

# A dangerous idea in action: the hegemony of endangered species legislation and how it hinders biodiversity conservation

Daniel Lunney

Office of Environment and Heritage NSW, Hurstville NSW 2220; School of Life and Environmental Sciences, the Faculty of Science, University of Sydney, NSW 2006; and School of Veterinary and Life Sciences, Murdoch University, Perth, WA 6150.

## ABSTRACT

The task I am promoting in this paper is to expand the conservation and management focus from just threatened vertebrate species to include all non-threatened vertebrates. I reason that it is easily possible to do so because it lies within our long-standing legal and public interest in our native birds and mammals, and more recently, reptiles and frogs. The shortfall in achieving the aspiration to conserve biodiversity is evident by examining both the Commonwealth and NSW governments' official State of the Environment reports. The rise of threatened species in the conservation agenda, called 'endangered species' in NSW until 1995, is examined from the time the legal interpretation of endangered species became important in 1991 with a decision by Justice Paul Stein of the NSW Land and Environment Court. Endangered species had captured both the legal and popular imagination, leading to the passage of the *Endangered Fauna (Interim Protection) Act 1991* (NSW). In 1992, 26% of the birds, mammals, frogs and reptiles of NSW became listed as endangered species. The non-threatened species became the neglected 74% of the vertebrate fauna of NSW. In short, this emphasis hinders the conservation of biodiversity in its broadest sense. I argue here that expanding beyond threatened species recovery to studying, managing and conserving all of our native vertebrate fauna is a major step forward in achieving our aim of conserving biodiversity.

**Key words:** dangerous ideas, endangered species, extinct species, native fauna, NSW fauna protection laws, threatened species, Chaelundi State Forest, NSW Land and Environment Court, State of the Environment reports.

DOI: <https://doi.org/10.7882/AZ.2017.015>

## The dangerous zoological idea of conserving all the fauna

Richard Dawkins (2006, p305), in his 'Afterword' to Brockman's (2006) engaging book, *What is your dangerous idea?*, considers that dangerous ideas are what have driven humanity onward. Dawkins noted that the book presents 108 intellectuals, commented on their ideas, then asked what was conspicuously under-represented in the book. He raised two points for discussion, eugenics, and the assumption of human moral uniqueness. Being a zoologist, he concluded that one way to dramatise the importance of such questions is to invoke the fact of evolution, that is, we are connected to all other living beings continuously and gradually, via the ancestors we share with them. Dawkins asks: what should our moral and political response be if relict populations of all the evolutionary intermediates of humans and chimpanzees were found, or if their genomes were used to engineer a chain of mating intermediates, thereby linking humans to chimpanzees via a living cline of fertile interbreeding?

The dangerous idea that I venture here is not nearly so fantastical, but surely as morally complex. In fact, to pursue the option to conserve all existing species should not be a dangerous idea. The idea puts conservation

of our fauna, and the habitats and natural areas where they thrive, at least on equal footing in any negotiations for the use of land and water for human development - that is what makes it dangerous. Dawkins (p205) writes that yesterday's dangerous idea is today's orthodoxy and tomorrow's cliché. To some considerable extent I have witnessed, and I am bold enough to claim to have contributed to, the change towards conservation of our natural areas and our fauna. From seeing the changes during my working life in NSW, since I first graduated in 1969, I am encouraged that we can conserve what remains of our natural legacy, but we have a long way to go to achieve that goal. We need to see that our happiness depends, in part, on conserving our natural world (Lunney (2017)). Without that, conserving biodiversity will remain a radical idea.

## My approach to the dangerous idea of conserving all our fauna

We can see how radical this idea is through an examination of the State of the Environment reports. These official reports from both the Commonwealth

and State governments, along with their commentary from experts in NSW fauna, reveal how little the idea of 'biodiversity conservation' is understood and therefore how far we are from achieving it. The rise of threatened species in the conservation agenda, called 'endangered species' in NSW until 1995, became far more important in 1991 with the decision by Justice Paul Stein of the NSW Land and Environment Court in *Corkill v Forestry Commission of New South Wales*<sup>1</sup>, called the Chaelundi case as it referred to Chaelundi State Forest. This gave endangered species a new and powerful status through the *Endangered Fauna (Interim Protection) Act 1991* (NSW), which followed closely after Stein's decision. Subsequent legal reviews recognised the importance of this decision by Justice Stein, and it fell to the NSW National Parks and Wildlife Service to implement the new Act in January 1992. The first object of the *Endangered Fauna (Interim Protection) Act 1991* was to "provide urgently an objective scientific evaluation of the conservation status of fauna in New South Wales". While 233 species were listed as endangered, 650 species were not listed, and potentially would be neglected. The task I have set myself here is to argue for expanding our willingness to conserve and manage all vertebrate species, not just those that have slipped so far as to be listed as threatened. This may appear to be a modest goal against the overwhelming need to conserve all of our biodiversity and its ecosystem services but, so far, it has proved to be beyond our collective willingness to do this. Conserving all vertebrate species covered by the *National Parks and Wildlife Act 1974* (NSW) (mammals, birds, reptiles and frogs) greatly enlarges our focus on what threats exist, how to tackle them, and provides a visible measure of success on managing our natural heritage. I focus on NSW because I am more familiar with the fauna as well as with the legal and policy backgrounds. The scientific ideas, however, extend to all of Australia.

### Scientists reflect on the application of the term 'biodiversity' to conservation

While conserving biodiversity has become a widely accepted idea in the last two decades, as not merely alluring but essential, for many people the scope and boundaries of the subject are somewhat hazy. This is not surprising given that one of the world leaders in the subject, Edward O. Wilson (1997, p1), stated in the introduction to *Biodiversity II* (Reaka-Kudla *et al.* 1997) that the word 10 years ago did not exist<sup>2</sup>. If in 1997 it

was a term that was then only 10 years old, it was only 26 years old at the time of the forum by the Royal Zoological Society of NSW on dangerous ideas. From my experience in over four decades in the NSW government department responsible for conserving fauna, threatened species and National Parks, 26 years is not enough time for the scope and importance of the concept to sink in, either to the broader public or to decision-makers and policy writers. Wilson (1997, p1) states that "biodiversity is defined as all hereditarily based variation at all levels of organisation, from genes within a single local population or species, to the species composing all or part of a local community, and finally to the communities themselves that compose the living parts of the multifarious ecosystems of the world." Wilson adds that the "key to the effective analysis of biodiversity is the precise definition of each level of organisation when it is being addressed." The issue of what is biodiversity was now alive to biologists in the mid-1990s and was being actively discussed. However, to suggest that it was then a household word is a stretch. When Recher *et al.* (1979, 1986) edited a textbook on ecology in Australia, we did so based on our experience that the concepts of ecology were new and too poorly known to be the foundation for government and non-government decisions on how to manage the land, the water and everything they contained.

In *Australia: State of the Environment 1996* (Commonwealth of Australia 1996), Ian Lowe, chair of the State of the Environment Advisory Council, stated in his opening letter to the Minister to the Environment that it "is with pleasure that I present the first ever independent and comprehensive report of the state of Australia's environment." 1996 is late in the day for conserving our natural heritage. 'Biodiversity', in the Report's chapter on *Biodiversity*, is defined as "the variety of all life forms – the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part." What the minister and the federal parliament in 1996 made of this definition is not recorded, but one can only guess that it looked academic, rather than a guide for how to manage the environment.

In the same period, a lively and provocative paper by Hochuli (1998, p15) opens with the statement that the "concept of 'biodiversity' is fast becoming an unoriginal, mythical and philosophical construct with little relevance to biology as it is practised." This statement is, of course, intellectually provocative, but for making a decision as to whether to restrain a particular development or permit the extraction of a resource, it does need clarification. Hochuli (p20) is helpfully straight-talking in his conclusion: "The prominence of biodiversity as the major target of most conservation strategies has identified a major failing with historical approaches to conservation. It is scientifically misleading to neglect certain taxa, particularly the invertebrates. Further, if biodiversity is

creation of man-made diversity – in the hope that the prevailing trend towards uniformity can be arrested...'

<sup>1</sup> Land and Environment Court of New South Wales. 1991. *Corkill V Forestry Commission of New South Wales* [No 2]. Stein J. 20-23, 26-30 August, 2-4, 25 September 1991. (1991) 73 LGRA 126-163.

<sup>2</sup> The measure of diversity for working biologists has a longer history, but what matters here is the meaning in a conservation context, and it too has a longer history. The zoologist Raymond Dasmann (1970) explored this idea in 'A different kind of country'. The opening line of his foreword, written in 1967 to the first edition, states that, 'This book is a plea for diversity – for the preservation of natural diversity and the

## The hegemony of endangered species

to be a meaningful concept, then it has to be measured. The basic unit for measuring it is the species. Clear and measurable goals for conservation management are key to a successful conservation strategy (Caughley and Gunn 1996). Most species are invertebrates, so goals have to be set in respect to them." The Royal Zoological Society of NSW agreed and took up that theme in a book entitled, *The Other 99%: The biology and conservation of invertebrates* (Ponder and Lunney 1999). Beattie (2013, p17) extends this theme by declaring that if conservation science ignores the fact that the majority of species are either invertebrate or microbial, then it is bad science. It follows, says Beattie, that conservation policies that ignore this majority are bad policies. The enormous scope and complexity of conserving biodiversity, just on the zoological side of the ledger, is glaring.

When Adam (2013, p83) presented his views as a 'grumpy scientist' in a forum of the Royal Zoological Society of NSW (Lunney *et al.* 2013a), he had already expressed his concern (Adam 1998) that the concept of biodiversity was being lost, and that legislation was tending to promote a narrow view that conservation of biodiversity could be reduced to a list of threatened species and communities. Almost every biologist concurs, and we pressed the point (Lunney *et al.* 2013b) in the same grumpy scientists' forum, when we argued for the critical importance of an ecological conscience.

In a clear and systematic style, Adam (1998) explains the historical development of the concept of biodiversity, and points out that conserving biodiversity will require that conservation be practised across the entire landscape (p12). Unfortunately, says Adam (p12), we live in an age when a big picture approach is no longer popular. Adam is blunt at this point. He acknowledges that comprehending the biggest of big pictures is a "profoundly unsettling prospect, requiring changes to most activities of governments and individuals." Adam then makes the critical statement that the restriction of "attention to species offers a way out, whereby commitment to biodiversity conservation can be claimed without radical change to existing practices." In effect, Adam is saying that the emphasis on species as the focus of biodiversity legislation is a major perversion of the concept of biodiversity. We can gauge some aspects of Adam's (1998, 2013) concerns by examining the various official NSW reports on the state of the environment.

My concentration on NSW reflects more than my local interest. It reflects a point of major difference between the States and the Commonwealth with respect to non-threatened species. Under the Commonwealth's *Environment Protection and Biodiversity Conservation Act* (1999) there is considerable concentration on threatened species. Species not on the Commonwealth's schedule of threatened species are not part of the Commonwealth's responsibility, except for such matters as international agreements, exports, through protection of communities or the implementation of threat abatement programs.

Thus, most of the fauna must be conserved and managed by the States, hence the critical importance of NSW State legislation and NSW State of the Environment reports for fauna in NSW.

## State of the Environment NSW

### a) State of the Environment Report 1997

When the 1997 State of the Environment (SoE) report came out, I issued a warning: the message is grim (EPA 1997; Lunney 1998). The report itself stated that it is "clear that human activity in this state has caused significant losses in biodiversity". In relation to endangered species, the report is forthright in stating that the "number of extinct species is the most publicised indicator of biodiversity loss... However, these figures portray only a limited aspect of biodiversity loss<sup>3</sup>. Many species are in decline or severely threatened as they are reduced to small populations isolated in extremely restricted and fragmented areas". This is formal recognition two decades ago that extinct species have captured both the public and political imagination. That other species are reduced to small, fragmented populations had not, it seems, seized the public spotlight, and certainly not in a way that they have for ecologists. For those species that have reached the threatened species lists, there is a public and formal focus, but for the others, their fate is not captured by the SoE reports.

The losses outlined were great, yet it is a credit to a maturing society that such a report can be produced by government. It is also, as the preface says, a call for help and an acknowledgment that we have yet to achieve ecological sustainability. That plea for help remains, and the need to recognise and respond to the increasing losses can be seen in subsequent State of the Environment (SoE) reports.

### b) State of the Environment Report 2000

A modern and startling catalogue of environmental degradation and extinction is the NSW State of the Environment Report 2000 (EPA 2000). In the introduction to the chapter on biodiversity, the following stark statement appears: "It is clear that human activities have a major impact on terrestrial and aquatic ecosystems. Despite recent efforts to alleviate these pressures, biodiversity is still being lost in NSW." In an editorial entitled, 'The NSW 'State of the Environment 2000' report: a rallying call for zoologists', I traced the concept of assembling zoological catalogues (Lunney 2001a). I was struck at the time by Lydecker's (1903) book *Mostly Mammals* and his thoughts on modern extinctions: "While the century which has lately closed may fairly lay claim to the gratitude of posterity on account of the magnificent tale of zoological work accomplished during its course, it is, on the other hand, undoubtedly open to the charge of having

3 <http://www.uow.edu.au/~sharonb/STS218/state/nsw/biodiversity.html>

permitted the total extermination of not a few animals, and of having allowed the numbers of others to be so reduced that their disappearance, at least as truly wild creatures, can scarcely be delayed very many years longer." That was in his chapter entitled: 'Animals exterminated during the nineteenth century'. Today we can reflect that we have recognised the problem for a century, but not yet arrived at a solution. Catalogues are not meant to offer solutions, but nonetheless solutions are called for.

### c) State of the Environment Report 2003

In his Foreword to the 2003 NSW State of the Environment (SoE 2003) report the then Minister for the Environment, Bob Debus, made several simple but necessary statements, "Thirty years ago, the dominant issues were visible for all to see: sewage pollution on our beaches and smoking factory chimneys in our cities. We have made excellent progress in fixing these problems, as this report demonstrates with its information on cleaner beaches and cleaner air. The future challenges to be faced may be far less visible to most people, but in many ways they will pose an equal or even greater threat to our long-term wellbeing. Protecting our unique biodiversity, improving river health, reducing the spread of salinity and doing our part to respond to global climate change are all problems that the Government and the NSW community must continue to address." Protecting our unique biodiversity is acknowledged as a far less visible challenge than pollution, but like pollution, making the problem visible is one of the tasks of government. Zoologists also have a critical role to play in this because it is their specialty.

Dipping into the detail within the 2003 SoE is revealing, even disturbing. Chapter 6 (SoE 2003), 'Terrestrial ecosystems: Importance of the issue', opens with: "The degradation and loss of terrestrial ecosystems are major threats to biodiversity". While the next paragraph states that, "The extent of native vegetation cover is a surrogate indicator of the state of ecosystem diversity in NSW. The indicator does not reflect all ecosystem components, omitting, for example, fauna." This statement is no longer acceptable. Animals need a far greater focus and this should be reflected within the SoE reports.

### d) State of the Environment Report 2015

"Species diversity is at threat from a number of human-induced pressures, in particular habitat loss, including clearing of native vegetation, and the impacts and spread of invasive species, most notably predation by foxes and cats. Species' ability to adapt to these pressures is further exacerbated by climate change." This blunt statement of decline, in section 12 of the NSW SoE 2015 report, under the heading: 'Threatened species. State of the Environment 2015', is a frank acknowledgment of our relentlessly deteriorating environment and, in particular, our loss of biodiversity (SoE 2015). Under, 'Status and trends' and 'Threatened species listings' the SoE 2015 looks back to earlier SoEs: "SoE 2012 (EPA 2012, chapter 5) noted the paucity of

data available to monitor and evaluate biodiversity. Figure 7.2 in SoE 2009 (DECCW 2009) contained data describing the historical decline in distribution of native terrestrial vertebrate species while Figure 7.3 in SoE (2009) described the sustainability of native terrestrial vertebrate species. However, there have been no updates to these analyses and there is little new information to evaluate the status and trends of native fauna populations or species distributions generally. As a result, this report is restricted to describing the status of native plant and animal species listed as threatened under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Fisheries Management Act 1994* (FM Act)." For zoologists, this stark statement is no surprise. I find it a disappointing and unacceptable level of ecological reporting. This highly restricted view shows either how little was done to conserve biodiversity, or how little is being studied and reported so that we do have accurate information on which to prepare our conservation policies and management actions.

I note that there is so little independent commentary on SoE reports that it is impossible to know whether the losses are acceptable, or even understood, by other than biologists. Counting the number of species entering or leaving the State's threatened species list falls too far short of being able to evaluate the status of our fauna to be a useful guide to decision makers. Moreover, these animal species are predominantly vertebrate fauna, as is evident from Table 12.1 in the 2015 SoE report and reproduced here as Table 1.

Paul Adam (1998, 2013) might well rail against just using species, and threatened species at that, in any evaluation of biodiversity, and Hochuli (1998) and Ponder and Lunney (1999) might point out the importance of invertebrates, but that depth of study is yet to be realised in NSW. The value of such candid, even disturbing, statements in formal State of the Environment reports, is to reveal what we are losing, what is still to be done, and how to use the report as a pointer for where more action to protect biodiversity is needed.

A high percent of mammals in Table 1 are extinct or threatened in NSW (59%). The question marks (?) in the rows on terrestrial and aquatic invertebrates mean that there is no official estimate of numbers. There are 999 species formally listed as threatened, of which 340 are animal species (i.e. vertebrates and invertebrates). Given that the row for the total number of species has a ?, then the percent of species that are threatened, or conversely not listed as threatened, cannot be calculated. We are left with 340 animals, an imposing and difficult number to recover from their path to extinction. However, if we take 'the other 99%' by Ponder and Lunney (1999) as a benchmark, then the total number of animal species for NSW would be in orders of magnitude greater. This figure is just a debating point, but it gives some clue as the

## The hegemony of endangered species

**Table 1.** 'Number of listed threatened species and populations in NSW (at 31 December 2014)'. (source Table 12.1 in SoE 2015).

Taxa	Number of NSW native species	Presumed extinct	Critically endangered	Endangered	Vulnerable	Number of threatened species listed	% of species listed	Endangered populations
Mammals	138	25	2	16	39	82	59%	10
Marine mammals	40	0	0	3	4	7	17%	0
Birds	452	12	11	23	91	137	30%	7
Amphibians	83	0	5	12	11	28	34%	1
Reptiles	230	1	0	18	23	42	18%	1
Plants	4677	33	51*	336	227	647	14%	29
Aquatic plants and algae	?	1	1	1	0	3	?	1
Freshwater fish	60	0	2	6	1	9	15%	4
Marine fish, sharks and rays	?	1	1	2	3	7	?	0
Terrestrial invertebrates	?	1	2	14	0	17	?	1
Aquatic invertebrates	?	2	2	3	4	11	?	0
Fungi	?	0	0	5	4	9	?	0
Total	?	76	77	439	407	999	?	54

selectivity of concentrating on threatened species. This is particularly so if studying and managing most of the 340 species of animals listed does not greatly help us understand either ecosystem function or its management, because their numbers are now so low, or their distributions so shrunken.

### Commentary on the State of the Environment reports

The 1997 report admits that "the pressures on biodiversity include: population growth ... economic factors ... [and] a lack of awareness and knowledge about biodiversity" (p. 316) (as cited from Lunney 1998). We might be forgiven for assuming that we know little about the current status of our fauna, other than which species are on the schedules of threatened species. Indeed, we have not known the status of our native fauna for some time. The fauna that we do know about are the vertebrates, whereas the invertebrates are almost out of sight, as far as the state of the environment is concerned. However, we do know more than is reported in these SoEs. One valuable example is the book by Lindenmayer *et al.* (2014), *Biodiversity and environmental change*, where the editors explain (p14) that the primary aim of the book is to demonstrate the importance of long-term data plots for providing insights into changes in the environment and biodiversity. They suggest that this critical aim needs to be part of standard environmental reports, such as 'state of the environment' reports. With the paucity of data in our SoE reports, I can only agree.

We are fortunate that we have an active community of biologists in Australia who are concerned about such matters. The forums and publications of the Royal Zoological Society of NSW are one example of that enterprise. There is a good spread of other societies, such as the Ecological Society of Australia and the Society for Conservation Biology, and specialist groups, such as the Australian Mammal Society, the Australasian Bat Society, the Australian Society of Herpetologists and Birdlife Australia. However, they are not set up to be legally responsible for conserving and managing our fauna. This must be a matter for government, hence the importance of SoE reports and of understanding the way the legislation is written, interpreted and implemented.

If the list, and size of the list, of threatened species becomes the sole indicator of trends in biodiversity conservation, then the focus of funding and projects will reflect this one indicator. Indeed, this indicator assumes that there is a clear relationship between the status of threatened species and other elements of biodiversity, such that threatened species recovery provides a powerful measure of conserved biodiversity. Any one indicator of biodiversity conservation would fall so far short of adequate that it is a travesty of sound judgment to suggest that it should be enough to serve as a guide to the status of conserving biodiversity. To avoid that narrowing possibility, the SoE reports would benefit from a broad range of indicators. Within my area of zoological interest, that means all the species in the four vertebrate classes (birds, mammals, frogs and reptiles) – that is, the species that have long been the standard

focus of the State's wildlife conservation agencies. There is wide public recognition and support for these species, much more so than the articulate but esoteric definition of biodiversity by Wilson (1997).

While I agree with Adam (1998, 2013), and indeed all the 'grumpy scientists', about missed opportunities for conserving biodiversity (Lunney *et al.* 2013a), a relatively simple step in expanding our conservation horizon is to include all mammals, birds, frogs and reptiles<sup>4</sup>. For a researcher, there is one clear advantage in including all species – the much higher numbers of individual animals that enable the investigator to assess impact and monitor change. Threatened species are often rare, or occur at low density. Assessing the impact of change, or establishing monitoring regimes for adaptive management, is laborious and difficult to reach the numbers required for statistical analyses. By contrast, many non-threatened species are common enough that regular censuses are possible, and comparison of treatment and control populations can be achieved with less effort and more confidence. If we are to assess status or trends of populations (not just adjustments to a table of threatened species), then we must use research, particularly ecological research, in this endeavour. Non-threatened species, with their abundant data, are therefore an essential choice.

One testing example in this area is what Beeton (2004), as chair of the Australian Threatened Species Scientific Committee, identified as the conundrum in dealing with the reality that rare species can be, by nature, rare, or have become threatened rare species because of the impact of a threatening process. The problem, says Beeton, is to know which is which and how to find what he calls the 'sleeper threatened species'. However, if the listed threatened species soak up all the funding, then research opportunities, such as finding the 'sleeper threatened species', are truncated and we shall continue on a path of not knowing status or trends of our fauna. It is instructive to look at how threatened species came to dominate the conservation outlook.

### **The rise of threatened species in the conservation agenda, called 'endangered species' in NSW until 1995**

The legal interpretation of endangered species became important in 1991, with the decision by Justice Paul Stein of the NSW Land and Environment Court, in what is popularly referred to as the Chaelundi case. Biodiversity was becoming an important academic focus, but endangered species now captured both the legal and popular imagination. Legal, in that a new Act, the

*Endangered Fauna (Interim Protection) Act 1991*<sup>5</sup>, passed through the NSW parliament at the very end of 1991 (assented to on 17 December 1991), and popular in that it was becoming widely understood in the public mind that 'endangered' species was just one step away from 'extinct'. The idea of endangered meaning on the path to extinction is reflected in the NSW parliament passing a specific Act to help stem the losses.

The *Endangered Fauna (Interim Protection) Act 1991*, which had amended Schedule 12 of the *National Parks and Wildlife Act 1974*, was replaced by the *Threatened Species Conservation Act 1995* (NSW), and threatened species became the generic term, with endangered being a category within threatened<sup>6</sup>. Until then, the term 'endangered' held sway. Endangered, or threatened, fauna has continued to hold the imagination of conservation initiatives, and non-threatened species, that is most species, have been relegated to a lesser, even a neglected, category for conservation action. Banks and Hochuli (2017) share this concern and considered that preventing extinction is the central driver of almost all conservation action. They further comment that most of the funding goes to removing extinction threats and recovering population of endangered species. It is clear to all of us that waiting for an abundant species to dwindle to near extinction can never conserve biodiversity.

In January 1992 I was one of a scientific committee, with Hal Cogger and Chris Dickman, appointed to prepare the lists of endangered species (Schedule 12) under the provisions of the new *Endangered Fauna (Interim Protection) Act 1991* (Lunney *et al.* 1996, 1997, 2000). Under this new Act, the definition of 'endangered fauna' was "protected fauna of a species named in Schedule 12 as threatened, as vulnerable and rare, or as a marine mammal". Fauna was now defined thus: "fauna means any mammal, bird, reptile or amphibian," the first inclusion of all the Amphibia<sup>7</sup> as fauna. In our reflections on the preparation of Schedule 12, we saw the non-threatened species fading into obscurity (Lunney *et al.* 2000).

The *Endangered Fauna (Interim Protection) Act 1991*, was replaced by the *Threatened Species Conservation Act 1995*. This new Act also encompassed vascular plants, freshwater algae, mosses, lichens, fungi, and invertebrates as well as populations and ecological communities, resulting in a considerable increase in the size of the schedules, but the emphasis remained on threatened species. It is instructive to look at the events of 1991 and 1992 to see why endangered species captured the legal, political and public imagination.

<sup>4</sup> Doubtless this also applies to fish, but in NSW fish are covered under a different Act, the *Fisheries Management Act 1994* (NSW), which is managed in a different government department, so there is little crossover of ideas.

<sup>5</sup> Copies of past legislation, such as this Act, may be found on: <http://www.legislation.nsw.gov.au/#/asMade>

<sup>6</sup> Under both Acts, the category of vulnerable was present as the lowest rank.

<sup>7</sup> We noted, as zoologists, that the native NSW amphibian fauna was solely comprised of frogs, so we used the term frogs in our publications.

## The hegemony of endangered species

The International Union for Conservation of Nature (IUCN) Red List gives international weight to the importance of species on the edge of survival, and considers that people have an inherent fascination for scarce plants, fungi and animals (Smart and Stuart 2011). In recounting the IUCN Red List history, Smart and Stuart (p 9) state that, since its early beginnings in 1949 with a list of 14 mammals and 13 birds, there was by 2010 a comprehensive and increasing compendium of almost 56,000 species. Smart and Stuart (p9) also record that a new, quantitative system of IUCN Red List categories and criteria was adopted in 1994. Following a review in the late 1990s, Smart and Stuart also record that a revised system was adopted and the IUCN decided to keep the system stable to enable changes in species status to be detected from one review period to the next. The changes to the IUCN list largely parallel those taking place in NSW legislation, both being under development in the 1990s. Smart and Stuart (2010, p15) provide what they call a glimpse, at the time of writing, of the severity of the extinction crisis, with 1 in 4 mammals, 1 in 8 birds, more than 1 in 3 amphibians, and 1 in 3 corals facing extinction. Their view that the proportion of species threatened with extinction is one measure of human impacts on the world's biodiversity accords with my analysis of the SoE reports. Endangered species have captured public and bureaucratic attention, so tracking the rise of this group is essential for understanding what forces shape the conservation agenda.

### **A turning point in 1991: endangered species achieve a new and powerful status as a result of a landmark court case**

We can see a dangerous idea in action with the Chaelundi case. It made endangered species more visible to those who were keen on environmental protection, provided the impetus for the drafting of the *Endangered Fauna (Interim Protection) Act 1991* and for its passage through NSW parliament, and created a defensible list of endangered fauna<sup>8</sup>. Dangerous ideas are not always three word slogans from the soapbox. Here, the radical idea of saving fauna is shown initially through a nuanced legal interpretation, secondly through a definitive Act of parliament, and thirdly through the creation of a list that had the power to modify or stop developments, restrict forest logging, and conserve the NSW natural landscape. By analysing the progress of a court decision, to Act of parliament, to an endangered fauna list, all within five months, we can see this powerful idea in action.

This is not just my opinion as an expert, but also as a participant, and I must make my direct involvement explicit. In January 1992 I became chair of the Scientific Committee that prepared Schedule 12, i.e. the list of

endangered fauna. The commentary from January 1992 is therefore largely my own. For the 1991 court case and its immediate aftermath I rely on the words of others who were more closely involved. Around this time, my research focus was on the effect of woodchip logging on the wildlife in the Eden region of the far south coast of NSW (e.g. Lunney 1987; Lunney *et al.* 1991, 2009). I was also presenting the ideas from a wide range of researchers, through an edited book, on how to conserve our forest fauna (Lunney 1991)<sup>9</sup>, and endeavouring to conserve the tree-dependent koala *Phascolarctos cinereus* (Lunney *et al.* 1990; Reed *et al.* 1990).

The 1991 Chaelundi case and its repercussions<sup>10</sup> are of more than mere academic interest. It has had an enduring impact on the meaning and significance of endangered fauna and the beginning of the ever-increasing elevation of this group over those species not listed as endangered (with the modern generic term, from 1995, being threatened fauna). In 1987, I was an expert witness in the NSW Land and Environment Court in *Jararius v. Forestry Commission of New South Wales*<sup>11</sup>. Being an expert witness in court and re-orienting my zoological knowledge to see it from a legal perspective propelled me, with the Royal Zoological Society of NSW in 1990, to organise a forum to examine the idea of 'zoology in court' to help lay a more productive relationship between the markedly different disciplines of science and the law (Lunney 1992). While I was not involved in the Chaelundi case, I had become interested in how a different world from scientists – that is, the legal world – perceived the issues of fauna conservation in NSW.

The detail of Stein's judgement in the Chaelundi case shows the first step in the importance of a legal definition of endangered and threatened fauna and how it is applied in an environmental impact assessment, such as a court case. This, therefore, is a critical step in government-led biodiversity conservation programs. In the opening sentence of his judgment, Justice Stein states: "Sections 98 and 99 of the National Parks and Wildlife Act 1974 (NSW) make it an offence to take or kill respectively any protected or endangered fauna and are not restricted to National Parks."<sup>12</sup> The following extensive quote reveals the reach of the schedule of endangered fauna available to the Land and Environment Court in 1991. This schedule had been considerably enlarged through

9 The 2<sup>nd</sup> edition of the *Conservation of Australia Forest Fauna* (Lunney 2004) was more than twice the size of the 1991 edition, which demonstrates the rising importance of conserving forest fauna to a wider range of interests.

10 Bonyhady (1993), in his chapter on limits to the law, gives both a legal and political explanation of the repercussions of this and related cases. His extensive coverage further illustrates the complexity of the issues and the tense environment in which the schedule of endangered fauna was prepared in January-February 1992.

11 (1989) 69 LGRA 156. See Bonyhady (1993, pp88-90) for an analysis of this case.

12 Land and Environment Court of New South Wales. 1991. *Corkill V Forestry Commission of New South Wales* [No 2]. Stein J. 20-23, 26-30 August, 2-4, 25 September 1991. (1991) 73 LGRA 126-163.

8 That is, Schedule 12 of the *National Parks and Wildlife Act* (1974) under the criteria in this new Act in February 1992.

amendments in 1983<sup>13</sup> to the *National Parks and Wildlife Act 1974*. On pages 130-131 Justice Stein summarises the legislation as follows: "Under the *National Parks and Wildlife Act 1974* (NPWA) fauna is categorised into unprotected, protected and endangered. Unprotected fauna are listed in Schedule 11 and include dogs, cloven-hoofed animals, horses, hares and rabbits. Protected fauna is defined as fauna of a species not named in Schedule 11 (s 5). Endangered fauna are listed in Schedule 12. This schedule is divided into four parts in ascending order of endangerment. Part 1 lists "Fauna of Special Concern" divided into mammals, reptiles and birds. Part 2 lists "Vulnerable and Rare Fauna". Part 3 lists "Threatened Fauna" and Pt 4 "Fauna in Imminent Danger of Extinction". Schedule 12A - which lists Protected Amphibians - was introduced by amendments enacted in 1983 (No 183) (s 94A). Section 98 of the NPWA makes it an offence to take or kill any protected fauna not including endangered fauna. Section 99 makes it an offence to take or kill any endangered fauna. "Take" is deemed in s 5 to include disturb or injure."

Of the four parts in the 1983 amendments referred to by Stein, only Parts 2, 3 and 4 equate to the meaning of endangered or threatened in subsequent legislation. Now, the numbers play an important role. Part 1, the 'fauna of special concern', was a long list with 74 mammal species, 22 reptiles, and 142 birds. In contrast, in part 2, vulnerable and rare, there were 12 species of mammals, 4 reptiles, 41 birds. Under part 3, there were 4 species of mammals, 5 reptiles and 12 birds. Also listed in this schedule was a category called 'protected amphibians', which lists 12 species. If parts 2, 3 and 4 are grouped, it gives 40 species of mammals, 10 reptiles and 60 birds, giving a total of 110 species.

Nine years earlier, when the *National Parks and Wildlife Act 1974* was made, the schedule of endangered fauna comprised 8 mammal species, 1 reptile species and 28 birds, giving a total of 37 species. Thus there was about a three-fold increase in nine years from 1974 to 1983 of mammals, reptiles and birds that feature in Parts 2, 3 and 4, as well as the addition of 12 frogs to the list. In a separate contrast, in 1992, under the amendments to the *National Parks and Wildlife Act 1974* from the *Endangered Fauna (Interim Protection) Act 1991*, the schedule of endangered fauna comprised 77 mammal species, 27 reptiles, 110 birds and 19 frogs, giving a total of 233 species, which is more than twice the 1983 list of species and more than six times the 1974 list. In 1992, for the first time, the name and number of every NSW species was identified and recorded, so the percent of species that were endangered could be calculated. Importantly, the *Endangered Fauna (Interim Protection) Act 1991* gave the criteria for including a species on the schedule as endangered (Lunney *et al.* 2000).

In the *National Parks and Wildlife Act 1974* there are no criteria for the inclusion of species. The category of 'Fauna of special concern', introduced into the Act by the 1983 amendments, included many species that have never been known as occurring in NSW, such as the Tasmanian thylacine *Thylacinus cyanocephalus* and the Victorian Leadbeater's possum *Gymnobelideus leadbeateri*. Such inclusions swelled the list of threatened fauna, but the reason for their inclusion was not specified in the Act. However, my direct involvement means that I know why some of the vulnerable and rare fauna were listed.

When I was studying the effect of woodchipping in the forests of south-east NSW in the early 1980s, we found the exceptionally rare bat, the golden-tipped bat *Kerivoula papuensis*<sup>14</sup> and the rare white-footed dunnart *Sminthopsis leucopus*. A colleague from the wildlife licensing section of the NSW National Parks and Wildlife Service was collating species for a possible inclusion in a proposed revision to Schedule 12 and I suggested the inclusion of these two species. They were duly included in the 1983 amended schedule used by Justice Stein, but no written reasons were required for the inclusion of species. Some of the fauna of special concern that Justice Stein drew upon included the koala *Phascolarctos cinereus* and the Spotted-tailed Quoll *Dasyurus maculatus*, species relevant to the Chaelundi case. If there had been no expansion of the list of endangered fauna, and the only available list was the one made in 1974, the endangered fauna list would have provided little emphasis to Stein's judgment. However, the 1983 amendments which expanded the list of endangered fauna gave Justice Stein more to work with and therefore more weight to his judgement.

Given that there were no criteria for defining fauna of special concern, it is not really possible to evaluate Stein's statement that schedule 12 was divided into four parts in ascending order of endangerment. Also, when the inclusion of species never known from NSW were included in Part 1, and given that the last known thylacine died in 1936 in Hobart, it is difficult to reconcile the list in Part 1 with the view that the fauna of special concern were at the lower end of the order of endangerment. Logically, from Stein's legal viewpoint, he was open to conclude that the 'fauna of special concern' were at the lower end of endangerment. After all, it is apparent that 'Fauna in Imminent Danger of Extinction' must be at the most endangered end of the spectrum, so 'fauna of special concern' must logically be at the other end. What it means is that the drafting of the 1983 amendments that changed the schedule of endangered fauna did not foresee a possible legal misinterpretation. Criteria for inclusion of a species are important because there is no reason why a lawyer should know the zoological provenance and status of each species of native fauna. However, from a crucial viewpoint in the Chaelundi case, the order of endangerment, or even that

<sup>13</sup> *National Parks And Wildlife (Amendment) Act, 1983, No. 183* [http://www.austlii.edu.au/au/legis/nsw/num\\_act/npawa1983n183354.pdf](http://www.austlii.edu.au/au/legis/nsw/num_act/npawa1983n183354.pdf)

<sup>14</sup> In the 1983 amendments to the *National Parks and Wildlife Act 1974*, it was named as the dome-headed bat *Phoniscus papuensis*.

## The hegemony of endangered species

a species was on Schedule 12 at all, was irrelevant in 1991. When Justice Stein made the judgment, protected fauna was as relevant as endangered species.

Of particular interest to zoologists reading Stein's judgment is his intuitive ecological approach to evaluating the zoological evidence. This is explained in detail in Appendix 1. Resonance between the legal and the scientific understanding of the importance of species, and their categorisation as threatened, endangered, and so on is vital. Legal decisions must be able to draw on expert scientific opinion, and scientists must be able to work with the law in order to protect species. To make sound legal judgements, there must be some commonality between the two viewpoints – such as in the Chaelundi case, where a sound decision was made, and its political potential was seen and acted upon.

### a) The court case as reported in Hansard of the NSW parliament

On the very day of the outcome of the Chaelundi case (25 September 1991) the subject of conservation moved into the NSW Parliament, and ushered in a sequence of events that changed the direction of biodiversity conservation in NSW. On 25 September 1991, the Hon. R. S. L. Jones in the NSW Parliament (Upper House) placed his views before parliament, as recorded in Hansard<sup>15</sup>:

"Today the conservation movement of New South Wales had a resounding victory in the Land and Environment Court. Mr Justice Stein found that the Forestry Commission was about to break the law by attempting to allow logging and roading activities in compartments 180, 198 and 200 of Chaelundi State Forest in northern New South Wales. The judgment is a damning indictment of the cavalier attitude of the Forestry Commission towards wildlife, and particularly endangered wildlife. ... Mr Justice Stein found that many endangered species would be seriously affected by the logging of the three compartments. Those species include the powerful owl, masked owl, sooty owl, spotted-tailed quoll, feathertail glider, eastern pygmy possum, long-nosed potoroo, parma wallaby, brush-tailed phascogale, dome-headed bat and large-footed Myotis, koala and the highly endangered Hastings River mouse, which is in imminent danger of extinction. In the conclusions to his findings, Mr Justice Stein said: 'Imminent breaches of s.99, and also of s.98 of the NPWA, have been proven in relation to a large range of endangered and protected species of fauna. This is not surprising given the extraordinary wildlife values of the compartments. The high species diversity of arboreal marsupials and the presence of numerous significant species listed in Schedule 12 of the NPWA makes it a veritable forest dependent zoo, probably unparalleled in south-eastern Australia. Every species of forest dependent marsupial is present. It contains prime or

critical habitat for numerous species of endangered fauna or "faunal hot spots". Special pleading for individual areas as exhibiting particular value relating to flora or fauna is not uncommon. However, the evidence before me is overwhelming that this portion of forest is significantly unique in Australia for its natural wildlife values."

A few points emerge from Jones' speech to Parliament. Of the 13 species named, 3 species were birds and 10 species were mammals. Mammals and birds capture the public and political imagination as creatures worth conserving. The naming of species is uncommon in the legal and political writings on this case, as the legal concepts, not the individual species, had captured the political agenda. Naming a species implies some level of knowledge and overlaps with the way that zoologists, particularly ecologists, present material. From Jones' speech, it is clear that all 13 species were endangered species. However, when he cited Mr Justice Stein, the breach actually applied to "to a large range of endangered and protected species of fauna." The idea of endangered species had political appeal to Jones, and in less than two months of Stein's judgment this issue came to a legal climax in the NSW parliament with the passage of the *Endangered Fauna (Interim Protection) Act 1991*.

### b) Commentaries on the 1991 case decided by Stein J.

The Chaelundi case outcome provoked the ire of government, yet the response of parliament was the controversial introduction of new legislation, the *Endangered Fauna (Interim Protection) Act 1991*. This debate has continued to generate both political and legal commentary. Among the most interesting is that of the Hon. Justice Nicola Pain, Judge of the Land and Environment Court of NSW, and Sarah Wright NELA (NSW) Committee Member. In their paper presented to the National Environmental Law Association (NELA) Annual Conference in 2003, they described the Rise of Environmental Law in New South Wales and Federally and the role of the Land and Environment Court of NSW in the development of environmental law (Pain and Wright 2003). They note that, "This decision illustrates the wide impact that decisions of the Land and Environment Court have had on important issues." Their account is part of a turning point of threatened species legislation in NSW, "In *Corkill v Forestry Commission of New South Wales*<sup>16</sup> a challenge was brought pursuant to the open standing provisions in the *National Parks and Wildlife Act 1974* (NSW) against the logging of the Chaelundi State Forest in Northern NSW, arguing that the logging and other activities were 'likely to disturb or injure certain endangered and protected species of fauna in breach of s 98 and s 99 of the *National Parks and Wildlife Act 1974* (NSW)'."

<sup>15</sup> <https://www.parliament.nsw.gov.au/Hansard/Pages/HansardResult.aspx#docid/HANSARD-1820781676-241>

<sup>16</sup> (1991) 73 LGRA 126

Pain and Wright then state the outcome of the case<sup>17</sup>, the consequences of which were summarised by Stein J: "It was held that the Forestry Commission's logging operations were in breach of the *National Parks and Wildlife Act* (NPW Act) and this finding was upheld on appeal to the Court of Appeal. The decision provoked an extreme reaction from the Government of the day which tabled a Regulation to exempt the Forestry Commission, and other State agencies, from the NPW Act. The Regulation was, however, disallowed by the Parliament. The Opposition (with the aid of Independent Green MPs) then introduced its own legislation, the *Endangered Fauna (Interim Protection) Act 1991* which drew on the Corkill decision in relation to habitat protection and the need for Fauna Impact Statements where any activity was likely to have significant effect on the environment of endangered fauna. No project, which might have that effect, could proceed without obtaining a licence from the National Parks and Wildlife Service. Third party appeals were permitted by any objector if a decision to grant a licence to 'take or kill' fauna was granted. This legislation, which lasted until the passage of the *Threatened Species Conservation Act 1995* (commencing in 1996), significantly slowed the loss of endangered and protected fauna and their habitat."<sup>18</sup>

The importance of the judgment by Justice Paul Stein was also commented upon by the Honourable Justice Brian J. Preston, Chief Judge of the Land and Environment Court of New South Wales Australia, in his 2006 paper on 'The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific'.<sup>19</sup> In addressing the issue of judicial decisions, Preston understood that, "This fundamental element of sustainable development has been recognised in a number of decisions concerning proposed developments or actions that may have a detrimental impact on certain ecological communities." He then drew on the Chaelundi case. Preston noted that "Stein J of the Land and Environment Court of NSW held that s 98 and s 99 of the *National Parks and Wildlife Act 1974* (NSW) were not constrained to the direct and intended consequences of conduct constituting the taking or killing of fauna". In particular, Preston observed that, "Stein J discussed the meaning of the term 'disturb' in the definition of 'take' in s 5 of the *National Parks and Wildlife Act 1974* (NSW). His Honour held that 'disturb': "covers conduct which modifies habitat in a significant fashion thus placing the species of fauna under threat by adversely affecting essential behavioural patterns relating to feeding, breeding or nesting. In other words, it includes habitat destruction or degradation which disturbs an endangered or protected species by adverse impact

upon it leading immediately or over time to a reduced population"<sup>20</sup>. Preston's conclusion clearly reveals how important the Chaelundi was to conserving biodiversity: "Stein J's wholistic [*sic*] reasoning is consistent with the principle of the conservation of biological diversity and ecological integrity. The proposed logging operations were found to constitute an imminent breach of s 98 and s 99 of the *National Parks and Wildlife Act 1974* (NSW) in relation to the many species of endangered and protected species of fauna. Stein J's decision was upheld by the New South Wales Court of Appeal."<sup>21</sup> What Preston has done, as a judge in Land and Environment court, is to reinforce the ecological thinking evident in Stein's judgment. The legal decisions, it would follow, need to make ecological sense.

Preston (2009), in a subsequent paper entitled, 'Jurisprudence on ecologically sustainable development: Paul Stein's contribution', again refers to the Chaelundi case making the same crucial point that Stein's reasoning is consistent with the principle of conservation of biological diversity. However, Preston made another observation in coming to that conclusion, that the forest areas in question "contained, or were likely to contain, over 30 different species of fauna species under the *National Parks and Wildlife Act 1974* (NSW)". Now consider that point in relation to Preston's next sentence, which makes it clear that, "The applicant claimed the respondents were in breach of s 98 and s 99 of the NPW Act which provided that it was an offence to take or kill any protected or endangered fauna." Preston, Pain and Wright, and Stein all recognised that both endangered and protected fauna counted equally in this case. The high number of species and the principle of conserving biodiversity are congruent in Preston's statement, because the species under consideration were all fauna, not just endangered fauna.

This was not to last. Protected species were about to lose their potency in the legal world as a result of a decision in the court of appeal and the subsequent passage of the *Endangered Fauna (Interim Protection) Act 1974*. Ecologically, this was a mistake. The political, legislative and administrative dominance of endangered species hinders biodiversity conservation. The age of the hegemony of endangered species at the expense of all fauna began in the closing months of 1991, following Stein's decision in the Chaelundi case.

On 1 November 1991, the Court of Appeal<sup>22</sup> made one crucial variation on breaches of s 98 and s 99 of the *National Parks and Wildlife Act 1974*. It held that: "...in

17 (1991) 73 LGRA 126 at 136

18 Stein, *supra* note 49, at [60]-[61].

19 [http://www.lec.justice.nsw.gov.au/Documents/preston\\_the%20role%20of%20the%20judiciary%20in%20promoting%20sustainable%20development.pdf](http://www.lec.justice.nsw.gov.au/Documents/preston_the%20role%20of%20the%20judiciary%20in%20promoting%20sustainable%20development.pdf)

20 (1991) 73 LGRA 126 at 139-140.

21 Forestry Commission of New South Wales v Corkill (1991) 73 LGRA 247 per Mahoney AP, Meagher and Handley JJA (also, <https://www.ecolex.org/details/court-decision/forestry-commission-of-new-south-wales-v-corkill-013841b9-ac63-480b-b849-18709f44f97e/>)

22 Forestry Commission v Corkill (1991) 73 LGRA 247. BC9101461 at 14 and 15

## The hegemony of endangered species

the present case it is clear that some at least of the work is to be carried out by logging companies who have, in the terms of their respective licences, accepted obligations which will involve the taking or killing of protected fauna. It is therefore necessary to determine whether such logging companies will be involved in breaches of one or both of the sections.

"(b) In our opinion, a person who takes or kills protected fauna within s98 is not liable to conviction for an offence against the section if he proves "that the act constituting the events was done ... in pursuance of a duty imposed on him by or under any Act": s98(3)(b). The duty imposed upon logging companies by the relevant licences is, in our opinion, a duty imposed by or under the Forestry Act and therefore the taking or killing of protected fauna within s98 would not give rise to a conviction for an offence.

"The position is, however, different in respect of s99. That section relates to endangered fauna. S99(3) provides that where the provisions of an Act or instrument under an Act "authorise or require anything to be done that would constitute an offence" under s99(1), "the provisions of this section prevail". That means that, notwithstanding that what was done may have been done pursuant to another Act, the taking or killing of endangered fauna will constitute an offence under s99. Therefore, what is here proposed by the Forestry Commission will involve, at least, the commission of an offence by the logging companies under s99."

In short, it is the endangered fauna that now mattered, in s 99 of the *National Parks and Wildlife Act 1974*, not protected species. Stein had considered both endangered and protected fauna under the NPW Act, but the Court of Appeal had restricted the focus to endangered fauna. Protected species no longer had the same formidable legal interest. In effect, endangered fauna had suddenly leapt ahead of the rest of the fauna, and thus a minority of species now held sway over the conservation agenda via a legal decision, in a court of appeal, that had arisen from a forest logging debate.

What was also made clear in the appeal judgment is who holds power: "it is to be emphasised that the prohibition upon the taking or killing of endangered fauna enacted by s 99(1) is not absolute. In the relevant sense, the effect of the Act is to place the protection of such fauna within the control of the Director of National Parks and Wildlife. The Act empowers the Director to grant licences of various kinds in respect of fauna."

The Director of the NSW National Parks and Wildlife Service now had a major role in deciding what activities may or may not be licensed with respect to the conservation and management of endangered fauna, a major shift in the power relations in NSW. The *Endangered Fauna (Interim Protection) Act 1991* (NSW) consolidated the Director's authority. Further, within

that framework, the actual species that were to be on the schedule of endangered species would determine the scope of the authority of the Director. A list with very few species would have very little effect, especially if those species had very limited distributions and occurred in very few places in NSW<sup>23</sup>. By contrast, a long species list, especially one that was inclusive of forest fauna, would have a major impact. The people who drafted the *Endangered Fauna (Interim Protection) Act 1991* had grasped this point, as reflected in the criteria for listing (see Lunney *et al.* 2000, p17, for the criteria). It fell to a Scientific Committee established by the new Act to produce the endangered fauna schedule in early 1992. The new Act could not come into force until the schedule of endangered fauna was promulgated, hence the tight 20-day time frame under the Act to produce the schedule.

### c) The rise of endangered species as a separate list in NSW

We are fortunate that the NSW parliamentary library research service has produced a summary of the subject of endangered species, under the title of 'National Parks in NSW' (Smith 1998). Under the heading of the development of National Parks legislation<sup>24</sup>, Smith describes relevant parts of the *Fauna Protection Act 1948*. Smith states that this Act made provision for the protection and preservation of fauna, defined as mammals and birds. Schedule One of the Act contained a list of unprotected fauna. Smith notes that while some of the animals on Schedule One were introduced pests, such as rabbits, many of the birds and mammals were native species. Smith further notes that Fauna on Schedule One were not protected and were subject to hunting and 'pest control', while all other fauna were protected and that it was an offence to take or kill any protected fauna unless the Minister declared an open season for that species (s18). Of greater relevance is that, as Smith reports, the Minister could also declare protected fauna to be rare, in which case an open season for that species could not be declared (s20). As an interesting finale to that section in his report, Smith records that in his Second Reading speech about the Fauna Protection Bill, the Minister Hon C Evatt MLA quoted from the Fauna Investigation Committee, which was established to report upon fauna protection. Mr Evatt stated: "the preservation of Australian fauna must be accepted by the State for economic reasons and as a very deep and lasting moral obligation". Evatt formally recognised the moral obligation to protect the fauna of NSW.

23 Such as being largely confined to the Western Division of NSW where 24 native mammal species had become extinct within the first decades of European occupation (Lunney 2001b).

24 For a more extensive coverage of the subject, especially the legislation that preceded the 1948 Act, see Stubbs 2001 and Jarman and Brock 2004.

The next step in the rise of the legal importance of endangered fauna is succinctly summarised by Smith (1998) under the heading, *National Parks and Wildlife Act 1974*. This Act, says Smith, consolidated provisions of the *National Parks and Wildlife Act 1967*, the *Fauna Protection Act 1948* and the *Wild Flowers and Native Plants Protection Act 1927*. The Act introduced, for the first time into NSW legislation, the concept of endangered fauna (redefined from rare fauna) and 'tidied up' existing legislation. The Act continued the system of fauna protection through Schedules 11 and 12<sup>25</sup>. It was these schedules that were at the centre of the 1991 Chaelundi case. The fauna on these schedules changed in February 1992 following the production of the Schedule of endangered fauna (Schedule 12) under the *Endangered Fauna (Interim Protection) Act 1991*.

#### d) The production of the schedule of endangered fauna under the *Endangered Fauna (Interim Protection) Act 1991*

The *Endangered Fauna (Interim Protection) Act 1991* passed through the NSW parliament in December 1991. In January 1992 the NSW National Parks and Wildlife Service had to implement this new Act. The Act's first object was to "provide urgently an objective scientific evaluation of the conservation status of fauna in New South Wales" and to produce the schedule of endangered fauna via a scientific committee. The Scientific Committee formally comprised three people, but it is important to record the skilled contribution of all the team members who helped prepare the schedule of endangered fauna, and all their names are listed as co-authors of the publications that reported on the preparation and subsequent interpretation of the schedule (see Lunney *et al.* 1996, 1997, 2000). As the NSW National Parks and Wildlife Service representative on the committee, I had the task of chairing and reporting the outcome within 20 working days. We completed the task on time and the schedule was promulgated on 28 February 1992 in the NSW Government Gazette and the major daily newspaper the *Sydney Morning Herald*, on 2 March 1992. The Scientific Committee had nothing to do with next phase of implementation of the *Endangered Fauna (Interim Protection) Act 1991*. There was a period of revision after the schedule was published, which produced some changes, and the schedule was finalised by late 1992. We published our methods and outcomes that record the schedule as it was complete before the end of 1992 (Lunney *et al.* 1996, 1997, 2000).

In the replacement Act, the *Threatened Species Conservation Act 1995*, the term 'threatened' is the generic term, with 'endangered' being a level within 'threatened.' At the beginning of 1992 there were no existing lists of NSW

<sup>25</sup> That is, Schedule 11 contained unprotected fauna, all other fauna was thus protected, while Schedule 12 contained endangered fauna. Smith added that, "For the first time, the definition of fauna was extended to include mammals, birds and reptiles." This sentence muddies the story. Birds and mammals were the fauna identified in the 1948 Act, it was the inclusion of reptiles for the first time that was new.

fauna; we had to construct them. The importance and legal relevance of producing such lists was that the Committee not only had to give reasons for including a species on the schedule of endangered fauna, but also to justify leaving a species off the schedule. We were thus required to know all the fauna of NSW (birds, mammals, frogs and reptiles) and then evaluate the status of each species, all within the month allowed by the Act. This exercise has not been repeated, although the Scientific Committee under the *Threatened Species Conservation Act 1995* can undertake this exercise again.

As part of our 1992 review of the status and population trends of all the birds, mammals, frogs and reptiles in NSW, we prepared and evaluated the first-ever list of the State's birds, mammals, reptiles and frogs, and drew attention to some serious issues. Among the most important finding was that 26% of the State's 883 faunal species met the criteria for listing, as set out in the *Endangered Fauna (Interim Protection) Act 1991* (and provided in Lunney *et al.* 2000, p12), with mammals being the class of vertebrates with the most dire status. Of the 132 mammal species we identified as being present in NSW at the outset of European occupation, 27 had become extinct, another 52 were endangered<sup>26</sup> and only 53 were in the non-threatened category. Another important finding was the results of our inquiry into the state of knowledge, based on expert opinion (Lunney *et al.* 2000 p 7), for assessing the status of each species. The options were adequate, limited or inadequate<sup>27</sup>. For mammals, the percent with inadequate knowledge of status or trends was 34% of species, for reptiles it was 74% of species, birds 46% of species and frogs 62% of species, giving an overall picture of 52% of the 883 species with inadequate knowledge. The expert opinion was drawn from the same set of experts that assessed the status of each of the species. Conversely, only 6% of the 883 fauna species were considered to have adequate knowledge to assess status and trends. In effect, we had identified that even though these four vertebrate classes may be the best known of our wildlife, we were a long way short of having adequate knowledge to assess, let alone manage, the majority of our vertebrate wildlife.

In 1992 we had listed 233 species as endangered. This was a marked increase from the 37 species (8 mammals, 1 reptile and 28 birds) listed as endangered species on Schedule 12 with the promulgation of the *National Parks and Wildlife Act 1974* (NSW), i.e. the Act as made. There were no published scientific criteria for a species being on

<sup>26</sup> As defined in the then categories of threatened and vulnerable as identified in the *Endangered Fauna (Interim Protection) Act 1991*, and repeated in Lunney *et al.* 2000 p12

<sup>27</sup> "Adequate knowledge" here is the response defined in Lunney *et al.* (2000, p 9) where we had recognised that the *Endangered Fauna (Interim Protection) Act 1991* did not have any categories equivalent to the then IUCN categories of "indeterminate" or "insufficiently known". So the decision was made to gauge the level of knowledge upon which status assessments were made. We used three levels - adequate, limited and inadequate.

## The hegemony of endangered species

the 1974 list, or not on the list, so the *Endangered Fauna (Interim Protection) Act 1991* (NSW) had, in 17 years, made a major leap in the recognition of endangered fauna and, by implication, the status and trends of all NSW fauna. Further, by our listing process, we had identified the parlous status of so much of our native vertebrate animals.

One of the elements of the listing process in 1992 was the difference in expert opinion. Some species were considered to be endangered by one or more experts, but other experts gave their vote to the species not being endangered, so the committee had to rely on a balance. If we look closely at those numbers (Lunney *et al.* 1996), we can see that, of the 650 species considered to be not endangered, 121 were recommended by at least one expert as being endangered. If we had included all species as endangered, such as may have been possible by a strict application of the precautionary principle (e.g. Whelan *et al.* 2004) where at least one expert considered it to be the case, then the endangered species list would have been 324 species. The 233 species that were listed in 1992 sat mid-way between the 127 species for which all contributing experts recommended the endangered status and the 324 species where at least one expert recommending the listing of endangered.

We were aware that the committee might finish up in court to justify either listing or not listing a species, because the *Endangered Fauna (Interim Protection) Act 1991* had passed through the NSW parliament in a politically charged context. This legislation had passed through the parliament, against the government of the day, by the combined vote of the opposition and the independent MPs.

The preparation of the new Schedule 12 produced by the Scientific Committee had many novel aspects, but what was palpably present at the time was the administrative concern that the Schedule was being produced under an Act that had been opposed by the government of the day. Since the first step to giving effect to the *Endangered Fauna (Interim Protection) Act 1991* was the production of the new Schedule 12, our research approach was a matter of considerable interest, even concern. This was particularly the case because of the fact that it was the Committee, not the Minister, who made the decisions as to which species of fauna were to be included in Schedule 12, i.e. which species were to be recognised as endangered. In other jurisdictions, the committee makes a recommendation to the relevant Minister in the government of the day as to what fauna should be included as endangered and then the minister decides. Presumably those people who drafted the NSW legislation foresaw that possibility, given that the government of the day had opposed the bill, and thus gave the authority to preparing and promulgating the schedule to the Committee. As it transpired, we were not taken to court, nor censured by the government, and our lists survived their promulgation. This can in large part be attributed to the use of expert opinion, rather than the Schedule being just our opinion or simply numerical

scores of population sizes and trends. For those species that occupied the border zone between being listed or not listed, we endeavoured to increase our sample of experts and thereby increase the confidence of our final decision. With the passage of the *Threatened Species Conservation Act 1995*, our schedule of threatened vertebrate fauna became embedded in the Act. This can be taken as testimony to the strength of the consistent process we adopted at the time. The 1995 Act lacked the statutory requirement to systematically review all the fauna, including the non-threatened species. Consequently, if no-one studies a particular species, it could be fading away and not drawn to the attention of the Scientific Committee.

The Government Gazette (No 30, of 28 February 1992) drew attention to the fact the reasons for listing or not listing a species were available for inspection, and that: 'Any person or organisation electing to use this format should contact the National Parks and Wildlife Service (Dan Lunney 585 6489) for further details. W. J. Gillooly Director.' What this official notice makes clear is that it was the sole responsibility of Scientific Committee, and by extension, the NSW Government, for producing the schedule of endangered species – not NSW National Parks and Wildlife Service. Consequently, as chair of that Committee, I was in the front line for defending any decisions to list or not list a species. As it transpired, our schedules became the linchpin of the implementation of the *Endangered Fauna (Interim Protection) Act 1991*. Minor revisions were made and the final list published in the Gazette in December 1992. The reasons for listing or not listing were those presented in Lunney *et al.* (2000) in a large table.<sup>28</sup> As might be noted from the NSW Government Gazette of 28 February 1992, the Scientific Committee alone had the responsibility to defend the listing process. That we, and the Schedule, survived allows me to conclude that our process was sufficiently robust and transparent that it avoided legal challenge. The independence of the Scientific Committee still holds a quarter of a century later.

At the time we were concerned for the fate of the 650 species not listed as threatened, especially the 121 species where at least one expert recommended listing. It is this large group of 650 species, 74% of the mammals, birds, frogs and reptiles of NSW, that is still waiting in the wings for the attention they richly deserve<sup>29</sup>. I continue to draw attention to this large group, partly to try to keep them off the list of threatened species by appropriate and early conservation action, partly because of the large following the public has for all our wildlife, and

<sup>28</sup> Table 1 in Lunney *et al.* 2000 with explanations as well as the numerical scores and the expert voting for listing or not listing, both of which contributed to our decision-making process of placing a species on, or leaving it off, the schedule.

<sup>29</sup> There are some notable exceptions to protected fauna receiving little attention, with the four large species of kangaroos being the major exception (e.g. Lunney 2010). We have covered this point in another forum, calling this group 'the neglected 74%' (Lunney *et al.* 2004)

partly because of their research potential when assessing impacts. As mentioned previously, endangered species are often rare, so assessing any impact or recovery is difficult, whereas many non-threatened species occur at much higher densities so designing studies to assess impacts is both economical and reliable. This view of the value of non-threatened vertebrates is not to neglect the wider aspiration of biodiversity conservation, nor to neglect the imperative to stop our threatened species from becoming extinct. Rather this view provides a more obvious link to the complexities of managing ecological processes on a landscape scale, through accepting the ecological importance of common species. As Dickman *et al.* (2004) conclude, "threatened species legislation is important, but just one act in the biodiversity play."

There has been no repeat, in later Acts, of the first object of the *Endangered Fauna (Interim Protection) Act 1991*, *i.e.* assess the status of all the fauna. As a consequence we do not know the status of the fauna of NSW, as is evident in the SoE reports. In contrast, there has been a consistent and high standard review of the submissions for listing since the introduction of the *Threatened Species Conservation Act 1995*.

Prest (1995), in his review of endangered fauna licensing under the *National Parks & Wildlife Act 1974* (NSW) between 1991 and 1995, noted that a concern of the drafters of the *Endangered Fauna (Interim Protection) Act 1991* (NSW) was to devise an endangered species Act built around a scientifically valid and justifiable list of endangered species, via an independent and depoliticised listing process, to avoid public brawling over the listing of particular species. Prest pointed out that a list was already contained in the *National Parks and Wildlife Act 1974* (NSW), but was, "generally out of date and inadequate".<sup>30</sup>

### e) The example of the platypus: a species not on any list of threatened species

A great many species that are unique to Australia, and of world significance, are not included on the State or Commonwealth lists of threatened species. One of these is the platypus *Ornithorhynchus anatinus*. It was listed as 'fauna of special concern' in the 1983 amendments to the *National Parks and Wildlife Act 1974*, but although it was identified by at least one expert as being endangered in the 1992 NSW listing process, it was not listed as endangered on the balance of expert opinion (Lunney *et al.* 2000). It is likely to be increasingly threatened by the many factors which make our freshwater creeks and rivers less habitable for wildlife. The platypus is a good example of a species whose threats to its existence are out of the public eye. It was listed as 'least concern' by IUCN criteria (Lunney *et al.* 2008). A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near

Threatened. Widespread and abundant taxa are included in this category<sup>31</sup>. Under the heading 'justification' for that classification, the platypus statement reads: "Listed as Least Concern in view of its wide distribution, presumed large population, and because it is unlikely to be declining at nearly the rate required to qualify for listing in a threatened category. There are, however, insufficient data at the catchment and local levels to predict population trends reliably in the long term." As part of the same 2008 IUCN appraisal that justifies 'least concern', there is reason to be concerned for the future of the platypus. Under the heading, 'major threats', a substantial suite of threats opens with: "Currently, the predominant threat to the species on the mainland is reduction in stream and river flows due to recent successive droughts, stream regulation, and extraction of water for agricultural, domestic, and industrial supplies. It is also at risk from the opposite extremes associated with climate change – extensive flooding both in space and time associated with recent tropical cyclones that have resulted in increased mortality and all but eliminated recruitment in 2006 over a substantial part of the species' northern range." Woinarski *et al.* (2014), in their review of the status of Australia's mammals, consider that the platypus is now 'near threatened' using IUCN criteria<sup>32</sup>, based on an inferred decline from a small set of monitoring programs and suspected threats. A limitation of the IUCN criteria is that the entire range of the species is taken into account. The NSW *Threatened Species Conservation Act 1995* introduced a new initiative, the category of 'endangered population' to account for a species becoming threatened in a particular geographical area. Surprisingly, to date, no platypus population has been declared endangered in NSW. The platypus is an example of a species that falls outside funding for threatened species recovery because it is not a listed threatened species, even though it is iconic by almost any zoological measure.

### A grumpy complaint

Inspired by the BBC and ABC television shows 'Grumpy Old Men' and 'Grumpy Old Women', the Royal Zoological Society of NSW (RZS) ran a forum in 2012 called *Grumpy scientists* (Lunney *et al.* 2013b), a place for emerging and established experts to give voice to their passionate scientific concerns. In this forum, I lamented that the environment had been downgraded as an issue within public discourse, along with the fact that most of our wildlife receives too little attention to ensure its survival (Lunney 2013). We need to broaden the priorities of vertebrate fauna conservation to cover all species of birds, frogs, mammals and reptiles, not just threatened species. This 'grumpy complaint'

31 [http://www.iucnredlist.org/static/categories\\_criteria\\_3\\_1](http://www.iucnredlist.org/static/categories_criteria_3_1)

32 The IUCN now recognises the platypus as 'near threatened', which is the category between 'least concern' and 'vulnerable'. Woinarski, J. & Burbidge, A.A. 2016. *Ornithorhynchus anatinus*. *The IUCN Red List of Threatened Species* 2016: e.T40488A21964009. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T40488A21964009.en>

30 Prest lists the reference as p8 EFIP Act explanatory memorandum, re: 92A NPWA.

## The hegemony of endangered species

becomes a dangerous idea when we consider that more resources and more effort are required to conserve all our mammal, bird, frog and reptile fauna. This applies to all of NSW, since every part of NSW has some non-threatened species. This means a lessening, reversing, or complete stop of some developments, logging, mining, increased water use, and a range of other activities that exploit our natural resources. Developers can see the cost and time of dealing with, and conserving, all species, not just threatened species. Those who support the economic advantages of development are unlikely to see the enormous advantages of considering the non-threatened species – that a) we shall have a better chance of conserving all of our wildlife, rather than just slowing the decline of threatened species, including through early warnings for population failures and for assessment of environmental impact; b) a more inclusive meaning to biodiversity conservation than could be achieved through focussing on only a small list of species; c) expanding the area of interest of the land and sea to cover all of the State, not just those locations where threatened species are found; and d) implementing procedures to avoid threats to biodiversity, not just threatened species. By shifting thought from only threatened species to all species, we can fully appreciate the critical role that science plays in assessing impacts. As much, if not more than economic or other factors, it is science that shows the greater strength in experimental design and statistical analysis when using large sample sizes – large samples that can only be obtained by using common species.

To overlook the majority of our vertebrate species because they are not on the Commonwealth or State threatened species lists does not conserve biodiversity. Why must we wait until it is almost too late before we can act? Under both the NSW and Commonwealth Acts which regulate developments that affect the environment, we act on lists composed entirely of threatened species. The significant impact criteria focuses entirely on species listed as threatened, and that in turn only reinforces the focus on threatened species, to the detriment of biodiversity. Threatened species schedules are only the beginning of the attention given to threatened species.

## References

**Adam, P. 1998.** Biodiversity- the biggest of big pictures. Pp 6-14 in *Is the biodiversity tail wagging the zoological dog?* edited by D. Lunney, T. Dawson and C. R. Dickman. Royal Zoological Society of NSW, Mosman, NSW, Australia.

**Adam, P. 2013.** Don't worry – be happy. Pp 71-87 in *Grumpy Scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings and H. F. Recher. Royal Zoological Society of NSW, Mosman, NSW, Australia. DOI: <https://doi.org/10.7882/FS.2013.016>

There are flow-on effects as to what is important, what is considered and what modifications are made to any development proposal. To conserve biodiversity we must make a radical shift in our thinking and through that, our actions, to include all species. It is illogical to think that the majority of species should fall outside our conservation efforts, that non-threatened species should not be of equal status and receive equal thought and conservation attention. We must put non-threatened species back in the conservation spotlight.

## Conclusion

The hegemony of endangered species legislation hinders biodiversity conservation. This hegemony has been built on a series of actions that collectively have resulted in a restriction to our ability to conserve biodiversity by narrowing our focus to threatened species. The State of the Environment reports reveal the shortfall in both our understanding of the issues for conserving biodiversity and our ability to deal with the issues that have been identified. The legislation subsequent to the Chaelundi case in 1991 limited the scope of political and bureaucratic interest in fauna conservation to the officially-listed threatened species, called endangered fauna until 1995. Together, these two official channels highlight our ignorance and, consequently, how inadequate our piecemeal attempts to conserve NSW biodiversity really are. This approach is no longer satisfactory. The dangerous idea I promote is to give protected vertebrate species the same attention as threatened species – the next piece of radical legislation. This idea is dangerous because it is necessary: we must conserve all our native fauna (Lunney 2017). Let us hope that politics, and the law, soon catch up with the science.

## Acknowledgements

I am indebted to critical comments on drafts of this paper by Paul Adam, Peter Banks, Chris Moon, Martin Predavec, Tessa Lunney and Owen Lunney. I am indebted to Max Newman and Owen Lunney for finding the relevant legislation and the text of the Chaelundi court case.

**Banks, P. B. and Hochuli, D. 2017.** Extinction, de-extinction and conservation: a dangerous mix of ideas. *Australian zoologist* 38: 390-394. DOI: <http://dx.doi.org/10.7882/AZ.2016.012>

**Beeton, R. J.S. 2004.** Foreword, pp iv-v in *Threatened Species Legislation: is it just an Act?*, edited by P. Hutchings, D. Lunney, and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW. DOI: <https://doi.org/10.7882/FS.2004.051>

**Bonyhady, T. 1993.** *Places worth keeping: conservationists, politics and the law*. Allen and Unwin, St Leonards, NSW, Australia.

- Brockman, J. (ed.). 2006.** *What is your Dangerous Idea? Today's leading thinkers on the unthinkable*. Pocket book edition 2007, first published by Simon and Schuster 2006, Sydney, Australia.
- Caughley, G. and Gunn, A. 1996.** *Conservation biology in theory and practice*. Blackwell Science Press, Massachusetts, USA. (As cited in Hochuli 1998.)
- Commonwealth of Australia. 1996.** *Australia: State of the Environment 1996*. CSIRO Collingwood, Victoria, Australia.
- Dawkins, R. 2006.** Afterword. Pp. 305-309 in *What is your Dangerous Idea? Today's leading thinkers on the unthinkable*, edited by J. Brockman. Pocket book edition 2007, first published by Simon and Schuster 2006, Sydney, Australia.
- Dasmann, R. F. 1970.** *A different kind of country*. Macmillan company, New York, USA.
- DECCW 2009** (cited in SoE 2015)
- Dickman, C., Hutchings, P. and Lunney, D. 2004.** Threatened species legislation: just one act in the play. Pp 180-192 in *Threatened Species Legislation: is it just an Act?*, edited by P. Hutchings, D. Lunney, and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW. DOI: <https://doi.org/10.7882/FS.2004.070>
- EPA. 1997.** *The New South Wales State of the Environment 1997*. Environment Protection Authority: New South Wales, Chatswood. (As cited in Lunney 1998.)
- EPA. 2000.** *The New South Wales State of the Environment 2000*. (Report and backgrounders). Environment Protection Authority: New South Wales, Sydney. (As cited in Lunney 2001a.)
- EPA. 2009.** *New South Wales State of the Environment 2009*. <http://www.epa.nsw.gov.au/soe/soe2009/chapter7/>
- EPA 2012.** *New South Wales State of the Environment 2012*. <http://epa.nsw.gov.au/soe/soe2012/index.htm>
- Hamilton, C. 2003.** *Growth Fetish*. Allen and Unwin, Crows Nest, NSW, Australia.
- Hochuli, D. F. 1998.** The biodiversity tale: how invertebrates can teach the zoology dog new tricks. Pp 15-23 in *Is the biodiversity tail wagging the zoological dog?* Edited by D. Lunney, T. Dawson and C. R. Dickman. Royal Zoological Society of NSW, Mosman, NSW, Australia.
- Hutchings, P. A. 2003.** Threatened species management: out of its depth for marine invertebrates. Pp 81-88 in *Conserving marine environments: out of sight, out of mind*, edited by P. Hutchings and D. Lunney. Royal Zoological Society of NSW, Mosman, NSW, Australia. DOI: <https://doi.org/10.7882/FS.2003.010>
- Hutchings, P. 2013.** Why are taxonomists often regarded as second class citizens? A misclassification that threatens the basic infrastructure of biodiversity. Pp. 26-30 in *Grumpy Scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings and H. F. Recher. Royal Zoological Society of NSW, Mosman NSW, Australia. DOI: <https://doi.org/10.7882/FS.2013.009>
- Jarman, P. J. and Brock, M. A. 2004.** The evolving intent and coverage of legislation to protect biodiversity in New South Wales. Pp 1-19 in *Threatened Species Legislation: is it just an Act?*, edited by P. Hutchings, D. Lunney, and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW. DOI: <https://doi.org/10.7882/FS.2004.053>
- Lindenmayer, D., Burns, E., Thurgate, N. and Lowe, A. 2014.** General overview. Pp 3-19 in *Biodiversity and environmental change: monitoring, challenges and direction*, edited by D. Lindenmayer, E. Burns, N. Thurgate and A. Lowe. CSIRO publishing, Collingwood, Victoria, Australia.
- Lunney, D. 1987.** Effects of logging, fire and drought on possums and gliders in the coastal forests near Bega, New South Wales. *Australian Wildlife Research* 14: 263-74. DOI: <https://doi.org/10.1071/WR9870263>
- Lunney, D. (ed.) 1991.** *Conservation of Australia's Forest Fauna*. Royal Zoological Society of New South Wales. Mosman, NSW.
- Lunney, D. (ed.) 1992.** *Zoology in Court*. Royal Zoological Society New South Wales, Mosman, NSW, Australia.
- Lunney, D. 1998.** Lack of awareness and knowledge about biodiversity. *Australian Zoologist* 30: 381-382.
- Lunney, D. 2001a.** The NSW "State of the Environment 2000" report: a rallying call for zoologists. *Australian Zoologist* 31: 529-32. DOI: <https://doi.org/10.7882/AZ.2001.001>
- Lunney, D. 2001b.** Causes of the extinction of native mammals of the Western Division of New South Wales: an ecological interpretation of the nineteenth century historical record. *The Rangeland Journal* 23: 44-70. DOI: <https://doi.org/10.1071/RJ01014>
- Lunney, D. (ed.). 2004.** *Conservation of Australia's Forest Fauna (second edition)*. Royal Zoological Society of NSW, Mosman, NSW, Australia.
- Lunney, D. 2010.** A history of the debate (1948-2009) on the commercial harvesting of kangaroos, with particular reference to New South Wales and the role of Gordon Grigg. *Australian Zoologist* 35: 383-430. DOI: <https://doi.org/10.7882/AZ.2010.027>
- Lunney, D. 2012.** Charismatic megafauna. Pp 63-66 in *The Encyclopedia of Sustainability: Vol. 5. Ecosystem Management and Sustainability*, edited by Robin Kundis Craig, Bruce Parady, John Copeland Nagle, Oswald Schmitz and William Smith. Great Barrington, MA: Berkshire Publishing, USA.
- Lunney, D. 2013.** Is a grumpy ecologist an oxymoron? Pp

## The hegemony of endangered species

- 95-105 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings and H.F. Recher. Royal Zoological Society of NSW, Mosman NSW, Australia.
- Lunney, D.** 2017. Dangerous? Necessary: we must conserve all our native fauna. *Australian Zoologist* 38: 281-288. <https://doi.org/10.7882/AZ.2017.005>
- Lunney, D., Urquhart, C. A. and Reed, P. (eds).** 1990. Koala Summit. Managing Koalas in NSW. (NSW) National Parks and Wildlife Service, Hurstville, NSW Australia.
- Lunney, D., Eby, P., O'Connell, M.** 1991. Effect of logging, fire and drought on three species of lizards in Mumbulla State Forest on the south coast of New South Wales. *Australian Journal of Ecology* 16: 33-46. <https://doi.org/10.1111/j.1442-9993.1991.tb01479.x>
- Lunney, D., Curtin, A., Ayers, D., Cogger, H. G. and Dickman, C. R.** 1996. An ecological approach to identifying the endangered fauna of New South Wales. *Pacific Conservation Biology* 2: 212-231. <https://doi.org/10.1071/PC960212>
- Lunney, D., Curtin, A., Fisher, D., Ayers, D. and Dickman, C. R.** 1997. The ecological attributes of the threatened fauna of New South Wales. *Pacific Conservation Biology* 3: 13-26. <https://doi.org/10.1071/PC970013>
- Lunney, D., Moon, C., Matthews, A. and Turbill, J.** 1999. *Coffs Harbour City Koala Plan of Management*. Parts A & B. NSW National Parks and Wildlife Service, Hurstville.
- Lunney, D., Curtin, A. L., Ayers, D., Cogger, H. G., Dickman, C. R., Maitz, W., Law, B. and Fisher, D.** 2000. The threatened and non-threatened native vertebrate fauna of New South Wales: status and ecological attributes. *Environmental and Heritage Monograph Series* No. 4. National Parks and Wildlife Service, Hurstville, NSW.
- Lunney, D., Matthews, A., Cogger, H. and Dickman, C.** 2004. The neglected 74% – the non-threatened vertebrates – and a reflection on the limitations of the process that fashioned the current schedules of threatened species in New South Wales. Pp. 145-157 in *Threatened Species Legislation: is it just an Act?*, edited by P. Hutchings, D. Lunney and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW. <https://doi.org/10.7882/FS.2004.066>
- Lunney, D., Dickman, C., Copely, P., Grant, T., Munks, S., Carrick, E., Serena, M. and Ellis, M.** 2008. *Ornithorhynchus anatinus*. Technical species reports (mammals) in the 2008 IUCN Red List of Threatened Species, Switzerland. (For citation: IUCN Red List of Threatened Species. 2008. Version 2010.1. [www.iucnredlist.org](http://www.iucnredlist.org) for each species, also <http://www.iucnredlist.org/details/40488/0>)
- Lunney, D., Matthews, A., Eby, P. and Penn, A. M.** 2009. The long-term effects of logging for woodchips on small mammal populations. *Wildlife Research* 36: 691-701. <https://doi.org/10.1071/WR08028>
- Lunney, D., Recher, H. F. and Hutchings, P.** 2013a. Preface. Pp. v-vi in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings and H. F. Recher. Royal Zoological Society of NSW, Mosman NSW, Australia. DOI: <https://doi.org/10.7882/FS.2013.001>
- Lunney, D., Recher, H. F. and Hutchings, P.** 2013b. The critical importance of an ecological conscience. Pp. 126-138 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings and H. F. Recher. Royal Zoological Society of NSW, Mosman NSW, Australia. <https://doi.org/10.7882/FS.2013.021>
- Lydecker, R.** 1903. *Mostly mammals. Zoological essays*. Dodd Mead and company New York, and Hutchinson and Co. London. (as cited in Lunney 2001).
- Pain, N. and Wright, S.** 2003. *The Rise of Environmental Law in New South Wales and Federally: Perspectives from the Past and Issues for the Future*. Paper presented to National Environmental Law Association Annual Conference, Broken Hill NSW, Friday 24 October 2003. Available as [http://www.lec.justice.nsw.gov.au/Documents/pain\\_the\\_rise\\_of\\_environmental\\_law.pdf](http://www.lec.justice.nsw.gov.au/Documents/pain_the_rise_of_environmental_law.pdf)
- Ponder, W. and Lunney, D. (eds).** 1999. The Other 99%. The conservation and biodiversity of invertebrates. Transactions of the Royal Zoological Society, Mosman, NSW.
- Prest, J.** 1995. *Licensed to kill: endangered fauna licensing under the National Parks and Wildlife Act 1974 (NSW) between 1991-1995*. Australian centre for Environmental Law. Law faculty, ANU, Canberra Australia.
- Preston, B. J.** 2006. *The role of the judiciary in promoting sustainable development: the experience of asia and the pacific*. A paper presented to the second Kenya National Judicial Colloquium on Environmental Law Mombasa, Kenya, 17-22 April 2006. Also available [http://www.lec.justice.nsw.gov.au/Documents/preston\\_the%20role%20of%20the%20judiciary%20in%20promoting%20sustainable%20development.pdf](http://www.lec.justice.nsw.gov.au/Documents/preston_the%20role%20of%20the%20judiciary%20in%20promoting%20sustainable%20development.pdf)
- Preston, B. J.** 2009. *Jurisprudence on ecologically sustainable development: Paul Stein's contribution*. A paper presented at the Symposium in honour of Paul Stein AM. Conference organised by: Law Council of Australia, Hunt & Hunt Lawyers, Sydney. 10 December 2009. Available as [http://www.lec.justice.nsw.gov.au/Documents/preston\\_jurisprudence%20on%20ecologically%20sustainable%20development.pdf](http://www.lec.justice.nsw.gov.au/Documents/preston_jurisprudence%20on%20ecologically%20sustainable%20development.pdf)
- Reaka-Kudla, M., Wilson, D. E and Wilson, E. O. (eds).** 1997. *Biodiversity II. Understanding and protecting our biological resources*, Joseph John Henry Press, Washington DC. USA.
- Recher, H. F., Lunney, D. and Dunn, I. (eds).** 1979. *A Natural Legacy. Ecology in Australia*. Pergamon Press, Rushcutters Bay, NSW, Australia.
- Recher, H. F., Lunney, D. and Dunn, I. (eds).** 1986. (Second

edn). *A Natural Legacy. Ecology in Australia*. Pergamon Press, Ruschcutters Bay, NSW, Australia.

**Reed, P., Lunney, D. and Walker, P. 1990.** Survey of the koala *Phascolarctos cinereus* (Goldfuss) in New South Wales (1986-87), with an ecological interpretation of its distribution. Pp 55-74 in *Biology of the koala*, edited by A. K. Lee, K. A. Handasyde and G. D. Sanson, Surrey Beatty and Sons, Chipping Norton, NSW.

**SoE. 2003.** *New South Wales State of the Environment 2003*. <http://epa.nsw.gov.au/soe/soe2003/index.htm>

**SoE 2015.** *NSW State of the Environment 2015*. <http://epa.nsw.gov.au/soe/soe2015.htm>

**Smart, J. and Stuart, S. 2011.** *The importance of species*. Pp 4-19 in *Species on the edge of survival*. IUCN Gland Switzerland and Harper Collins Glasgow UK.

**Smith, S. 1998.** *National Parks in NSW*. Briefing Paper No 22/98. ISSN 1325-5142 ISBN 0 7313 16355, December 1998. <https://www.parliament.nsw.gov.au/researchpapers/Documents/national-parks-in-nsw/22-98.pdf>

**Stubbs, B. J. 2001.** From 'Useless Brutes' to National Treasures: a century of evolving attitudes towards native fauna in New South Wales, 1860s to 1960s. *Environment and History* 7: 23-56. <https://doi.org/10.3197/096734001129342397>

**Whelan, R. J., Brown, C. L. and Farrier, D. 2004.** The precautionary principle: what is it and how might it be applied in threatened species conservation. Pp 49-58 in *Threatened Species Legislation: is it just an Act?*, edited by P. Hutchings, D. Lunney and C. Dickman. Royal Zoological Society of New South Wales, Mosman, NSW. <https://doi.org/10.7882/FS.2004.056>

**Wilson, E. O. 1997.** Introduction. Pp 1-3 in *Biodiversity II. Understanding and protecting our biological resources*, edited by M. Reaka-Kudla, Wilson, D. E and Wilson, E. O. Joseph John Henry Press, Washington DC. USA. [https://doi.org/10.1163/9789004267343\\_002](https://doi.org/10.1163/9789004267343_002)

**Woinarski, J. C. Z., Burbidge, A. A. and Harrison, P. L. 2014.** *The action plan for Australian mammals 2012*. CSIRO publishing, Collingwood, Victoria, Australia.

## APPENDIX I Justice Paul Stein's intuitive ecological approach to evaluating the zoological evidence in the Chaelundi case of 1991

In bringing his judgment to a conclusion (73 LGRA 161), Stein states: "The Court declares 1. That the proposed logging and roading activities by the respondents and their servants, agents, licensees or contractors in compartments 180, 198 and 200 of Chaelundi State Forest are likely to disturb or injure the following endangered species listed in Schedule 12 of the National Parks and Wildlife Act 1974 in breach of s 99 of the Act: Powerful Owl, Masked Owl, Sooty Owl, Spotted-tailed Quoll, Feathertail Glider, Eastern Pygmy Possum, Long-nosed Potoroo, Hastings River Mouse, Parma Wallaby, Brush-tailed Phascogale, Dome-headed Bat, Large-footed Myotis, Koala, Glossy Black Cockatoo, Rufous Fantail, Carpet Python. 2. That the proposed logging and roading activities by the respondents and their servants, agents, licensees or contractors in compartments 180, 198 and 200 of Chaelundi State Forest are likely to disturb or injure the following protected fauna in breach of s 98 of the National Parks and Wildlife Act 1974: Fletcher's Frog, Beech Skink, Rufous Bettong, Squirrel Glider, Yellow-bellied Glider, Greater Glider, Sugar Glider."

This represents 16 endangered species and 7 protected, i.e. non-endangered, species. It also includes a frog, which appears to be the first time that a frog has received such prominence, and it might be further noted that the endangered species mentioned included species of special concern, such as the koala and the spotted-tailed quoll.

Stein's judgment is ecological in its reasoning, and it is expressed in plain English, the koala is a good example (p 156): "There is little doubt that the koala is present in the compartments .... Tallowwood leaves are frequently utilised by koalas as a food source. Tallowwood is a dominant canopy tree species in the area. The koala is listed as an endangered species and a "Fauna of Special Concern" in Pt 1 of Schedule 12. ... the long-term future of the species is in doubt because of continued clearing of eucalypt forest and restriction of koala populations to small patches of sub-optimal habitat. Apart from not felling a tree in which a koala is spotted, (until the koala moves on), the forestry prescriptions do not appear to make any special effort to avoid disturbance to the species. ... The plans do not adequately protect the habitat requirements of the koala. I find that the koala is very likely to be disturbed, or injured by the proposed forestry operations. The species is clearly sensitive and has limited food tree sources. The koala will likely be detrimentally affected by permanent changes in the forest structure. Its numbers will diminish as its habitat is disturbed."

Another clear example of the logic of Stein's judgment (p152-153): "The Spotted-tailed Quoll (sometimes known as the Tiger Cat) is included in Schedule 12 of the endangered species list as "Fauna of Special Concern". It is known to occur in the subject compartments (Gilmore, Hines and Dickman). According to Dr Dickman, an expert in the species, it is vulnerable to operations which significantly modify, destroy, fragment and/or isolate its habitat. The male quoll has a requirement of a large home range of in excess of 30 hectares in sub-optimal habitat. Its prey are birds, rats, small terrestrial mammals, arboreal mammals, gliding possums, small macropods, reptiles and arthropods. There are no special prescriptions in the harvesting plans which address likely impact on the quolls. It is the undisputed opinion of Dr Dickman that the proposed logging operations will cause injuries and deaths to the Spotted-tailed Quoll and cause their species population to decline. In particular, any roading or logging during the quolls' mating season (April to August) will create a most significant disturbance of reproductive cycles. In Dr Dickman's opinion the wildlife corridors are too small in area to sustain home ranges. The resident quolls will therefore be displaced and in turn disturb the home ranges of others in adjacent areas. The likely result is injury or death. Roads, trails and snig tracks will permit the ingress of predator species, particularly the feral cat and fox. These will provide competition and predation. Understorey perturbation will also react adversely to disturb the quoll. In Mr Gilmore's view the worst case scenario will lead to disturbance and injury and ultimately the elimination of Spotted-tailed Quolls. These opinions are supported by Gilmore, Recher and Smith. Forestry Commission documents also acknowledge the threat of forestry operations to the quoll (at 138; 352). I have little or no doubt that the proposed forestry operations will kill, injure or disturb the Spotted-tailed Quoll. On the evidence I believe this will be an inevitability. An imminent breach of s 99 of the NPWA has been shown."

The reasoning by Justice Paul Stein is ecological in its frames of reference, but not using scientific language, and it represents a clear case of good science emerging from an intelligent appreciation of how the connections of forest fauna to a suite of potential threats can logically be made. It also means that close attention was paid to the expert scientific witnesses. Also, the importance of well-considered environmental legislation that is intelligible to both the legal and scientific domains emerges from this judgment, and one might comment that any future schedule of fauna of special concern deserves more consideration in its drafting. However, of overwhelming importance is the fact that Stein was able to draw on s 98, i.e. protected fauna, meaning non-threatened fauna, in forming his judgment. It is the non-threatened fauna that I argue needs to be re-instated as being of equal importance to threatened fauna in determining how to manage our native fauna.