Report to the Land Court of Queensland on the distribution of regional ecosystems on “Khyber” (Lot 1884 on PH204)

Don W. Butler BSc.(Hons 1) PhD., Senior Botanist, Queensland Herbarium, Environmental Sciences Division, Environmental Protection Agency.

23rd August 2006

Contents

Introduction

1. On 28th July 2006 I was asked by the Crown Solicitor to provide an expert report to the Land Court of Queensland concerning the distribution of regional ecosystems on a property known as 'Khyber' (Lot 1884 on Plan PH204 in the Parish of Khyber) near Augathella. The request (provided in Appendix 1) related to an appeal against a decision to refuse an application for a permit under the *Land Act 1994* to clear vegetation on portions of Khyber. I was specifically asked to address two factual questions:

    Q1. Identify and classify the extent of *endangered, of concern*, and *not of concern* regional ecosystems on the land in accordance with the *Vegetation Management Act 1999* and the *Vegetation Management Regulation 2000* as currently in force.

    Q2. Is any area of the land an "environmentally sensitive area" as an area that is of high nature conservation value because it is an area of regrowth vegetation that, if retained, will enhance an endangered regional ecosystem?

Experience

2. My current role in the Environmental Protection Agency (EPA) includes assessing and acting upon requests for changes to the remnant regional ecosystem maps certified under the *Vegetation Management Act 1999*. I have worked in this role since August 2002 and have worked at the Queensland Herbarium and been involved in mapping regional ecosystems since late 1998. My academic qualifications include a PhD in the field of Botany from the University of Queensland. Appendix 2 provides further details on my experience and qualifications.

Methodology

3. In preparing this report I utilised standard mapping procedures employed by the Queensland Herbarium (detailed in Neldner *et al* 2005) to map the regional ecosystems over the area subject to the tree clearing application and adjacent land. This involved:
    - stereoscopic examination of aerial photographs taken in 1969, 1981, 1994 and 1995 (details in Appendix 3);
    - digital examination, using ArcInfo GIS, of the current certified regional ecosystem mapping;
    - digital examination of rectified Landsat Satellite Imagery from the years 1991, 1995, 1997, 1999, 2000, 2001, 2003 and 2005, and rectified high resolution scans of selected aerial photographs;
    - digital examination of 1:250 000 scale geology mapping and landsystem mapping (Turner *et al.* 1978);

- two days of reconnaissance on Khyber, August 1st and 2nd, 2006, accompanied by Helen Cartan (BApp.Sc(hons), Senior Botanist, Vegetation Survey, Mapping and Management Unit, Queensland Herbarium, EPA), during which notes were taken on vegetation and soils across the area of interest (see map 2 for observation locations);
- reference to the EPA's Regional Ecosystem Description Database (REDD, Environmental Protection Agency 2005) and supplementary published descriptions of vegetation referred to in REDD (particularly Turner *et al.* 1978, and Neldner 1984); and,
- discussions with Mr Bruce Wilson (BSc. MSc., Chief Scientist, Vegetation Survey, Mapping and Management Unit, Queensland Herbarium, EPA), the co-ordinator for regional ecosystem mapping in the two bioregions concerned (Mulga Lands and Brigalow Belt).

Results

Q1. Identify and classify the extent of *endangered, of concern,* and *not of concern* regional ecosystems on the land in accordance with the *Vegetation Management Act 1999* and the *Vegetation Management Regulation 2000* as currently in force.

4. Updated remnant regional ecosystem mapping is presented in map 1 (coloured according to status under the *Vegetation Management Regulation 2000*) and map 2 (linework over Landsat Imagery and showing sites visited during this assessment), a copy of the current certified map is provided as map 3. The original application area, considered during the field inspection, was amended by the appellant on 26th August 2006 (after my field inspection) and the amended application area is provided in Appendix 4. The amendment excluded some areas of endangered regional ecosystems covered by the original application area but did not substantially the area of interest with respect to the regional ecosystem map review.

5. The remapping resulted in minimal change to the extent of remnant vegetation on the property but did change the regional ecosystems present and their relative extents. There was a small increase in the extent of *endangered* regional ecosystems and a small decrease in the extent of *of concern* regional ecosystems[1]. The regional ecosystems in the updated mapping are summarised in Table 1.

6. The *endangered* regional ecosystems on Khyber occur on a plateau of red earth that the geology mapping suggests consists of unconsolidated Quaternary sediment overlying the Hooray sandstone. This area was the subject of a map change request arising out of the application assessment process (October 2004, Queensland Herbarium map assessment request number 1657). This assessment resulted in a change in the regional ecosystem mapping over the plateau to a

[1] Background information on the status and classification of regional ecosystems is available in Neldner *et al.* (2005) or at http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/introduction_and_status/

mosaic of 11.4.3 (*endangered*) and 6.5.3 (*not of concern* but not available for clearing because it was at the threshold of changing status).

7. The current assessment confirmed the presence of 11.4.3; brigalow and belah with emergent eucalypts, predominantly blackbutt (see Appendix 5 for scientific names). However, the more open land type that had been mapped as a mosaic of 6.5.3 and 11.4.3 was predominantly poplar box woodland with a well-developed shrub layer of false sandalwood and groves of brigalow throughout. This is classified on the updated map as 11.4.7 (*endangered*). Within the 11.4.7 there are small areas where patches of mulga occur within the poplar box woodland and brigalow groves are absent. Silver leaved ironbark is more common in such situations. These areas represent regional ecosystem 6.5.9 (*not of concern*) and are included on the map as a sub-dominant component (5%) of the areas of 11.4.7.

8. The current certified mapping (map 3) includes 465ha of *of concern* regional ecosystems (11.9.7 and 11.9.11) on the southern side of the western end of the remnant band covering the north of the property. However, the field inspection showed that this area is predominantly silver leaved ironbark woodland with cypress pine (*Callitris glaucophylla*) and the geology mapping indicates that this area occurs on unconsolidated Quaternary sediments. This area is therefore appropriately classified as 11.5.5, a *not of concern* regional ecosystem.

9. Most of the remnant area of *of concern* regional ecosystems on Khyber is 11.3.2, poplar box woodlands on alluvium associated with Sandy Creek and the Warrego River. The application area intersects these ecosystems in the south. *Of concern* vegetation (11.9.11 - brigalow and poplar box on sedimentary rock) occurs in two areas within the application area in the north-west (immediately north of the quarry and on the northern boundary).

10. Most of the application area is over *not of concern* regional ecosystems, primarily bendee and lancewood in 11.10.3 and silver leaved ironbark woodlands (11.5.5 and 11.10.7).

Q2. Is any area of the land an "environmentally sensitive area" as an area that is of high nature conservation value because it is an area of regrowth vegetation that, if retained, will enhance an endangered regional ecosystem?

11. No regrowth vegetation that would, if retained, enhance an *endangered* regional ecosystem was identified.

Conclusions

12. The application area supports a single large patch of *endangered* regional ecosystems and smaller occurrences of *of concern* regional ecosystems. These are delineated in map 1. The remainder of the remnant vegetation on Khyber represents various *not of concern* regional ecosystems. The regional ecosystems on Khyber are summarised in Table 1.

13. No regrowth constituting an "environmentally sensitive area" was identified.

Declaration

The factual matters stated in this report are true, to the best of my knowledge. I have made all enquiries considered appropriate in review of this matter. The opinions stated in the report are genuinely held by me and I have referenced all matters I consider to be significant. I understand my duty to the Court and believe I have complied with this duty to the best of my ability. To the best of my knowledge there are no readily ascertainable facts that would assist me in reaching more reliable conclusions.

Don W. Butler

References

Environmental Protection Agency (2005). *Regional Ecosystem Description Database (REDD).* Version 5.0. Updated December 2005.

Neldner, V.J. 1984 *Vegetation Survey of Queensland; south-central Queensland.* Queensland Botany Bulletin No. 3. Queensland Department of Primary Industries, Brisbane.

Neldner, V.J., Wilson, B. A., Thompson, E.J. and Dillewaard, H.A. (2005) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland.* Version 3.1. Updated September 2005. Queensland Herbarium, Environmental Protection Agency, Brisbane. 128 pp.

Turner, E.J., Beeston, G.R., Lee, A.N., Ahern, C.R. and Hughes, K.K. (1978). *Western Arid Region Land Use Study, Part IV.* Tech. Bull. 23, Division of Land Utilisation, Department of Primary Industries, Brisbane.

Table 1. Summary of remnant regional ecosystems on Khyber

RE	Area (ha)	VMA status	Short description from REDD	Distribution and character on Khyer
11.4.3	562	Endangered	Acacia harpophylla and/or Casuarina cristata shrubby open forest on Cainozoic clay plains	Brigalow frequently with belah and emergent blackbutt. Mainly in central north but also occurs near Khyber Road. (Appendix 6, Plate 3)
11.4.7	259	Endangered	Open forest to woodland of Eucalyptus populnea with Acacia harpophylla and/or Casuarina cristata on Cainozoic clay plains	Only in central north of Khyber, groves of brigalow throughout a poplar box woodland. Areas with abundant mulga and sparse brigalow are 6.5.9. (Appendix 6, Plate 4)
11.3.2	1165	Of concern	Eucalyptus populnea woodland on alluvial plains	Associated with Sandy Creek and Warrego River. Shrub layer of false sandalwood and occassional small Cypress pine.
11.9.11	824	Of concern	Acacia harpophylla shrubland on fine-grained sedimentary rocks	Brigalow with poplar box emergents on edges of cleared parts of Khyber and associated with Sandy Creek in east. (Appendix 6, Plate 7)
11.9.7a	179	Of concern	Eucalyptus populnea, Eremophila mitchellii shrubby woodland on fine-grained sedimentary rocks	Poplar box shrubby woodland on edges of cleared areas on Khyber.
11.10.6	3078	Not of concern	Angophora leiocarpa, Callitris glaucophylla open woodland on coarse-grained sedimentary rocks. Broad valleys	Common in valleys within the Hooray Sandstone. Very sandy soil and smooth barked apple are indicators of this ecosystem on Khyber. Silver leaved ironbark is common and Baradine red-gum is also present. (Appendix 6, Plate 9)
11.10.3	2552	Not of concern	Acacia catenulata or A. shirleyi open forest on coarse-grained sedimentary rocks. Crests and scarps	Occurs on highest parts of Hooray sandstone across Khyber's remnant vegetation. Both bendee and lancewood are common on Khyber. Emergent eucalypts include Queensland peppermint , broad-leaved red ironbark, silver leaved ironbark and narrow leaved ironbark. Small areas of *Acacia sparsiflora* also occur. (Appendix 6, Plate 8)

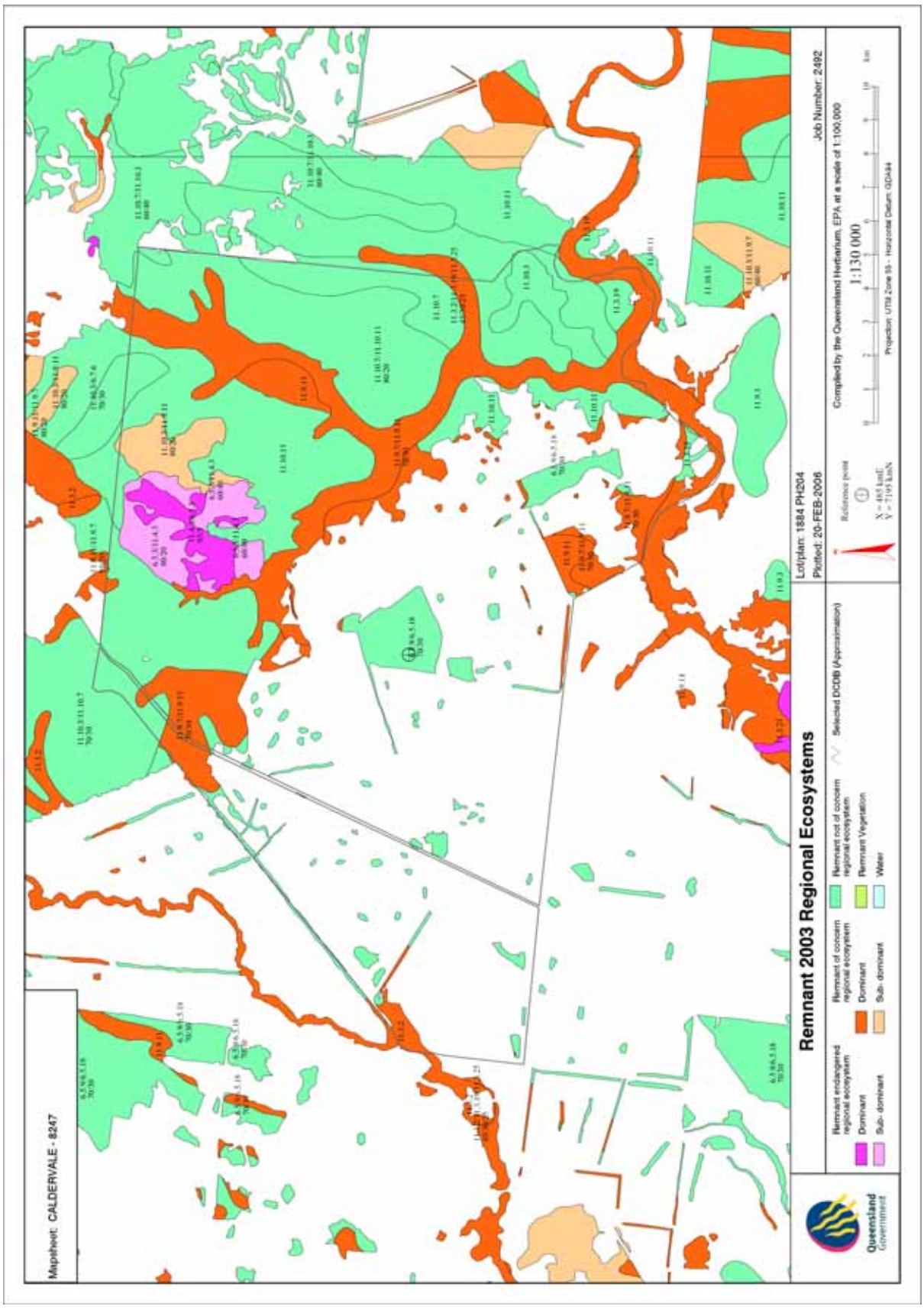
RE	Area (ha)	VMA status	Short description from REDD	Distribution and character on Khyer
11.10.7	1839	Not of concern	Eucalyptus crebra woodland on coarse-grained sedimentary rocks	Dominated by silver leaved ironbark rather than narrow leaved ironbark on Khyber (refer to long description in REDD). Small to medium sized pine and patchy *Acacia crassa* susp. *crassa* are common.
11.10.11	1278	Not of concern	Eucalyptus populnea, E. melanophloia ± Callitris glaucophylla woodland on coarse-grained sedimentary rocks	Mapped in east of Khyber outside the area investigated for this report
6.5.9	1217	Not of concern	Acacia aneura, Eucalyptus populnea ± E. melanophloia shrubby low woodland on Quaternary sediments	Main mulga RE on Khyber. (Appendix 6, Plate 1)
11.5.5	544	Not of concern	Eucalyptus melanophloia, Callitris glaucophylla woodland on Cainozoic sand plains/remnant surfaces. Deep red sands	Occurs around Khyber Road on southern edge of remnant band. (Appendix 6, Plate 5)
6.5.18	322	Not of concern	Acacia aneura ± Eucalyptus populnea ± E. melanophloia ± Eremophila mitchellii low open woodland on plains	
11.3.19	238	Not of concern	Callitris glaucophylla, Corymbia spp. and/or Eucalyptus melanophloia woodland on Cainozoic alluvial plains	Broad open sandy areas with large rough barked apple adjacent to the Warrego river and lower Sandy Creek.
11.3.25	227	Not of concern	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	River red-gum on the banks of Sandy Creek and the Warrego River. Often with rough barked apple.

RE	Area (ha)	VMA status	Short description from REDD	Distribution and character on Khyer
11.7.1	233	Not of concern	Acacia harpophylla and/or Casuarina cristata and Eucalyptus thozetiana or E. microcarpa woodland on lower scarp slopes on lateritic duricrust	Grey box with groved brigalow. Occurs around powerline on remnants of weathered surface overlying Hooray Sandstone. Often occurs with patches of Bendee or Mulga RE6.5.9
6.7.1	78	Not of concern	Acacia catenulata ± A. shirleyi ± Eucalyptus spp. open scrub on crests and slopes	Main occurrence is associated with 6.5.9 on a remnant of the weathered surface overlying the Hooray sandstone east of the quarry on the Khyber Road. (Appendix 6, Plate 2)
11.10.9	52	Not of concern	Callitris glaucophylla woodland on coarse-grained sedimentary rocks	Mapped in small area adjacent alluvium of the Warrego in the south of Khyber, contains large pine (*Callitris glaucophylla*)
11.7.5a	21	Not of concern	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks (the "a" indicates landzone 10).	Occurs in north east on highest parts of Hooray Sandstone. Shrubland dominated by *Phebalium glandulosum* with emergent Queensland peppermint. (Appendix 6, Plate 6)
11.7.5	10	Not of concern	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	Small area of Eucalyptus viridis woodland with a dense shrublayer in centre of property on eastern edge of surface supporting 11.4.7 and 11.4.3

Map 1 Updated remnant 2003 regional ecosystems; coloured by VM status – provided as separate image file to electroinc copy of report

Map 2 Updated mapping over Landsat Imagery – provided as separate image file to electroinc copy of report

Map 3. Current certified remnant 2003 regional ecosystem mapping for Khyber



Appendix 1. Letter requesting report from Crown Solicitor

Crown Law
Queensland Government

Your ref:
Our ref: PL4/LAN044/2930/FIK
Contact: Ken Fisher
Direct ph: (07) 3239 6425
Direct fax: (07) 3211 9731

Department of
Justice and Attorney-General

28 July 2006

Dr Don Butler
Senior Botanist
Queensland Herbarium

By email

Dear Don

Mackenzie v Minister for Natural Resources, Mines and Water – Tree Clearing Permit for "Khyber" – Land Court of Queensland Appeal No. LA2005/1797

The Crown Solicitor acts on behalf of the Minister for Natural Resources, Mines and Water in an appeal in the Land Court of Queensland by DJ Mackenzie against a refusal of an application for a tree clearing permit under the *Land Act 1994*.

You are requested to provide an expert report to the Land Court on the distribution of regional ecosystems on the land the subject of the application addressing the factual questions set out below. Additional reports are being sought from Mr Alan Chenoweth in relation to biodiversity and Mr John Schultz in relation to commercial timber.

The appeal is listed for hearing in the Land Court on 28-30 August 2006. As you appreciate, this matter is therefore quite urgent. I ask that you provide a draft of your report for review by 9 August 2006 before finalising it by 11 August 2006. I apologise for these very short timeframes.

Material included for your consideration

The following material has been included with this letter of instructions or previously to you for your consideration:

- Copy of application for a tree clearing permit (5 November 2001);
- Map/landsat image of land the subject of tree clearing permit;
- Copy of the *Broadscale Tree Clearing Policy for State Lands* (September 2000).

Brief history of the application

Mr Mackenzie applied for a tree clearing permit under the *Land Act 1994* on 5 November 2001. The land the subject of the application is located north east of Augathella within the Warrego catchment and is described as Lot 1884 on PH204 (the land).

State Law Building
50 Ann Street Brisbane
GPO Box 149 Brisbane
Queensland 4001 Australia
Dx 40121 Brisbane Uptown
CDE D38
Telephone 07 3239 6703
Facsimile 07 3239 0407
ABN 13 846 673 994

Document No.:

The land is a pastoral lease and the property is known as "Khyber" and the proposed clearing is for grazing purposes.

The application was for broadscale clearing of 3,727 ha of remnant vegetation.

The land is located in the Brigalow Belt South Bioregion / Sub-bioregion and contains a number of regional ecosystems (REs). Dr Butler is preparing a report to confirm the RE mapping.

The application was refused in an original decision on 20 August 2004 and a review decision on 8 November 2005. The refusal was for a number of reasons, including issues related to Res, biodiversity and clearing of commercial timber. Mr Mackenzie subsequently appealed to the Land Court against the refusal.

Instructions regarding the legal context of the appeal

As a preliminary matter, please note that you are not permitted to express an opinion on any question of law in your report and that your report should confine itself to the relevant issues of fact within your area of expertise. However, you need to understand the legal context of the appeal to understand the relevant questions of fact that the Land Court requires your assistance on. The legal questions are quite complex and it may be of assistance to the Court if you set out your instructions in an introductory section to explain how you understand the relevant concepts involved in the questions of fact addressed in the body of your report.

You are instructed that the question the Land Court must consider in the appeal is whether the application for a tree clearing permit should be approved in light of the considerations stated in section 262 of the *Land Act 1994*, as in force at 20 May 2004, and the policies in force under that Act at the time the application was lodged in 2002. Consequently, the application must be assessed against the *Broadscale Tree Clearing Policy for State Lands* (September 2000) (the Broadscale Tree Clearing Policy).

As relevant to the issue of regional ecosystems, section 262 of the *Land Act 1994* as in force at 20 May 2004 requires consideration of:

- the protection of restricted vegetation types and areas of heritage value;
- the protection of environmentally sensitive areas; and
- the heritage or cultural value of the trees on the land proposed to be cleared.

As relevant to biodiversity, "environmentally sensitive areas" are defined in section 24A of the *Land Regulation 1995* as in force at 20 May 2004 to include "an area that is of high nature conservation value because it an area of regrowth vegetation that, if retained, will enhance an endangered regional ecosystem." Section 24A defines "endangered regional ecosystem" to mean "an endangered regional ecosystem under the *Vegetation Management Act 1999*."

Definitions and classifications relevant to regional ecosystems are provided by the *Vegetation Management Act 1999* and the *Vegetation Management Regulation 2000*. You are an expert in this classification system so I will not attempt to summarise or explain it for you.

These definitions are relevant to applying the Broadscale Tree Clearing Policy to the facts of this case. The purposes of the Policy are to provide a framework for the management of vegetation that:

- reconciles environmental objectives in vegetation management and the sustainable economic development of land;
- allows sufficient flexibility to provide for additional protection of environmental values in local and regional circumstances within a consistent statewide framework;
- provides planning certainty for landholders and the community;
- encourages business innovation, best practice in property management and planning and long-term farm profitability; and
- has an integrated planning base.

The principles upon which the policy is based include, amongst other matters, that the best available scientific information and continuous improvement in the information base should underpin the regulatory system.

The Broadscale Tree Clearing Policy is seeking to achieve a number of outcomes including the maintenance of biodiversity and ecological processes. Maintenance of biodiversity is sought to be achieved through, amongst other measures, protecting *endangered* and *of concern* regional ecosystems from clearing. Ecological processes are sought to be maintained through, amongst other measures, protecting environmentally sensitive areas.

The Broadscale Tree Clearing Policy states the outcomes will be achieved by, amongst other measures, promoting good practice in native vegetation management.

The Code for Clearing of Vegetation in Appendix 2 of the Broadscale Tree Clearing Policy (the Code) is required to be applied to the application as no local guidelines exist.

The purposes of the Code relevant for regional ecosystems that must be achieved in this case are:

> **Purpose 1**: The protection of remnant *endangered* regional ecosystems by not clearing in any remnant *endangered* regional ecosystem (except in limited circumstances that are not relevant in this case).
>
> **Purpose 2**: The protection of remnant *of concern* regional ecosystems by not clearing in any remnant *of concern* regional ecosystem (except in limited circumstances that are not relevant in this case).
>
> **Purpose 3**: The protection of vegetation in environmentally sensitive areas by not clearing in any environmentally sensitive areas (except in limited circumstances that are not relevant in this case).
>
> **Purpose 4**: The maintenance of biodiversity by:
>
> - not clearing in a *not of concern* regional ecosystem to the extent of causing a change to its conservation status (except in limited circumstances that are not relevant in this case);

- not reducing the total extent of remnant vegetation cover in a bioregion to less than 30% of its pre-clearing extent (except in limited circumstances that are not relevant in this case).

Factual questions that you are asked to address

Please address the following factual questions in your report in the context of the legal issues for the Court set out above:

1. Identify and classify the extent of *endangered*, *of concern*, and *not of concern* regional ecosystems on the land in accordance with the *Vegetation Management Act 1999* and the *Vegetation Management Regulation 2000* as currently in force.

2. Is any area of the land an "environmentally sensitive area" as an area that is of high nature conservation value because it is an area of regrowth vegetation that, if retained, will enhance an endangered regional ecosystem?

Please provide a map or maps of any areas you identify as relevant to these questions.

Duty to the Court

Your duty in preparing your report is to assist the Court. This duty overrides any obligation you may have to any party to the appeal or any person who is liable to pay your fees or expenses.

Required information

Your report is required to include the following information:

- Your qualifications;
- All material facts, whether written or oral, on which your report is based;
- References to any literature or other material relied upon by you to prepare the report;
- For any inspection, examination or experiment conducted or relied on in preparing your report, a description of what was done, who conducted it, their qualifications, and the result;
- If there is a range of opinion on the matters dealt with in your report, a summary of the range of opinion, and the reasons why you adopted a particular opinion; and
- A summary of the conclusions you reached.

Declaration

At the conclusion of your report, you must include the following declaration (assuming, of course, the declaration is correct to your knowledge):

> The factual matters stated in this report are true, to the best of my knowledge. I have made all enquires considered appropriate in review of this matter. The opinions stated in the report are genuinely held by me, and I have referenced all

matters I consider to be significant. I understand my duty to the Court and believe I have complied with this duty to the best of my ability. To the best of my knowledge there are no readily ascertainable additional facts that would assist me in reaching more reliable conclusions.

Formatting of report

Please format your report as follows:

- Address your report to the Court;
- Sign and date your report;
- Include a summary of your qualifications and experience as an appendix to your report;
- Use 12 point type and at least 2cm page margins;
- Print your report single sided and supply 5 bound copies of it, or supply a PDF version of your report for printing and binding;
- Number each paragraph of your report;
- Number all pages, including attachments and annexes, continuously from the first page to the last page (excluding any coverpage to your report);
- Annex the first letter of instructions sent to you and this further letter of instructions to your report.

Draft of report

Please provide a draft of your report for review by 9 August 2006 before finalising it by 11 August 2006. The purpose of this is not to influence the substantive conclusions or recommendations you make but to ensure that the report is clear and addresses the required questions and issues adequately.

Conclusion

Thankyou for your assistance and diligence in preparing your report in the manner set out in this letter and in such a short timeframe. Please contact the undersigned if you have any further questions.

Yours faithfully

Ken Fisher
Senior Lawyer
for **Crown Solicitor**

Appendix 2. Curriculum Vitae for Don W. Butler

ACADEMIC QUALIFICATIONS

Doctor of Philosophy
Department of Botany, University of Queensland, 2004
Thesis title - "Seed dispersal syndromes and the distribution of woody plants in south-east Queensland's vine-forests."
This project addressed the ecology, biogeography and evolution of seed dispersal syndromes among the woody plants in southern Queensland's vine-forests. Analyses focused on: associations between dispersal syndromes, seed size, life form and habitat; association between dispersal syndromes and regional abundance within and across habitat types; and, the importance of dispersal to recruitment at local scales.
Supervised by Dr. D.Lamb (UQ) and Dr. R.Green (Griffith University).

Bachelor of Science with First Class Honours
Majors in Botany and Zoology, University of Queensland
Honours research: 1994, Thesis title - "Vegetation history and environmental inferences from Quaternary sediments at Currimundi, coastal southeast Queensland." Department of Botany, University of Queensland.

WORK EXPERIENCE SUMMARY

August 2002 – present
Senior Botanist (PO3), Ecology and Vegetation Management, Queensland Herbarium, Environmental Protection Agency, Queensland Government.
Key Responsibilities:

- provide advice regarding regional ecosystems and vegetation mapping to government officers and the public.
- assess and process requests to modify certified regional ecosystem coverages.
- research and provide advice on vegetation management issues

May 2006 - June 2006
Principle Botanist (Acting, PO4), Ecology and Vegetation Management, Queensland Herbarium, Environmental Protection Agency, Queensland Government.
Key Responsibilities:

- provide advice regarding regional ecosystems and vegetation mapping to government officers and the public.
- assess and process requests to modify certified regional ecosystem coverages.
- research and provide advice on vegetation management issues
- supervise a principle botanist and senior botanist

April 2004
Senior Policy Officer (Acting, PO3), Vegetation Management Unit, Department of Natural Resources Mines and Energy, Queensland Government.
Key Responsibilities:

- contribute to the final formulation of the *Vegetation Management and Other Legislation Amendment Act 2004* , which was passed toward the end of April 2004.
- contribute to the formulation and communication of vegetation management policy, principally concerning the *Vegetation Management Act 1999* and *Integrated Planning Act 1997*.

September 2001- August 2002
Botanist (PO2), Seconded to Forest Ecosystem Research and Assessment, Queensland Parks and Wildlife Service, Environmental Protection Agency, Queensland Government.
Key responsibilities:

- as part of a multidisciplinary team, survey floristics, fauna and community structure in State Forests throughout Queensland's Brigalow Belt Bioregion.
- collect and identify plant specimens to ensure accuracy in floristic data collection.
- check Queensland Herbarium mapping of Regional Ecosystems and correct any errors identified.

November 1998-August 2001
Variously employed as Technical Officer (TO2, 1.25 years total), Botanist (PO2 1.5 years total), and Senior Botanist (PO3, 3 months), Vegetation and Regional Ecosystem Survey and Mapping, Queensland Herbarium, Environmental Protection Agency, Queensland Government.
Key responsibilities:

- utilise aerial photographs, Landsat imagery, field survey, smaller scale mapping, SLATS data and other information to develop and maintain 1:100 000 scale digital coverage of the preclearing and remnant extent of Regional Ecosystems using the Arc View and Arc Info GIS software packages. Working in the Brigalow Belt, New England Tableland, Mulgalands, Einasleigh Uplands and Gulf Plains Bioregions.
- carry-out botanical field survey work including the collection of floristic and structural data for representative stands of Regional Ecosystems recognised in the mapping exercise.
- cooperate with other botanists to ensure consistency in the teams approach to Regional Ecosystems and their mapping.
- modify existing vegetation or regional ecosystem mapping to improve its compliance with the contemporary regional ecosystem framework.
- direct and enlist the help of technical officers as required. error check and utilise site data (CORVEG) to develop quantitative descriptions of regional ecosystems in the Brigalow Belt.
- utilise CORVEG and HERBRECS data to assist in the preparation of a list and analysis of environmental weeds in south eastern Queensland.
- member of the expert panel for the New England Tablelands bioregion biodiversity assessment.

November 1998
Lecturer and Tutor on Vacation Course for students from Hobart William Smith College, USA.
Key Responsibilities: 3 lectures on the vegetation of Australia attempting to introduce something of the overall diversity, broad biogeography and important concepts in landscape ecology of vegetation across the continent; four days teaching rainforest ecology at Lamington National Park.

July - September 1997
Consultant Naturalist, CMPS&F Brisbane
Key Responsibilities: survey flora and avifauna and produce reports and maps of findings for planning processes in various land and infrastructure developments

November 1996
Lecturer and Tutor on Vacation Course for students from Hobart William Smith College, USA.
Key Responsibilities: a lecture on the history and evolution Australia's terrestrial vegetation; four days teaching rainforest ecology at Lamington National Park.

1995 - 2002
Tutor, University of Queensland.
I tutored the following undergraduate subjects at the University of Queensland while I was a postgraduate student.
2002: Plant identification
1998: Applied Ecology (BT339)
1997: Applied Ecology (BT339)
Plant Identification Field Course (BT348)
Rainforest Ecology Field Course (ID321)
1996: Introductory Plant Ecology (BT221)
Applied Ecology (BT339)
Rainforest Ecology Field Course (ID321)
1995: Introductory Botany Laboratory Course (BL134)

February - November 1995
PhD. student, University of Queensland.
"Vegetation History and Palaeo-environments of Ngarrabullgan (Mt Mulligan), north Queensland"
This project considered the palaeobotany/ecology of the area around Ngarrabullgan (southern Cape York) using analysis of fossil pollen. Ngarrabullgan is associated with very old human occupation sites (older than 40 000 years).
Supervised by Dr. M.Dettmann, Dr. D.Bergstrom and Prof. G.Stewart.
Key responsibilities:
- several trips to north Queensland for plant and sediment collection (including an Earth Watch Expedition), working closely with the traditional owners of the land.
- analysis of preserved pollen in cored and surface sediments.
- development of a pollen reference collection, involving plant identification and specimen preparation.
- interpretation of pollen record and presentation of results in seminars and as a book chapter (see publications)

PUBLICATIONS

Peer reviewed scientific publications

Butler D.W., Green R.J., McDonald W.J.F. and Forster P.I. (submitted) Biogeography of seed dispersal syndromes, life-forms and seed sizes among woody rain forest plants in Australia's subtropics. *Journal of Biogeography*

Butler D.W., Fairfax R.J. and Fensham R.J. (2006) Impacts of tree invasion on floristic composition of subtropical grasslands on the Bunya Mountains, Australia. *Australian Journal of Botany* 54(3), 261–270

Pollock A.B., Butler D.W. and Price R.J. (2004) Floristic communities of the lower Dawson River plains, mid-eastern Queensland. *Cunninghamia* 8(4): 501-513.

Fensham R.J., Fairfax R.J, Butler D.W. and Bowman D.M.J.S. (2004) Effects of fire and drought in a tropical eucalypt savanna colonised by rain forest. *Journal of Biogeography* 30, 1405-1414.

Fensham R.J. and Butler D.W. (2004) The spatial pattern of dry rainforest colonising unburnt *Eucalyptus* savanna. *Austral Ecology* 29, 121-128.

Butler D.W. and Fairfax R.J. (2003) Buffel grass and fire in a Gidgee and Brigalow woodland: a case study from central Queensland. *Ecological Management and Restoration* 4, 120-125.

Batianoff G.N. and Butler D.W. (2003) Impact assessment and analysis of sixty-six invasive weeds in southeast Queensland. *Plant Protection Quarterly* 18, 11-17.

Batianoff G.N. and Butler D.W. (2002) Assessment of Invasive Naturalised Plants in Southeast Queensland. *Plant Protection Quarterly.* 17, 27-34.

Smith I.R. and Butler D. (2002) The Bunya in Queensland's forests. *Queensland Review* 9, 31-38

Butler D.W. (1998) Environmental change in the Quaternary. *In* "Ngarrabullgan: Geographical investigations in Djungan country, Cape York Peninsula." B. David (*ed.*). *Monash Publications in Geography and Environmental Science* 51. Monash University, Clayton. pp. 78-92.

Rogers R., Butler D. and Carnell J. (1993) Dispersal of germinable seeds by emus in semi-arid Queensland. *The Emu* 94, 132-134.

Selected other reports

Butler, D.W. (2006) Recovery plan for the "Bluegrass (*Dichanthium* spp.) dominant grasslands in the Brigalow Belt bioregions (north and south)" endangered ecological community 2007–2011. Report to Department of the Environment and Heritage, Canberra. Queensland Parks and Wildlife Service, Brisbane.

Butler D.W. (2005) Conservation of endangered grasslands in the Brigalow Belt – are things looking up for bluegrass downs? *Australasian Plant Conservation* 14(3), 3-5.

Butler D.W. (2004) Seed dispersal syndromes and the distribution of woody plants in south-east Queensland's vine-forests. PhD thesis, Department of Botany, University of Queensland, Brisbane.

Cogger H.G., Ford H.A., Johnson C.N, Holman J. and Butler D. (2003) Impacts of land clearing on Australian wildlife in Queensland. WWF Australia: Brisbane.

Wang J. and Butler D.W. (2002) A review of the conservation status of *Macrozamia platyrhachis* F.M.Bailey. Unpublished report for the Environmental Protection Agency, Brisbane.

Batianoff G.N. and Butler D.W. (2002) Environmental weeds in south-east Queensland. *The Greening Australian*. Greening Australia, Brisbane.

Batianoff G., Butler D. and Panetta D. (2001) Potential New Weeds in southeast Queensland: Examining the processes of invasion. *In* "Proceedings of SE Queensland Local Government Pest Animal and Plant Workshop, 2001 A Pest Odyssey." Queensland Government.

Batianoff G.N. and Butler D.W. (2001) Invasive weeds of natural areas: prepared for southeast Queensland environmental weeds strategy. Unpublished report presented February 3rd 2001 to the Southeast Queensland Environmental Weeds Strategy working group.

Franks A.J., Butler D.W. and Fairfax R.J. (2000) A weed by any other name. *Wildlife Australia.* 37, 24.

Butler D.W. (1994) Report on preliminary botanical studies on Ngarrabullgan. *In* "The 1994 scientific expedition to Ngarrabullgan: preliminary results for consideration in the plan of management" compiled by B.David for the Kuku Djungan Aboriginal Corporation, Mareeba.

Butler D.W. (1993) Quaternary climates and vegetation of north eastern Australia. Honours Literature Review. Botany Department, University of Queensland.

Butler D.W. (1993) Vegetation history and environmental inferences from Quaternary sediments at Currimundi, coastal southeast Queensland. Honours Thesis. Botany Department, University of Queensland.

Published vegetation mapping

Neldner V.J. and Butler D.W. (2002) Vegetation Communities and Regional Ecosystem Survey and mapping of Gulf Plains Bioregion: Manuka 1:250 000 map sheet. Queensland Environmental Protection Agency, Brisbane.

Fox I.D., Neldner V.J., Wilson G.W., Bannick P.J., Wilson B.A., Brocklehurst P.S., Clark M.J., Dickinson K.J.M., Beard J.S., Hopkins A.J.M., Beeston G.R., Harvey J.M., Thompson E.J., Ryan T.S., Thompson S.L., Butler D.W., Cartan H., Addicott E.P., Bailey L.P., Cumming R.J., Johnson D.C., Schmeider M., Stephens K.M. and Bean A.R. (2001) The Vegetation of the Australian Tropical Savannas 1:2 000 000 scale map. Queensland Environmental Protection Agency, Brisbane.

Butler D.W., Sparshott K.M., Grimshaw P., Young P. and Schmeider M. (2000) Vegetation Communities and Regional Ecosystem Survey and Mapping of New England Tableland bioregion. Queensland Environmental Protection Agency, Brisbane.

Butler D.W. (1999) Vegetation Communities and Regional Ecosystem Survey and Mapping of Brigalow Belt Bioregion: Mantuan Downs 1:100 000 map sheet. Queensland Environmental Protection Agency, Brisbane.

Selected oral presentations delivered

Butler D.W. “Evidence for benefits from seed dispersal inferred from spatial patterns in four Subtropical rainforests.” Ecological Society of Australia Annual Conference, Brisbane, December 2005.

Butler D.W. “What can fruit morphology tell us about species abundance at regional scales?”Fourth International Symposium/Workshop on Frugivores and Seed Dispersal, Griffith University, Brisbane, July 2005.

Fensham R.J., Fairfax R.J. and Butler D.W. “The gift of the GAB: The springs of Queensland's Great Artesian Basin.” Presented to the Queensland Field Naturalists' Club Inc., Queensland Museum, September 2003.

Butler D.W. “Dynamics and spatial pattern in rainforest on the Bunya Mountains” Queensland Herbarium Seminar Series. October 2002.

Batianoff G.N. and Butler D.W. “Prioritising Environmental Weeds in south-east Queensland” The Hut Environmental and Community Group annual conference. September 2002.

Butler D.W. “Dispersal syndromes of plant species across southeast Queensland’s rainforest continuum”. Griffith University Ecology Seminar Series. May 2001.

Butler D.W. “Evolutionary ecology of seed dispersal in southeast Queensland rainforests”. Queensland Herbarium Seminar Series. December 2000.

Selected oral presentations delivered by others

Batianoff G.N. and Butler D.W. “Prioritising environmental weeds in Queensland.” Presented to a joint meeting of the Queensland Weed Society and North Coast Environment Council (NSW), Tweed Heads, February 2004.

Smith I.R and Butler D.W “The Bunya Pine; the ecology of Australia’s other living fossil Araucarian” Presented at the International Araucariaceae Symposium, Auckland, New Zealand, March 2002.

Batianoff G., Butler D. and Panetta D. “Potential New Weeds in southeast Queensland: Examining the processes of invasion”. Presented at “A Pest Odyssey”, SE Queensland Local Government Pest Animal and Plant Workshop, April 2001.

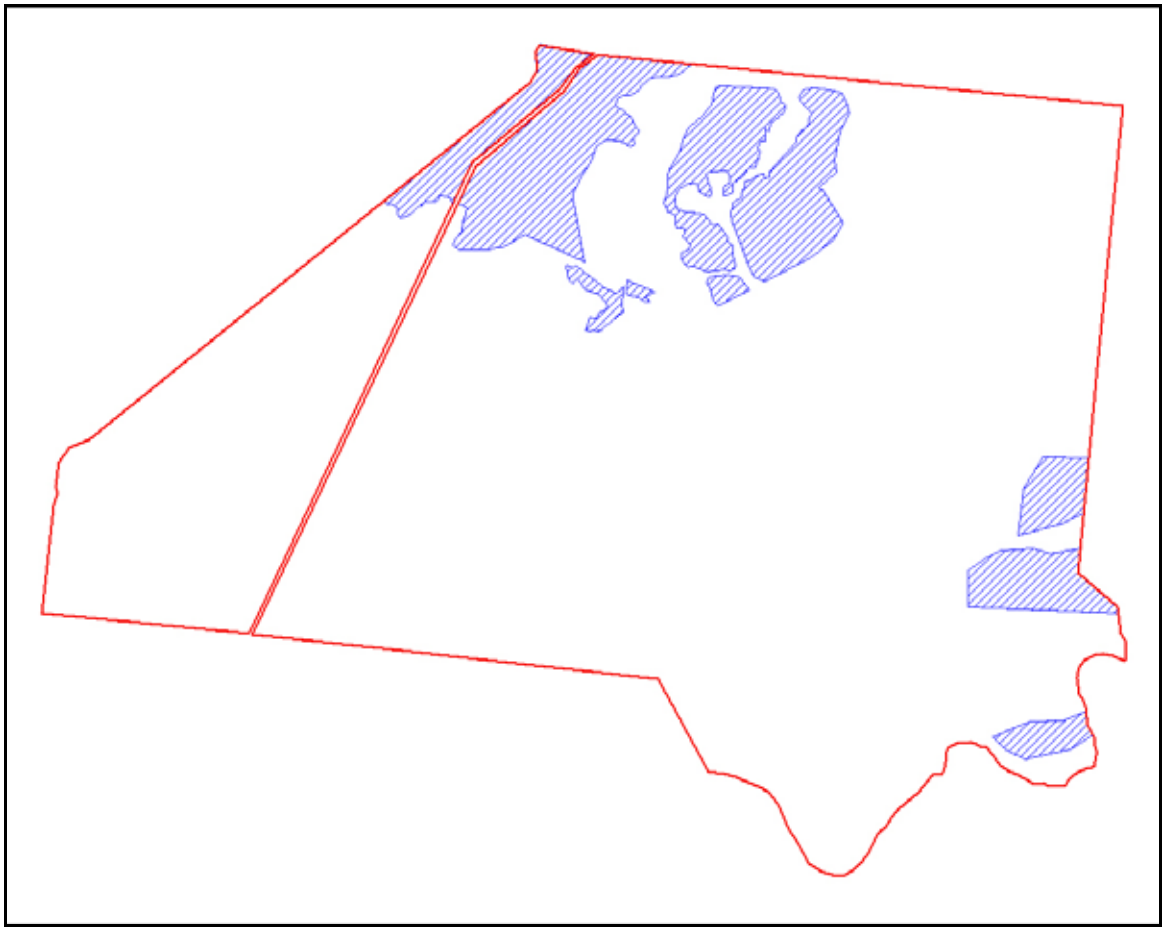
Fensham R., Butler D. and Fairfax R. “The buffel grass dilemma for fire sensitive vegetation in National Parks”. Presented at “Symposium on remnant vegetation in the Brigalow Belt: Management and conservation”. Central Queensland University, Rockhampton. April 2001.

In addition to the above publications I have undertaken peer review for the following journals:
Austral Ecology
Australasian Journal of Environmental Management
Ecological Management and Restoration
Pacific Conservation Biology
Proceedings of the Royal Society of Queensland

Appendix 3. Details of aerial photography examined.

Title	Year	Film Number	Approximate Scale	Negative type	Run	Frames
G55-6 Augathella	1969	CAB7008	1:80 000	Black & White	3	235,237,239
					4	119,121
8247 Caldervale	1981	Q3942	1:25 000	Black & White	8	192-198
					9	175-179
					10	130-136
Augathella SG55-6	1994	QC5316	1:80 000	Colour	3	153-156
					4	146-148
Chesterton 8347	1995	QC5359	1:40 000	Colour	8	77-79

Appendix 4. Map of amended application area (provided by Mr. Graham Kenny, 22nd August 2006)



Appendix 5. Scientific names for common names used in report

Common name	Scientific name
Baradine red-gum	*Eucalyptus chloroclada*
belah	*Casuarina cristata*
bendee	*Acacia catenulata*
blackbutt	*Eucalyptus cambageana*
broad leaved red ironbark	*Eucalyptus fibrosa* subsp. *nubila*
Cypress pine	*Callitris glaucophylla*
false sandalwood	*Eremophila mitchellii*
grey box	*Eucalyptus microcarpa*
lancewood	*Acacia shirleyi*
mulga	*Acacia aneura*
narrow leaved ironbark	*Eucalyptus crebra*
Queensland peppermint	*Eucalyptus exserta*
river redgum	*Eucalyptus camaldulensis*
rough barked apple	*Angophora melanoxylon*
silver leaved ironbark	*Eucalyptus melanophloia*
smooth barked apple	*Angophora leiocarpa*

Appendix 6. Photographic plates of some of the regional ecosystems on Khyber.

Plate 1. Mulga with emergent *Corymbia clarksoniana* and Queensland peppermint (regional ecosystem 6.5.9).

Plate 2. Bendee with emergent Queensland peppermint (regional ecosystem 6.7.1).

Plate 3. Brigalow with false sandalwood, wilga and emergent blackbutt (regional ecosystem 11.4.3).

Plate 4. Poplar box over groved brigalow, false sandlawood and scattered mulga (regional ecosystem 11.4.7).

Plate 5. Silver leaved iron-bark woodland with *Acacia crassa* (regional ecosystem 11.5.5).

Plate 6. Shrubland of *Phebalium glandulosum* with emergent Queensland peppermint (regional ecosystem 11.7.5).

Plate 7. Brigalow with bauhinia and false sandalwood (regional ecosystem 11.9.11).

Plate 8. Lancewood (regional ecosystem 11.10.3).

Plate 9. Smooth barked apple, silver leaved iron bark and Cypress pine in a broad sandy valley (regional ecosystem 11.10.6).

Plate 10. Rough barked apple on a deep sandy flat associated with the Warrego River (regional ecosystem 11.3.19).