

## DEVELOPING AN APPROACH TO THE LISTING OF ECOLOGICAL COMMUNITIES TO ACHIEVE CONSERVATION OUTCOMES

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ABSTRACT: An important mechanism for biodiversity conservation in Australia is the protection of threatened ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). This article describes the evolution of the approach adopted by the Threatened Species Scientific Committee for defining threatened ecological communities to better account for regional variation and ecological community state and condition in order to optimise environmental outcomes. Definitions now recognise different states of ecological communities, and for each allow up to three condition categories: good quality remnants, degraded but recoverable remnants, and irrecoverable remnants. The new approach seeks to provide more operational and understandable definitions of the entity considered and its variability. It focuses on legislative protection for remnants in the best condition to ensure that they remain intact. It facilitates recovery by

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encouraging landholders to rehabilitate degraded remnants that have the best potential for improvement to a condition where they can contribute to conservation outcomes. The approach recognises that it is inefficient to direct resources towards remnants that are too changed for any effective recovery of their biodiversity values to occur.

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## I INTRODUCTION

In this article, we report on how the approach to listing of terrestrial ecological communities at the national level in Australia has developed since the enactment of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (the *EPBC Act*) and describe the current system for their listing and

subsequent management. In doing so, we demonstrate how the action research<sup>1</sup> approach was applied by the Threatened Species Scientific Committee (the Committee)<sup>2</sup> in the context of implementing legislation that is science dependent. Preston and Adam examined the approach taken to defining threatened ecological communities in the State of New South Wales but no-one has previously described the approach developed at a federal level under the *EPBC Act*.<sup>3</sup>

The conservation of biodiversity in Australia involves a complex planning and management system extending well beyond fully protected areas in public ownership.<sup>4</sup> While protected areas, such as national parks, form the cornerstone of biodiversity conservation planning, off-park conservation measures form an essential component of the system. Such an approach is consistent with Australia's obligations under Article 8 of the *Convention on Biological Diversity 1992 (Biodiversity Convention)* to 'establish a system of protected areas' and to 'regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use'.<sup>5</sup> The listing of threatened species is one mechanism for off-park conservation. However, formal listing systems for threatened species have been challenged as the sole tool for

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<sup>1</sup> Kurt Lewin, *Field Theory in Social Science* (1951).

<sup>2</sup> Established under sections 502 and 503 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

<sup>3</sup> Brian J Preston and Paul Adam, 'Describing and listing threatened ecological communities under the Threatened Species Act 1995 (NSW): Part 1 – the assemblage of species and the particular area' (2004) 24 *Environmental and Planning Law Journal* 250 ('Describing and Listing Pt 1'); Brian J Preston and Paul Adam, 'Describing and listing threatened ecological communities under the Threatened Species Act 1995 (NSW): Part 2 – the role of supplementary descriptors and the listing process' (2004) 24 *Environmental and Planning Law Journal* 372 ('Describing and Listing Pt 2').

<sup>4</sup> See, eg, Gerry Bates, *Environmental Law in Australia*. (4<sup>th</sup> ed, 2006); M D Young, N Gunningham, J Elix, J Lambert, B Howard, P Grabosky and E McCrone, *Reimbursing the Future: An Evaluation of Motivational, Voluntary, Price-based, Property-right, and Regulatory Incentives for the Conservation of Biodiversity*. Report by CSIRO Division of Wildlife and Ecology, the Australian Centre for Environmental Law, and Community Solutions to the Biodiversity Unit, Department of the Environment, Sport and Territories. Biodiversity Series, Paper No. 9 (Australian Government Publishing Service, Canberra, 1996) ch 2; Allan Curtis and Michael Lockwood, 'Landcare and catchment management in Australia: Lessons for State-sponsored community participation' (2004) 13 *Society and Natural Resources* 61.

<sup>5</sup> *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993). For text of the Convention see Secretariat of the Convention on Biological Diversity (SCBD), *Convention on Biological Diversity. Text of the Convention* (SCBD, Montreal, Canada, 2007) (*Biodiversity Convention*) <<http://www.cbd.int/convention/convention.shtml>> at 15 September 2007.

achieving conservation outcomes.<sup>6</sup> Uncertain and changing science, difficulties in identification and location of threatened species, and the merits of using lists of species to prioritise conservation efforts above non-listed species are but a sample of the concerns raised. Some have suggested that focusing on ecosystems, including rare or threatened ecosystems, may be a mechanism with many advantages over a single species or a single threat approach, while others have advocated the use of such criteria in addition to threatened species listing for more strategic conservation investments.<sup>7</sup> Protecting species and ecosystems are, of course, complementary rather than mutually exclusive approaches. The use of both as tools for biodiversity conservation is also consistent with Australia's obligations under Article 8 of the *Biodiversity Convention* to 'promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings'.

Achieving conservation outcomes through the listing of ecological communities as distinct, recognisable and immutable entities should *a priori* be more open to the problems that beset species listing. Nonetheless, listing of ecological communities at a national level in Australia was first legislated for under the *Endangered Species Protection Act 1992 (Cth) (ESP Act)*. It took until 1997 for listing guidelines to be developed. Subsequently 5 ecological communities were listed in 1998 and 17 in 1999. These 22 ecological communities were transferred to the *EPBC Act* on 16 July 2000 when the *ESP Act* was repealed and the *EPBC Act* commenced. The *ESP Act* lacked the referral and assessment procedures of the *EPBC Act* and, hence, did not require the more complex listing information that has become necessary under the *EPBC Act* to enable landholders and others to understand their obligations.

The *EPBC Act* represents a major reform of national environmental laws in Australia that focuses Australian Government interests on matters of national environmental significance (NES), Commonwealth actions, and Commonwealth land. Matters of NES include World Heritage properties, National Heritage properties, Ramsar wetlands, listed threatened species, listed threatened ecological communities, and listed migratory species. The Act established an assessment and approval process for actions likely to have a significant impact on these matters. The Act also established an inter-related regime for biodiversity conservation providing for, amongst other things, listing of threatened species and threatened ecological communities. The Act provides a wide range of other

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<sup>6</sup> Hugh P Possingham, Sandy J Andelman, Mark A Burgman, Rodrigo A Medellín, Larry L Master and David A Keith, 'Limits to the use of threatened species lists' (2002) 17(11) *Trends in Ecology and Evolution* 503.

<sup>7</sup> Reed F Noss, 'High-risk ecosystems as foci for considering biodiversity and ecological integrity in ecological risk assessments' (2000) *Environmental Science and Policy* 321; Possingham et al, above n 6.

mechanisms for biodiversity conservation such as regulating the international trade in threatened species involving Australia.

The *EPBC Act* requires a person proposing to take an action that they think is likely to have a significant impact on a matter of NES to refer the action to the Australian Government Minister for the Environment, Heritage and the Arts (the Minister) for assessment and approval. Failure to refer an action that has a significant impact on a matter of NES may result in enforcement action being taken by third parties<sup>8</sup> or the Minister. For example, in the *Greentree Case* the Minister obtained an injunction, rehabilitation order, and pecuniary penalties totalling AUD 450 000 against a farmer in New South Wales (NSW) who, in preparation for sowing a wheat crop, cleared part of a Ramsar wetland without obtaining the Minister's approval under the *EPBC Act*.<sup>9</sup>

The *EPBC Act* operates in conjunction with State and Territory laws to fulfil Australia's obligations under the *Biodiversity Convention* for *in situ* conservation through both protected areas and the protection and management of species' habitats and ecological communities. State vegetation clearing laws are particularly important for protecting biodiversity and habitat outside protected areas.<sup>10</sup> Some States, particularly NSW, have also used the concept of threatened ecological communities as a mechanism for conservation planning. Preston and Adam described the NSW approach in detail and some of the litigation that has occurred under it regarding the description of threatened ecological communities.<sup>11</sup>

Protected areas and threatened ecological communities are inevitably embedded in landscape mosaics, with biodiversity values being maintained concomitantly with socio-cultural and economic values. It is perhaps inevitable that the introduction of such a system for achieving conservation outcomes into a context where economic development has been the predominant paradigm will be controversial to some extent.<sup>12</sup>

The *EPBC Act* attempts to establish a regime for the listing of threatened species and ecological communities that is open, transparent, and rigorously based on scientific advice. Any member of the public or any entity can nominate

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<sup>8</sup> Under section 475 of the *EPBC Act*.

<sup>9</sup> *Minister for the Environment and Heritage v Greentree (No 2)* (2004) 138 FCR 198; [2004] FCA 741; and *(No 3)* [2004] FCA 1317; (2004) 136 LGERA 89.

<sup>10</sup> For an overview of vegetation clearing laws in Australia, see Productivity Commission, *Impacts of Native Vegetation and Biodiversity Regulations*. Report No 29 (Productivity Commission, Melbourne, 2004) <<http://www.pc.gov.au/inquiry/nativevegetation/docs/finalreport>> at 30 May 2008; and, for Queensland, Chris McGrath, 'End of broadscale clearing in Queensland' (2007) 24 *Environmental and Planning Law Journal* 5.

<sup>11</sup> Preston and Adam, 'Describing and Listing Pt 1' and 'Describing and Listing Pt 2', above n 3.

<sup>12</sup> Peter Grabosky and Neil Gunningham, 'The agriculture industry' in Neil Gunningham and Peter Grabosky, *Smart Regulation: Designing Environmental Policy* (1998) 267, 278–9.

species or ecological communities for listing as threatened, and there are opportunities for public comment and response. Interested parties are asked to comment, and expert comment is sought. The Committee prepares listing advice using well-defined criteria for judging eligibility, but socio-economic issues are not part of the evaluation.<sup>13</sup> The Minister is responsible for listing threatened ecological communities under the *EPBC Act*. The Minister must consider the advice of the Committee when making decisions on listings.<sup>14</sup> The Minister has expanded the legislative requirements for publishing information about listing processes by deciding to publish all advices from the Committee on the internet.<sup>15</sup>

Recent *EPBC Act* amendments,<sup>16</sup> which commenced in early 2007, have streamlined the listing and recovery planning process, placed a requirement on the Committee to recommend priorities annually, and provided for immediate recovery actions to be proposed in the form of conservation advice for species and communities. It is likely that this will place greater emphasis on the landscape scale, namely ecological communities and key threatening processes.

These amendments were developed after considerable experimentation and discussion between 2000 and 2005. The Committee formed the view that the listing of individual threatened species can at times be an inefficient tool for rapid and efficient broad-scale conservation. In contrast, despite their classificatory complexities, ecological communities had the potential to provide a more embracing and expansive focus that could be extended across large areas even when an ecological community is fragmented. In addition, this approach opens a path to restoration interventions. The Committee found that the disadvantage of using ecological communities was that they are far harder to define, because they are constructs of ecological theory and lack a clear and precise framework for resolving classificatory debates. Nonetheless, the *EPBC Act* treats them in a similar fashion to species. Preston and Adam explained the similar approach and similar difficulties faced under the *Threatened Species Conservation Act 1995 (NSW)*.<sup>17</sup>

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<sup>13</sup> *EPBC Act* policy guidelines are available on the Australian Government, Department of Environment, Water, Heritage and the Arts [DEWHA(Cth)], 'EPBC Act policy statements' webpage <<http://www.environment.gov.au/epbc/guidelines-policies.html#threatened>> at 17 February 2009.

<sup>14</sup> *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* s 189.

<sup>15</sup> See DEWHA, 'Threatened species and ecological communities' webpage <<http://www.environment.gov.au/biodiversity/threatened/index.html>> at 17 February 2009.

<sup>16</sup> Attorney-General's Department, *Environment and Heritage Legislation Amendment Act (No. 1) 2003*, Act No 88 of 2003 as amended, incorporating amendments to Act No 165 of 2006 <[http://www.comlaw.gov.au/ComLaw/Legislation/ActCompilation1.nsf/0/340B715E6AD6953CCA25728F001B90D4/\\$file/EnvironHeriLegAmendNo12003.pdf](http://www.comlaw.gov.au/ComLaw/Legislation/ActCompilation1.nsf/0/340B715E6AD6953CCA25728F001B90D4/$file/EnvironHeriLegAmendNo12003.pdf)> at 15 September 2007.

<sup>17</sup> Preston and Adam, 'Describing and Listing Pt 1' and 'Describing and Listing Pt 2', above n 3.

This article discusses the development of the new approach to defining terrestrial ecological communities for listing under the *EPBC Act*. Since 1999, the Committee and the Australian Government department administering the Act, now the Department of the Environment, Water, Heritage and the Arts (the Department), have worked as an ‘informal learning community’.<sup>18</sup> This approach is innovative and deliberately directed to achieve continuous improvement using an action learning model.<sup>19</sup> The Committee has responsibility for framing advice to the Minister while the Department supports the process. Comprehensive expert advice is sought using a ‘two plus cycle’ model. All procedures, matters under consideration and recommendations are published on the internet.<sup>20</sup> Departmental staff attend Committee meetings, conduct background research, present papers prepared in a Committee-determined format, and receive feedback. As part of this process, the procedures of the Committee are reviewed annually to achieve continuous improvement of both procedures and outcomes. The work on ecological communities reported here emerged from this cooperative and adaptive framework. It is a scientific approach, as required by the Act, which has been strongly influenced by an understanding that the limitations of scientific knowledge may be addressed for management purposes by the Committee’s judgement, along with necessary administrative procedures, legislative requirements, the need to capture knowledge from the scientific and wider community, and a recognition of the administrative need for certainty in implementation.

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<sup>18</sup> Michael Eraut, ‘Informal learning in the workplace’ (2004) 26 *Studies in Continuing Education* 247.

<sup>19</sup> Lewin, above n 1; C S Holling, Fikret Berkes and Carl Folke, ‘Science, sustainability and resource management’ in Fikret Berkes and Carl Folke (eds), *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience* (1998) 342.

<sup>20</sup> The relevant internet site entry point is the DEWHA (Cth), ‘Threatened species and ecological communities’ webpage <<http://www.environment.gov.au/biodiversity/threatened/index.html>> at 17 February 2009.

## II CONTEXT

### A Theory

#### 1 *Environmental Policy and Regulatory Theory*

Biodiversity continues to be in serious decline in many parts of Australia as a legacy of past unsustainable practices and current pressures.<sup>21</sup> The legacy effect drives, in part, environmental policy through the need to recover already degraded ecosystems where possible. But it will be some time before recovery, if any, attributable to recent management actions will be seen. Gaps in information and lack of fundamental knowledge about the condition and trend of biodiversity at a range of scales are also significant barriers to the development of effective conservation policies and recovery of degraded ecosystems.

The listing of threatened ecological communities should be viewed within the overall context of environmental policy attempting to achieve overarching objectives of sustainable development and biodiversity conservation in the context of a legacy of previously degraded ecosystems. In this context, a 'policy' is a position taken and communicated by government that recognises a problem and identifies in general what will be done about it.<sup>22</sup> Dovers describes a cyclical process for creating good environmental policy with four major stages: problem-framing, policy-framing, policy implementation, and policy monitoring and evaluation.<sup>23</sup> As an integral part of the wider policy process and planning cycle, evaluating the effectiveness of environmental policy makes an essential contribution to a system that is constantly evolving and changing in response to new information. As the environment and society are constantly changing, this is an ongoing and difficult task with no endpoint or final solution. Just as our understanding of the problems change, so too must our responses change and evolve. Bartlett described these issues as 'patently tangled, wicked environmental policy problems'.<sup>24</sup>

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<sup>21</sup> R J S (Bob) Beeton, Kristal I Buckley, Gary J Jones, Denise Morgan, Russell E Reichelt and Dennis Trewin (Australian State of the Environment Committee), *Australia State of the Environment 2006*. Independent report to the Australian Government Minister for the Environment and Heritage (Department of the Environment and Heritage, Canberra, 2006).

<sup>22</sup> Stephen Dovers, *Environment and Sustainability Policy: Creation, Implementation, Evaluation* (The Federation Press, Sydney, 2005) 12.

<sup>23</sup> Ibid 15, 59–65; and ch 8 ('Policy monitoring and evaluation').

<sup>24</sup> Robert V Bartlett, 'Evaluating environmental policy success and failure' in Norman J Vig and Michael E Kraft (eds), *Environmental Policy in the 1990s: Towards a New Agenda* (2<sup>nd</sup> ed, 1994) 167.



In addition to environmental policy, a discussion of the listing of threatened ecological communities should also be understood in the context of regulatory theory,<sup>25</sup> which deals with government regulation of human behaviour. Another related field is compliance theory, which considers why legal obligations are met and recognises that deterrence through the imposition of sanctions is not the only reason for compliance with laws and policies, particularly at an international level.<sup>26</sup> Understanding such related fields and concepts is important for good policy design and choice of policy instruments.

Given the scale and complexity of the task, any regulatory system attempting to conserve biodiversity is unlikely to be effective in the long-term unless it is generally efficient, cost-effective, equitable, politically acceptable, and 'optimal'.<sup>27</sup> Short-term success at a cost that leads to long-term failure is not truly effective. When considering off-park conservation measures on private land, the importance of creating a system that can be understood and applied by landholders should be a fundamental objective for policy-makers. It is also critically important to maintain the goodwill of landholders through creating a practical, equitable, and transparent management system. These problems are considered together with issues of risk and conservation priorities by the formalisation of conservation advices in the 2006 amendments to the *EPBC Act* which requires that when a species or ecological community is listed the listing is accompanied by a 'Conservation Advice'<sup>28</sup> that sets out immediate priorities for recovery. This advice is a statutory document signed by the Minister and as such is directive of Commonwealth actions.

### B *The Difficulties with Defining and Describing Ecological Communities*

In the context of the present discussion it is useful to distinguish clearly between the *definition* and *description* of ecological communities.<sup>29</sup> What

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<sup>25</sup> There are many texts on regulatory theory and design. Two useful ones for environmental regulation are: Neil Gunningham and Peter Grabosky, *Smart Regulation: Designing Environmental Policy* (1998); and Malcolm K Sparrow, *The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance* (2000).

<sup>26</sup> See generally, Ronald B Mitchell, 'Compliance Theory: An overview' in James Cameron, Jacob Werksman and Peter Roderick (eds), *Improving Compliance with International Environmental Law* (Earthscan Publications, London, 1996) 3.

<sup>27</sup> These terms are explained by Neil Gunningham, 'Introduction' in Neil Gunningham and Peter Grabosky, *Smart Regulation: Designing Environmental Policy* (1998) 26–7, and will be discussed below. See also Michael Jacobs, *The Green Economy: Environment, Sustainable Development and the Politics of the Future* (1991) 152.

<sup>28</sup> *Environment Protection and Biodiversity Conservation Act 1999* (Cth) s 266B as amended.

<sup>29</sup> Preston and Adam describe the approach taken in the State of New South Wales: Preston and Adam, 'Describing and Listing Pt 1' and 'Describing and Listing Pt 2', above n 3.

constitutes an ecological community and a listed threatened ecological community are defined in section 528 of the *EPBC Act*:

**ecological community** means the extent in nature in the Australian jurisdiction of an assemblage of native species that:

- (a) inhabits a particular area in nature; and
- (b) meets the additional criteria specified in the regulations (if any) made for the purposes of this definition.

**listed threatened ecological community** means an ecological community included in the list referred to in section 181.

Section 181 of the *EPBC Act* requires the Minister to publish a list of threatened ecological communities divided into three categories: critically endangered, endangered, and vulnerable. Section 182 defines these categories. For example, an ecological community is eligible to be included in the *critically endangered* category if ‘it is facing an extremely high risk of extinction in the wild in the immediate future in accordance with the prescribed criteria’. Regulation 7.02 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) states the prescribed criteria for the different categories of listed threatened ecological communities.

Section 187 of the *EPBC Act* allows the Minister to amend the list of threatened ecological communities according to the criteria for listing in a particular category.

While the *EPBC Act* defines what constitutes an ecological community in general terms, the *description* of any ecological community within this definition can be considered as a separate matter. In addition to these legislated attributes the Committee was convinced by its experience and the problems of definition and description<sup>30</sup> experienced with the *ESP Act* that it needed an approach that described and listed threatened ecological communities at their national extent which was scientifically credible and repeatable for all manner of ecological communities. An example of a functional description is an ecological community given the title of ‘White Box-Yellow Box-Blakely’s Red Gum Grassy Woodlands and Derived Native Grasslands’ that was included on the list of threatened ecological communities as a critically endangered ecological community on 18 May 2006. It was described in detail in a schedule two pages in

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<sup>30</sup> The definition is the legal expression of what constitutes an ecological community; the description on the other hand is how one would recognise the community in the field.

length of text only (that is, no pictures, diagrams or maps were included in the description).<sup>31</sup> The first paragraph of the description reads as follows:

White Box–Yellow Box–Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (Box–Gum Grassy Woodlands and Derived Grasslands) are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely’s Red Gum trees. In the Nandewar Bioregion, Grey Box (*Eucalyptus microcarpa* or *E. moluccana*) may also be dominant or co-dominant. The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the canopies are clearly separated.

This description followed the Committee’s recommendations in relation to the listing of this ecological community.<sup>32</sup>

The approach adopted in the *EPBC Act* for defining and describing ecological communities should be seen in the context of the ecological, legal and administrative, and social difficulties with any definition and description of an ecological community.

### 1 *Ecological*

Internationally and in Australia, the description of ecological communities and their dynamics has been problematic.<sup>33</sup> Ecological communities in Australia are inherently complex, even in a pre-European condition, due to the compounding effects of long-term climate change, humans, fire, and faunal loss creating an inherent compositional instability within a highly diverse and

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<sup>31</sup> Available on the website of the Australian Government, Attorney General’s Department ComLaw [Commonwealth of Australia Law. Incorporating the Federal Register of Legislative Instruments], ‘Inclusion of ecological communities in the list of threatened ecological communities under section 181 of the *Environment Protection and Biodiversity Conservation Act 1999*’ (20 December 2005) <<http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/all/search/5505C010D8C04939CA257169007DD7C6>> at 30 May 2008.

<sup>32</sup> Robert J S Beeton (chair TSSC), ‘Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the List of Ecological Communities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)’ (adopted November 2004) <<http://www.environment.gov.au/biodiversity/threatened/communities/pubs/box-gum.pdf>> at 17 February 2009.

<sup>33</sup> M P Austin, ‘Vegetation theory in relation to cost-efficient surveys’ in C R Margules and M P Austin (eds), *Nature Conservation: Cost Effective Biological Surveys and Data Analysis* (CSIRO Australia, Melbourne, 1991) 17; Preston and Adam, ‘Describing and Listing Pt 1’ and ‘Describing and Listing Pt 2’, above n 3.

dynamic ecosystem.<sup>34</sup> In addition Australia's relatively subdued topographic variation, typically without sharply-etched topographic or edaphic (soil) variation results in assemblages of species that may change subtly and vary gradually over very large distances.<sup>35</sup> Conversely, local conjunctions of topographic, soil or geological features, compounded by disturbance history, may result in highly complex mosaics of intergrading communities. These communities exist naturally in a range of states,<sup>36</sup> for example different fire regimes can result in seral communities ranging from closed forest states through a woodland state to a grassland state.<sup>37</sup> The result is Australia's naturally variable landscapes where ecological communities undergo a transition in space or time from one state to another and from one ecological community to another often with no clear demarcation between them. In this context, it is not unreasonable to recognise as an 'ecological community' an entity that might, in a non-Australian context, be seen as a series of distinct communities. Such 'broad-scale' ecological communities occur over large areas, and usually exist in a range of states of variable condition<sup>38</sup> and generally intergrading with other ecological communities.

The problems of complexity are compounded when ecological communities occur in fragmented landscapes where land use change and the occurrence of non-native plants and animals has become a significant ecological driver that distorts, in often idiosyncratic ways, the underlying natural variation. This induces changes in the condition and/or composition of ecological communities ranging from 'the most intact' to 'locally extinct'.<sup>39</sup>

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<sup>34</sup> G S Hope, 'Quaternary vegetation' in Robert S Hill (ed), *History of the Australian Vegetation: Cretaceous to Recent* (1994) 368; G Hope and J Kirkpatrick, 'The ecological history of Australian forests' in Kevin J Frawley and Noel M Semple (eds), *Australia's Ever Changing Forests*. Proceedings of the First National Conference on Australian Forest History, Canberra, 9–11 May 1988 [Special Publication No. 1. Department of Geography and Oceanography, Australian Defence Force Academy, Canberra, 1988] 3.

<sup>35</sup> J C Z Woinarski, R J Williams, O Price and B Rankmore, 'Landscapes without boundaries: Wildlife and their environments in northern Australia' (2005) 32 *Wildlife Research* 377.

<sup>36</sup> Ryan R J McAllister, Nick Abel, Chris J Stokes and Iain J Gordon, 'Australian Pastoralists in Time and Space: The Evolution of a Complex Adaptive System' (2006) 11(2) *Ecology and Society* 41.

<sup>37</sup> R C Ellis, 'The relationships among eucalypt forest, grassland and rainforest in a highland area in north-eastern Tasmania' (1985) 10 *Austral Ecology* 297; L J Webb, 'Environmental relationships of the structural types of Australian rain forest vegetation' (1968) 49 *Ecology* 296.

<sup>38</sup> For a discussion on condition, see Sue V Briggs and David Freudenberger, 'Assessment and monitoring of vegetation condition: Moving forward' (2006) 7(s1) *Ecological Management & Restoration* S74-S76.

<sup>39</sup> That is, the assemblage of plants and animals in an area is no longer the ecological community in question.

The definition and description of what constitutes an ecological community is further complicated by the hierarchical level at which a community should be defined. Biologists recognise species as the most fundamental of entities in life's taxonomy, even though there are higher levels (for example, genus, family) and lower levels (for example, subspecies, variety). It is the species level that is the taxonomic linchpin for many conservation initiatives, including the *EPBC Act*, but there is no comparable consensus amongst ecologists or policy-makers as to what hierarchical level is most appropriate for the definition and management of ecological communities. Nor is there any consensus among the Australian jurisdictions on this matter. The ability to lump together or split ecological communities is both a pragmatic boon and a source of almost intractable vexation, and the issue may be compounded when attempting to translate ecologists' esoterica into something that lay-people can understand and appreciate.

Defining and describing the entity is hard, but it may also be difficult to provide a robust assessment of its conservation status, particularly since many of the status criteria are based on an assessment of the degree of change in community composition and/or its extent. This assessment is frequently obscured by an understandably inadequate historical record of the geographic bounds of a community before the present, and a dearth of knowledge about what its species composition and structure may once have been. Such retrospection is particularly 'slippery' as almost all of the Australian continent has been transformed either markedly or subtly such that there are few sites that can be used reliably as reference benchmarks, and because dynamism is a natural part of ecological systems, such that some degree of change is to be expected and is ongoing.

Consequently, when seeking to identify and establish priority for ecological community listings, both scale and condition are relevant considerations. Communities may have highly detailed descriptions and be limited in extent, or they may be broadly described and of considerable extent with associated variability.

## 2 *Legal and Administrative*

Ecological communities have been subject to legislative listing for up to two decades in NSW, Victoria and Western Australia (WA), and this has resulted in some litigation that has clarified the application of the legislation. Preston and Adam set out several principles for determining the existence of a threatened ecological community that have been developed in litigation under the *Threatened Species Conservation Act 1995* (NSW).<sup>40</sup> These principles include that the descriptions of threatened ecological communities need to be reasonably

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<sup>40</sup> Preston and Adam, 'Describing and Listing Pt 1' and 'Describing and Listing Pt 2', above n 3.

clear and unambiguous<sup>41</sup> but the condition of an ecological community is a relevant consideration as to its existence<sup>42</sup> and an exact description of a community is not required for it to be recognisable.<sup>43</sup>

Only one case has considered the listing of threatened ecological communities under the *EPBC Act* at this stage. That case involved a challenge to the consideration given by the Minister's delegate to the presence on the Anvil Hill mine site of 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands'.<sup>44</sup> The decisions in that case support the flexible approach to describing ecological communities under the NSW legislation. In addition to that litigation, some early listings attracted significant controversy based on issues associated with condition and recognition. Especially, this was the case for the early listing of Bluegrass (*Dichanthium* spp) dominant grasslands of the Brigalow Belt Bioregions,<sup>45</sup> and the rejection by the Committee of highly

<sup>41</sup> *VAW (Kurri Kurri) Pty Ltd v Scientific Committee* (2003) ('VAW') 58 NSWLR 631; (2003) 128 LGERA 419; [2003] NSWCA 297 at [6] (Spigelman CJ); *Hornsby Shire Council v Vitone Pty Ltd* (2003) 132 LGERA 122; [2003] NSWLEC 272 at [108] (McClellan CJ) and *BGP Properties Pty Limited v Lake Macquarie City Council* (2004) 138 LGERA 237; [2004] NSWLEC 399 at [138] (McClellan CJ).

<sup>42</sup> *Hornsby Shire Council v Vitone Pty Ltd* (2003) 132 LGERA 122; [2003] NSWLEC 272, a case in which McClellan CJ held that the vegetation on the site had been modified over many years by clearing for orchards and crops, timber getting, mowing, major sewerage constructions work and filling with imported topsoil such that the vegetation was no longer part of the Blue Gum High Forest community. In *Plumb v Penrith City Council* [2002] NSWLEC 223, Pearlman CJ found that a somewhat degraded community did constitute part of the Cumberland Plain woodland.

<sup>43</sup> *VAW* (2003) 58 NSWLR 631; (2003) 128 LGERA 419; [2003] NSWCA 297, in which the NSW Court of Appeal rejected challenges to the lack of precision in the description of the Kurri sand swamp woodlands.

<sup>44</sup> *Anvil Hill Project Watch Association Inc v Minister for the Environment and Water Resources* [2007] FCA 1480 at [50]–[58] (Stone J); and [2008] FCAFC 3 at [35]–[39] (Tamberlin, Finn and Mansfield JJ).

<sup>45</sup> For the listing advice to the Minister, see DEWHA (Cth) Threatened Species and threatened ecological communities webpage, 'Bluegrass (*Dichanthium* spp) dominant grasslands of the Brigalow Belt Bioregions (North and South) Recommendation to the Minister for the Environment and Water Resources from the Threatened Species Scientific Committee (TSSC) on a public nomination for an ecological community listing on the *Environment Protection and Biodiversity Conservation Act 1999* (the Act)' (effective 4 April 2001) <<http://www.environment.gov.au/biodiversity/threatened/communities/bluegrass.html>> at 17 February 2009. Note: delisted 7 January 2009 as a review of this ecological community recommended its replacement by two ecological communities: 'Natural Grasslands of Queensland Central Highlands and the northern Fitzroy Basin', and 'Natural grasslands on basalt and fine textured alluvial plains of northern New South Wales and southern Queensland' (listing of both communities effective 7 January 2009); email from Assistant Director, Ecological Communities Section, DEWHA, John Vranjic, DEWHA, to E Newby, 24 February 2009.

circumscribed ecological communities in NSW and Victoria in favour of a more 'strategic' and broad scale approach.<sup>46</sup>

Under the *EPBC Act*, a person proposing to take an action that they think is likely to have a significant impact on a matter of NES must refer that action to the Minister. Given this, the Act is largely self-assessing. Accordingly, the description of an ecological community must be sufficiently precise to enable enforcement of the Act and allow a lay-person to be able to recognise the listed ecological community in the field. Hence the issue of a readily interpretable ecological description and recognition is critical for effective administration and public cooperation.

The Committee, when it first was confronted with ecological community listing decisions, chose to describe ecological communities in words rather than map listed ecological communities as is done in some other Australian jurisdictions such as Queensland.<sup>47</sup> This decision was driven by the issues of complexity (discussed above), the usefulness of a clear description for the self-assessment process, the imperfect knowledge of the geographic distribution of communities that were threatened, and the confusion arising from inconsistent approaches to classifying and mapping vegetation adopted across jurisdictions and published systems. Description of specific ecological communities was also a necessary precursor to the mapping of an entity.

### 3 Social

Social issues associated with ecological communities fall into two broad classes along an artificial, but often stated, productionist / conservationist divide.<sup>48</sup> For example, it is clear that some conservation stakeholders see the

<sup>46</sup> This is described in Australian Government Department of Environment and Heritage, 'Ecological communities and the *EPBC Act*. A new approach to listing ecological communities' (May 2006) <<http://www.environment.gov.au/epbc/publications/pubs/ecological-communities-listing-approach-factsheet.pdf>> at 17 February 2009. It includes the decision on listing of Box-gum grassy woodlands and derived grasslands as a threatened ecological community.

<sup>47</sup> Chris McGrath, 'End of broadscale clearing in Queensland' (2007) 24 *Environmental and Planning Law Journal* 5.

<sup>48</sup> See, eg, Philip Lowe, Graham Cox, Malcolm MacEwen, Tim O'Riordan and Michael Winter, *Countryside Conflicts: The Politics of Farming, Forestry and Conservation* (1986); A Dennis Lemly, Richard T Kingsford and Julian R Thompson, 'Irrigated agriculture and wildlife conservation: Conflict on a global scale' (2000) 25 *Environmental Management* 2 485; I Gray and G Lawrence, *A Future for Regional Australia: Escaping Global Misfortune* (2001) ch 8; E F Lambin, B L Turner, H J Geist, S B Agbola, A Angelsen, J W Bruce, O T Coomes, R Dirzo, G Fischer, C Folke, P S George, K Homewood, J Imbernon, R Leemans, X Li, E F Moran, M Mortimore, P S Ramakrishnan, J F Richards, H Skånes, W Steffen, G D Stone, U Svedin, T A Veldkamp, C Vogel and J Xu J, 'The causes of land-use and land-cover change: Moving beyond the myths' (2001) 11 *Global Environmental Change* 261.

listing of ecological communities as addressing the wider issue of land clearance,<sup>49</sup> while others see ecological communities as a strategic way of achieving particular conservation outcomes. This is important as the provisions of the Act apply to ecological communities on land of any tenure, including privately owned land. These laws, therefore, have important social and economic implications.<sup>50</sup>

The *EPBC Act* created increased legal control of actions that might damage listed ecological communities, including but not limited to land clearing. Actions that were fully approved under Commonwealth, State and Territory laws at the commencement of the Act on 16 July 2000 do not require approval under the *EPBC Act*.<sup>51</sup> This exemption limits the operation of the Act to new actions and enlargement, expansion or intensification of previous uses.

As recognised by the *Biodiversity Convention* and the *EPBC Act*, conservation *in situ* outcomes are best achieved at a landscape level. It is axiomatic that such outcomes are dependent upon the goodwill of those who control the land (as the majority of Australia's land is privately held) and the broader society who more strongly influence the political process. The polarities identified above are the antithesis of this and effective management is dependent upon mechanisms that resolve conflict, build goodwill and make conservation outcomes a value-adding proposition for land managers. Without these mechanisms, the likely outcome would be pressures for a regulatory or enforcement approach that would almost certainly be counterproductive, with significant ecological communities being deliberately degraded before recognition and legal protection. In such a context, enforcement actions would be legally difficult for the reasons of definition and condition identification previously discussed.

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<sup>49</sup> Land clearance is listed as a Key Threatening Process under the *EPBC Act* and is defined to include all forms of ecological communities – including grasslands: DEWHA (Cth) Threatened Species and threatened ecological communities webpage, 'Land Clearance. Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee on a public nomination of a Key Threatening Process under the *Environment Protection and Biodiversity Conservation Act 1999*' (effective 4 April 2001) (*Land Clearance Advice*) <<http://www.environment.gov.au/biodiversity/threatened/ktp/clearing.html>> at 17 February 2009.

<sup>50</sup> See the discussion by the Productivity Commission, above n 10.

<sup>51</sup> See *Environment Protection and Biodiversity Conservation Act 1999* (Cth) ss 43A and 43B.



### III AN ADAPTIVE APPROACH TO ECOLOGICAL COMMUNITIES 2000–2006

#### A Evolution of the Approach

As noted in the previous section, ecological communities have been listed in NSW, Victoria and WA for some time and were listed under the *Endangered Species Protection Act 1992* by the Commonwealth, although most listings were relatively non-controversial and at a small scale; typically, they were unusual or highly circumscribed systems. At the commencement of the *EPBC Act*, a number of ecological communities were nominated for listing. These particularly covered a large area of what was seen as the land clearance frontier in Queensland. In addition, land clearance was nominated as a key threatening process.

In 2000, the Committee agreed that land clearance was undoubtedly a key threatening process under the Act, and recommended accordingly.<sup>52</sup> However, the listing of ecological communities was far more complex. This is illustrated by the Queensland / NSW border being a definitional boundary for Brigalow communities and many of the nominated communities being significantly intergraded across the boundary. The Committee agreed to use an adaptive approach to resolve these problems of complexity and definitional confusion. This led to the first attempt by the Committee to use workshops as a tool to understand appropriate listing scales and ecological community descriptions. These first workshops were expert workshops and did not involve other stakeholders affected by the listing. Informed by these workshops, descriptions consistent with the Act were adopted for four very different ecological communities, each of which was the subject of a recommendation to the Minister.

These communities were:

- Great Artesian Basin mound springs<sup>53</sup> — the problem confronting the Committee was that, although all mound springs have a similar origin, there was considerable variation between them in community structure and species composition. In a strictly ecological sense, well over a hundred springs could have been listed as distinct communities. To avoid this, the ecological community was described as the ‘the community of native species dependent

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<sup>52</sup> See DEWHA, *Land Clearance Advice*, above n 49.

<sup>53</sup> For the listing advice to the Minister, see DEWHA (Cth) Threatened Species and threatened ecological communities webpage, ‘The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin. Recommendation to the Minister of Environment and Water Resources from the Threatened Species Scientific Committee (TSSC) on a public nomination for an ecological community listing on the *Environment Protection and Biodiversity Conservation Act 1999* (the Act)’ (effective 4 April 2001) <<http://www.environment.gov.au/biodiversity/threatened/communities/gabsprings.html>> at 17 February 2009.

on natural discharge of groundwater from the Great Artesian Basin'. This definition clearly allows all discharge springs to be captured by the listing but does not reflect a conventional understanding of an ecological community based on its biotic composition. In contrast, it uses the abiotic component of an ecosystem as the key circumscription variable.

- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions<sup>54</sup> — these rainforest communities with highly variable species composition exist now as small isolated patches across a wide geographic range, with these residual areas largely maintained because they occur on substrates that are 'un-developable'. The major threat to these communities is fire. The description of the community was relatively simple, using structural characteristics with species composition only by way of example.
- Brigalow shrublands and woodlands<sup>55</sup> — initially the Committee was confronted with seven nominations of brigalow communities in Queensland. Other Brigalow communities occurred in both Queensland and NSW and were equally threatened. The Committee recommended listing of the community as 'Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Brigalow Bioregions North and South'. This effectively combined all the Queensland nominations plus additional Queensland Regional Ecosystems and occurrences in NSW into one national ecological community with the boundary defined using recognised bioregions.
- Blue Grass (*Dichanthium*) grasslands<sup>45</sup> — this nomination was limited to two bioregions. As a native grassland, it also represented a new challenge for community listing in Australia. In the south, the known extent of the community was less than one per cent of its pre-European extent. In the north, the remaining extent was greater but the level of threat from the spread of weeds and introduced pasture grasses was considerable. The community was described as being dominated by blue grass and an attempt was made to

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<sup>54</sup> For the listing advice to the Minister, see DEWHA (Cth) Threatened Species and threatened ecological communities webpage, 'Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions. Recommendation to the Minister of Environment and Water Resources from the Threatened Species Scientific Committee (TSSC) on a public nomination for an ecological community listing on the *Environment Protection and Biodiversity Conservation Act 1999* (the Act)' (effective 24 December 1999) <<http://www.environment.gov.au/biodiversity/threatened/communities/sevt.html>> at 17 February 2009.

<sup>55</sup> For the listing advice to the Minister, see DEWHA (Cth) Threatened Species and threatened ecological communities webpage, 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' (effective 4 April 2001) <<http://www.environment.gov.au/biodiversity/threatened/communities/brigalow.html>> at 17 February 2009.

define its condition and boundaries. The Committee recommended listing of the community as 'Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South)'.

In each of the above cases, the original nominations were considerably modified by the Committee. In many cases, the recommendation to the Minister to reject a nomination was accompanied by a recommendation to list a community defined by the Committee that subsumed the rejected nominations. The process for listing the four national ecological communities, above, required the formal rejection of 19 small-scale, separate nominations. In so doing, the national listings covered at least 37 ecological communities recognised at the State level (including the 19 nominated items).

These four ecological communities were listed on 4 April 2001, and considerable public interest and some protest followed with representation being made to government at many levels. The Committee re-evaluated the decision-making processes leading to a listing recommendation. The decision was made to continue to move to an even more strategic approach where communities were considered on the basis of major vegetation subgroups following a priority set by the Committee. This was an extension of the Committee's experience from its first attempt at listing. Once priorities were set, contracts were let to consultants to prepare subgroup evaluations and consequential nominations. In the meantime, single listing nominations continued to be submitted, but if the ecological community fell within a subgroup being evaluated, the nominations were recommended for rejection on the basis that the evaluation would provide a better circumscription of the threatened communities and conservation outcomes consistent with the objectives of the Act.

However, this approach was threatened because the necessary rejection of poorly circumscribed communities attracted a threat of legal challenge on the grounds that the Committee was taking into account 'extraneous matters'.<sup>56</sup> The Committee responded by agreeing to keep the nominations on the work plan as Committee nominations but to continue with the task of developing a better process and applying it to many of the communities in question. This meant that these nominations were not subject to the time constraints of the Act but could be better addressed once the listings process was clarified and improved.

The Committee commenced a full review of the problem of ecological communities commencing with a comprehensive literature review followed by several discussion papers. These papers were presented to a specially convened national workshop that included experts from all jurisdictions and interest groups. After several iterations and some test workshops by Departmental staff

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<sup>56</sup> The Environmental Defenders Office was acting on behalf of conservation NGOs. The threatened legal action did not eventuate and most of the communities were subsequently incorporated into much broader scale listings.

and Committee members using topical examples from the backlog of ecological community nominations, a recommendation was made to the Minister for a new approach.<sup>57</sup> The approach was adopted in December 2004 and has, to date (October 2008), been successfully applied to two broad scale and five State-endemic listings. There has been considerable attention directed to temperate grassland and grassy woodland communities, with the ‘White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland’, ‘Iron-grass Natural Temperate Grassland of South Australia’ and ‘Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia’ being listed under the new approach. Nominations for the Inland Grey Box Woodlands, Weeping Myall Woodlands and the grassy woodlands of western Victoria and Gippsland are undergoing similar, active assessments.

## B Current Approach

The current approach for describing ecological communities under the *EPBC Act* is set out in detail on the internet.<sup>58</sup> It relates only to terrestrial ecological communities, and almost entirely those defined on vegetation characteristics. Protocols for the description and assessment of aquatic and marine ecological communities and faunal communities remain as important issues to be addressed when there is sufficient reliable scientific information for determinations.

### 1 Overview

The Committee reached three conclusions, namely that:

- first, the problems of describing ecological communities, and subsequent management considerations for those communities, could be resolved, provided that listings are scientifically credible, easily understood by the community, and capable of being used in an effective natural resource management (NRM) regime;
- second, the issues of land clearance and ecological community conservation, while clearly related, should be separated; land clearance being a threat management problem and the identification of threatened ecological communities a conservation and restoration problem; and

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<sup>57</sup> For the advice to the Minister, see ‘Ecological Communities: A Way Forward. Threatened Species Scientific Committee Advice for The Minister for Environment and Heritage, September 2004’ (2004) <<http://www.environment.gov.au/epbc/publications/pubs/ecological-communities-listing-approach.pdf>> at 17 February 2009.

<sup>58</sup> See DEWHA (Cth) website, ‘Threatened ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999* (last updated 21 January 2009) <<http://www.environment.gov.au/biodiversity/threatened/communities.html>> at 17 February 2009.

- third, ecological communities frequently occur in a range of states, and within these states there may exist a number of condition classes. A practical conservation definition of an ecological community identifies ‘high conservation quality’ elements of the state(s) of an ecological community that should be protected by the *EPBC Act* and ‘significantly modified’ elements that may attract appropriate NRM interventions. This would allow landholders to access funding available through their NRM regional organisations for assistance in management of properties to achieve better outcomes for ecological communities.

## 2 Definition and Description of Listed Ecological Communities

The complexity and hierarchical nature of Australia’s ecological communities can be represented diagrammatically (Figure 1). EC1 communities are highly circumscribed ecological communities that are recognisable isolated types determined by either *deep history*,<sup>59</sup> geomorphology, geology, or all three. Such ecological communities may not have declined in extent, but are under significant threat or may have become extinct in some areas. ‘*The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin*’ is an ecological community currently listed under the EPBC Act that would conform to EC1 in Figure 1. Mound springs can be either existing or destroyed<sup>60</sup> and the listing advice for mound springs reflected this. In addition, the ecological communities are variable in form and spatially separated with varying species composition.

Closed forest ecological communities with significant species variation, but consistent structural and dominant elements (for example vine thickets and rainforest), either exist or are cleared with easily recognised residuals dotted across the landscape. These are examples of EC2 in Figure 1. These ecological communities can be described structurally or in terms of the dominant species.

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<sup>59</sup> ‘*Deep History*’: history beyond our ability to measure. See Joel Cracraft, ‘Deep-History biogeography: Retrieving the historical pattern of evolving continental biotas’ (1988) 37(3) *Systematic Zoology* 221; Brett R Riddle, ‘The molecular phylogeographic bridge between deep and shallow history in continental biotas’ (1996) 11 *Trends in Ecology and Evolution* 207). All Australian ecological communities have over the last 60,000 years been subject to two glacial periods and human influences. Consequently, we can often only speculate about the historic influences on the current expression of an ecological community.

<sup>60</sup> The most dramatic cause of this is the loss of water flow because of a decline in Great Artesian Basin pressure due to agricultural and, more recently, mining-related extraction of artesian water, and the use of the springs as unfenced and reticulated watering points.

EC3 in Figures 1 and 2 represent the fragmented woodlands and grasslands that typically occur in a band west of the Great Dividing Range and in an arc into South Australia. These communities naturally intergrade,<sup>61</sup> occur in mosaics that were probably manipulated by traditional Aboriginal management, and are now fragmented. Some EC3 ecological communities have different naturally occurring states. This is recognised ecologically in terms of a system of states and transitions between these states. The totality of these states makes up the broad extent of the ecological community.<sup>62</sup>

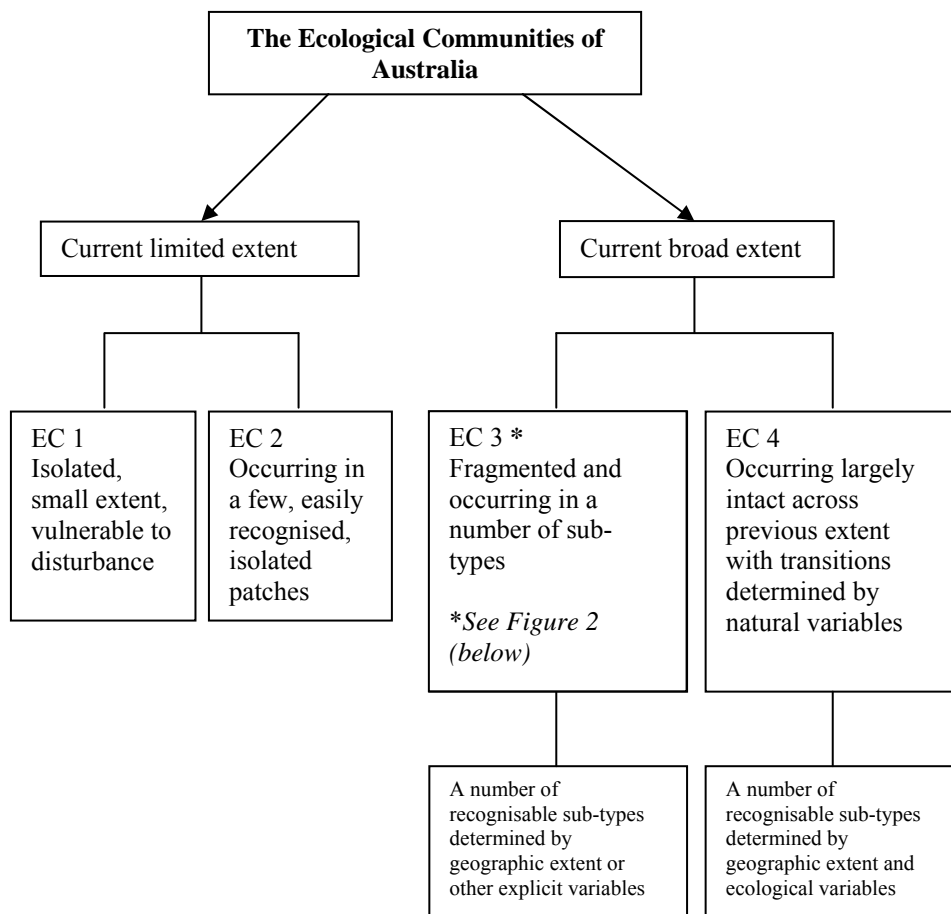
Where two closely related ecological communities exist and intergrade, it is possible that some forms can be recognised as being in both ecological communities. Additionally, depending on natural and human influences, a state could be changed (through active management or continuing threat) into a condition that is entirely within one ecological community (Figure 2). This complexity led the Committee to form the view that ecological community definitions for such complex natural systems need to recognise the on-ground reality. Accordingly, any functional description of an ecological community under the Act should recognise:

- that some ecological communities can exist in a number of states;
- the degree of disruption that the system has undergone;
- the possibility of restoration; and
- areas where the ecological community is effectively intact.

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<sup>61</sup> When communities intergrade they may do so over some considerable but variable distances. Typically species composition changes gradually and the point where one community stops and the other starts is not knowable.

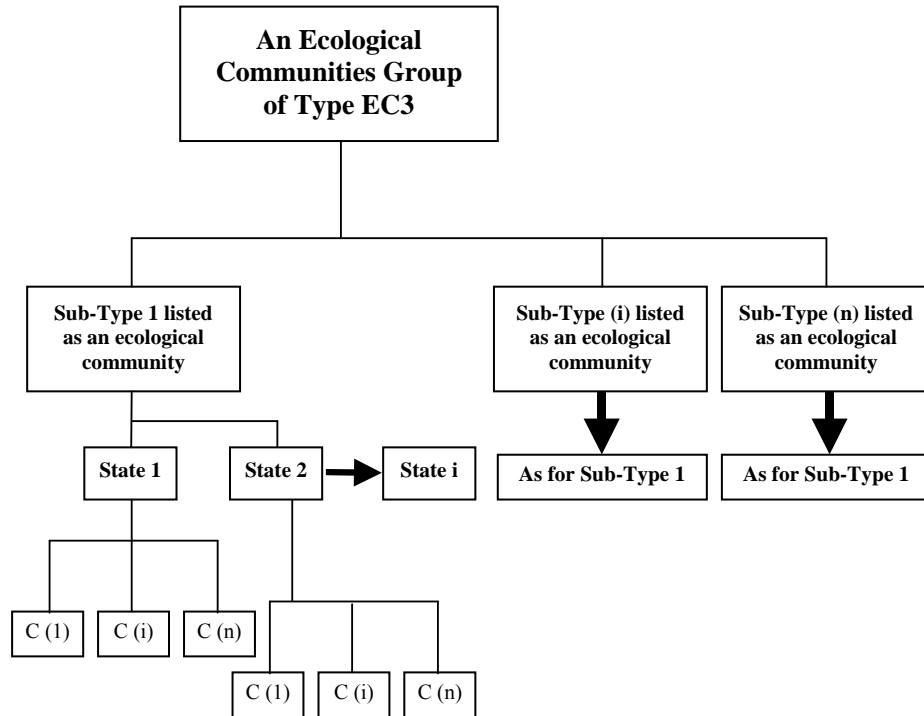
<sup>62</sup> P Jones and W H Burrows, 'State and transition models for rangelands. 13. A state and transition model for the mulga zone of south-west Queensland' (1994) 28 *Tropical Grasslands* 279.



**FIGURE 1: A FRAMEWORK FOR UNDERSTANDING ECOLOGICAL COMMUNITIES LISTED UNDER THE EPBC ACT**

EC4 represents naturally determined and intact ecological communities and ecological community complexes. These occur in the extensive areas of inland Australia and in forested areas around the seaboard. Examples include much of the mulga lands, extensive forested areas subject to the Regional Forest Agreements, connected National Parks along the Great Dividing Range, and some World Heritage Areas. While these are ‘the most intact’ ecological communities in Australia, the majority have not escaped the impact of human disturbances. Some are undergoing change because of changed fire regimes, others through use as grazing lands, and others through the impact of invasive

species. In addition, all are subject to natural climatic variability and climate change. Undoubtedly, these ecological communities contain recognisable sub-types. However, their demonstration, while scientifically of interest, does not trigger the conservation objective of the Act.



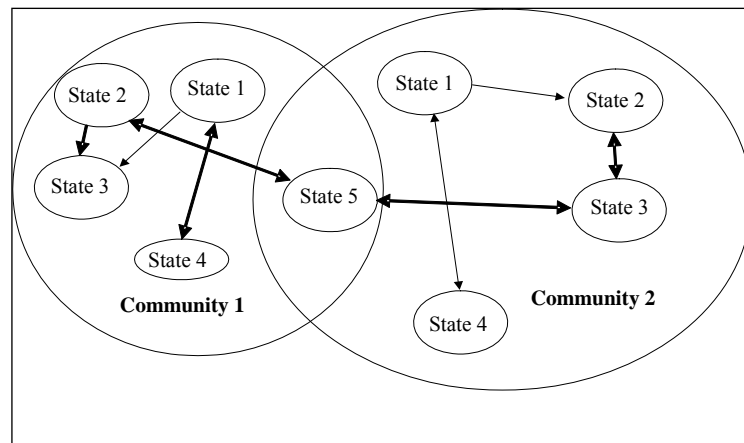
**FIGURE 2: A FRAMEWORK FOR UNDERSTANDING ECOLOGICAL COMMUNITIES OF TYPE EC3 IN FIGURE 1**

These communities may exist in one or more naturally occurring forms, each of which may have one or more naturally occurring states (that is, 1 to n). Sometimes a transition from one state to another occurs either through natural or human processes (for example, State 2 to State i in figure 2). Each state may include a range of (human-induced) condition classes (that is, 1 to n), some of which might be so altered as to warrant their exclusion from the listed ecological community.



### 3 States and Conditions

The issue of state is an important consideration within this framework. If a range of states is identified as constituting the ecological community, states need to be clearly expressed and be capable of being recognised in the field. Indicators of each state and of the overall ecological community should be defined to allow unambiguous recognition of the ecological community (Figure 3). For each state, ‘*condition classes*’ are identified as points along a continuum (Figures 2 and 4) from the most intact ecological community state to a situation in which the ecological community is in such a degraded state that essentially it is locally extinct. Factors distinguishing the condition of an ecological community could include the structure of its particular state, its species composition, the presence or absence of agreed indicator species or ecological properties, and the relative proportion (or dominance) of native and non-native species. For an ecological community that does not have a number of states, the same principles with respect to condition apply.



**FIGURE 3: REPRESENTATION OF POSSIBLE RELATIONSHIPS BETWEEN DIFFERING STATES OF AN ECOLOGICAL COMMUNITY\***

\*Note: States of ecological communities are indicated by circles and transitions by arrows. Transitions may be uni- or bi-directional depending on a range of biophysical and, at times, anthropogenic variables.

In the case of woodland ecological communities, several broad types may exist. For listing purposes, the ecological communities could be described as having a '*recognisable name*' descriptive of their occurrence in one or more Interim Biogeographic Regionalisation for Australia (IBRA)<sup>63</sup> regions (that is, AA ecological community of ABC IBRA Region(s)). Each such ecological community would have one or more recognisable states and within them, various condition classes.

For each recognised woodland ecological community, its states could be:

- one in which all the components of the overstorey and understorey that are taken to represent/signify 'the highest quality' or 'the least disturbed' are present;
- one that just has an understorey of significant value floristically and ecologically; and
- one that just has an overstorey of the ecological community's dominant and co-dominant species.

The establishment of the point where an expression of an ecological community state ceases to be part of the community depends on establishing a threshold. Typically, threshold variables for establishing the '*condition classes*' include:

- patch size (condition or functional considerations);
- connectivity;
- native plant species presence and abundance;
- native plant species diversity;
- overstorey projective foliage cover;
- understorey composition and cover; and
- recognised faunal values.

These variables are assessed against identified and locatable condition examples. These examples would change from state to state for each '*recognised ecological community*' (Figure 3). Within each '*recognised ecological community*' some of the condition classes would be identified as being part of the listed ecological community and others may be considered too degraded to warrant listing. The latter would be identified for rehabilitation and management through the NRM and recovery planning process. Figure 4 illustrates this approach. This process creates the '*administrative boundary*' of the ecological

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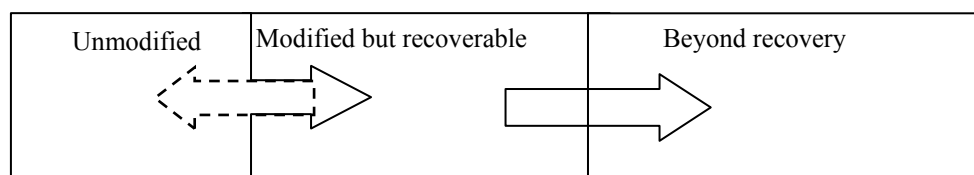
<sup>63</sup> IBRA – Australia's 85 Bioregions. See DEWHA, 'Interim Biogeographic Regionalisation for Australia – Regions' (22 February 2008)). For a description of the regionalisation, see DEWHA (Cth) Caring for Country website, 'Maps: Australia's bioregions (IBRA) <<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html>> at 17 February 2009.

community in question. The logic for this has to be explicit in listing advice and conservation advice to the Minister and, once listed, understandable by landholders.

#### 4 Practical Considerations

##### (a) Applying These Principles

The Committee recognises that even within this framework not all expressions of a listed ecological community are equal. A judgement would need to be made about the value of each for effective NRM management, conservation management and protection. The Committee, by recommending the setting of condition thresholds, defines the expressions of a listed ecological community that trigger the assessment provisions of the *EPBC Act*. Lower quality but 'recoverable' examples should be identified for management through the NRM and recovery planning processes. This creates scope for some recovery of the listed community without taking away the focus from those areas that warrant protection. While other degraded areas would not be addressed within the context of the *EPBC Act*, they may still retain conservation value and are best addressed by State and regional NRM processes.



**FIGURE 4: THE CONTINUUM OF STATE CONDITION CLASSES IN AN ECOLOGICAL COMMUNITY\***

\*Note: *Communities may move to 'lower conservation value' condition under pressure and potentially to 'higher' condition if pressure is relaxed or management interventions are made. The two exceptions are, firstly, systems that are beyond recovery because of total species loss or a loss or major disruption of the ecological processes on which the community depends. In such a case, full recovery is impossible, but 'functional' recovery should be an NRM objective. Secondly, 'natural' systems may 'degrade' in an insidious fashion in the absence of Indigenous management.*

(b) *Necessary Splitting and Lumping*

The effect of this approach would be that apparently intact or nearly intact expressions of the ecological community would be listed under the *EPBC Act* if the community across its national extent met at least one of the listing criteria. This process is being assisted by benchmark sites for each expression or state of the ecological community being identified and material to assist in identification being made available through the ‘*Communities for Communities*’ website.<sup>64</sup>

(c) *Threatening Processes*

The Committee believes that although the definition/circumscription of ecological communities for the purposes of the *EPBC Act* is administratively and scientifically challenging, the conservation issues driving their decline are reasonably well understood. In reality, in most of the intensive land-use zone of Australia, the ecological limits of land clearance have been exceeded so that broad-scale landscape functions are significantly compromised. The solution is to regulate<sup>65</sup> land clearance, create incentives for those who manage intact native vegetation and implement necessary landscape management and restoration practices.

5 *A Practical Model*

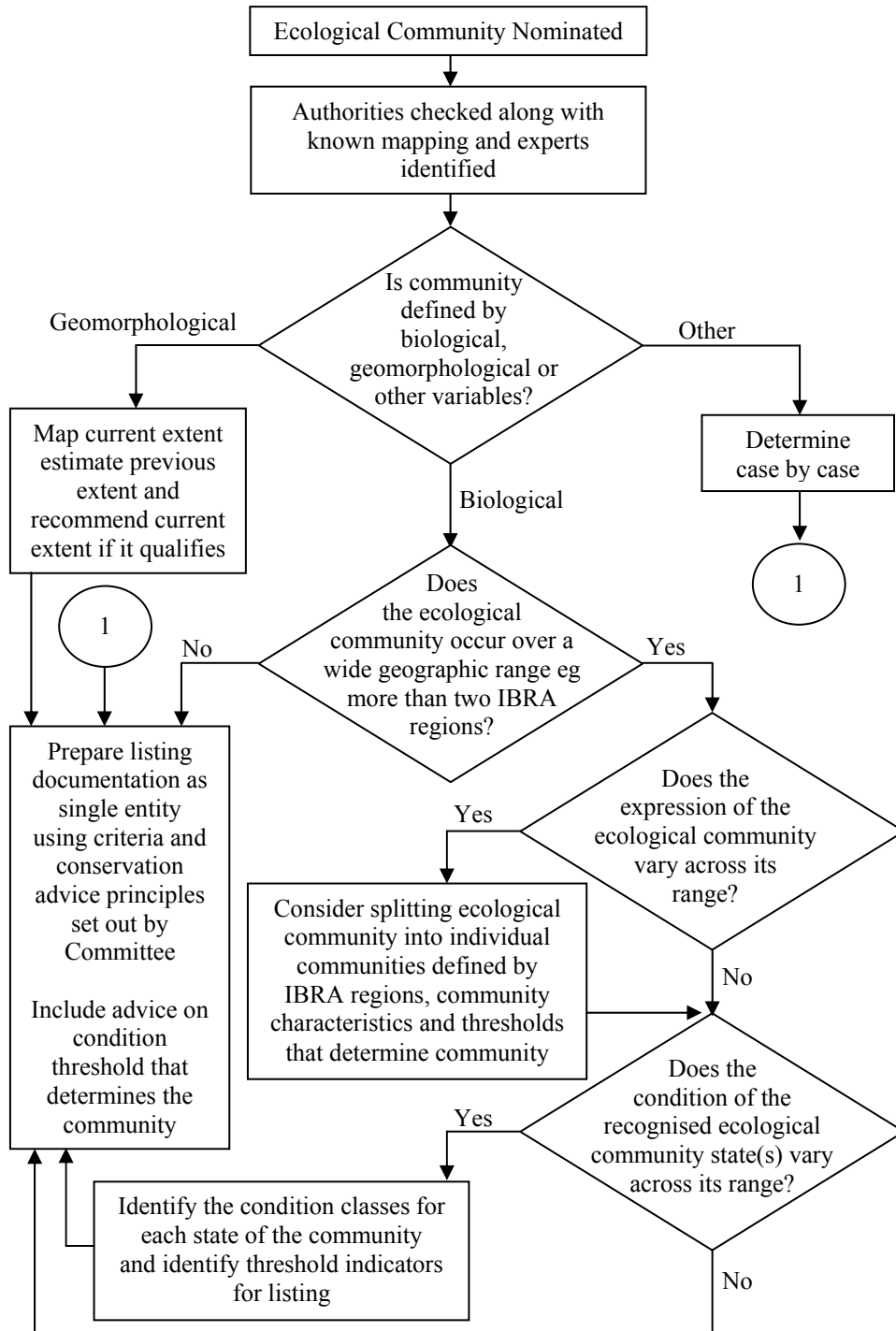
Figure 5 shows the logical sequence by which the process set out above can be applied to the listing of ecological communities. This model has now been accepted and is the current framework for the listing of ecological communities.

**FIGURE 5 (AT RIGHT): ALGORITHM FOR GUIDING THE DECISION MAKING PROCESS FOR LISTING ECOLOGICAL COMMUNITIES**

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<sup>64</sup> See DEWHA (Cth) ‘Communities for Communities’ newsletters avail <<http://www.environment.gov.au/biodiversity/threatened/publications/communities-newsletter/index.html>> at 17 February 2009.

<sup>65</sup> In most areas, this will be a cessation of land clearance but exceptions may occur.



## 6 *Special Cases*

A special case might be made for situations where there are no, or extremely few, intact expressions of an ecological community, but where the possibility of restoration exists. In such cases, the biodiversity value of an area is determined by its potential rather than its actual condition. This approach could be applied for example to some highland swamps that have been impacted by grazing.

## 7 *Special Complexity*

In the south-west of Western Australia, and possibly elsewhere, the expression of ecological communities is influenced by subtle substrate variations. Often an ecological community is only recognisable as a large number of endemic species intermixed to form complex, highly diverse patterns that do not easily conform to phytosociological descriptions. In these cases, the extent of the ecological community is best described by using vegetation structure and geomorphological features. Similar practical approaches may be needed for other ecological communities that do not readily conform to taxonomically-based descriptions. A precedent for this treatment has been set in the description of the listed ecological community '*Community of native species dependent on natural discharge of groundwater from the Great Artesian Basin*'.<sup>66</sup>

## IV RESOLVED AND OUTSTANDING ISSUES

The processes outlined in this article represent the operation of a legal, ecological and political system that has to operate within a framework of imperfect knowledge. Many issues remain in terms of how the legal system will regard what is a mix of ecological and pragmatic considerations in an environment where the science is largely unresolved.

From a Committee perspective, the resolution of such technical problems is understood to involve the continual improvement of the legislative listing system by its ongoing application to ecological communities. This process is underway and a number of recent listings have used the system.<sup>67</sup>

<sup>66</sup> See 'The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin. Recommendation to the Minister of Environment and Water Resources from the Threatened Species Scientific Committee (TSSC) on a public nomination for an ecological community listing on the *Environment Protection and Biodiversity Conservation Act 1999* (the Act)' (effective 4 April 2001) <<http://www.environment.gov.au/biodiversity/threatened/communities/gabsprings.html>> at 17 February 2009.

<sup>67</sup> See listing advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland at DEHWA (Cth) Species Profile and Threats Database 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland'

## V CONCLUSION

In framing the approach to ecological communities reported in this article, the Committee was aware of situations where conservation systems have become overwhelmed by litigation initiated by development and conservation interests.<sup>68</sup> Listing threatened ecological communities or ecosystems may be a mechanism for avoiding the issues of threatened species lists, and provides a cost-effective means of simultaneously conserving groups of species.<sup>69</sup> Moreover, the Committee was concerned that the listing of all but the most circumscribed ecological communities as distinct, recognisable and immutable entities should *a priori* be infinitely more open to the problems that beset species listing. Nonetheless, the process for listing ecological communities under the *EPBC Act* as entities has been formalised and treated systematically within an adaptive management framework. This article reports how a difficult problem in conservation has been addressed to date. The revised system of listing ecological communities may be in part a solution to the challenges made to the formal listing systems for threatened species as a tool for achieving conservation outcomes. It is a work in progress, however, and much remains to be done. Whether the approach has met Dovers'<sup>70</sup> criteria of the approach moving from problem-framing, through policy-framing, to policy implementation, and policy monitoring and evaluation will be judged in terms of the conservation outcomes achieved.

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(effective 17 May 2006) <<http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=43&status=Critically20Endangered>> at 17 February 2009; and listing advice on Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia at DEHWA (Cth) Species Profile and Threats Database, 'Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia' (effective 21 June 2007) <<http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=36&status=Critically20Endangered>> at 17 February 2009.

<sup>68</sup> See, eg, Ben Boer, 'World Heritage disputes in Australia' (1992) 7 *Journal of Environmental Law and Litigation* 247; Nicola Pain and Sarah Wright, 'The rise of environmental law in New South Wales and federally: Perspectives from the past and issues for the future' (Paper presented at the national Environmental Law Association Annual conference, Broken Hill, NSW, 24 October 2003) <[http://www.lawlink.nsw.gov.au/lawlink/lec/ll lec.nsf/vwFiles/Speech\\_24Oct03\\_PainJ.pdf/\\$file/Speech\\_24Oct03\\_PainJ.pdf](http://www.lawlink.nsw.gov.au/lawlink/lec/ll lec.nsf/vwFiles/Speech_24Oct03_PainJ.pdf/$file/Speech_24Oct03_PainJ.pdf)> at 25 April 2008; US Department of Justice, *Overview of the Endangered Species Act and highlights of recent litigation*. Prepared by the Wildlife and Marine Resources Section, Environment and Natural Resources Division, United States Department of Justice, Washington DC (updated January 04) <<http://www.abanet.org/enviro/committees/endangered/OverviewoftheESA.pdf>> at 25 April 2008.

<sup>69</sup> Reed F Noss, Edward T LaRoe III and J Michael Scott, *Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation*. Biological Report 28 (National Biological Service, US Department of the Interior, Washington DC, 1995).

<sup>70</sup> Dovers, above n 22, 12.