

Threatened species legislation: just one act in the play

Chris Dickman¹, Pat Hutchings² and Daniel Lunney³

¹ Institute of Wildlife Research, School of Biological Sciences, University of Sydney, NSW 2006. cdickman@bio.usyd.edu.au

² Australian Museum, 6 College Street, Sydney, NSW 2010. path@austmus.gov.au

³ Department of Environment and Conservation (NSW), PO Box 1967, Hurstville NSW 2220. dan.lunney@environment.nsw.gov.au

ABSTRACT

Governments in Australia and elsewhere in the world use legislation to conserve species and other elements of biodiversity that are threatened by human activities. This forum examined to what extent relying on the legislative process is justified and, in particular, considered the effectiveness of legislation in achieving broad conservation goals. A synthesis of the papers presented at the one day forum run by the Royal Zoological Society of NSW is presented in this final paper. These papers display considerable insight into how threatened species legislation works, from the decision to list a species, to the consequences of listing for government departments, local councils, community groups and consultants. While the papers concentrated on the NSW Acts, they were compared with Commonwealth and other States' legislation as well as overseas examples. For many contributors to this forum, threatened species legislation is deficient in that it focuses on conspicuous, iconic and well-known taxa, and does little to conserve small, cryptic organisms, common but declining taxa, or ecological processes. In addition, threatened entities must often be identified using imprecise criteria that can be interpreted differently, and uncertain or incomplete information, while recovery planning for ever-expanding lists of threatened taxa is difficult and expensive. Scarce resources could be made to go further by allocating them to priority taxa, but criteria for ranking priorities are themselves highly contentious. Given these difficulties, an efficient way forward would be to identify common threats that afflict suites of populations, species and ecological communities and to target these for management. This is possible, but has been given insufficient priority under some existing legislation such as the NSW *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*. Other priorities for achieving broad conservation goals are the familiar yet critical requirements for sustaining research, education and funding, but added to these is the need for more public debate, engagement of the whole community, and informed inspiration to show that solutions are possible. We conclude that threatened species legislation is important, but just one act in the biodiversity play.

Key words: endangered species, Threatened Species Conservation Act 1995, Fisheries Management Act 1994; scientific experts; threatened species legislation, populations, communities, threatening processes, vulnerable.

Introduction

As biological diversity continues to diminish across the world, a common response by governments has been to pass legislation to endeavour to halt the decline. This response is understandable. Human activity is responsible for the current biodiversity crisis and, as most modern societies are founded on the rule of law, appropriate legislation is essential to rein in our worst excesses and allow the variety of life to be retained. But, does such legislation work? The contributors to this forum agreed that threatened species legislation is important, but diverged in their evaluations of its effectiveness, of the consistency of its administration, and where such legislation fits into the larger picture of biodiversity conservation. Here, we identify just some of the themes arising from the forum and, adapting the concept that species can be viewed as players in the ecological theatre (Hutchinson 1965), put the case that threatened species legislation is but one act in the play.

The forum falls into four parts, with the fourth being the plenary session. In checking the proofs of the plenary, one

of the participants (Martin Denny) sent the following message: "I think this session is the most important from the whole meeting. A lot of people speaking honestly, and giving good suggestions." As President of the Ecological Consultants' Association of NSW, Denny represents the view, as he did so adeptly in his paper, that there are many more interested parties than may be apparent by just reading the views of one of the more vocal protagonists. When these other views are neglected, the capacity of both Commonwealth and State threatened species legislation is thereby diminished, as has been crisply demonstrated by Lambert's (2004) pointed contribution. More importantly, these views may well be struggling to find a voice, hence the importance of the public forum on threatened species legislation held by the Royal Zoological Society of NSW.

Among the seemingly wild suggestions in the plenary session was the view put forward by Liz Denny: "Sitting here today I've realised that we have done everything back to front. In fact, everything should be listed, and the game

should be to get it off the list.” Zany as it may seem, that was in fact among the directions to the Scientific Committee under the *Endangered Fauna (Interim Protection) Act 1991*. Here the Committee was required not only to prepare a list of endangered fauna and be prepared to justify it, but also to be able to justify leaving a species off the list. This meant that it was necessary to prepare the first ever State-wide list of fauna and then to employ a system that was robust enough to be even in its ranking procedures across all vertebrate species (Lunney *et al.* 2004). This unusual requirement is not part of other threatened species acts, including the current NSW *Threatened Species Conservation Act 1995*. In one sense, Liz Denny’s proposal is an extreme application of the precautionary principle that is examined in detail in Whelan *et al.* (2004). However, they take the view that the listing process could be precautionary, but a significant amount of information is needed before a population, species or community can be listed, so nominations of taxa for which little information is available are likely to be unsuccessful. Consequently, they note that a precautionary approach to listing would be to use the IUCN classification “Data Deficient” as a category, especially if it were designed to trigger a process of ecological study to gather relevant data, and a Species Impact Statement in cases where a data deficient taxon was likely to be affected by a specific development proposal. This fragment of the debate reveals that in considering threatened species legislation, the precautionary principle has a distinct place. What it also exposes is the problem of how to deal with a lack of information. One approach is to utilise experts, but at this juncture Burgman (2004) jolts everyone who is complacent about the presumed ability of experts.

As Burgman (2004) points out, experts are often the only available source of knowledge to support decisions that would otherwise be made in a vacuum. Group opinions are likely to be better than individual opinions, says Burgman, in that they provide an efficient and convenient way of compiling and aggregating a broad range of knowledge. But, Burgman cautions, there may be a great deal to be learned from other technical disciplines and from the psychology and sociology of risk perception and decision theory. Fortunately, Burgman proposed some positive steps to address the limitations of the expert system, such as noting that performance is enhanced when experts possess appropriate models and are trained to translate subjective assessments into numerical estimates, and that experts perform better when they use a consistent format to communicate, when they are trained to provide unbiased estimates, and when their judgement is reinforced by immediate, unambiguous feedback.

Another of the far-reaching insights from the papers in this forum is that by Farrier and Whelan (2004). Like Burgman’s startling contribution, it bridges the disciplines to portray a problem in a new and lucid way. Consider the penultimate paragraph in their paper. It is an example of a superb mix of practical and theoretical studies. It represents a fine example of intellectual adaptive management and also lays bare one of the greatest challenges to the conservation of threatened species. The paragraph runs as follows: “NSW provisions

relating to the protection of threatened species habitat betray their roots in a system originally designed to regulate hunting. At a symbolic level, heavy reliance appears to be placed on command regulation triggered directly by threatened species listing, and backed up by the threat of prosecution. In practice, however, this is significantly moderated by the operation of an *ad hoc* approvals process dominated by socio-economic considerations, with conservation outcomes a hoped-for side-effect of ameliorating provisions rather than a primary objective. Decision-making processes are driven by individual development proposals rather than strategic thought, and assessment of cumulative impact is a significant casualty. The government agency with expertise in threatened species conservation and scientific research is marginalised.”

Farrier and Whelan (2004) proceed to identify the need for a more effective approach to planning, and to that we can add that all the insights from all the papers and the plenary comments offer an even wider scope for change. This need to broaden our views and come up with new ideas begins with the foreword by Bob Beeton (2004). He felt impelled to add a new dimension as he declared that writing a foreword is “a rare opportunity to be slightly outrageous and perhaps provocative without the normal discipline of modern publication.” He was provoked by the title of the forum, which he says, invites such an approach. His foreword draws on his experience of chairing the Australian Threatened Species Scientific Committee whose task is to recommend listings and whose decisions are expected to show “Solomonic” judgement. Mark Burgman has yet another source of data on which he can exercise his growing expertise as an iconoclast, especially when some judgements are regarded as “Solomonic”. Australia would be a poorer place without the skilled heckler, the critic or the expert. Consequently we are lucky to have such a diversity of minds with the willingness to speak, be criticised and then respond by improved performance. While this is the very essence of education philosophy, it is not necessarily always appreciated by those who feel threatened by threatened species legislation.

The debates in the NSW parliament, such as the Threatened Species Conservation amendment bill, as reported in the NSW Legislative Assembly Hansard of 25 September 2002, reveal this conflict and confusion (Appendix 1). This appendix is included here to display the context in which those concerned with threatened species work. It also shows the difficulty of distinguishing a threatened species, with the Green and Golden Bell Frog *Litoria aurea* gaining a mention in the parliamentary debate on this matter. Herein lies the difficulty of managing the rapid change of status of a species, as shown by the Southern Corroboree Frog *Pseudophryne corroboree* as displayed on the cover of this book. Most germane to this forum in this book is the role of scientific committees, the difficulties of implementation of threatened species legislation in the field, such as in rural and regional NSW, and the contest over the importance of conserving threatened species in relation to economic matters, including the question of “who pays?” To us, the key importance of communication of

ideas surfaces yet again, and the relativeness newness of threatened species legislation demands that the subject has a thorough public hearing. For those who have been living and breathing threatened species legislation for the last decade or so, it may seem that the subject has been perpetually on the political and scientific agenda. However, the documentation of the debate says otherwise. Wilson (1986), representing the then Australian National Parks and Wildlife Service, stated that it is the State and Territory governments which have the first responsibility for endangered species and that the Commonwealth is involved as the national government through its controls over overseas trade and certain land and marine areas. Wilson noted that some have suggested that the Federal Government should have a greater involvement in the protection and management of endangered species, such as along the lines of the American model. Wilson then comments that “such an all encompassing piece of legislation is unlikely to be passed by the federal government in Australia.” It is at this point that the thorough and much-needed paper by Jarman and Brock (2004) becomes so applicable. They have catalogued the sequence of the changes to the legislation in NSW from the 19th century, and it becomes clear that threatened species legislation is both new and only part of a suite of legislation to conserve biodiversity. They consciously avoid the question of effectiveness, but if the State of the Environment reports reflect the state of play, then it can be stated for Australia that “during the 1990s, Australia’s biodiversity has experienced continued degradation and decline” (p 7, Williams *et al.* 2001), and for NSW that the “loss of biodiversity is ongoing” (p 191, EPA 2003). We have, as a society, yet to formulate ways of reversing such losses. Any such approaches will include threatened species legislation, but the case we are putting in this chapter is that this is but one act in the play.

Conflict and confusion engender fear and lack of acceptance. For those keen on conserving biodiversity, the need to communicate the science of the subject, and its consequences, has been amply demonstrated by the strong language in the debate as reported in Hansard (Appendix 1). Such debates provoked the Council of the Royal Zoological Society of NSW to run its 2003 forum on this theme. We can now hope that the outcome of this forum will assist those in parliament, and those they represent, to see that there is also an active debate in the scientific and legal world on this matter, and that there is an active public and professional interest in the outcomes.

The scope of threatened species legislation

The term ‘threatened species legislation’ implies that acts and by-laws are concerned with species and nothing else and, in some older legislation and current jurisdictions, this is certainly true. In New South Wales, for example, the now-superseded *Endangered Fauna (Interim Protection) Act 1991* allowed for the listing and protection only of terrestrial vertebrates, while in Tasmania the *Threatened Species Protection Act 1995* allows for the listing only of

recognised species and sub-species. The emphasis on species is not surprising. The conservation efforts of the World Conservation Union are based on identifying and listing species at risk of global extinction (IUCN 2003), and powerful arguments can be made that species are the fundamental ‘units’ of conservation because they are intuitively obvious and easy to manage (Caughley and Gunn 1996). In addition, news stories about iconic but declining species such as the Koala *Phascolarctos cinereus*, Greater Bilby *Macrotis lagotis* or Green and Golden Bell frog *Litoria aurea* help to keep conservation issues before the public, and maintain support for sometimes costly programs of population restoration.

On its own, however, a focus on threatened species is not enough to achieve the broader goal of biodiversity conservation. In her contribution, Hutchings (2004) points out that invertebrates are overwhelmingly dominant and crucially important in the functioning of both aquatic and terrestrial systems, but our incomplete knowledge of most species means that few are likely to find their way onto threatened species lists. Clearly, the legislative process will be inefficient if it focuses on invertebrates at the species level; this will be true also for many poorly-known and cryptic species of fungi, non-vascular plants and microbes, as well as for hybrids and other life forms that are difficult to categorise. One way out of this dilemma is to conserve communities of invertebrates or their habitats, or to tackle the processes that threaten them. Despite the problems of species-level conservation for invertebrates, Hutchings (2004) argues the case that small numbers of conspicuous, charismatic species should be listed and targeted for conservation because they can raise community awareness. Such species might include the Bathurst copper butterfly *Paralucia spinifera* (Dexter and Kitching 1991), Cumberland Plain land snail *Meridolum comeovirens* (Clark 2004) and Richmond birdwing butterfly *Ornithoptera richmondia* (Sands *et al.* 1997); at present the two former species are listed on the *NSW Threatened Species Conservation Act 1995*, but the spectacular *O. richmondia* remains unlisted.

Although we can extend legislation to incorporate invertebrates and other poorly-known taxa, there is another group of species that will not be covered under any threatened species paradigm. These are the common, widespread and ostensibly non-threatened species. Should common species warrant conservation attention? Lunney *et al.* (2004) comment that reliable identification of threatened species is often fraught with difficulty, and use the species of vertebrates *not* listed in the schedules of the *NSW TSC Act 1995* – the neglected 74% - to make their case. Apart from uncertainties in distinguishing some species as threatened or not, Lunney *et al.* (2004) note that non-listed species are of little interest to planners, managers and others involved in land use decisions because there is no legal imperative to do so; consequently there is little incentive to work on them. With declining research effort on non-threatened species, and so little monitoring on any species, we then have little capacity to recognise when formerly-common species are in trouble or threatened species have recovered. There may be a

case for distinguishing species that are close to being threatened, as is done by the World Conservation Union (IUCN 2001), or adding the IUCN category of 'data deficient' (Whelan *et al.* 2004), but there is little sense in making lists of threatened species all-inclusive. Lunney *et al.* (2004) propose broadening the conservation agenda by constructing a database that allows dynamic tracking of all species, so that assessments of status can be made effectively and swiftly as new knowledge is obtained.

In recent years some of the deficiencies of maintaining a strict focus on threatened species have been recognised, and legislation has been broadened to allow listing and protection of other entities (Adam 2004). In New South Wales, for example, the *Threatened Species Conservation Act 1995 (TSC Act)* took the innovative step of providing for the listing of endangered populations and endangered ecological communities, as well as threatened species; the importance of key threatening processes was also recognised (Auld and Tozer 2004; Baker 2004; Leys 2004). Also, for the first time, it became possible to list taxa other than the familiar vertebrates and vascular plants. As a consequence, six species of fungi, 10 insects, four other species of invertebrates and communities of lichens and fungi have taken their place in the schedules of the *TSC Act 1995*. Similarly broad legislation, the *Fisheries Management Act 1994*, covers marine and many freshwater taxa, as well as endangered communities and key threatening processes. Jarman and Brock (2004) provide a fascinating account of the changing scientific, social and economic conditions that have driven conservation legislation in New South Wales, and note how current laws have increased in complexity and moved to incorporate broad conservation objectives. Not only this, conservation legislation is integrated across local, State and Commonwealth levels of government, and international agreements such as RAMSAR have been developed to recognise that conservation initiatives do not stop at national borders. However, the links and obligations across State, Commonwealth and international boundaries are far from even (Tsamenyi *et al.* 2003).

Threatened species legislation in some jurisdictions has moved much beyond its historically narrow focus on identifying and protecting just the most obvious species. The ability to list populations, ecological communities and threatening processes is a sign of greater sophistication in our thinking about conservation, and also reflects the increasing effectiveness of conservation scientists in making their case to both the media and politicians (Thomas and Salwasser 1989; Burgess 2001). But, is this enough? We are not aware of any legislation that yet addresses the specific needs of metapopulations, hybrids, common but declining species, or the longer term effects of disruption on ecological processes such as dispersal, fire, disturbance, pollination, facilitation or mutualism. Calls to incorporate such concepts into legislation have been made before (*e.g.* Rohlf 1991), but they remain unheeded and serve as challenges for the future. We now turn to the equally important issues of how lists of threatened species and other entities are compiled, and what happens when a listing is made.

The listing process

In most jurisdictions, the listing of a species as threatened will confer recognition of status and trigger some kind of planning process that is intended to manage and oversee the species' recovery. It is important to get this step right to maintain both the species itself and credibility in the process. At several levels, procedures for listing are remarkably similar. At the international level, for example, the World Conservation Union's red lists of threatened species are maintained by Species Specialist Groups operating under the Species Survival Commission. The specialist groups may be concerned with monitoring the status of particular species, such as the Malayan tapir *Tapirus indicus*, or with large groups of species, such as the Australasian Monotreme and Marsupial Specialist Group or the Mollusc Specialist Group. These groups meet with different frequencies and have memberships of between two and over 100 people, but all comprise specialist researchers who know their taxa from first hand experience, and all make recommendations based on adherence to criteria specified by the World Conservation Union. Many specialist groups also take advice from external sources and consider public submissions, thus ensuring that all readily available information is used to decide the status of particular species. In Australia, the Commonwealth and all States and Territories have scientific committees or panels that evaluate species' status within their political boundaries, and all are able (or required) to consider nominations from any person or organisation. The committees either make recommendations for listing to the relevant minister or, in the case of the NSW Scientific Committee, have the final say in what gets listed and what does not. Thus at all levels, there is opportunity for both specialist expertise and broader public input into the listing process. Does this mean that we can have full confidence in the integrity of lists of threatened species and other entities?

In his paper, Adam (2004) points out that some of the first problems besetting the listing process are how to define the entities that can be listed and how to interpret the criteria that would place them on the schedules of the relevant legislation. Using the *TSC Act 1995*, Adam shows that even such familiar terms and concepts as 'indigenous', 'species', 'populations' and 'ecological communities' can mean different things to biologists, lawyers and others. He notes that this places an obligation on the Scientific Committee to make its determinations as clear and unambiguous as possible, although the certainty sought by critics is not realistic and hence unlikely to be attained.

Assuming that issues of definition can be overcome, further obstacles to creating a reliable list of threatened taxa can arise from logistical constraints and a lack of knowledge. In compiling the schedules of threatened vertebrates for the *Endangered Fauna (Interim Protection) Act 1991*, Lunney *et al.* (2004) describe how just one month was allocated for the review of all vertebrates in New South Wales and the identification of species that should be listed. One month! Although there was a longer period of public review after the production of the initial list, the logistical constraints facing the three-person Scientific Committee charged with

compiling the list were formidable; the approach taken to deal with this problem has been outlined by Lunney *et al.* (2000, 2004). We do not know the timeframes allowed for the production of similar lists under other pieces of legislation, as this is seldom spelled out. However, if legislators believe that reliable syntheses of large and diverse biotas can be achieved in a matter of just days or weeks, there is a clear disconnect between optimism and reality. When lists of threatened taxa and other entities have been compiled, there is a requirement under some current legislation, such as the *TSC Act 1995* and *Fisheries Management Act 1994*, to review the lists at regular intervals. This is a reasonable requirement, and should help ensure that lists are based on the most up-to-date knowledge from new research and surveys as these are carried out. However, it can also be a logistical impediment. For example, section 17 of the *TSC Act 1995* required that the Scientific Committee keep lists in the schedules under review, and at least bi-annually, to determine whether any changes were necessary. There is a small likelihood that new knowledge would accumulate every six months on all the entities listed in the schedules, and carrying out continuous reviews would be a poor use of time. Dickman (2004) outlines the procedures adopted by the Scientific Committee to meet this statutory requirement, particularly the engagement of consultants to review 'problematic' groups of species, or communities, to provide advice on their status.

Even when time and other resources are available to compile and maintain lists of threatened species, we must often grapple with the further problem that knowledge of many taxa is limited. In a short but provocative essay, Diamond (1987) proposed that lists of threatened species are misleading because they make us think that even the most poorly-known taxa on the lists remain extant. However, due to the difficulty of searching all possible habitats, especially for small or cryptic species, it is usually difficult to prove that extinction has occurred, and so species often stay listed as threatened due to inertia. Would it not be more reasonable to assume such species to be extinct until proven extant? The blue-grey mouse *Pseudomys glaucus* provides a good example. This species is listed as endangered (*TSC Act 1995*) or critically endangered (IUCN 2003), but as the last individual was seen in 1956 in an area that has since been extensively disturbed (Dickman 1993), a more realistic assessment would be that it is extinct. In the absence of specific knowledge, but armed with the general understanding that habitats are at risk of disruption everywhere, perhaps the onus of proof should shift to confirming that highly threatened species are still hanging on.

Whelan *et al.* (2004) extend this line of thinking, arguing that our incomplete knowledge of the ecology of many threatened species should in itself act as a trigger for application of the precautionary principle. Thus, if a species is little known, why assume that it is secure and leave it off a list of threatened taxa? Species are likely to be poorly-known precisely because they are sparse or occupy small geographical ranges; if listing triggers subsequent ecological research, we will then gain the information needed to make an informed decision about the species' status. Likewise, in assessments of the impact of development, such as the

eight-part-test specified in the *NSW Environmental Planning and Assessment Act 1979*, why assume that a development will have no significant effect just because a species is too poorly-known to be sure what the impact will be? It is arguably better to adopt the precautionary approach that there might be a significant impact, despite any proposed mitigation or remediation works, and evaluate the proposal for development as thoroughly as possible before any habitat is modified. As Auld and Tozer (2004) emphasise in their contribution, fragmentation and attrition of remnant habitats undermine the long-term viability of ecological communities and their constituent species, so any proposal for new development must be taken seriously. And, as the impacts of any development are virtually never monitored after proposals have been approved and the development begun, there must be much more onus on evaluating the impacts effectively in the first place. Whelan *et al.* (2004) note that developments will often go ahead even if significant impacts are predicted, because socio-economic and other imperatives are part of the decision-making process. However, if the precautionary principle is used more extensively to identify species that will be affected by developments, these authors argue cogently that decision-makers will be forced, for the first time, to be honest about the impacts they are authorising.

The issue of limited knowledge in the listing process is explored further by Burgman (2004), who questions the uses and limitations of expert judgement in arriving at listing decisions. A worked example of one way the problem has been tackled is in the paper by Lunney *et al.* (2004). That work documents the range in expert opinion that was received when threatened vertebrates were being identified for listing in the schedules of the *NSW Endangered Fauna (Interim Protection) Act 1991*, and shows that variance in expert opinion about species' status is related inversely to how much we know about those species. In listing 26% of the vertebrate fauna of New South Wales as threatened, the Scientific Committee established under the *Endangered Fauna (Interim Protection) Act 1991* steered a middle course between conservatism (just 14% of the State's vertebrates would have been listed if all experts consulted had agreed) and speculation (40% would have been listed if just one expert voted for listing), using its own expertise to adjudicate the responses of other experts. The present Scientific Committee, established under the *NSW Threatened Species Conservation Act 1995*, also relies on advice from external experts, and uses a process of extensive information-gathering, debate and review to arrive at its decisions on listing (Dickman 2004).

The consequences of listing

What happens when a species, population or ecological community is listed as threatened, or a key threatening process is recognised? If there is no statutory recognition of the listing, not much happens at all. For example, the *Red Lists* produced by the World Conservation Union (IUCN 1996, 2003) represent the most comprehensive and quantitatively-assessed data bases of threatened species that are available (Lamoreux *et al.* 2003), but many national governments pay little more than lip service to them. There is no international law that dictates otherwise. However,

when there is statutory recognition of threatened species or threatening processes, usually at national, state or local levels, different requirements for administration, research and management come into play. Here, we consider these requirements and how effectively they work.

In all Australian States and Territories, as well as the Commonwealth, the listing of a species as threatened triggers the need to produce a recovery plan. The timeframes specified for writing recovery plans differ between jurisdictions, and plans vary greatly in the emphasis they place on biological review, research, monitoring and active management (Dickman 1996). In New South Wales, for example, the recovery plan for Coxen's Fig-parrot *Cyclopsitta diophthalma coxeni* calls for an extensive program of captive breeding, field survey, raising of community awareness and habitat assessment and restoration, whereas that for the Painted Burrowing Frog *Neobatrachus pictus* recommends only surveys for extant populations and engaging the community (NPWS 2000, 2002). Although all recovery plans specify biodiversity conservation as their ultimate goal, it is not surprising that they recommend different tactics to achieve it. Species with historically small but stable populations may be threatened by random events or human incursions into their habitats and need only to be monitored, whereas declining species must usually be actively managed to reverse the downward trend in their populations (Caughley 1994). There are also many different methods in the 'ecological toolbox' (Norris 2004), and their effectiveness in achieving species recovery depends on the nature of the threats faced by particular species as well as on the philosophy of the recovery planners (Carroll *et al.* 1996; Green 2002; Norris 2004). Sometimes several taxonomically or geographically related species may be grouped together for management; threat abatement plans written to reduce the impacts of key threatening processes will potentially also assist suites of threatened and non-threatened taxa.

Analyses of the effectiveness of recovery and threat abatement planning are scarce. However, there are general concerns that plans take too long to be written and approved (Tear *et al.* 1995), that cute and glamorous species get both the earliest attention and most resources (Restani and Marzluff 2002), and that recovery planning is not always cost effective. With respect to cost, perusal of recently approved and draft recovery plans in New South Wales suggests that the combined funding needed to achieve broadscale species recovery is in the order of several million dollars each year; for threatened Australian birds alone, almost \$28 million was dedicated to recovery between 1993 and 2000 (Garnett *et al.* 2003a). With respect to the effectiveness of recovery plans in achieving their objectives, Silver (2003) commented that only 30 of 1262 species listed as threatened on the US Endangered Species Act had been removed from the list since 1973; of these, seven species were removed because they became extinct. A selective review by Reeves (1999) suggested that no Australian-based projects had successfully brought species back from the brink, but intensive management has in fact been successful for several threatened species of vertebrates (Kinnear *et al.* 2002; Garnett *et al.* 2003b), invertebrates (New 1997; Sands 1999) and plants (Johnston and Dollary 1998). Although

no comprehensive analyses have been undertaken to evaluate the current effectiveness of recovery planning in Australia, case studies and perspectives provided by forum participants suggest that both cautious optimism, and more work, are needed.

Perspectives from case studies

In New South Wales, the *Threatened Species Conservation Act 1995* is a major legislative instrument for the conservation of terrestrial biota, and primary responsibility for its administration lies with the Department of Environment and Conservation. The *Fisheries Management Act 1994* mandates the conservation of the State's aquatic biota, and its administration lies with NSW Fisheries.

Papers by Baker (2004) and Shields (2004) make the case that recognising and listing threatened taxa are fundamentally different processes from those needed to prevent extinction and promote recovery. Both are concerned that we fail collectively to clearly articulate this difference, and question whether the bottom-line objective – conservation of biodiversity – is being achieved. Baker (2004) applauds the provision in the TSC Act that allows the listing of endangered populations, but laments our inability to monitor or manage, in any way, the majority of the endangered populations that have been listed so far. Shields (2004) elaborates on this issue, and describes a series of steps to ensure effective species recovery and threat abatement. These include articulating a clear vision to guide environmental legislation, defining key actions for success and, crucially, ensuring that they are implemented. Shields also emphasises the importance of gaining community support for environmental legislation, the need for improved resourcing, less bureaucracy, and the need to adopt conservation outcomes that are measurable. His challenging conclusion is that conservation of biodiversity cannot be achieved in piecemeal fashion by making ever-expanding lists of threatened taxa, but rather by managing overall threats so that such lists are of secondary importance in conservation planning.

Case studies of the management of listed entities are provided by Murphy and Nally (2004), Talbot *et al.* (2004) and Auld and Tozer (2004). For example, for those keen on conserving invertebrates hope that their contribution will assist in making the point that landscape planning is not guaranteed to conserve threatened species. However, the striking feature of these studies is that they demonstrate that threatened species legislation can be intelligently applied to difficult problems with good local outcomes. The case studies demonstrate the level of skill needed, the time taken and the resources that will be necessary to achieve worthwhile results. More importantly, these case studies show that the scale of the total problem is large if we are to go down the route of recovery planning for an ever-increasing list of entities. Finally, the case studies, covering such diverse entities as sharks, snails and butterflies, and endangered ecological communities from a botanical perspective, give a far greater insight into the complexity of this subject of conservation biology than just the particular studies reported. Being able to draw on such skilled studies is a great asset in this broader debate.

Community perspectives

Several contributors to the forum highlighted the importance of community involvement and ownership in conserving biodiversity, both in their remarks on the day itself (see plenary discussion) and in the written papers presented here. This issue has also been recognised at previous forums of the Royal Zoological Society (Bennett *et al.* 1995; Dickman and Lunney 2001; Eby and Lunney 2002; Lunney and Dickman 2002; Lunney *et al.* 2002). In her contribution, Lambert (2004) re-emphasises the role of the community and commends the potential value of State and Commonwealth legislation in allowing people to get involved in a hands-on way in the conservation of threatened species and their habitats. However, she also sounds a sobering note of caution, commenting that individual and community interests in the environment are often subverted in the courts or by ministerial discretion to favour yet more development. At North Head, home to endangered populations of Long-Nosed Bandicoots *Perameles nasuta* and Little Penguins *Eudyptula minor* as well as remnants of the endangered Eastern Suburbs *Banksia* scrub community, such decisions have already eroded habitat and may increase traffic flows, putting the bandicoot population, at least, at increased risk (Banks 2004). If local communities become disillusioned, local governments will also face increasingly uphill battles to carry out their statutory obligations under State and Commonwealth legislation, and biodiversity conservation will suffer. To counter these trends and offset the bullying tactics of the pro-development lobby using the existing legislation, Lambert (2004) urges stronger collaborations between concerned scientists, local people and local government.

Consultant perspectives

Although local communities, councils, government agencies, scientists, lawyers and others may all deal with threatened species legislation on a regular basis, ecological consultants are left to hold the pointy end of the stick more than most. In New South Wales, consultants are often called to judge whether a proposed development is likely to have a significant impact under the terms of the *Environmental Planning and Assessment Act 1979*, or to carry out the much more detailed requirements of a Species Impact Statement as specified under the *Threatened Species Conservation Act 1995*. Writing as an experienced consultant and President of the Ecological Consultants Association, of New South Wales, Denny (2004) highlights some of the problems encountered in interpreting the legislation and in keeping up to date with the expanding lists of threatened taxa that must be considered. Denny (2004) also echoes the growing concern that threatened species legislation is narrowing the conservation focus, inappropriately, on just a small subset of the overall biota; that is, the species, populations and ecological communities that are listed. Common species, including the 'neglected 74%' of non-threatened vertebrates in New South Wales, simply do not rate in assessments of impact, despite the

fact that many are likely to have ecologically important roles in the natural system or that many could be listed as threatened if we had up-to-date information on their status (Dickman and Steeves 2004; Lunney *et al.* 2004). For Denny (2004), and probably many others concerned with the conservation of biodiversity generally, the limited focus of threatened species legislation is therefore frustrating and unsatisfactory.

Landowner perspectives

The issue of landowner responses was raised in several presentations and also in the plenary discussion at the forum. It has become increasingly clear in recent years that conservation efforts cannot be confined to protected areas such as national parks and reserves because these areas represent just fractions of the entire landscape. Moreover, they contain only a small subset of the overall suite of habitats and land systems, and sometimes represent just the unproductive areas that could not be used for agriculture (Hobbs 1994). Hence, much recent effort has gone into engaging private landowners and into ensuring that the matrix of production and non-production land is managed to the best effect (Bennett *et al.* 1995; Craig *et al.* 2000). Given the importance of private land to the conservation effort, what are the incentives for landowners to protect threatened species and what are the constraints on land development?

Among the incentives are the values placed on biodiversity by people on the land themselves, and their desire to see it maintained. Such incentives are extremely important, but of course, they do not pay the bills. Financial or assistance-based incentives include joint management agreements, voluntary conservation agreements and other kinds of covenants where a landholder sets aside an area of land in return for tax breaks, help with management or some other compensation for lost opportunity. These kinds of compensation are outlined in detail by Farrier and Whelan (2004) and Shields (2004). Such incentive schemes have yet to achieve any kind of profile in Australia, but they are being contemplated increasingly in the United States (Silver 2003).

In contrast to the provision of carrots, sticks are also used to constrain over-development of land. It is illegal to clear native vegetation without a permit in most Australian States, and the listing of species, populations and communities as threatened is also intended to provide legislative protection. But these protective laws are often flouted. In New South Wales, Bartel (2003) notes that few cases of illegal land clearance have been prosecuted since 1998, that monitoring and enforcement are insufficient, and that political will to change this situation is weak due to stakeholder influence. Farrier and Whelan (2004) comment further that command regulation in an environmental context has traditionally been used to direct developments towards approval processes rather than to outlaw them altogether. As approvals are usually *ad hoc* and driven by individual development proposals, habitats, communities and areas generally of high conservation value get whittled away with no consideration of cumulative impacts.

Given the pros and cons of extending the operation of threatened species legislation to private land, what do landowners do when a species, population or ecological community that occurs on their property is listed? Unfortunately, we have little documentation of this in Australia, but a recent study from the United States by Brook *et al.* (2003) is instructive. Following listing of Preble's Meadow Jumping Mouse *Zapus hudsonius preblei* as threatened under the Endangered Species Act, Brook *et al.* (2003) mailed a questionnaire to landowners on whose property the mouse occurred. They found that 56% of respondents would not allow any biological survey of their property, hence precluding collection of data needed for conservation. In terms of hectares owned, 25% of respondents reported managing their land to improve habitat for the mouse, whereas 26% said that their management had sought to harm it. Thus, the listing of Preble's meadow jumping mouse did little to increase its prospects of survival on private land. Brook *et al.* (2003) suggested that mutually better outcomes would be obtained by alleviating the economic concerns of landowners about listings, increasing the use of social networks and collaborative processes to improve communication, and providing institutional assurances that landowner interests would not be harmed by managing their land to conserve threatened species. There are lessons to be learnt for conservation in Australia.

Alternatives / additions to the current legislation

We must now ask what other options might be available for achieving broad conservation goals, and where threatened species legislation fits into the bigger picture. One of the themes to emerge from the forum papers was that listing and saving species (or populations or ecological communities) is very costly if this is done on a one-by-one basis. The costs of species-based recovery programs, when summed, are clearly prohibitive, and this prompted several authors at the forum (e.g. Baker 2004; Hutchings 2004; Lunney *et al.* 2004; Shields 2004; Whelan *et al.* 2004) and elsewhere to question what can be done (Wilcove and Chen 1998; Possingham *et al.* 2002; Williams *et al.* 2001). As this issue has been canvassed broadly in other forums (Beattie and Ehrlich 2001; Archer 2002; Foran and Poldy 2002; Lunney and Dickman 2002; Archer and Beale 2004), we present only some brief and selective comments here.

Priority lists

If there are insufficient funds to recover all listed taxa, one solution is to create a list to rank the priorities for the allocation of resources. At present, there is a tendency for the most endangered species to be awarded most attention and funding for recovery (Garnett *et al.* 2003a), although this *de facto* priority list has been criticised because it sometimes means that money is thrown at lost causes (Possingham *et al.* 2002) or ignores threatening processes (Lunney *et al.* 2003). If species were ranked according to some cost-effectiveness measure, such as rate of population increase or rate of geographical spread per

dollar allocated, we may see some spectacular recoveries of not-so-threatened species and smiles on the faces of conservation economists. However, biological data to inform such a measure would be lacking for many species and, because of their reduced ability to respond quickly, many seriously threatened species would rank poorly and thus be consigned to oblivion.

Other possibilities for ranking might be to identify 'zombie' species, *i.e.* the living dead, or taxa that otherwise appear to be unimportant, and remove these from funding formulae. Zombies are species whose time is almost up, and which persist in ever-diminishing numbers. Some might be identified as taxa that will lose all their habitat in the next few years due to climate change; examples would include high altitude specialists such as the Mountain Pygmy-possum *Burramys parvus*, Leadbeater's Possum *Gymnobelideus leadbeateri* (Lindenmayer *et al.* 1991), or the Bramble Cay Melomys *Melomys rubicola*, whose tiny island home in Torres Strait is eroding inexorably into the sea (Limpus and Watts 1983). Other potential zombie species might include those with very small populations that could vanish during a bad year or due to a fire or other catastrophic event; examples would include the Northern Hairy-nosed Wombat *Lasiorhinus krefftii* and Lord Howe Stick Insect *Dryococelus australis*. Of course, these and many other potential zombie species are well known and iconic. In the absence of certainty about the directions of future climate change, writing them off prematurely would be a brave but foolish act, and one that would also be damaging to the collective psyche of conservation biologists. Further, a converse argument can be mounted that the studies of species near mountain tops are giving the clearest early warning of the impending impact of climate change (e.g. Williams *et al.* 2003; Winter 2004), and that the Leadbeater's possum has been the most important animal in Australia to challenge the orthodoxy of woodchipping and logging as usual, and the effort to conserve it has led to scanning the international literature on conservation biology, identifying its limitations, then beginning to plug the gaps (e.g. Lindenmayer and Franklin 2002).

How about 'unimportant' species? Species are sometimes considered unimportant if they have no obvious role in an ecological community (see Walker 1992, 1995 for discussion on this point), or if they do not engage in diverse interactions with others (Soulé *et al.* 2003). If a species has many close relatives, its loss is arguably of less importance in terms of conserving genetic diversity than that of another species that is the last member of its family or order (Strahan 1986). Strahan's thesis is extraordinary because of its boldness, its deep grasp of the evolutionary place that each species occupies and its challenge to priorities, or more importantly, our inability to either see them or to articulate them. Strahan is now famous for his book on Australian mammals (Strahan 1995) and it is to his view of mammals that he expounds his thesis. 'Importance' may also be assigned by ranking on scales of cuteness, tourist dollar value, use in drug production, medical research and so on. The obvious difficulty with

all such ranking schemes based on importance is that value is in the eye of the beholder, so that agreement across any two or more ranked lists is likely to be low (Dickman *et al.* 2005). In addition, how might we rank such different entities as species, populations and endangered ecological communities? Any system that ranks some species or entities above others is, in a sense, an admission that a component of biodiversity is to be cut adrift from any conservation effort; it is an admission of defeat. Perhaps we should ask not how to slice the conservation budget ever more finely, but ask rather how we can increase the overall allocation.

Beyond species-based conservation: threatening processes

A strong theme to emerge from the forum was that conservation of species, populations and ecological communities could often be achieved most effectively by managing the threats that afflict them. This point was made most cogently by Leys (2004), but echoed by Auld and Tozer (2004), Murphy and Nally (2004) and Talbot *et al.* (2004), among others at the forum. The advantages of effective threat abatement are clear: if a threatening process such as predation by the Red Fox *Vulpes vulpes* can be reduced, many native species will benefit. Threat abatement is often an expensive, on-going and labour-intensive enterprise that sometimes has unexpected consequences (*e.g.* Roemer and Wayne 2003), but there is no doubt that it will continue to be a crucial act in the biodiversity play.

Acknowledgements

We are indebted to many colleagues who have contributed to our ideas over the years, to the participants at this forum for their insights and

Getting conservation onto the agenda

Five years ago, Recher (1999) made the seemingly apocalyptic prediction that up to 50% of Australia's bird species would be come extinct within the next century. This remark is now bordering on a citation classic. However, it is likely to be eclipsed by the more recent view of one of the world's leading conservation biologists, Peter Raven, from the Missouri Botanic Gardens in the United States, who said on Earthbeat on 4 September 2004: "that if we continue with business as usual, up to two-thirds of the species on Earth will be gone within a hundred years" (<http://www.abc.net.au/rn/science/earth/stories/s1191446.htm>). In this context, Liz Denny's view that "everything should be listed, and the game should be to get it off the list" can be seen as both a smart remark and very smart biology. In the context of this prediction of mass extinction, threatened species legislation will be dealing with most species, communities and issues of biological conservation. This seems a most uneconomical way to proceed, and makes little use of the many other acts in the play, including, research, education, reserve selection, community involvement, and most importantly, public debate about the future of Australia's biological heritage. Indeed, we need to lift Cassandra's curse - that dire predictions by conservation biologists for the future, though true, are not believed - and shift conservation biology from a discipline of doom and despair to one of informed inspiration (Redford and Sanjayan 2003), from science to political action (Haber 1992), and to engagement of all the community. This forum was convened and edited in this spirit.

perspectives on threatened species legislation, and to Carol McKechnie for critical comments on drafts of this manuscript.

References

(Note: references that appear in the body of the text with a 2004 date that do not appear below refer to other chapters in this book, and can be found listed in the contents page.)

Archer, M. 2002. Confronting crises in conservation: a talk on the wild side. Pp. 12-52 in *A Zoological Revolution: Using Native Fauna to Assist in its own Survival*, edited by D. Lunney and C. Dickman. Royal Zoological Society of New South Wales, Mosman, and Australian Museum, Sydney, NSW, Australia.

Archer, M. and Beale, B. 2004. *Going Native: Living in the Australian Environment*. Hodder Headline, Sydney.

Banks, P.B. 2004. Population viability analysis in urban wildlife management: modelling management options for Sydney's quarantined bandicoots. Pp. 70-77 in *Urban Wildlife: More than meets the Eye*, edited by D. Lunney and S. Burgin. Royal Zoological Society of New South Wales, Mosman, NSW.

Bartel, R.L. 2003. Compliance and complicity: an assessment of the success of land clearance legislation in New South Wales. *Environmental and Planning Law Journal* 20: 116-141.

Beattie, A. and Ehrlich, P.R. 2001. *Wild Solutions: How Biodiversity is Money in the Bank*. Melbourne University Press, Melbourne.

Bennett, A., Backhouse, G. and Clark, T. (eds). 1995. *People and Nature Conservation: Perspectives on Private Land Use and Endangered Species Recovery*. Royal Zoological Society of New South Wales, Mosman, NSW.

Brook, A., Zint, M. and de Young, R. 2003. Landowners' responses to an Endangered Species Act listing and implications for encouraging conservation. *Conservation Biology* 17: 1638-1649.

Burgess, B.B. 2001. *Fate of the Wild: the Endangered Species Act and the Future of Biodiversity*. University of Georgia Press, Athens, USA.

Carroll, R., Augspurger, C., Dobson, A., Franklin, J., Orians, G., Reid, W., Tracy, R., Wilcove, D. and Wilson, J. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: an assessment by the Ecological Society of America. *Ecological Applications* 6: 1-11.

Caughley, G. 1994. Directions in conservation biology. *Journal of Animal Ecology* 63: 215-244.

Caughley, G. and Gunn, A. 1996. *Conservation Biology in Theory and Practice*. Blackwell Science, Oxford.

- Clark, S.A.** 2004. Native snails in an urban environment – conservation from the ground up. Pp. 78-81 in *Urban Wildlife: More than meets the Eye*, edited by D. Lunney and S. Burgin. Royal Zoological Society of New South Wales, Mosman, NSW.
- Craig, J.L., Mitchell, N. and Saunders, D.A. (eds).** 2000. *Nature Conservation 5: Conservation in Production Environments: Managing the Matrix*. Surrey Beatty & Sons, Chipping Norton, NSW.
- Dexter, E.M. and Kitching, R.L.** 1991. *Nomination for the Register of the National Estate*. Unpublished report, Australian Heritage Commission, Canberra.
- Diamond, J.M.** 1987. Extant unless proven extinct? Or, extinct unless proven extant? *Conservation Biology* 1: 77-79.
- Dickman, C.R.** 1993. The biology and management of native rodents of the arid zone in New South Wales. *NSW National Parks and Wildlife Service Species Management Report No. 12*: 1-149.
- Dickman, C.R.** 1996. Incorporating science into recovery planning for threatened species. Pp. 63-73 in *Back from the Brink: Refining the Threatened Species Recovery Process*, edited by S. Stephens and S. Maxwell. Surrey Beatty & Sons, Chipping Norton, NSW.
- Dickman, C.R. and Lunney, D. (eds)** 2001. *A Symposium on the Dingo*. Royal Zoological Society of New South Wales, Mosman, NSW.
- Dickman, C.R., Pimm, S.L. and Cardillo, M.** In press. Extinction risk, biodiversity loss, and does it matter? In *Hot Topics in Conservation Biology*, edited by D.W. Macdonald. Oxford University Press, Oxford.
- Dickman, C.R. and Steeves, T.E.** 2004. Use of habitat by mammals in eastern Australian forests: are common species important in species management? Pp. 761-73 in *Conservation of Australia's Forest Fauna*, second edition, edited by D. Lunney. Royal Zoological Society of New South Wales, Mosman, NSW.
- Eby, P. and Lunney, D. (eds).** 2002. *Managing the Grey-headed Flying-fox as a Threatened Species in New South Wales*. Royal Zoological Society of New South Wales, Mosman, NSW.
- EPA.** 2003. *New South Wales State of the Environment 2003*. Department of Environment and Conservation, Sydney, NSW.
- Foran, B. and Poldy, F.** 2002. *Future Dilemmas: Options to 2050 for Australia's Population, Technology, Resources and Environment*. Available as a 61-page summary, 'Dilemmas Distilled', or as the full 337-page report (www.cse.csiro.au/futuredilemmas).
- Garnett, S.T., Crowley, G.M. and Balmford, A.** 2003a. The costs and effectiveness of funding the conservation of Australian threatened birds. *BioScience* 53: 658-665.
- Garnett, S.T., Crowley, G.M. and Stattersfield, A.J.** 2003b. Changes in the conservation status of Australian birds resulting from differences in taxonomy, knowledge and the definitions of threat. *Biological Conservation* 113: 269-276.
- Green, R.E.** 2002. Diagnosing causes of population declines and selecting remedial actions. Pp. 139-156 in *Conserving Bird Biodiversity*, edited by K. Norris and D.J. Pain. Cambridge University Press, Cambridge.
- Haber, W.** 1992. On transfer of scientific information into political action; experiences from the German Federal Council of Environmental Advisors. *INTECOL Bulletin* 20: 3-13.
- Hobbs, R.J.** 1994. Effects of landscape fragmentation on ecosystem processes in the Western Australian wheatbelt. *Biological Conservation* 64: 193-201.
- Hutchinson, G.E.** 1965. *The Ecological Theatre and the Evolutionary Play*. Yale University Press, New Haven, Connecticut.
- IUCN.** 1996. 1996 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.
- IUCN.** 2001. *IUCN Red List Categories and Criteria. Version 3.1*. IUCN Species Survival Commission, Gland, Switzerland.
- IUCN.** 2003. 2003 IUCN Red List of Threatened Species. IUCN Species Survival Commission, Gland, Switzerland.
- Johnston, B. and Dollary, C.** 1998. Survey Report – *Grevillea kenedyana*. Unpublished report to NSW National Parks and Wildlife Service, Hurstville, NSW.
- Kinnear, J.E., Sumner, N.R. and Onus, M.L.** 2002. The red fox in Australia – an exotic predator turned biocontrol agent. *Biological Conservation* 108: 335-359.
- Lamoreux, J., Akçakaya, H.R., Bennun, L., Collar, N.J., Boitani, L., Brackett, D., Bräutigam, A., Brooks, T.M., da Fonseca, G.A.B., Mittermeier, R.A., Rylands, A.B., Gärdenfors, U., Hilton-Taylor, C., Mace, G., Stein, B.A. and Stuart, S.** 2003. Value of the IUCN Red List. *Trends in Ecology and Evolution* 18: 214-215.
- Limpus, C.J. and Watts, C.H.S.** 1983. *Melomys rubicola*, an endangered murid rodent endemic to the Great Barrier Reef of Queensland. *Australian Mammalogy* 6: 77-79.
- Lindenmayer, D.B. and Franklin, J. F. (eds).** 2002. *Conserving Forest Biodiversity: a comprehensive, multiscaled approach*. Island Press, Washington, D.C., USA.
- Lindenmayer, D.B., Nix, H.A., McMahon, J.P., Hutchinson, M.F. and Tanton, M.T.** 1991. The conservation of Leadbeater's possum, *Gymnobelideus leadbeateri* (McCoy): a case study of the use of bioclimatic modelling. *Journal of Biogeography* 18: 371-383.
- Lunney, D. and Dickman, C. (eds).** 2002. *A Zoological Revolution: Using Native Fauna to Assist in its own Survival*. Royal Zoological Society of New South Wales, Mosman, and Australian Museum, Sydney, NSW, Australia.
- Lunney, D., Dickman, C. and Burgin, S. (eds).** 2002. *A Clash of Paradigms: Community and Research-based Conservation*. Royal Zoological Society of New South Wales, Mosman, NSW.
- Lunney, D., Matthews, A., Stein, J.A. and Lunney, H.W.M.** 2003. Australian bat research: the limitations of *The Action Plan for Australian Bats* in determining the direction of research. *Pacific Conservation Biology* 8: 255-260.
- New, T.R.** 1997. *Butterfly Conservation*, 2nd edition. Oxford University Press, Oxford.
- Norris, K.** 2004. Managing threatened species: the ecological toolbox, evolutionary theory and declining-population paradigm. *Journal of Applied Ecology* 41: 413-426.
- NPWS.** 2000. Painted Burrowing Frog (*Neobatrachus pictus*) Recovery Plan. NSW National Parks and Wildlife Service, Hurstville, NSW.
- NPWS.** 2002. Recovery Plan for the Coxen's Fig-parrot *Cyclopsitta diophthalma coxeni* (Gould). NSW National Parks and Wildlife Service, Hurstville, NSW.
- Possingham, H.P., Andelman, S.J., Burgman, M.A., Medellin, R.A., Master, L.L. and Keith, D.A.** 2002. Limits to the use of threatened species lists. *Trends in Ecology and Evolution* 17: 503-507.
- Recher, H.F.** 1999. The state of Australia's avifauna: a personal opinion and prediction for the new millennium. *Australian Zoologist* 31: 11-27.
- Redford, K. and Sanjayan, M.A.** 2003. Retiring Cassandra. *Conservation Biology* 17: 1473-1474.
- Reeves, G.W.** 1999. *Midterm Review of the Natural Heritage Trust: Bushcare Program*. CSIRO Centre for International Economics, Canberra.
- Restani, M. and Marzluff, J.M.** 2002. Funding extinction: biological needs and political realities in the allocation of resources to endangered species recovery. *BioScience* 52: 169-177.

- Roemer, G.W. and Wayne, R.K. 2003. Conservation in conflict: the tale of two endangered species. *Conservation Biology* 17: 1251-1260.
- Rohlf, D.J. 1991. Six biological reasons why the Endangered Species Act doesn't work – and what to do about it. *Conservation Biology* 5: 273-282.
- Sands, D.P.A. 1999. Conservation status of Lepidoptera: assessment, threatening processes and recovery actions. Pp. 382-387 in *The Other 99%: the Conservation and Biodiversity of Invertebrates*, edited by W. Ponder and D. Lunney. Royal Zoological Society of New South Wales, Mosman, NSW.
- Sands, D.P.A., Scott, S.E. and Moffatt, R. 1997. The threatened Richmond birdwing butterfly (*Ornithoptera richmondia* (Gray)): a community conservation project. *Memoirs of the Museum of Victoria* 56: 449-453.
- Silver, S. 2003. Attacking the Act. *Frontiers in Ecology and the Environment* 1: 59.
- Soulé, M.E., Estes, J.A., Berger, J. and del Rio, C.M. 2003. Ecological effectiveness: conservation goals for interactive species. *Conservation Biology* 17: 1238-1250.
- Strahan, R. 1986. Why save endangered species and which ones do we save? Pp. 2-17 in *Endangered Species: Social, Scientific, Economic and Legal Aspects in Australia and the South Pacific*, edited by S. Burgin. Total Environment Centre, Sydney.
- Strahan, R. (ed.). 1995. *The Mammals of Australia*. Reed, Chatswood, NSW.
- Tear, T.H., Scott, J.M., Hayward, P.H. and Griffith, B. 1995. Recovery plans and the Endangered Species Act: are criticisms supported by data? *Conservation Biology* 9: 182-195.
- Thomas, J.W. and Salwasser, H. 1989. Bringing conservation biology into a position of influence in natural resource management. *Conservation Biology* 3: 123-127.
- Tsamenyi, M., Rose, G. and Castle, A. 2003. International marine conservation law and its implementation in Australia. Pp. 1-17 in *Conserving Marine Environments. Out of sight, out of mind*, edited by P. Hutchings and D. Lunney. Royal Zoological Society of New South Wales, Mosman, NSW.
- Walker, B.H. 1992. Biological diversity and ecological redundancy. *Conservation Biology* 6: 18-23.
- Walker, B.H. 1995. Conserving biological diversity through ecosystem resilience. *Conservation Biology* 9: 747-752.
- Wilcove, D.S. and Chen, L.Y. 1998. Management costs for endangered species. *Conservation Biology* 12: 1405-1407.
- Williams, J., Read, C., Norton, A., Dovers, S., Burgman, M., Proctor, W. and Anderson, H. 2001. *Biodiversity, Australia State of the Environment Report 2001 (Theme Report)*. CSIRO publishing on behalf of the Department of the Environment and Heritage, Canberra, Australia.
- Williams, S.E., Bolitho, E.E. and Fox, S. 2003. Climatic change in Australian tropical rainforests: an impending environmental catastrophe. *Proceedings of the Royal Society of London B* 270:1887-92.
- Wilson, G. R. 1986. Endangered species – an overview. Pp. 18-25 in *Endangered Species: Social, Scientific, Economic and Legal Aspects in Australia and the South Pacific*, edited by S. Burgin. Total Environment Centre, Sydney.
- Winter, J. W. 2004. Forest mammals of northern Queensland: is their conservation status improving? Pp. 435-451 in *Conservation of Australia's Forest Fauna* (second edition), edited by D. Lunney. Royal Zoological Society of NSW, Mosman, NSW, Australia.

APPENDIX I

Appendix I.

In the Threatened Species Conservation amendment bill, as reported in the NSW Legislative Assembly Hansard of 25 September 2002 (<http://www.parliament.nsw.gov.au/prod/parlament/hansart.nsf/IV3Key/LA20020925074>), the following extracts show some of the community divisions and strength of feeling on the matter.

“Mr Slack-Smith: In the United States of America if a species is important to the community and to the environment, the community contributes towards the preservation of that species. That is not happening in New South Wales. Two per cent of the population is bearing 98 per cent of the costs. That must be changed. The New South Wales community should be responsible for all endangered species. If the community accepts that responsibility, many species will be taken off the threatened species list. Treasury cannot afford to retain some of the endangered species that have been placed on that list by the Scientific Committee. It all goes back to dollars and cents. If the Scientific Committee wants to retain threatened species on that list the whole New South Wales community should contribute towards the preservation of those species. At the moment 98 per cent of those costs are being borne by land-holders. Let us look seriously at making the entire community the custodians of all threatened species. Primary producers should be paid if they are required to preserve some of these threatened species. Thirty years ago farmers in the United States of America used to shoot, bury and burn any threatened species on their properties and say nothing about it. That is what will happen in New South Wales if this legislation is enacted.”

“Mr Armstrong: (Lachlan) [10.33 p.m.]: I listened with great interest to the contributions of honourable members to debate on this bill. Some good and cogent points were made by a number of honourable members who contributed to this debate. We are debating a complex subject—a subject that the scientific community and the broader community do not fully understand. Everyone can make a positive contribution to an issue that will evolve over the years. What is a threatened species? Can a threatened species be identified? It is a matter of personal opinion, preference and management. I am in favour of preserving genuine and unique threatened species, but we have to determine what constitutes a unique species.”

“Mr Armstrong: ... the superb parrot is a beautiful bird. Signs on Trunk Road 56, which leads to Cowra and Yass, and on Main Road 248, which leads to Young and Crookwell, reflect the fact that Boorowa is the home of the superb parrot. The mayor is proud of that fact, but he is not nearly as proud as the local member, the honourable member for Burrinjuck. Two years ago this Government allocated \$1 million to lay bitumen on the road from Young to Boorowa—a welcome amount of money to complete a road that is used by school buses almost every day. The budget blew out by \$160,000 because it took nine months for a decision to be made about the relocation of 10 nests of the superb parrot. The Roads and Traffic Authority, the National Parks and Wildlife Service, and the local council were involved in the relocation of the superb parrots.”

“Mr Whelan: Do you think they should have been killed?”

“Mr Armstrong: No, they should have been relocated. I am simply saying that we have to work out a methodology before we start to lay down the law. I am very much in favour of such legislation, but we need to get our priorities right. We need to work out the mechanics before we inflict this sort of legislation on local government, farmers, State Government instrumentalities and the broader community. Who paid for the relocation of the parrots? The people of Young. The funding shortfall to complete the road had to come out of ratepayers’ funds because the Government did not advise properly. There is an inequity in the management of the process. This legislation does not provide for the proper process, and therefore the end objective cannot be achieved. We are starting the proposition in the middle of the management exercise.”

“Mr Oakeshott: (Port Macquarie) [10.48 p.m.]: In the recent past the farming community on the mid North Coast and in the electorate of Port Macquarie has been hit by a whole range of regulations. In addition to the threatened species legislation, there has been an obvious and public debate about the native vegetation plans of management and the acid sulfate soil plans of management that are currently the subject of consultation.” “New South Wales farmers in general are at the crossroads.” “Sadly, the research of some Independents has shown that even Liberal Party and National Party members should hang their heads in shame in this regard.”

“Mr Fraser: You should talk about shame; you walked away from the National Party.”

“Mr Oakeshott: And with very good reason. You guys are selling your constituents down the drain, and this debate is a very good example of that.”

“The Chairman: Order! If the honourable member for Coffs Harbour does not cease interjecting, I will call him to order.”

“Mr D. L. Page (Ballina) [10.58 p.m.]: Since I have been challenged by the honourable member for Port Macquarie in relation to native vegetation management, I would like to clarify the position. As I said when the native vegetation legislation went through Parliament and again more recently in a matter of public importance, we support responsible management of native vegetation. If the honourable member for Port Macquarie had any brains he would too.”

“Mr Debus: (Blue Mountains—Attorney General, Minister for the Environment, Minister for Emergency Services, and Minister Assisting the Premier on the Arts) [11.08 p.m.]: Australia is home to more than one million species of fauna and flora, many of them found nowhere else in the world. Changes to the landscape and loss of native habitat resulting from human activity have put many of these unique species at risk. Over the past 200 years many species have become extinct—they are gone for ever. For other species of plants and animals whose very survival is threatened, a range of management and conservation measures are in place.

The New South Wales Government’s mechanism for conservation of threatened species is the Threatened Species Conservation Act—landmark legislation that was passed seven years ago, in 1995. However, one would hardly guess that from the contributions of members opposite tonight. The threatened species conservation legislation was passed seven years ago. The Act aims to secure the recovery of plant and animal species that are in imminent danger of becoming extinct. It integrates species impact assessment into the concurrence provisions of the Environmental Planning and Assessment Act. That means that almost all actions that are likely to have a significant effect on threatened species do not require separate licences under the Act. That is worth reiterating.

The amendments contained in this bill will enhance the biodiversity conservation objectives of the Threatened Species Conservation Act and they will, indeed, safeguard the independence of the Scientific Committee. I point out that this bill responds to the recommendations of the joint parliamentary committee and to the enactment of the new Commonwealth threatened species legislation. That is, it responds to the unanimous recommendations of the joint select committee which considered legislation that was passed in 1995, and the Opposition is now lining up to pretend that something entirely new is happening. In fact, the present bill amounts to finetuning of a bill that has been in place since 1995. In no respect does it make life more difficult for farmers.”

“Almost every concurrence request is approved but, importantly, only after the proponent has modified the development to ensure that threatened species are, wherever possible, protected. That is to say, this bill ensures that ecologically sustainable development is carried out. The Government cannot support the establishment and function of a social and economic committee as has been proposed by the Opposition. The amendments moved by the Opposition would subject a factual decision as to whether a species is threatened with extinction, and therefore listed or not listed under the Act, to political considerations, and that is not appropriate.”

“**Mr Fraser:** But compensation is what is wanted. You said you would pay compensation.”

“**Mr Debus:** ... it is simply a contradiction to suggest that a Scientific Committee cannot make a decision on a scientific basis and that instead it has to take into account political considerations.”

“The Government will support the establishment of a social and economic committee on the understanding that that committee will be established through administrative processes rather than by statutory means.” “In carrying out that role it is not intended that the committee should compromise the independence of the Scientific Committee in its scientific assessment of the conservation status of a species, a population or an ecological community, or its deliberations regarding threatening processes.”

“**Mr Stoner:** This is madness. You have sold out rural and regional New South Wales.”

“**Mr Debus:** I must say the Opposition is more than usually confused tonight.”

“**Mr Debus:** For those who have ears to hear, I have demonstrated that the Government is serious about taking into account the social and economic effects of its threatened species legislation.”

“**Mr Fraser:** (Coffs Harbour) [11.27 p.m.]: “The Minister went on about science and about nobody understanding science. In the endangered species listing in this bill is a frog whose common name is the green and golden bell frog. If the Minister goes to the Parliamentary Library and gets the Australian book of frogs, produced by the Australian Museum—which has members on the Scientific Committee—he will see [sic] that in that book the Australian Museum has listed the frog as being abundant up and down the east coast. Under this legislation it is listed as an endangered or threatened species.

I ask the Minister, “Why not have checks and balances?” Emotion, as well as science, is involved in these issues.”

“**Mr Debus:** (Blue Mountains—Attorney General, Minister for the Environment, Minister for Emergency Services, and Minister Assisting the Premier on the Arts) [11.32 p.m.]: I move: That the report be now adopted.

The House divided. Ayes, 46, Noes, 31.