What makes this old scientist grumpy

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ABSTRACT

This scientist is grumpy with his scientific colleagues and the conservation agenda driven by green groups. Scientists are too conservative and lack the skills to communicate effectively with the community. Scientists need to assume moral responsibility for the application of their science and not allow multinationals and politicians dictate science policy or interfere with the communication of science. This requires fundamental changes in science education in Australia. The conservation agenda is anthropocentric with too much emphasis on conservation reserves for human recreation, and on wilderness, threatened species, and alien (exotic) species. The result is a fragmented reserve system that cannot conserve continental biodiversity in the long-term, and inadequate funding for less charismatic species or preventing common species from becoming threatened. A whole-of-landscape approach, such as WildCountry and Wild Lands, is needed; the conservation paradigm should be inverted with the entire continent seen as a nature reserve and human activities managed with nature conservation as a priority. However, nothing will be achieved without policies to limit and then reduce the human population and its consumption of resources. Humanity needs to share Earth with all other species regardless of those species economic benefits or costs.

Key words: communication and science education, conservation reserves, WildCountry, wilderness, population policy, citation indices, scientific publication, long-term ecological research, connectivity and dispersive species, recovery plans, exotic species

http://dx.doi.org/10.7882/FS.2013.004

Introduction

Many things make me grumpy. My scientific colleagues make me grumpy, as does the way we conduct nature conservation in Australia. I'll start with scientists, their conservatism, and their reluctance to challenge authority or take a public stance on critical environmental issues. I'll then explain why I am grumpy about nature conservation and many in the conservation movement who drive the conservation agenda. Not wanting to be just grumpy, I will provide recommendations on how we could do things better, which if implemented would make me less grumpy.

Scientists

Contrary to what one might expect, scientists are conservative and, with rare exceptions[1] do not challenge authority as individuals (Recher 2012)[2]. As a consequence and because of their inadequate education in communication and the humanities (Recher 1992, 1998a; Dean 2009; Olson 2009) along with concerns that taking an advocacy role may threaten their careers (Martin 2012), the scientific community has failed to give direction, much less set a moral compass, on how society can best use the technology and knowledge generated by scientific and medical research[3]. This is despite strong statements from groups of scientists on the threats to global survival from the mis-use of science and technology (e.g., The Club of Rome [Meadows *et al.* 1972, 1993, 2004]; the Union of Concerned Scientists [http://www.ucsusa.org/about/1992-world-scientists.html]; the Wentworth Group; and the majority of the world's national academies of science), as well as many individual scientists, such as Paul Ehrlich and Ed Wilson. Worse, science directs its research, or allows its research to be directed, to technologies that threaten the survival of countless millions of species, entire ecosystems, and human civilization itself. Ehrlich (2013) questions whether civilization will survive unless people come to grips with population growth and excessive consumption. Vast sums are devoted to research encouraging reproduction and prolonging human life, with no regard to the quality of life, while other studies produce technologies that threaten survival through nuclear holocaust and climate change. While a few of us live longer, healthier lives, more go hungry and world ecosystems verge on collapse (Scheffer *et al.* 2001; Millennium Ecosystem Assessment 2005; Barnosky *et al.* 2012; Ehrlich 2013). As if creating an ecologically dysfunctional world was not enough, in recent decades academics have yielded control of their journals to a cartel of commercial publishing houses and turned the

1. Among Australians who have challenged the system are the late Peter Cullen, and the very much alive and vocal Richard Kingsford, David Lindenmayer, and David Paton.
2. A common excuse for the failure to take a public stance on controversial issues are the restrictions imposed by governments and employers preventing scientists from speaking without approval. Fear of criticism from colleagues also prevents many scientists from speaking openly. While such restrictions are real, most do not apply to university academics and can be circumvented with little risk by government and industry scientists. Nonetheless, they make a convenient excuse for staying silent. Too many scientists in Australia choose not speak to the public because they are afraid of the media and lack good communication skills.
3. For a review of the reasons why scientists should be or should not be advocates see Nelson and Vucetich (2009), who conclude that scientists should take a more active role in policy development. That is, scientists should be advocates.

Pp 1-8 in *Grumpy Scientists: the Ecological Conscience of a Nation*, edited by Daniel Lunney, Pat Hutchings and Harry F. Recher. Royal Zoological Society of New South Wales, Mosman, NSW, Australia. 2013.

communication of science into an economic activity that threatens the survival of important Australian journals, such as *Australian Zoologist* and *Pacific Conservation Biology*. Others, such as *Emu* (*Austral Ornithology*), *Australian Wildlife Research* (*Wildlife Research*), and *Austral Ecology* (*Australian Journal of Ecology*) are already lost as journals dedicated to the publication of Australian research, with their emphasis now on the Southern Hemisphere (see Bryant and Calver (2012) for a summary of changed editorial policies for these journals). The free and open communication of science is further threatened by the unthinking and selfish acceptance of journal rankings and citation indices as measures of excellence thereby side-stepping the merits and utility of the research itself (for critiques of rankings and indices see Bryant and Calver 2012; Calver 2013, Calver *et al.* 2013). In my opinion, the entire concept of ranking journals is irrational, biased, and controlled by the same international publishing houses that now control most scientific journals. The proliferation of open access journals where authors pay to have their work published is an equally disturbing trend that risks creating two castes of scientists; those with money for rapid publication and those without. Publication should not be about who can afford to pay and who cannot. All scientific publication should be 'open access' and neither researchers nor readers should have to pay other than as members of scientific societies or as subscribers and supporters of scientific journals.

Some of these problems can be avoided by better support of scientific societies. Scientists should support their societies by becoming members and actively participating in publication, not just as authors, but as editors and referees. Instead of allowing conferences to be organized by for profit professional organizers, scientists should tithe some of their time and take turns at conference organization, as was the way in past decades. 'Volunteering' keeps costs down and allows all scientists to publish, read journals, and participate in conferences. This is unlike the current situation where many journals are obscenely expensive, the cost of downloads prohibitive unless you have access through a library, and conferences priced out of the reach of anyone on a pension or not in receipt of a grant.

In a parallel capitulation to administrators, politicians, and mindless ideology, academics have allowed animal rights/welfare zealots to distort the conduct of research and teaching through so-called ethics committees without ever asking why the same standards do not apply to the rest of society[4] . What is unethical about research intended to place the survival of species above the welfare of a few individuals, but such research is too frequently hindered by unrealistic ethics standards (Fulton and Ford 2001; Tidemann and Vardon 2002; Dyson and Calver 2003; Lunney 2012a,b). The result is poor conservation and increased risk to species survival.

What can be done to improve the way science interacts with the world? In Australia we can start by beginning the education of science students with a foundation year in the humanities and communication skills. A science degree would then require four years of study putting it on par with American universities and colleges; there would be no Honours year as such[5]. Postgraduates need instruction on their moral and social responsibilities, not only to other people and species, but to science itself. They need to learn that their research responsibilities extend to being good referees, taking on editorial duties, assisting with conferences, and mentoring less experienced workers. They need to learn and understand that they have a responsibility to communicate with the public, explaining the meaning and consequences of their research, and that this subsumes any responsibilities they may have to employers, governments, or personal advancement (Recher and Ehrlich 1999; Recher *et al.* 2009a; Nelson and Vucetich 2009).

Conservationists

If academics make me grumpy, they are not as frustrating as the relentless failure of individuals and conservation groups, including the so-called 'Greens', to understand the most basic principles of ecology; instead relying more on raw emotion than good science to set Australia's conservation agenda[6]. Worse, almost all nature conservation groups in Australia lack policies on population growth. For a continent that is already grossly overpopulated in a world that is equally overpopulated, I find it hard to see how any conservation body, including those that profess to 'green' politics, can avoid taking a stand on population growth. The Australian Conservation Foundation, for example, has issued a policy statement (No. 54; >http://www.acfonline.org.au/aboutus/governance/acf-policies<, accessed 27 January 2013) on population, which calls for the adoption of a national population policy with an emphasis on sustainability, but fails to advocate any action to ensure the population and its rate of growth is sustainable.

4. It is only necessary to spend a few hours watching television commercials or programs devoted to, say recreation fishing, to see activities involving wild animals that would never receive approval from a university ethics committee. Although not as obvious, wild animals are often manipulated in nature documentaries in ways that would also not be approved by an ethics committee. Please note that I have no personal objections to the ways in which animals are handled on television nor do I consider the actions unethical, but they highlight a dual standard for the treatment of animals within society. Animals are not the victims; science is.

5. The Honours year in Australia has long been an anachronism. By itself, it is no criterion of research ability, much less excellence. In over 45 years of scientific research and higher education in Australia, I have never seen any evidence that selection for Honours means the student has the necessary skills to achieve as a research scientist. Too often I've observed the 'best' students failing to be accepted for Honours, while those good at exams and rote learning proceed. There are similar problems in the way universities accept students to higher degree programs with too much emphasis on 'grades' and not enough on ability and communication skills. Is this why so few Honours and higher degree theses are ever published unless led by supervisors?

6. It was for this reason that I organized a series of lectures at the Australian Museum in 1976 entitled 'Ecology for Conservationists'. The response was overwhelming and the lectures had to be given twice, although a majority of the audiences probably would not have described themselves as 'conservationists'. The lectures led to the publication of '*A Natural Legacy: Ecology in Australia*' (1979), with a second edition in 1986. David Milledge illustrated both editions, which were originally published by Pergamon Press. Although the book was widely read and used through the '90s, nothing seems to have changed in respect to the ecological sophistication of green groups in Australia.

Taking on the prevailing social and economic dogma of 'bigger is better' is difficult, but the conservation movement, including government conservation and environment instrumentalities, pursues a conservation agenda that not only fails to protect continental biodiversity (for frank assessments of the state of Australia's biota see Recher and Lim 1990, Recher 1999, and Kingsford 2013, as well as various State and Commonwealth 'State of Environment' reports), but can never work. The conservation agenda can never work because it is anthropocentric and founded on emotion and ideology, not science. Mind you, not many scientists seem very concerned about human population growth either, but that is another story[7].

The Conservation Agenda

There are three aspects of the conservation agenda that make me especially grumpy.

The first thing that makes me grumpy is the adulation of a conservation reserve system that cannot protect continental biodiversity (Recher 1990a,b,c, 1994, 1999, 2002a,b,c; Recher *et al.* 2007; Soulé *et al.* 2007). Australia's system of reserves is unrepresentative, fragmented and lacking connectivity, anthropocentric, too-often poorly managed, and temporary pending decisions on the best economic use of the land (Recher 1976, 1998b; Recher *et al.* 2007). Wilderness is the worst of the lot and the push to declare wilderness over existing reserves has nothing to do with nature conservation and everything to do with providing recreation for a privileged few (Recher 1998c, Recher and Lunney 2003). As an example, the destruction of long-term ecological research in the Nadgee Nature Reserve by declaring it a 'wilderness' so bush walkers would not see vehicles while walking from A to B has set back the conservation of other species and long-term ecological research in Australia in ways that can never be recovered (Recher and Lunney 2003). Yet, when Nadgee was established in 1957 it had a primary objective of encouraging conservation research (Lunney *et al.* 2012). Ironically, Nadgee was never a wilderness having a long history of human disturbance, pre-dating European settlement of Australia, with none of the reserve outside the sights and sounds of industrial society[8]. Only the researchers have been excluded[9].

This does not mean conservation reserves have no value. They are important building blocks, but they will succeed in protecting biodiversity only if managed in a whole of landscape approach to nature conservation such as that embodied in the Wilderness Society's WildCountry or the North American Wild Lands concept (Noss 1992; Recher 2003; Foreman 2004; Wilderness Society 2005). It is also necessary to provide adequate resources for reserve management and ensure that reserve managers have the kind of education that empowers them to communicate effectively with conservation scientists and apply the outcomes of conservation research to reserve management. I see little evidence of either adequate resources or education for reserve management anywhere in Australia. Instead reserves are starved of funds, treated more as tourist venues, and playgrounds than as centres for biodiversity conservation. Most are managed (if that is the word) with little understanding or regard for the ecology of the reserve's flora and fauna. If there is communication between managers and conservation scientists, it is spasmodic at best and antagonistic at worst.

At particular risk from a fragmented reserve system, where land is apportioned among different land tenures and management systems without an integrated and overarching conservation goal, are dispersive species (Gilmore *et al.* 2007; Recher 2007; Ford 2013). Included here are migratory and nomadic birds and insects, as well as much of the life in the oceans. Fragmentation also means the end of evolution as each reserve and its biota become increasing isolated in a dysfunctional and alien landscape (Saunders *et al.* 1991; Recher 1998b; Soulé *et al.* 2004). In the absence of connectivity, the opportunity to adapt to climate change has been taken away from most species. Applying the concept of a piecemeal terrestrial reserve system to the marine environment only exacerbates my grumpiness, but this is the core theme of efforts to protect marine biodiversity, with the Commonwealth of Australia declaring in 2012 the largest system of marine reserves in the world. Not all marine biologists favour this approach to marine conservation (Allison *et al.* 1998; Halpern 2003; Pressey 2013). Although there can be benefits to a marine reserve system, as with terrestrial reserves the marine parks programme in Australia is unrepresentative, anthropocentric, political, and based on inadequate or poor science (Pressey 2013).

We could do things differently. We could invert the conservation paradigm and treat the entire continent, including its marine environments, as a conservation reserve within which there are nodes of human activity (Recher *et al.* 2007) nodes that would be managed with sustainability, environmental integrity, and nature (biodiversity) conservation as primary goals. We could recognize we live in a finite world and that humanity has already gone past sustainable development and faces an era of intense resource competition, with significant risk of ecosystem and social collapse (Ehrlich 2013). What should we do? We should adopt WildCountry principles of connectivity[10] and take a whole-of-landscape approach to environmental management and nature conservation

7 For example, a recent search (3 February 2013) of the web site of the Ecological Society of Australia failed to find any mention, much less a policy statement, on population growth. A similar search of the web site of the Society for Conservation Biology also failed to find any policy statement on population growth, despite numerous statements on a wide range of conservation biology issues most of which have a root cause in too many people.

8 During a census of birds on Impressa Moor in Nadgee, I counted 29 boats from runabouts to fishing trawlers to cruise liners to container vessels in sight at the same time. Hardly a wilderness experience.

9 As recently as December 2012, researchers with a history of long-term ecological research in the Nadgee Nature Reserve, including D. Lunney and H. Recher, were denied permission by park authorities to enter Nadgee as part of a scientific tour of research sites in the Eden region. The reason given was that the tour would be by vehicle and this might 'offend' bush walkers visiting the reserve as a wilderness (J. Shields pers comm). Permission was eventually granted, but restricted to five hours meaning key research areas, such as the Nadgee River small mammal study site of Lunney and Recher (Recher *et al.* 2009b) could not be visited. The restricted offer was rejected.

(Soulé *et al.* 2004; Wyborn 2011). We must impose limits on growth and move to a no-growth economy accompanied by population decline. This means an end to politicising the environment.

The second worst thing to make me grumpy is the preoccupation of conservationists and academic ecologists with charismatic and iconic threatened species at the expense of the 99.9% of the biota that make ecosystems function (Recher 1990a,b; McIntyre *et al.* 1992; Ponder and Lunney 1999; Ponder *et al.* 2002). While I do not advocate allowing Koala *Phascolarctos cinereus*, Regent Honeyeater *Xanthomyza phrygia*, Grey Nurse Shark *Carcharias taurus*, or Davidson's Plum *Davidsonia jerseyana* to proceed to extinction, it is time that we accepted the plight of these species as no more than a symptom of a dysfunctional continental ecosystem created and perpetuated by poor land, water, and resource management. Efforts to redirect scarce conservation resources to restore ecosystems adversely affected by poor management might lead to the loss of some icons, but have greater potential to save the 99.9% than species by species recovery plans, few which are ever implemented. If nothing else, recovery plans are expensive and most are doomed to fail without simultaneous ecosystem recovery and protection. Enclosing land with vermin proof fences is a poor substitute for good conservation management of the landscape, yet the conservation movement ignores the species that can be saved while lamenting the demise of the dead species walking. According to Pat Hutchings (*in litt.*) even the Great Barrier Reef Marine Park Authority acts as if conserving biodiversity starts and stops with listed endangered species.

In an ideal world there would be funds to protect all species regardless of their conservation status. Regrettably there is too little funding for the environment and current governments in Australia have embarked on cost-cutting schemes that have seen significant reductions in resources for nature conservation and extensive retrenchments of conservation scientists. Even in universities, the appalling emphasis now placed on applied research with expected economic outcomes and demands that academics only publish in highly cited international journals is crippling environmental and nature conservation education and research. Thus, more thought needs to be given on how best to spend scarce conservation dollars. However unpalatable, it may be necessary to sacrifice some threatened species that have little chance of survival without on-going human intervention so that the many can be saved.

Australia has already lost more than 50% of its continental avian biodiversity, with the remainder rapidly disappearing (Recher and Lim 1990; Recher 1999; Ford 2011, 2013), yet I hear more about the Lord Howe Island Woodhen *Gallirallus sylvestris* than about the myriad threatened small brown bush birds. We are losing the small brown birds that lack charisma without comment or action; maybe we do not care (Kingsford 2013). It would be nice if conservationists piggybacked small brown birds on the backs of the likes of the woodhen or Regent Honeyeater, which is what a flagship icon should be used for, but to date this has not happened. This makes me very grumpy and is another symptom of the anthropocentric fixation of nature conservationists. When will conservationists start caring for all species and begin sharing the world with the small and ugly instead of mindless agitation[11] about the sustainable harvest of a few hundred Minke Whales *Balaenoptera acutorostrata*, a non-threatened species, by the Japanese. How many would-be conservationists ever ask whether we have the right or moral authority to take the smallpox virus to extinction or to spray hundreds of square kilometres with biocides simply to prevent a few people becoming sick or dying from Dengue fever much less burning vast acreages of bush in the Brisbane Water National Park along with most of its fauna to protect the houses of rich people at Pearl Beach on the Central Coast in New South Wales?

We need to do things differently for nature conservation. We need to invert the conservation paradigm and restore connectivity allowing other species the right to live, adapt, evolve. Our goal should be conserving entire ecosystems, not single species. Above all else, we need to limit and then reduce the human population by taking control of our own fecundity. In part we can do this by ensuring all females have an opportunity for an education and are given equal opportunity in the work force (Ehrlich 2013). However, education of females is not enough, nor can it happen quickly. Action on population growth is required now and the action needed may require some loss of basic human rights, such as the assumed right to have children. It is now time to see the 'right to have children' as a privilege, but one that comes at extreme costs to current and future generations. Those costs need to be quantified and the economic burden of having two or more children placed on the people making that choice. Otherwise, those who choose to practice reproductive restraint, as well as their children and grandchildren and children beyond those, will be forced to subsidize, financially, environmentally, and in personal freedoms, those who elect to use more than their share of world resources by not limiting the size of their families. With rights and privileges come responsibilities and it is time that humanity recognized this in respect to population growth and resource consumption. Those responsibilities not only extend to other people and future generations, but to all species humans share Earth with.

I'll conclude with comments about attitudes to 'aliens' which not only make me grumpy, but which I find shallow and hypocritical. Unless you are one of a very small number who have bought tickets back to wherever you or your family genes originated and out of Australia, I assume you share my views on alien (non-indigenous or exotic) species in Australia. On the other hand, you may be among those whom I offended by including alien

10. For the ecological principles underlying WildCountry see >http://www.wilderness.org.au/campaigns/wildcountry/wild-country-scientific-principles<, accessed 28.1.13

11. Agitation that diverts attention from real threats to Australia's biodiversity and allows politicians to grandstand as being environmentally aware and concerned because they know 'protecting' whales will not cost them votes, especially when the whales are being protected against the Japanese.

vertebrates, such as Black Rat *Rattus rattus*, Corn Snake *Pantherophis guttatus*, European Carp *Cyprinus carpio*, Japanese Goby *Tridentiger trigonocephalus*, and companion animals as part of the vertebrate fauna of Sydney (Recher 1972, 2010). Be realistic, these 'aliens' are now as much part of the city's wildlife and biodiversity as the indigenous Brush-turkeys *Alectura lathami* in my garden or White-eared Honeyeaters *Lichenostomus leucotis* in Ku-ring-gai Chase.

Conservationists, conservation managers, and academic ecologists seem to have an unedifying dislike of any species alien to the continent, excluding, of course, themselves, their dogs, cats, and garden plants. They also exclude the food plants and animals they eat, but rail against any other plant and animal that doesn't 'belong here'. Before there are too many tears of anguish and rage, I can reassure you that there are alien species on the Australian continent requiring control, even eradication. However, the list is not that long and it is remarkable how many of those species were introduced by agriculture (e.g., pastoral grasses, biological control agents, goats *Capra hircus*), industry (e.g., horticultural varieties, plantation timbers, camels *Camelus dromedarius*), or for sport (e.g., European Rabbit *Oryctolagus cuniculus*, European Fox *Vulpes vulpes*, Rainbow Trout *Oncorhynchus mykiss*). Most were introduced to provide food, recreation, and amenity; only a few were accidents (e.g., Black Rat, Northern Pacific Seastar *Asterias amurensis*) or self-introductions (e.g., humans *Homo sapiens*, including the indigenous Aboriginal population).

Why am I grumpy about the people and authorities who are grumpy about alien species? Firstly, it is hypocritical and largely driven by that part of human behaviour which is incapable of admitting an error. Thus, it is easier to blame Lantana *Lantana camera* for the proliferation of Bell Miners *Manorina melanophrys* and the Bell Miner Dieback Syndrome (Wardell-Johnson *et al.* 2005) or Camphor Laurel *Cinnamomum camphora* for invading and degrading farmland than admitting that it has been poor land and resource management that created the conditions for these species to expand. Secondly, it is gross hypocrisy to only vilify those aliens we perceive as affecting our economic well-being or our prejudiced view of what is and what is not 'natural', while ignoring alien species we use in food production, horticulture, animal husbandry, biological control, and as companion animals and plants.

Granted some, perhaps many, aliens adversely affect native plants and animals. Cane Toads *Rhinella marina* are a prime example, as are foxes, goats, sheep, cattle, trout, and rabbits, but we no longer have a pristine Australia and many exotics have significant wildlife values. Indeed, exotics may be all that stand between a native species' survival and extinction. For example, the spread of Camphor Laurel on degraded farmland in northern New South Wales provided a critical food resource for White-headed *Columba leucomela* and Topknot *Lopholaimus antarcticus* pigeons which had been plunged perilously close to extinction by land-clearing and residential development (Date *et al.* 1996). Both species have recovered and are again abundant, but their long-term survival depends on the fruits provided by Camphor Laurel. Lantana and Blackberries *Rubus fruticosus*, which are spectacular weeds, provide food and cover for a wide range of native animals, while protecting the soil and enhancing its fertility (pers. obs.). In Western Australia, black cockatoos may benefit importantly from new food sources provided by exotic plant species (Lee *et al. in press*). Many aliens do have value for Australia's native flora and fauna.

Why don't we recognize these benefits? I'm grumpy because these values are not considered when deciding to 'eradicate' or 'control' alien plants as 'weeds', a view that is shared by many other ecologists (Theodoropoulos 2003; Gurevitch and Padilla 2004; Kirkpatrick and Kiernan 2006; Davis *et al.* 2011; see Larson 2007 for a concise review of the debate over the impact of alien species on biodiversity). Given the rate of collapse of Australian ecosystems and the loss of its biota, it would be better to accept a conservation management system in which ecosystems were restored without regard to the origin or source of the organisms used. The measure of success should not be restoration of some mythical pre-Captain Cook ecosystem, but the absence of species and population extinctions. Even if we knew what it was, we can never return to Australia as it was before Aboriginal people colonized the continent, nor should we aspire to that. It could be productive to begin to think about reconstructed ecosystems built from all genetic resources available to us, including such plants as *Cecropia* (a Neotropical rainforest tree), which have significant potential to replace native species lost through mindless land development and poor land management, as happened with Camphor Laurel, or which are threatened by climate change. Maybe there is benefit in 'intelligent creation' through 'intelligent introductions'.

Analogous to the 'native plant Nazis', as some refer to the zealots who would eradicate all non-indigenous plant species on the Australian continent, some wildlife conservationists focus their hatred on introduced birds such as Common Starling *Sturnus vulgaris* and Common Myna *Acridotheres tristis* despite little evidence that these species adversely affect native wildlife outside suburbia (see Grarock *et al.* 2012 for a different view). They thereby divert scarce conservation dollars from actions that might actually help conserve Australia's biodiversity. I'm grumpy because conservationists and conservation agencies are willing to trap and kill exotic animals while ignoring the adverse impacts of proliferating native species, such as Sulphur-crested Cockatoo *Cacatua galerita*, Galah *Eolophus roseicapillus*, Noisy Miner *M. melanocephala*, Brush-turkey, and Pied Currawong *Strepera graculina* (Recher 1972; Recher 1999). Mind you, the worst impacts of these species, including most exotics, occur in highly human-modified landscapes, such as farms and cities, where we could just shrug it off and let nature take its course, freeing scarce resources for better management of the limited less

disturbed landscapes that survive. We should remove the protected status of these dysfunctional native species and allow land managers and hunters to control them[12].

Denis Saunders (*in litt.*) on reading this paper commented:

> *'How long is it going to take before we admit that we will never eradicate "aliens". The most we can do is control them where necessary to mitigate their worst impacts. After all, the dingo is an alien, having been introduced by humans about 3,000 years ago, a blink in evolutionary time. We need to learn to live with alien species and make sure we don't introduce any more. '*

Mike Soulé on reading this paper took a somewhat different position. Mike was concerned that I might be seen as advocating a 'garden for humanity' where diversity was lost and the same species occurred across the world. I do not advocate that and my position is similar to that of Denis Saunders. We need to live with the alien species that are here, recognize the benefits to both humans and the indigenous biota that some provide, but take reasonable steps to control those that adversely affect native species and prevent unwanted aliens from colonizing the continent. However, conservation dollars are scarce and spending them on unnecessary or futile control efforts of species that have no adverse impacts on the indigenous biota or may actually provide resources that we as humans have destroyed through our poor land management practices does nothing to protect native species from extinction.

A disservice to conservation

By not understanding the basics of ecology, by being anthropocentric, focussing on individuals not species, and being unwilling or incapable of taking on new ideas in conservation management, the conservation movement does a disservice to biodiversity conservation and plays into the hands of developers and their political lackeys. I've said all this before (Recher 1976, 1990a, 1994, 1998b, 2002b, 2012) and I'll probably say it again, because it all makes me increasingly grumpy.

In effect, it is too late to worry about saving pristine ecosystems; not many remain. What is important is how well Australia's and the world's remaining ecosystems function[13]. Yes, it is important to prevent extinctions and each species lost should bring tears of blood to our breasts and wails of lamentation to our children. But that will not happen until conservationists and ecologists change the way they perceive the world and accept that they are the aliens, not Cane Toads or Camphor Laurels. Very grumpy am I.

What can we do about alien species?

1. We can impose controls on species that actually cause harm regardless of their origin.
2. When evaluating the harm a species may cause, we need to consider the benefits it may bring in restoring ecosystem function or in providing food and cover for native wildlife.
3. The most important thing to do in managing alien species is correcting and preventing poor land management practices - prevent over-grazing, protect riparian habitats from domestic stock, stop damming waterways, and end any form of land clearing, as just a few examples.

Concluding comments

Dan Lunney told me that the president of the Royal Zoological Society, Peter Banks, was worried that this forum could become a whinge fest. He was also looking for a positive note, something I've tried to provide with my few, brief recommendations of action. By the time Peter is my age, my guess is that the whinge proportion of his outlook will be greater than it is now. It is highly likely, that he, as I have, will have witnessed his most cherished parts of the natural world destroyed before his eyes. He will be grumpy then, but if I were to ask Peter now about Animal Ethics Committees, funding for long-term projects, teaching loads on academics who are promoted by the papers they publish and the journals they publish in, or the work load of an average academic, would he smile, or would his teeth be grinding? When I was an academic ecologist half way through my working life, I was obsessed about undergraduate spelling, clarity of writing by students, the narrow, competitive interests and selfishness of some colleagues, and the lack of time to pursue my field program of study. Do I assume that none of these matters trouble my younger academic colleagues? I do understand Peter's concerns about a 'whinge fest'. We need some light to guide us, some source of inspiration, some reason to listen to grumpy old scientists and thereby feel impelled to meet at least some of the challenges. There are three things that give me some cheer:

1. The opportunity to be grumpy; this forum is a good example.

2. Working with colleagues for decades who share these ideas and, even though their responses may be different, they too can see the issues.

3. The appreciation of leaders who speak out, such as Paul Ehrlich, whose insights on the human condition and his ability to communicate remain inspirational.

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12. I do not advocate allowing recreation hunters access to national parks or nature reserves. The decision to do so in New South Wales (now suspended or reversed) was political and ill-conceived. National parks are not places where hunting for sport is appropriate any more than mining, timber harvesting, or intensive tourism. However, there would be merit in Australia adopting something similar to America's wildlife refuge system where habitats and wildlife are intensively managed not just for nature conservation, but to provide game for hunters. Such refuges would be complementary and separate from national parks and nature reserves.

13. Ecosystem functions are equivalent to 'life-support systems'. Thus, the functions ecosystems provide or should provide include soil formation, nutrient cycling, regulation of water and river flows, removing toxins from air, water, and land, producing oxygen, and absorbing and sequestering carbon dioxide. Without these 'services' life, as we know it, would not be possible. For an ecosystem to function properly requires all of its biota from microbes to top end predators; no species is dispensable, least of all those species conservationists never seem to think about (Ponder and Lunney 1999; Beattie 2013).

I was delighted to share the stage at the Forum with Paul, Frank Talbot, Andy Beattie, Pat Hutchings, Richard Kingsford, Dan Lunney, and Mike Calver to mention a few who presented at the Forum and who are experienced, if not old, and very grumpy. All are friends and colleagues and each does what all scientists should do - they communicate and never give up trying to make a difference.

Acknowledgments

I appreciate the comments from Mike Calver, Pat Hutchings, Dan Lunney, Denis Saunders, and Mike Soulé on an early version of this paper. Their suggestions have been helpful and forced me to think about what I was saying and how it might be interpreted. My brother Paul's fight with the weed Nazis in northern New South Wales has been uplifting and helped form my ideas on the need to change our approach to alien life forms.

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