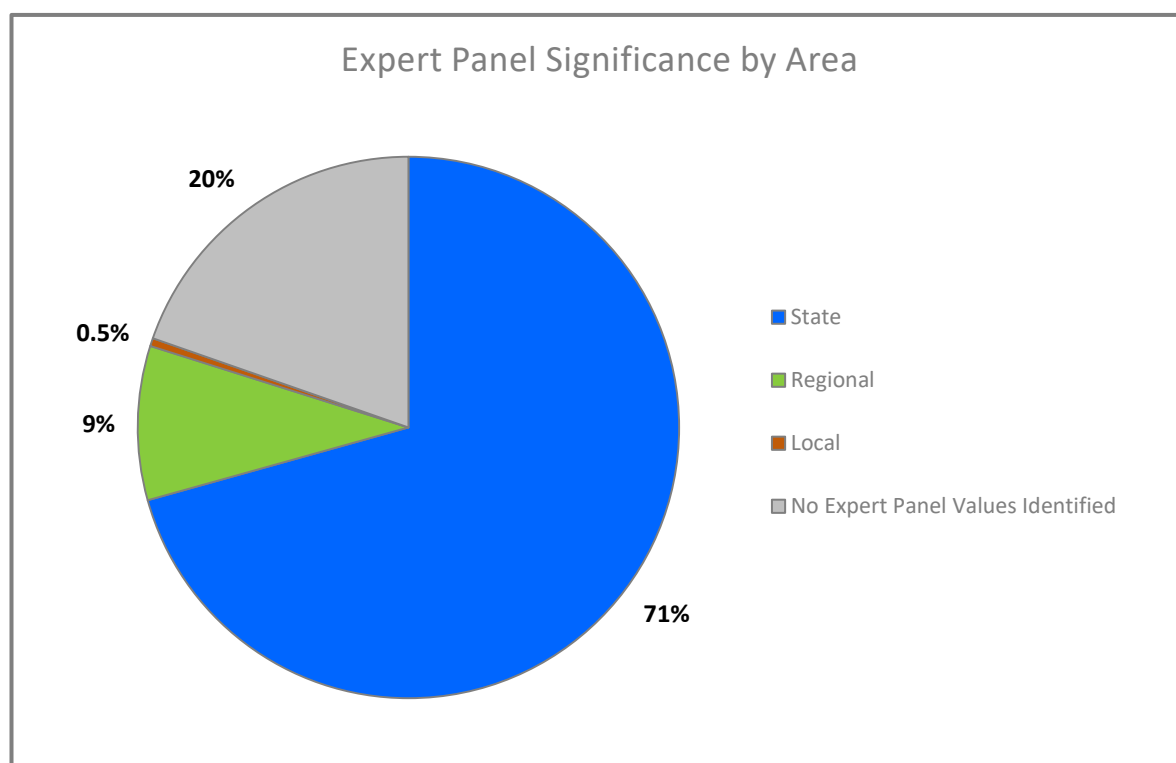


Figure 8. Summary of biodiversity assessment expert panel criteria results

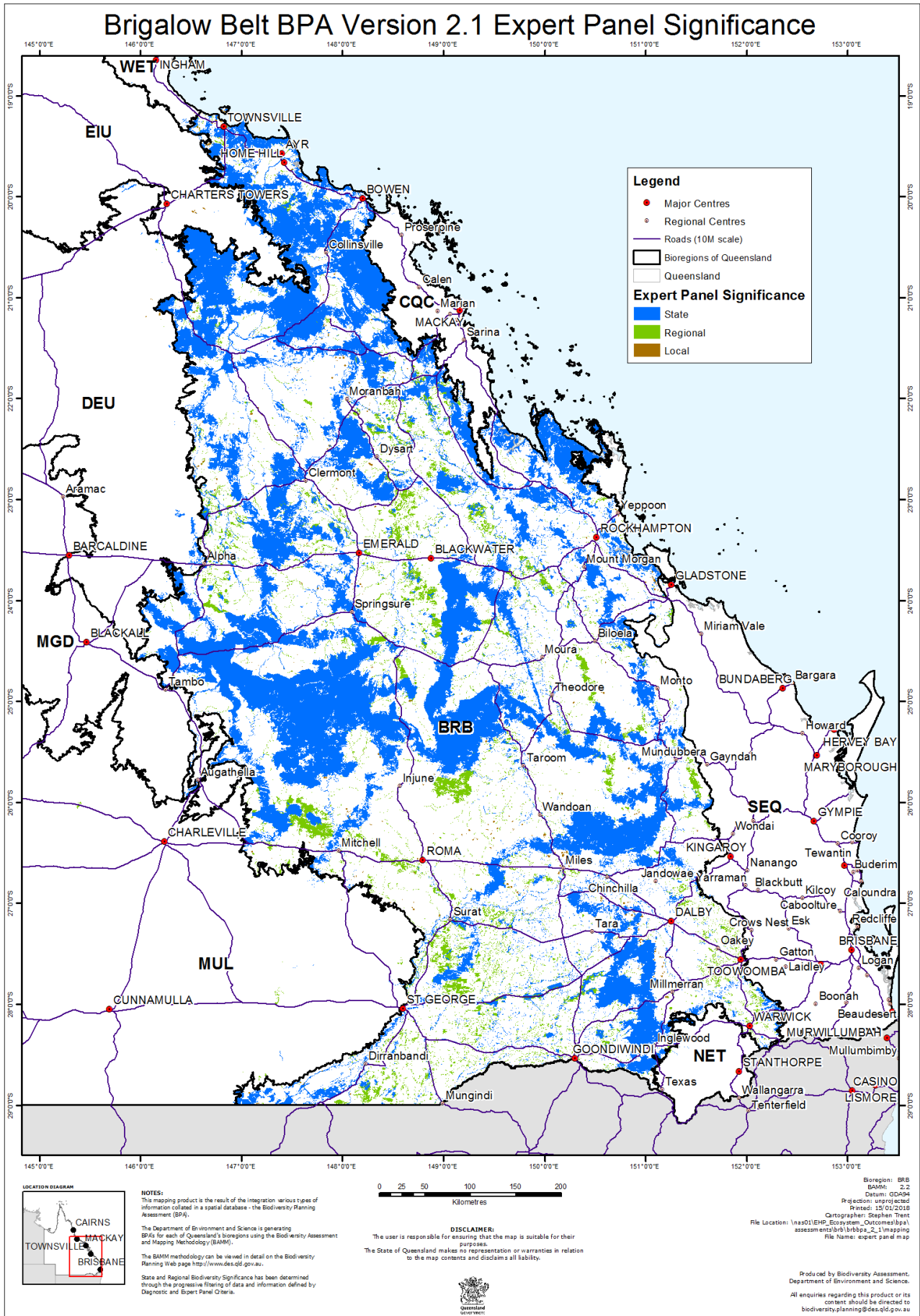


Figure 9. Expert panel criteria biodiversity significance

### 3.5.2 Criterion H (priority taxa habitat) results

Priority species are those not listed as endangered, vulnerable or near threatened, however, are considered to be of particular conservation significance by the flora and fauna expert panels (DES 2018). There were 123 priority species identified in the BRB (53 flora, 70 fauna), and 7,129 total records for these species. Due to the relatively small buffer size attributed to point records, the large size of the bioregion and relatively low survey effort comparative to bioregions such as Southeast Queensland, only a small proportion of BRB (61,000 ha, or 0.4%) achieved a value of Very High for criterion H, and 53,000 ha (0.3%) was determined to be High for this criterion (Table 8).

**Table 8. Criterion H (Priority taxa habitat) results as percentage of remnant vegetation**

	Very High	High	Medium
H rating	0.4%	0.3%	2.9%

### 3.5.3 Other expert panel criteria

Criterion I (special areas) and Criterion J (corridors) were identified by the expert panel members. Approximately 63% of the total assessment area has been identified as having Criterion I special biodiversity values (State, Regional or Local). Figure 10 illustrates the special areas and their biodiversity rating.

Landscape scale corridors have been defined and mapped at a state-wide level for most of the state. The network is being expanded as BPAs are completed for additional bioregions. Their broad purpose is to provide for ecological and evolutionary processes at a landscape scale. Corridors considered of the greatest importance at the bioregional scale or above were assigned State significance. This mapped network (State and Regional terrestrial corridors) comprises approximately 21% of the remnant vegetation (Table 9).

**Table 9. Criteria I, J, K Biodiversity Significance results as percentage of remnant vegetation**

	State	Regional
I rating (Special Areas)	54.1%	8.7%
J rating (Corridors)	16.7%	3.8%
K rating (Threatening Process)	4.1%	0.5%

### 3.5.4 Criterion I sub-criteria results

Areas exhibiting special biodiversity values are identified by flora, fauna and landscape expert panel members based on their own knowledge and experience. Expert panel members were tasked with identifying what they considered to be the most important areas in the bioregion. For the most part, only Very High and High category values were identified, with Medium values identified less frequently. These identified areas are determined by selection and assignment of specific sub-criteria values as defined in Table 10. Areas exhibiting characteristics of wildlife refugia (Ib rating - 52%, 8.3 million ha), high species richness (Ie rating - 19%, 3 million ha) and species endemism (Ia rating - 15%), 2.5 million ha account for the greatest proportion of total area identified as Very High. The expert panel report (DES 2018) has detailed information relating to these areas. Most areas exhibited more than one sub-criteria value, with many exhibiting up to five sub-criteria values. Each of the sub-criteria were assessed and valued separately by the expert panel and the results are shown in Figure 10.

**Table 10. Criterion I sub-criteria results as percentage of remnant vegetation**

Criterion I sub-rating	Very High	High	Medium
Ia rating (centre of endemism)	15.4%	2.7%	<0.1%
Ib rating (wildlife refugia)	51.9%	8.9%	0.1%

<b>Criterion I sub-rating</b>	<b>Very High</b>	<b>High</b>	<b>Medium</b>
Ic rating (disjunct populations)	11.7%	2.4%	<0.1%
Id rating (species at geographic range limit)	13.4%	2.4%	<0.1%
Ie rating (high species richness)	18.8%	3.8%	0.9%
If rating (areas with concentrations of relictual populations - ancient and primitive taxa)	7.2%	0.4%	-
Ig rating (REs show distinct variation in species composition)	2.1%	2.7%	-
Ih rating (artificial waterbody or managed/manipulated wetland of ecological significance)	-	<0.1%	-
Ii rating (high density of hollow-bearing habitat trees)	7.6%	2.2%	-
Ij rating (significant breeding or roosting sites)	2.1%	<0.1%	-
Ik rating (climate change refugia)	8.2%	4.9%	-

## BRB Biodiversity Planning Assessment v2.1 Map B Criterion I Special Biodiversity Values

### Criterion I. Special Areas

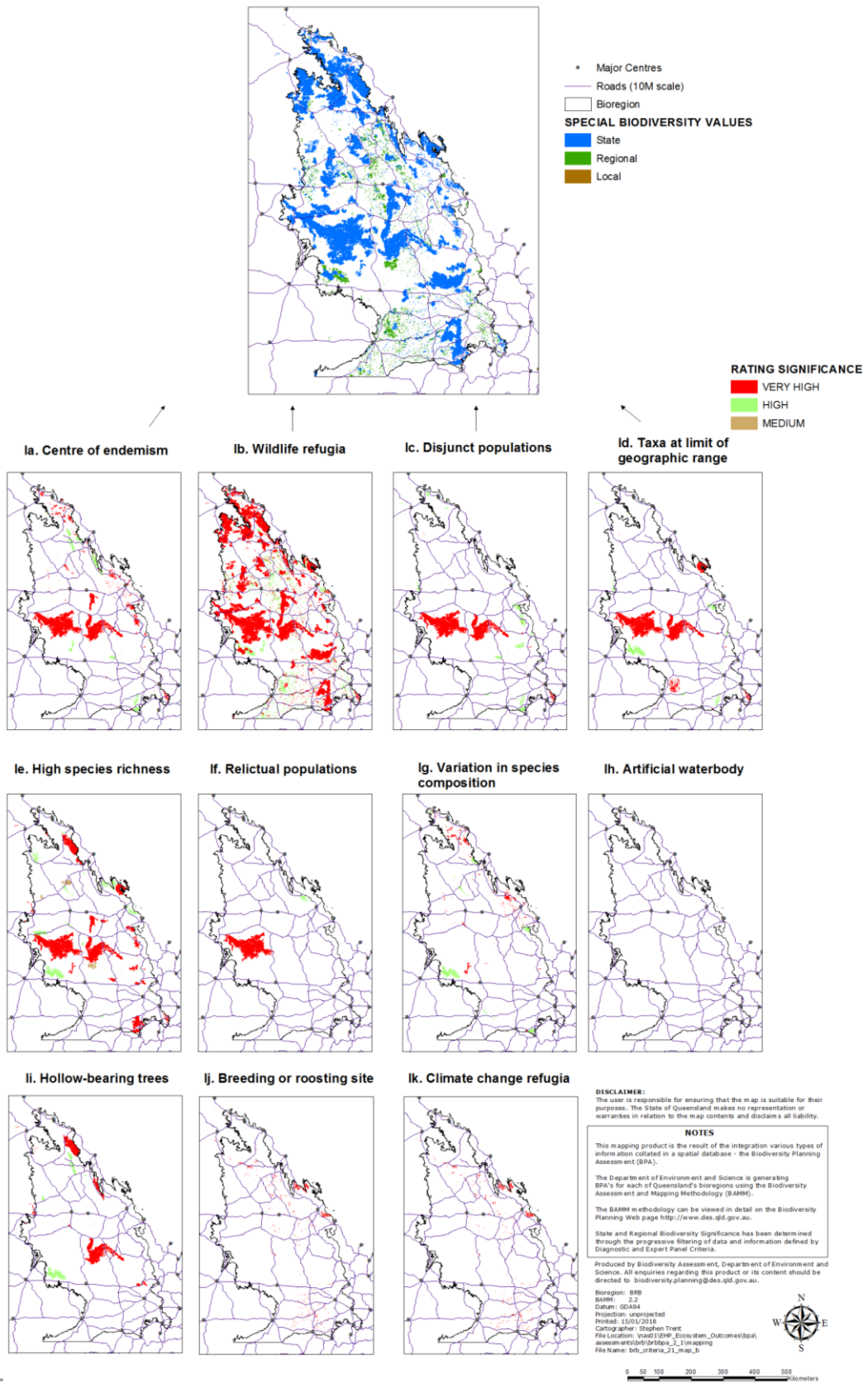


Figure 10. Criterion I special biodiversity values

### **3.6 Assessment caveats and limitations**

Some data layers are not spatially uniform across the bioregion, e.g. species records. Many areas are under-surveyed relative to areas with high densities of records and known values. Poorly sampled areas can be identified relatively easily using species record datasets. Areas such as roads are clearly more heavily sampled, while ranges, escarpments and interior parts of major floodplain wetland systems are under-represented and should be the focus of future survey effort.

Whenever lines are drawn on a map, e.g. from the expert panels or extracted from datasets produced as part of other assessments, e.g. Blackman (2001), there is a risk that the boundary may be approximate at the scale of the individual spatial unit. For these types of decisions the boundary should always be considered at the appropriate scale. The RE mapping is the fundamental spatial input into this BPA and the polygons are mapped at a scale of 1:100,000.



## 4 Summary and recommendations

Approximately 92% of the remnant vegetation of the Brigalow Belt bioregion was assessed as being of either State or Regional significance. This high proportion is not unexpected as the region is highly fragmented and the remaining vegetation is critical for biodiversity. The region contains a wide variety of underlying geomorphology and climatic gradients. It also contains many ecosystems that are recognised for their importance at a national scale.

36% of the bioregion was assessed as State biodiversity significance based upon the diagnostic criteria. The major contributing factors for this was the presence of Nationally Threatened Ecological Communities and State identified endangered vegetation (diagnostic Criterion B1).

The expert panels identified 80% of the BRB bioregion remnant vegetation as having biodiversity values of State or Regional significance. This was largely due to Criterion I special biodiversity values, bioregional corridors and to a lesser extent, Criterion K (condition). Approximately 54% of the bioregion was identified as State significance special feature biodiversity values under Criterion I.

The results of a BPA can be used in a number of ways and for a number of purposes. Well-founded ecological or conservation values are a useful input to many natural resource management decision making processes including regional planning, development assessment, tenure negotiations or protected area estate review. In addition to BPA scores, subordinate elements from each assessment may also be used for management and planning purposes. An example of this is prioritising natural resource actions spatially within a bioregion for surveys, changes in land management practices, rehabilitation and weed eradication.

Interpretation of the BRB BPA results for the purposes of management priority or for development of management actions can be undertaken as part of future regional planning.

An analysis of the filtering table and how many spatial units triggered at each decision was performed. There does not appear to be any major inconsistencies in the hit analysis. In the longer term the hit analysis for all the BPAs should be compared to see if there are any redundant decisions or decisions that are inconsistent.

Species records and habitat models were used in the BPA. Future BPA versions should incorporate new scale appropriate habitat models as they are developed. Systematic flora and fauna surveys of the BRB away from main roads, iconic locations and other existing high survey effort areas are needed to understand taxon distributions and the ecology of the area.

The biodiversity of the Brigalow Belt bioregion is facing several threats, such as the continuing loss and fragmentation of native vegetation, both remnant and regrowth habitat, due to clearing for agriculture or as part of resource development associated with coal, gas and water exploitation (Ponce-Reyes et al. 2016). The impacts associated with the above may be exacerbated by climate change and result in significant risks to the entire bioregion, from coastal ecosystems and the remaining lowland vegetated patches to the elevated environments. Maintaining ecosystem resilience through landscape connectivity and topographic variation will be key to mitigating the effects of climate change in the future. More information is needed to quantify what impacts these threats are having and are likely to have on the biodiversity values of the bioregion.

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