



A Biodiversity Planning Assessment for the Southeast Queensland Bioregion

Summary Report
Version 4.1

Prepared by: Biodiversity Assessment, Department of Environment and Heritage Protection

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1 Introduction

This report briefly describes the scientific methodology that underpins the production of Biodiversity Planning Assessments (BPA) and summarises the overall results of the BPA for the Southeast Queensland Bioregion (SEQ). BPAs are usually repeated every few years as new information becomes available or underlying data layers change. This report relates only to the Southeast Queensland BPA v4.1.

1.1 Biodiversity Planning Assessments

The Biodiversity Assessment and Mapping Methodology (BAMM) provides a consistent approach for assessing biodiversity values at the landscape scale in Queensland. The BAMM is based on vegetation mapping from the Queensland Herbarium. It incorporates a range of biodiversity-related data and is focused primarily on assessing terrestrial values. The Department of Environment and Heritage Protection (EHP) 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 reliable 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
- providing input to broader social and economic evaluation and prioritisation processes.

BPAs are used by EHP 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
- 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 Southeast Queensland study area

The SEQ Bioregion shares its western boundary with the Brigalow Belt Bioregion, and extends from the Border Ranges on the New South Wales border, north to the dry coastal corridor between Gladstone and Rockhampton that forms part of the Brigalow Belt Bioregion. The McPherson Range borders the southern boundary of the bioregion while the Great Dividing Range is to the west. Ranges extend north south through the central region creating an altitudinal gradient from the coast. Small volcanic plugs remain in the landscape offering distinctive conditions for taxa and ecosystems. Large sand islands off the coast offer unique environments and create sheltered bays and passages within which marine and coastal plants and animals thrive.

Southeast Queensland has a humid sub-tropical climate with mild winters and warm, wet summers. It is the most densely populated area of Queensland, accommodating over 70% of the state population (Queensland Treasury 2015), and is subject to a range of land uses including grazing, nature conservation, irrigated agriculture, urban uses (including industrial and residential) and rural living. The region's major agricultural products include dairy, fodder crops, cereal and a variety of horticultural produce.

The region contains the most urbanised parts of Queensland but also some of the most exceptional natural areas in the state, including the Gondwana Rainforests of Australia and Fraser Island World Heritage Areas. The main pressure on the environment in SEQ is the impact of rapid population growth and concomitant growth of services that fragment the landscape. Other important threats are unsustainable land management practices, native vegetation clearing, point source and diffuse pollutants (from urban, industrial and agricultural areas) entering waterways and the impacts of introduced plants and animals.

There are 12 sub-regions within the Southeast Queensland Bioregion (Sattler & Williams 1999, Figure 1). The Department of Science, Information Technology and Innovation (DSITI) has mapped and classified regional ecosystems (RE) to a peer reviewed and published mapping and classification methodology. These RE maps were used as a platform for the conservation assessments reported here. BPAs accept the released RE maps unmodified and therefore, are limited by the REs inherent mapping and classification accuracy. Issues to do with RE mapping or classification errors are dealt with by DSITI's mapping update processes and are not part of a BPA.

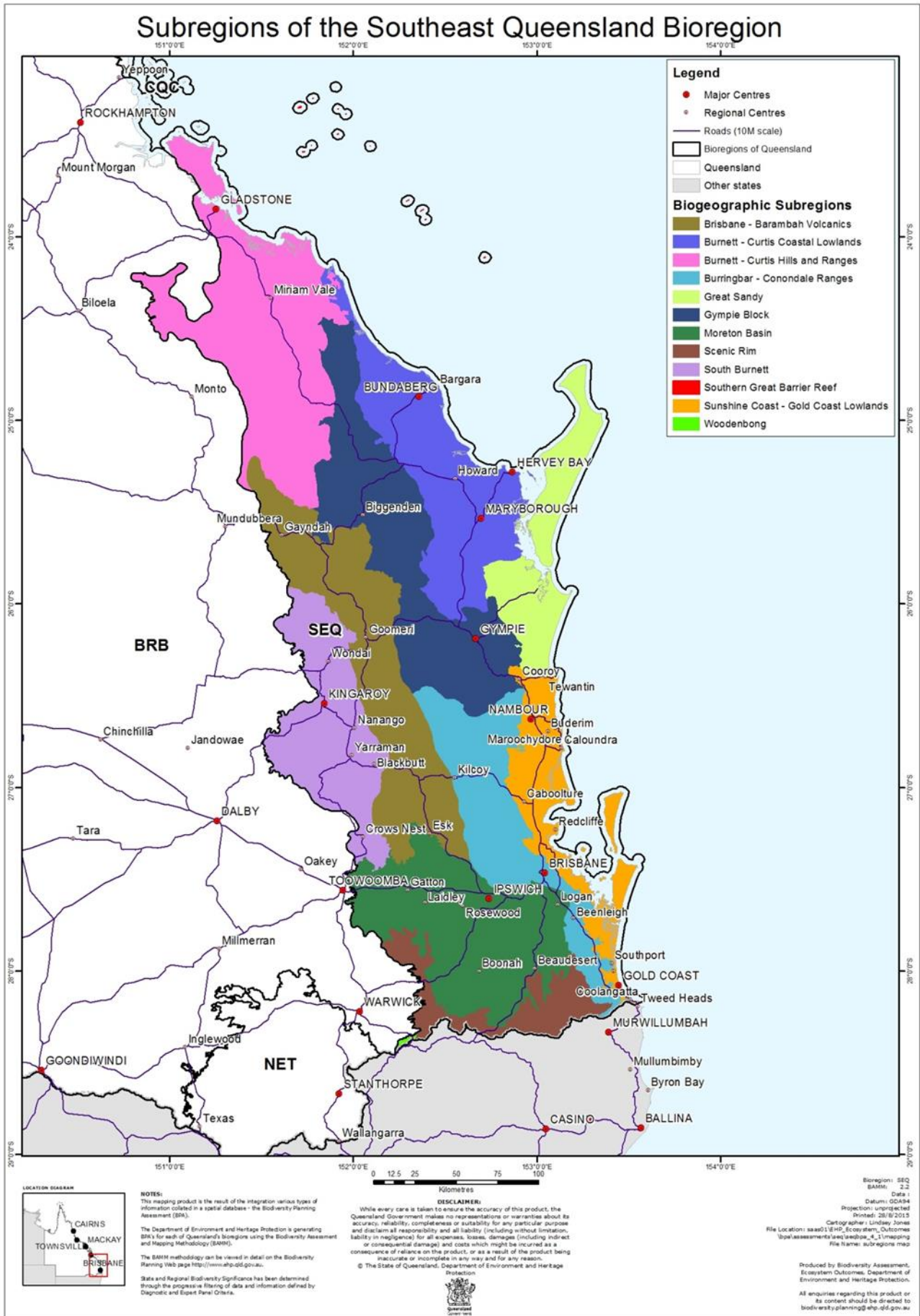


Figure 1. The Southeast Queensland bioregion and its subregions

Table 1: Subregions of the Southeast Queensland bioregion

Subregion	Subregion area (ha)	Percentage remnant (2013)
Brisbane - Barambah Volcanics	806,778	32.2%
Burnett - Curtis Coastal Lowlands	706,909	49.2%
Burnett - Curtis Hills and Ranges	1,031,742	63.6%
Burringbar - Conondale Ranges	535,410	48.4%
Great Sandy	362,412	79.0%
Gympie Block	859,024	43.6%
Moreton Basin	784,969	23.7%
Scenic Rim	228,692	64.0%
South Burnett	563,865	25.5%
Southern Great Barrier Reef	272	84.7%
Sunshine Coast - Gold Coast Lowlands	365,498	35.8%
Woodenbong	2846	1.1%
Grand Total	6,248,417	

2 Methods and implementation

2.1 BAMM

The SEQ 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, which is relatively uniform and reliable across a bioregion. 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.

The seven diagnostic criteria in Table 2 use reliable and uniformly available information that is usually accessible in database format, 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 to ensure transparency and allow for any combination of criteria to be used in isolation from others in decision making.

Table 2: BAMM criteria

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

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 where possible spatial extent of the proposed features.

2.2 Datasets

Typically, a BPA using BAMB 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 DSITI. A list of datasets used in the SEQ BPA is included in Table 3.

Table 3: List of datasets used in the SEQ BPA

Dataset	Version	Release date	Custodian
Regional Ecosystems	9.0	April 2015	DSITI—Queensland Herbarium
Species records - WildNet		November 2015	DSITI
Species records - HerbreCs		March 2016	DSITI—Queensland Herbarium
Species records - Corveg		November 2015	DSITI—Queensland Herbarium
Species records – Queensland Historical Fauna Database (QHFD)		April 2016	EHP—Biodiversity Assessment
Ecological Communities of National Significance Database		Nov 2015	Australian Government Department of Environment and Energy
Protected Areas of Queensland		June 2015	NPSR
Nature refuges - Queensland		May 2015	DEHP
World Heritage Areas		February 2012	Australian Government Department of Sustainability, Environment, Water, Population and Communities
Queensland Wetland Data – Wetland areas 2013	Version 4.0	Nov 2015	DSITI
RAMSAR		November 2002	DEHP
State Marine Parks		2014	NPSR
Fish Habitat Areas		Sep 2014	NPSR
Directory of Important Wetlands		Jan 2005	DEHP

2.3 Expert panels

Five expert panels for the SEQ BPA were held in Maryborough and Brisbane between December 2015 and March 2016 to address fauna, flora and landscape ecological values. Attachment A details the composition, role, findings and recommendations of these panels.

2.4 Implementation

The BAMB version 2.2 (EHP 2014) was followed in the compilation of this assessment. Python scripts and ArcGIS ModelBuilder toolbox was used to apply BAMB and create the BPA. A number of methodological updates were implemented in this version of the SEQ BPA, and they will form the basis for updating BAMB to version 2.3 (EHP 2016). The methodological changes are summarised below in Table 4.

Table 4: BAMB method changes implemented in SEQ BPA Version 4.1

Criterion	Change in 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"> 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). 2. EPBC listed threatened ecological communities were incorporated in criterion B1 and assigned a significance rating of "Very High".
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"> 1. Revised the justifications for nomination of priority species. 2. New category was incorporated - "Taxa particularly vulnerable to climate change." 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.
I	Addition of a new sub-criterion, Ik: Climate change refugia.
J	Altered the implementation of terrestrial corridors to include all 'High' and 'Very High' tracts from criterion C, where a corridor intersects the tract.

2.5 Assessment parameters

The tools that are used to produce the BPA calculate a number of criteria parameters 'on the fly' 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 SEQ BPA

Subregion	Low	Medium	High	Very High
12.1	< 85ha	< 165ha	< 1082ha	NA
12.2	< 64ha	< 110ha	< 502ha	> 502ha
12.3	< 90ha	< 194ha	< 1829ha	> 1829ha
12.4	< 95ha	< 249ha	< 4901ha	> 4901ha
12.5	< 90ha	< 174ha	< 1085ha	> 1085ha
12.6	< 63ha	< 103ha	< 390ha	> 390ha
12.7	< 87ha	< 176ha	< 1310ha	> 1310ha
12.8	< 97ha	< 233ha	< 3134ha	> 3134ha
12.9	< 279ha	< 1147ha	< 115922ha	NA
12.10	< 83ha	< 173ha	< 1456ha	NA
12.11	< 67ha	< 142ha	< 1264ha	> 1264ha
12.12	< 1112ha	< 23593ha	< 7680159475ha	NA
11.14	< 193ha	< 551ha	< 13320ha	> 13320ha
11.18	< 146ha	< 334ha	< 3679ha	> 3679ha
11.22	< 91ha	< 161ha	< 753ha	> 753ha
11.27	< 89ha	< 165ha	< 935ha	> 935ha
11.31	< 67ha	< 114ha	< 481ha	> 481ha

For criterion F (ecosystem diversity), the calculated buffer distance was 122.5 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 an almost-infinite 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.

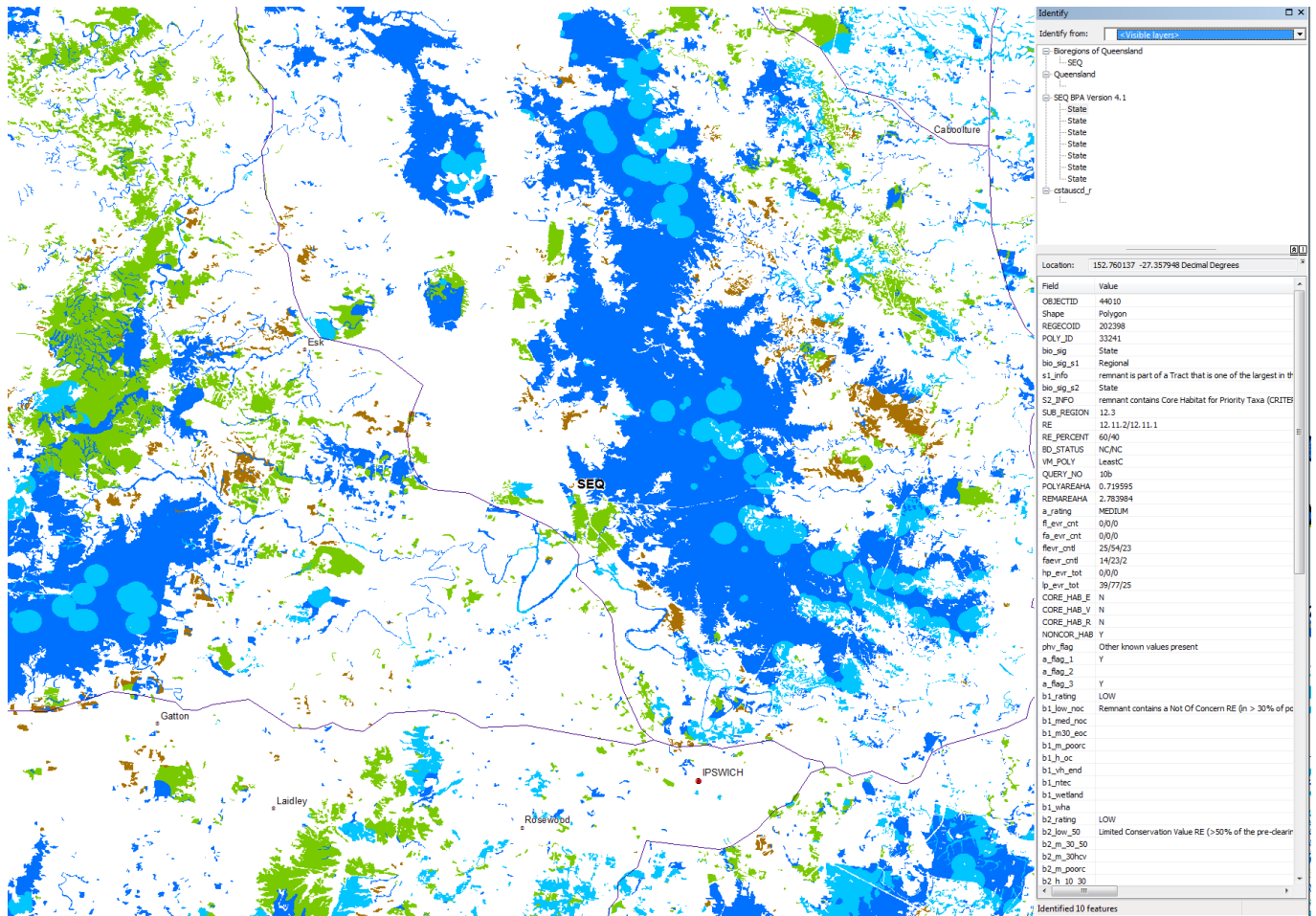


Figure 2. Interrogating the BPA results for a spatial unit in the GIS environment.

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 filtering combination table was not changed for the SEQ BPA.

Table 6: Filter table as used for the SEQ 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
S: State	1	A: very high	or	B1: very high		n/r		n/r		n/r		n/r		n/r
Or	2	n/r		B1: high		n/r	&	D1: very high		n/r		n/r		n/r
Or	3	n/r		B1: high	&	C: high	&	D1: high	&	E: very high ¹	or	F: very high ¹	or	G: very high ¹
Or	4	n/r		n/r		C: very high	&	D1: very high	&	E: very high		n/r		n/r
Or	5	n/r		n/r		n/r		D1: very high	&	E: very high ¹	or	F: very high ¹	or	G: very high ¹
R: Regional	6	A: high	or	B1: high		n/r		n/r		n/r		n/r		n/r
Or	7	n/r		B2: very high		n/r		n/r		n/r		n/r		n/r
Or	8	n/r		B2: high	&	C: very high	or	D2: very high		n/r		n/r		n/r
Or	9	n/r		n/r		C: very high	&	D2: very high	&	E: very high		n/r		n/r
Or	10	n/r		n/r		C: very high		n/r	&	E: very high	&	F: very high	or	G: very high
Or	11	n/r		B2: high	&	C: high	&	D2: high ²	or	E: vh or high ²	or	F: vh or high ²	or	G: vh or high ²
Or	12	n/r		n/r		n/r		D2: very high	&	E: vh or high ²	or	F: vh or high ²	or	G: vh or high ²

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
L: Local	13	n/r		B2: high		n/r		n/r		n/r		n/r		n/r
Or	14	n/r		B3: very high		n/r		n/r		n/r		n/r		n/r
Or	15	n/r		B3: high	&	C: very high	or	D3: very high		n/r		n/r		n/r
Or	16	n/r		n/r		C: very high	&	D3: very high	&	E: very high		n/r		n/r
Or	17	n/r		n/r		C: very high		n/r	&	E: vh or high ²	or	F: vh or high ²	or	G: vh or high ²
Or	18	A: medium	or	B3: high	or	C: high	&	D3: high ²	or	E: vh or high ²	or	F: vh or high ²	or	G: vh or high ²
Or	19	n/r		n/r		n/r		D3: very high	&	E: vh or high ²	or	F: vh or high ²	or	G: vh or high ²

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 High¹: A single 'Very High' score is not sufficient—at least two of the criteria marked as Very High¹ must be rated as Very High to qualify as significant.

High²: A single 'High' score is not sufficient— at least two of the criteria marked as High² 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 referential within each bioregion, but each value category has characteristics in common. BAMB 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 primarily dependant on the accuracy of the Herbarium Regional Ecosystem (RE) Mapping Version 9.0 (April 2015), which is recorded in that metadata as a scale of 1:50,000 for parts of SEQ. 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 linework 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 SEQ bioregion overall results

A BPA was conducted for the SEQ bioregion. A summary of the results is provided below.

Overall, 86%¹ (2.39 million ha) of remnant vegetation in the SEQ bioregion was found to have biodiversity values that are of State significance of which 22% (627,000ha) is State Habitat for EVNT taxa. Regional significance was attributed to 11% (303,000ha), with the remaining 3% of remnant vegetation being assigned Local or Other Values. (Figure 3 and Figure 4)

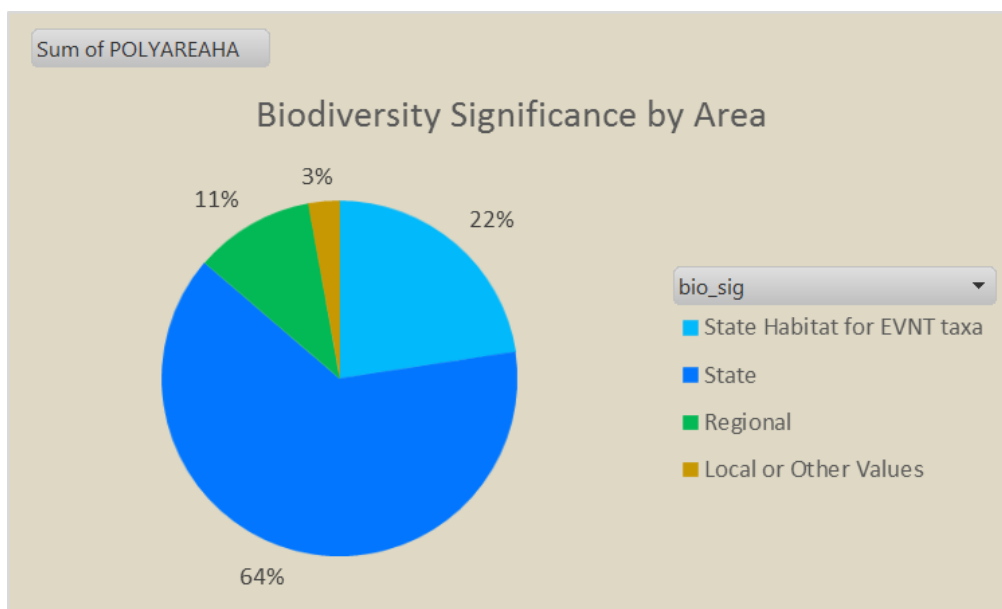


Figure 3. Summary of biodiversity assessment overall results

¹ 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) have been excluded for the purpose of the report.

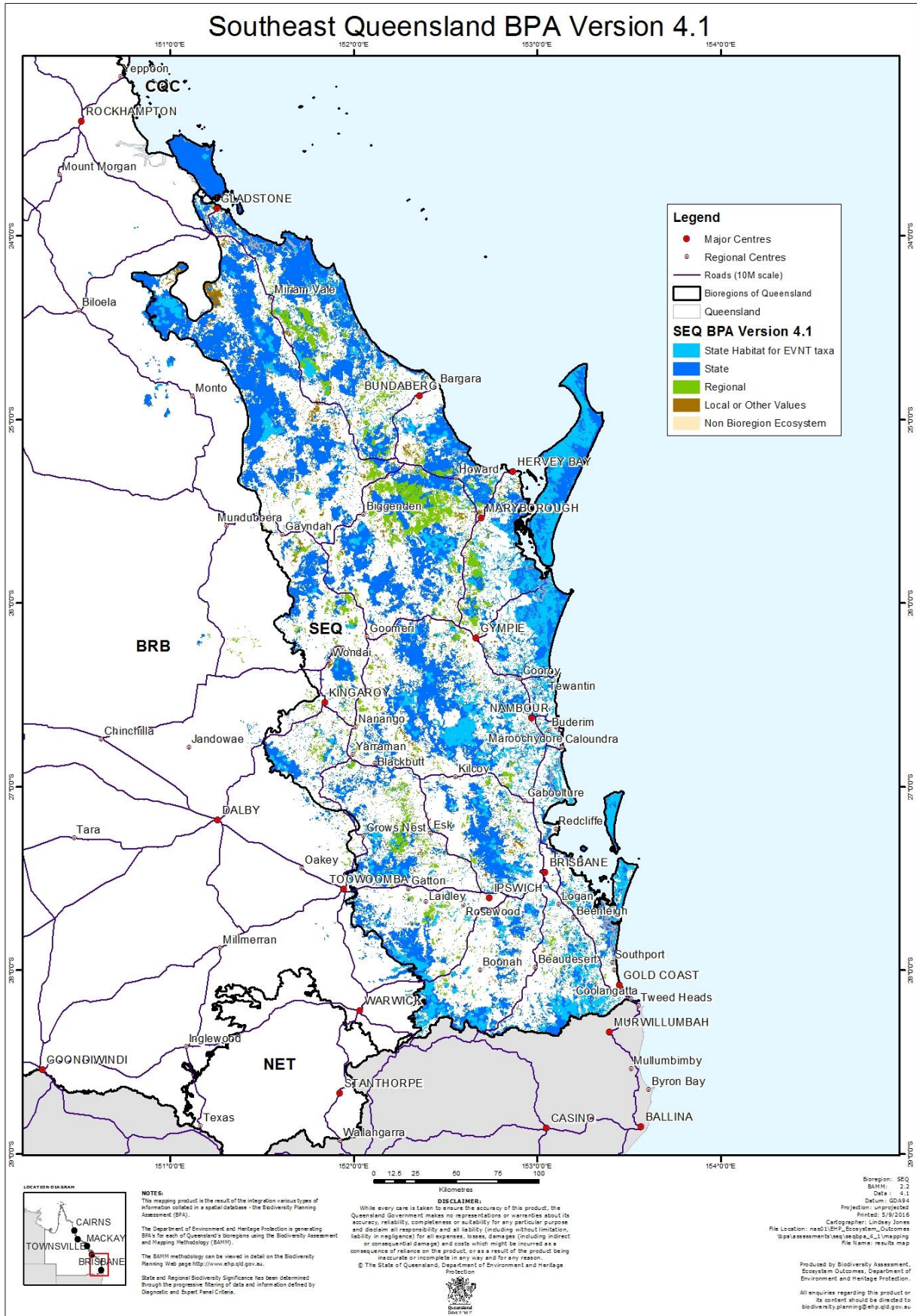


Figure 4. Overall biodiversity significance

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.

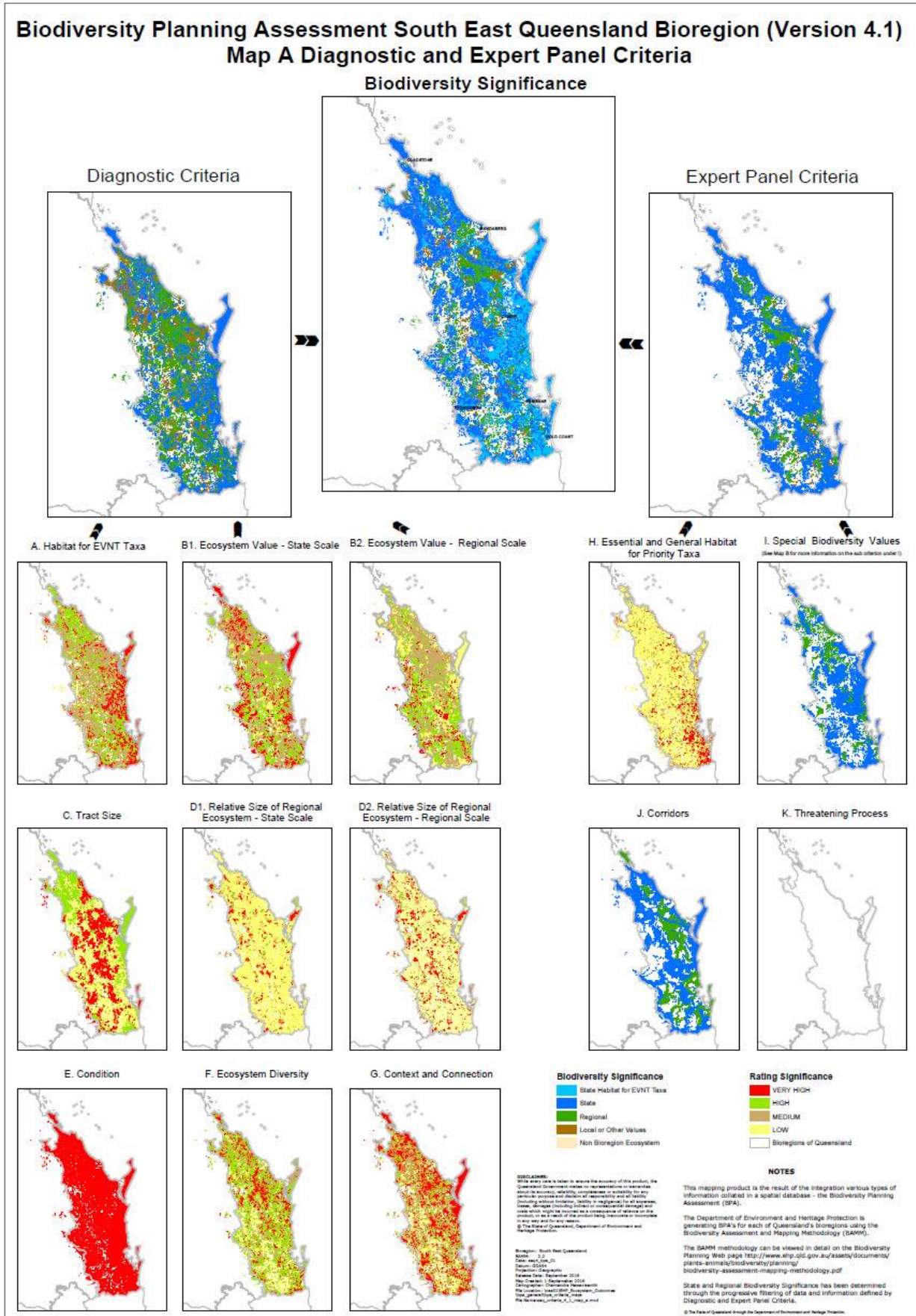


Figure 5. Diagnostic and expert panel criteria

3.4 Diagnostic results

3.4.1 Overall diagnostic criteria results

From the diagnostic criteria, 50% of the SEQ bioregion remnant vegetation (1.4 million ha) was found to have biodiversity values that are of State significance. Regional significance was attributed to 36% (0.99 million ha), and Local or Other Values was attributed to 14% (403,000ha) of the SEQ remnant vegetation (Figure 6 and Figure 7).

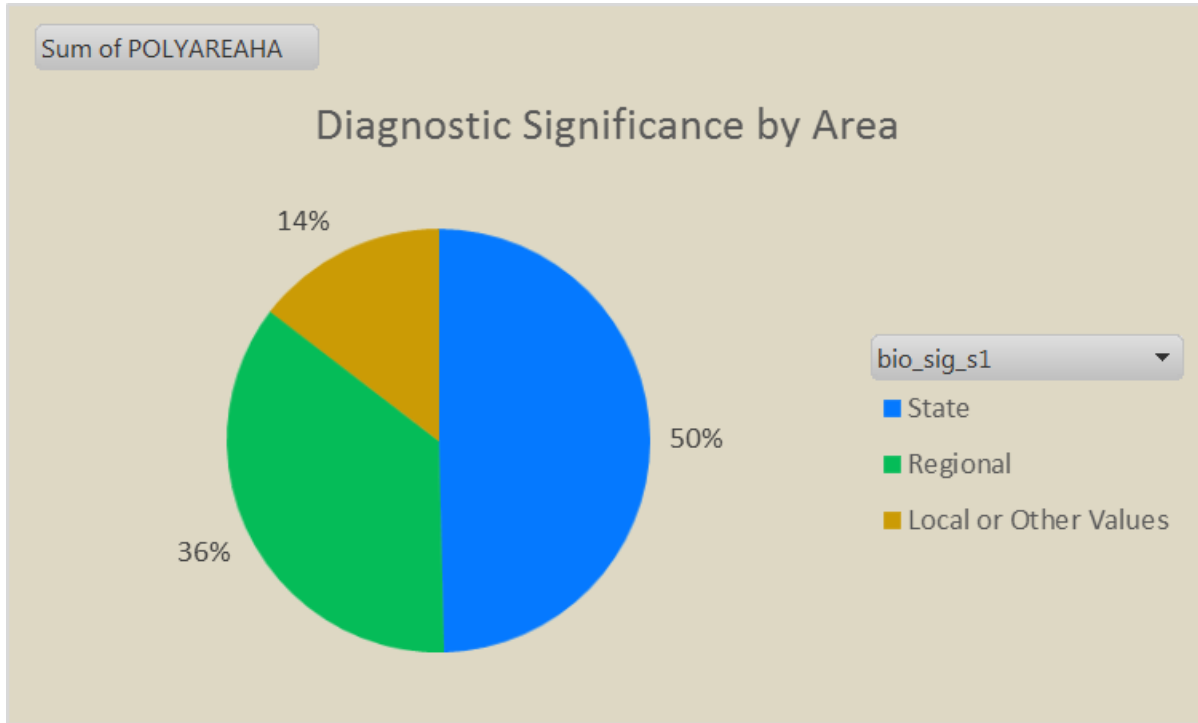


Figure 6. Summary of biodiversity assessment diagnostic criteria results as proportion of total assessment area.

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 of Table 7. The results of the hit analysis for the diagnostic criteria are as follows:

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

Query No. ¹	Area (ha)	Significance	Percentage of total area	Percentage of total query no. frequency (167,448)
1a	627,018	State	22.6%	36.9%
1b	442,098	State	15.9%	24.8%
2a	137,580	State	5.0%	1.1%
3a	2,341	State	0.1%	<0.1%
3b	7,026	State	0.3%	0.1%
4a	127,230	State	4.6%	1.2%
5a	16,469	State	0.6%	0.1%
5b	16,793	State	0.6%	0.3%
6a	372,338	Regional	13.4%	17.5%
6b	260,569	Regional	9.4%	10.4%
7a	9,455	Regional	0.3%	0.4%
8a	13,423	Regional	0.5%	0.3%
8b	1,138	Regional	<0.1%	<0.1%
9a	68,105	Regional	2.5%	0.6%
10a	63,354	Regional	2.3%	2.1%
10b	122,730	Regional	4.4%	3.5%
11b	226	Regional	<0.1%	<0.1%
11f	144	Regional	<0.1%	<0.1%
11g	5,258	Regional	0.2%	0.1%
11i	16,587	Regional	0.6%	0.2%
12c	587	Regional	<0.1%	<0.1%
12d	60,780	Regional	2.2%	0.3%

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

The results of the hit analysis (Table 7) reveal that the most widespread (by area) combination to trigger State significance is query 1a (22.6% or 627,018ha). This query is due to a Very High criterion A rating, indicating that the remnant unit contains high precision (precision ≤ 500m) or core habitat for one or more Endangered or two or more Vulnerable or Near Threatened species. This is not surprising, given that there are 374 EVNT listed species found in SEQ, and a total of 17,138 records and habitat models for 12 species were included in criterion A. This

decision was triggered in 36.9% of remnant units, which demonstrates the large number of EVNT species records found in SEQ.

The second most widespread (by area) combination to trigger State significance is query number 1b, which accounts for 15.9% of remnant area (442,098ha). Criterion B1 is Very High, due to the presence of an Endangered RE, Nationally Important Wetland, EPBC listed community or World Heritage Area. Again, this result is expected given the large number of these features, many of a substantial size in the SEQ. This query is also the second most common decision that resulted in State significance, with 24.8% of remnant units containing these values.

The most widespread (by area) combination to trigger Regional significance is query 6a, with 13.4% (372,338ha) being triggered. This query is due to a High rating for criterion A, indicating that the remnant unit contains high precision (precision \leq 500m) or core habitat for one or more Vulnerable or Near Threatened species. This query was also the most commonly triggered decision that resulted in Regional significance, with 17.5% of all remnant units containing this value.

The second most widespread combination to trigger Regional significance is query 6b, with 9.4% (260,569ha) being triggered. This query is due to a High rating for criterion B1 (high conservation RE or significant wetland), indicating that the remnant unit contains an 'Of Concern' regional ecosystem. This query triggered for 10.4% of remnant units.

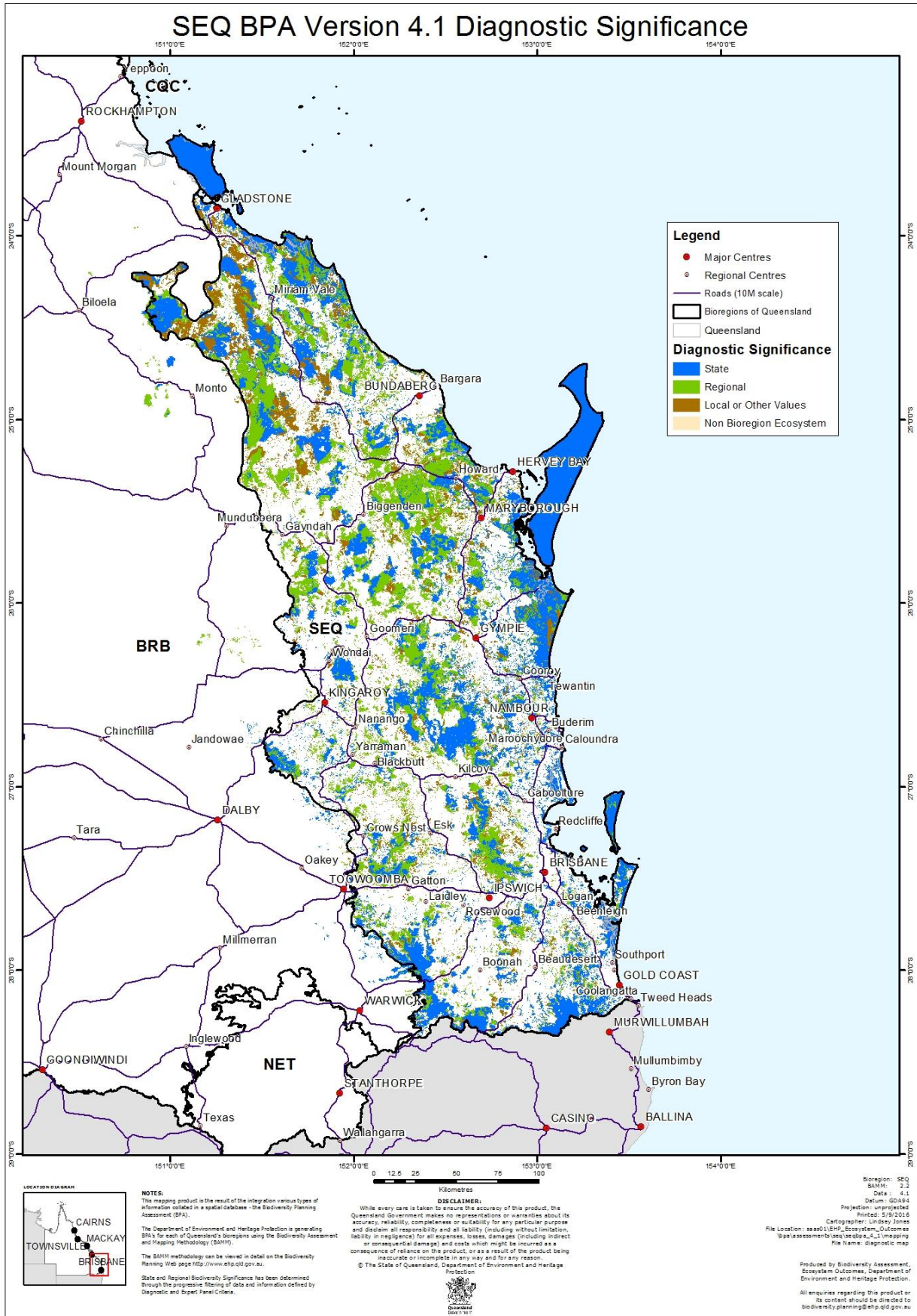


Figure 7. Diagnostic significance

3.5 Expert panel results

3.5.1 Overall expert panel results

Overall, 93% of the SEQ bioregion was seen to have significance by the expert panel. The expert panel found 81% (2.2 million ha) of the SEQ bioregion to have biodiversity values that are of State significance. Regional significance was attributed to 11% (0.3 million ha) (Figure 8 and Figure 9). Due to the changes in the way that Criterion H (Priority species) was implemented in this version of the BPA, 1% (24,258ha) 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 SEQ bioregion were identified by consulting experts and using existing data, it is possible that not all areas were identified.

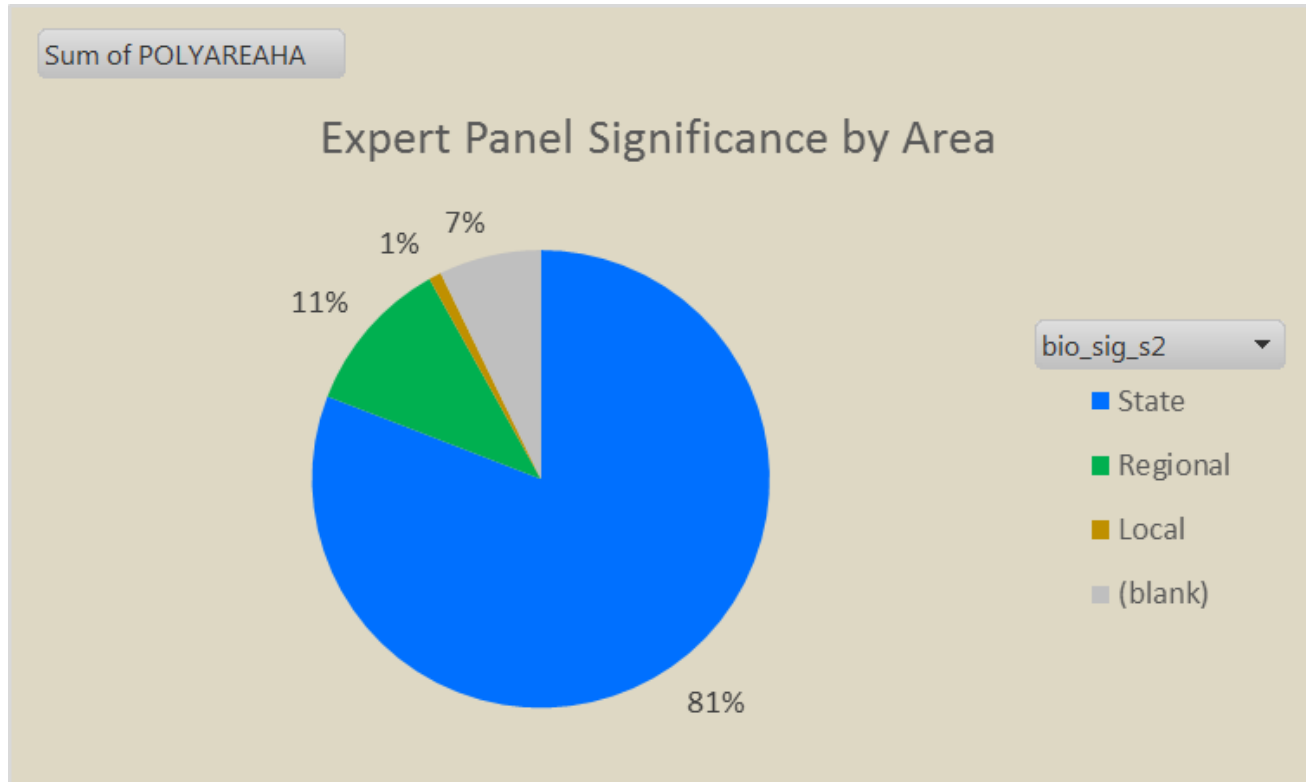


Figure 8. Summary of biodiversity assessment expert panel criteria results

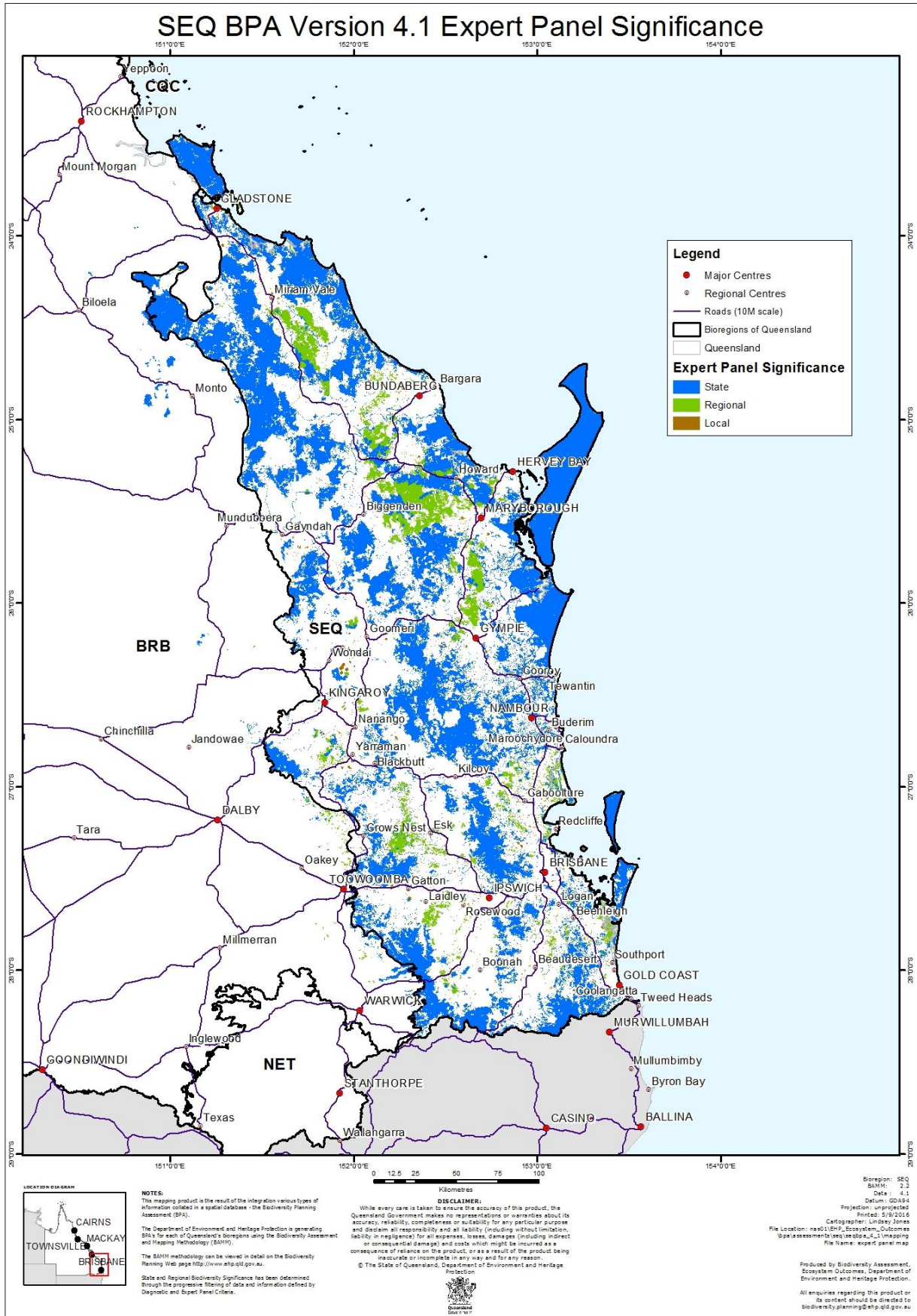


Figure 9. Expert panel significance

3.5.2 Criterion H (priority species 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 (see flora and fauna reports in Attachment A). Priority species habitat is based on buffered species records. While the proportion of total area identified as habitat for these species is relatively small, these areas nevertheless hold important conservation values for long-term sustainability of priority species populations. The process for determining H rating was reviewed for this version of the BPA (see flora and fauna expert panel reports for details), due to the relative power of Criterion H in BMM, and the abundance of priority species records in the bioregion. Two factors determine the H rating for an area: species significance (State or Regional as defined by expert panel) and record precision (high or low). There were 375 priority species identified in SEQ (129 flora, 246 fauna), and 21,957 total records for these species. Due to the relatively small buffer size attributed to point records and the large size of the bioregion, only a small proportion of SEQ (272,433ha, or 10%) achieved a value of Very High for criterion H, and 63,905ha (2%) was determined to be High for this criterion (Table 8).

Table 8: Criterion H (Priority species habitat) results as percentage of total assessment area

	Very High	High	Medium	Local
H rating	10%	2%	14%	74%

3.5.3 Other expert panel criteria

Criterion I (special areas) and Criterion J (corridors) were identified by flora, fauna, and landscape expert panel members. Criterion K (threatening processes) was not assessed by the SEQ expert panel.

Approximately 63% of the total assessment area has been identified as having Criterion I special biodiversity values (State or Regional). The characteristics of these areas are described in section below. Figure 10 illustrates the general coverage of all 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 that form part of the state-wide network were assigned State significance. This mapped network comprises approximately 86% of assessment area (Table 9).

Table 9: Criteria I, J, K Biodiversity Significance results as percentage of total assessment area.

	State	Regional
I rating (Special Areas)	55%	8%
J rating (Corridors)	66%	20%
K rating (Threatening Process)	N/A	N/A

3.5.4 Criterion I sub-criteria results

Areas exhibiting special biodiversity features 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 below. Areas exhibiting characteristics of species endemism (Ia rating - 27.9%, 775,320ha), wildlife refugia (Ib rating - 56.3%, 1 561,614ha) and climate change refugia (Ik rating - 23.5%, 652,095ha) account for the greatest proportion of total area identified as Very High value. The flora, fauna and landscape reports will have 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 total assessment area

Criterion I sub-rating	Very High	High	Medium
Ia rating (centre of endemism)	27.9%	17.8%	3.8%
Ib rating (wildlife refugia)	56.3%	4.2%	N/A
Ic rating (disjunct populations)	10.5%	4.9%	16.0%
Id rating (species at geographic range limit)	6.9%	20.6%	0.8%
Ie rating (high species diversity)	14.3%	21.3%	1.8%
If rating (areas with concentrations of relictual populations - ancient and primitive taxa)	N/A	N/A	1.4%
Ig rating (REs show distinct variation in species composition)	6.4%	6.7%	1.7%
Ih rating (artificial waterbody or managed/manipulated wetland of ecological significance)	N/A	N/A	N/A
Ii rating (high density of hollow-bearing habitat trees)	6.2%	1.5%	0.5%
Ij rating (significant breeding or roosting sites)	3.9%	0.8%	N/A
Ik rating (climate change refugia)	23.5%	0.1%	N/A

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Map B Criterion I Special Biodiversity Values

Criterion I. Special Biodiversity Values

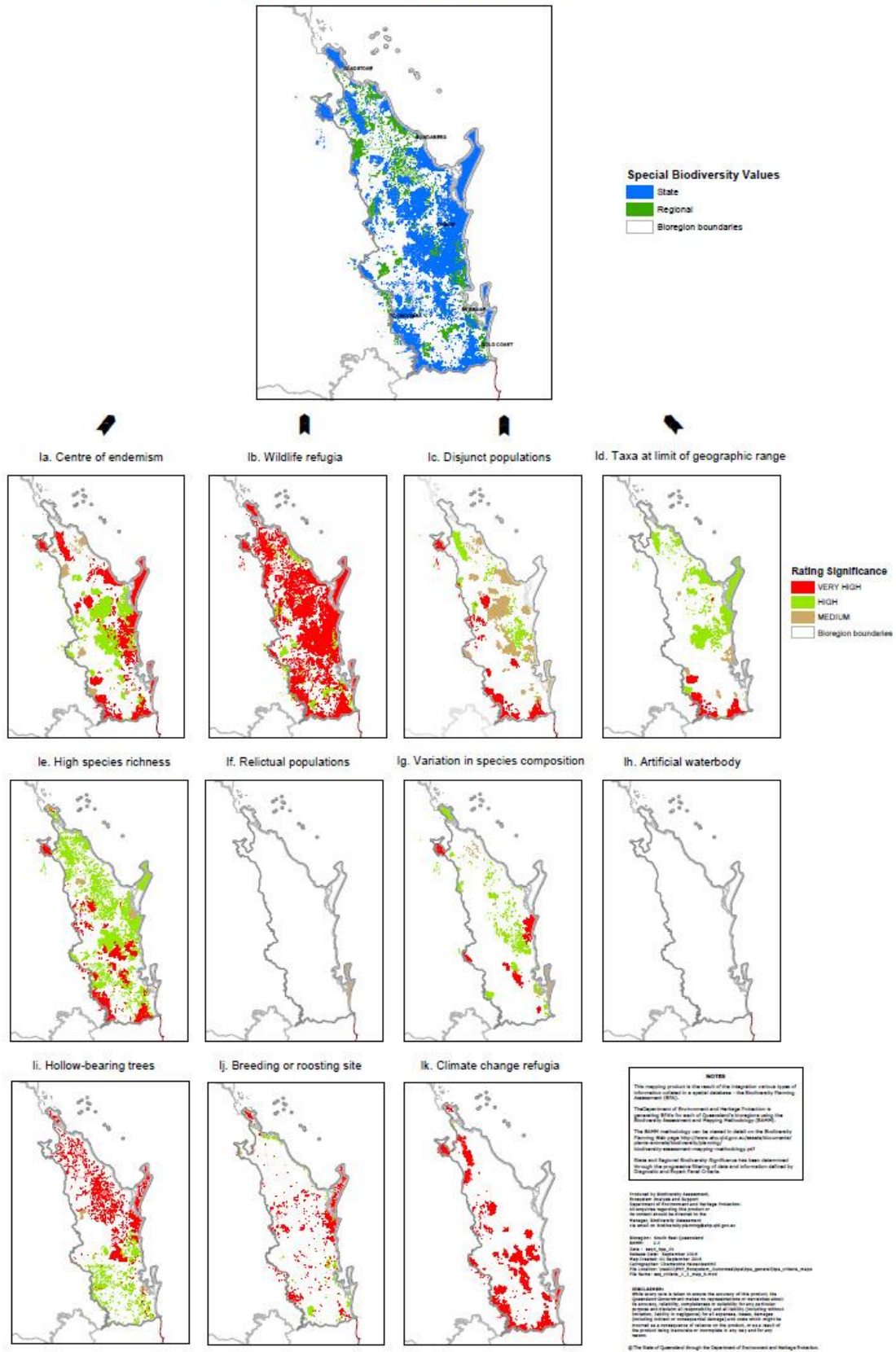


Figure 10. Criterion I Special Biodiversity Values

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 1:50,000.

4 Summary and recommendations

Approximately 97% of the remnant vegetation of the Southeast Queensland bioregion was assessed as being of either State or Regional significance. This high proportion is not unexpected. The region is highly fragmented, and the remaining vegetation is extremely important 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.

The diagnostic criteria accounted for half of the assessment area as having State biodiversity significance. The large number of threatened species, as well as the large number of records and habitat models for these species, have contributed to high values for diagnostic criterion A (habitat for EVNT taxa). The other major contributing factor for this was nationally listed wetlands and vegetation communities, and endangered vegetation (diagnostic criterion B).

The expert panel identified 92% of the SEQ bioregion as having biodiversity values of State or Regional significance. This was a combination of Criterion I special biodiversity values and bioregional corridors. Approximately 55% of the overall assessment area was identified as exhibiting State significance special feature biodiversity values (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 for ecosystems 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 spatially natural resource actions within a bioregion for surveys, changes in land management practices, rehabilitation and weed eradication.

Interpretation of the SEQ 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 western half of SEQ away from main roads and iconic locations are needed to understand taxon distributions and the ecology of the area.

The biodiversity of Southeast Queensland is facing several threats, such as the impact of rapid population growth and infrastructure that fragments the landscape. Other important threats include unsustainable land management practices, native vegetation clearing, point source and diffuse pollutants (from urban, industrial and agricultural areas) entering waterways and the impacts of introduced plants and animals. All of these could be exacerbated by climate change that could result in significant risks to the entire bioregion, from coastal ecosystems to montane cloud forests. 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.

5 References

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6 Attachments

Attachment A Flora, fauna and landscape expert panel reports.