

# Politics, emotion, and ideology: the reality of reserve selection for nature conservation in Australia

Harry F. Recher, FRZS, AM

Australian Museum Research Institute, The Australian Museum, Sydney, New South Wales, Australia; Email: hfrecher@gmail.com,  
Postal address: POB 154, Brooklyn, New South Wales 2083, Australia

## ABSTRACT

Australia's system of conservation reserves is inadequate to conserve continental biodiversity. Reserves are small, isolated, and unrepresentative of continental ecosystems to the extent that entire groups of organisms, such as nomadic and migratory birds, are poorly conserved. The reasons for the inadequacy of the reserve system are historical and embedded in politics, emotion, and ideology. To illustrate these ideas, I describe my experiences in dealing with the politics, emotion, and ideology of reserve selection and management from the late 1960's to the early 1990's in New South Wales first as a member of the Scientific Committee advising the Minister of Lands and then as a member of the New South Wales National Parks Advisory Council. An emphasis on pristine landscapes and wilderness compromised recommendations for the development of the New South Wales' reserve system. My account of events as I experienced them may be of interest to persons tracing the history of reserve selection in Australia and of value to those seeking a better system of reserves for the conservation of Australia's biota. Not everyone will agree with my views, but creating a reserve system capable of conserving Australia's biodiversity requires a new vision for conservation. There is evidence that this is happening, with increased scientific involvement in reserve selection, design, and management, but politics, emotion, and ideology continue to dominate Australian conservation efforts.

**Key words:** National parks, New South Wales, Biodiversity conservation, politics, ideology, New South Wales National Parks Advisory Council, Scientific Committee advising the Minister for Lands, Wilderness, Long-term ecological research, reserve selection, WildCountry.

DOI: <http://dx.doi.org/10.7882/AZ.2015.024>

## Introduction

A large body of literature challenges the ability of Australia's conservation reserve system to protect continental biodiversity (Recher 1976, 1990a; Hall 1988; Purdie 1995; Whitehouse 1990; Pressey 1990, 1994; Reed 1990; Pressey *et al.* 1993; Burbidge and Wallace 1995; Soulé *et al.* 2004; Watson *et al.* 2010; Woinarski *et al.* 2014). This does not mean that reserves are not important for biodiversity conservation. Reserves are important, but need to be part of a conservation system designed following ecological principles with the goal of protecting the continental biota and integrated with comprehensive off-reserve nature conservation (Recher 1971a, 1976; 1990a,b; Burbidge 1990; Pressey 1990, 1994; Recher and Lim 1990; Saunders 1990; Saunders *et al.* 1987; Mott and Bridgewater 1992; Pressey *et al.* 1993; Papps and Wilson 1995; Purdie 1995; Hale and Lamb 1997; Soulé *et al.* 2004; Wyborn 2011; Byron *et al.* 2014). The reasons Australia's system of conservation reserves fails to preserve continental biodiversity are historical and embedded in politics, emotion, and ideology; the criteria for the creation of a reserve system that would adequately sample and protect all parts of continental biodiversity are well known, but

rarely applied. Too frequently, reserve selection has been opportunistic and a scramble for land among competing interests (Whitehouse 1990; Strom 1990).

In this paper, I present my experiences with the politics, emotion, and ideology of reserve selection in New South Wales. My interpretation of events is personal and others may have different opinions or knowledge of events<sup>1</sup>; this is a historical account based on my knowledge of reserve selection in New South Wales from 1968 to the early 1990's. As argued by one reviewer of this paper, considerable progress in reserve selection and design has been made since the 1980's. The process of reserve selection and establishment is an evolving science. It is widely recognized within conservation agencies, such as the New South Wales National Parks and

<sup>1</sup> The diversity of views on reserve selection in New South Wales and Australia is available in a series of papers in the *Australian Zoologist* volumes 26 (1 and 2) (1990) and 32 (1) (2002). For a cultural perspective of the value of wilderness for nature conservation in Australia see Adams (2008). For an overseas perspective, papers in *Conservation Biology* between 2011 and 2014 (Volumes 26 – 28) on 'new conservation' are informative and provocative. Many will find them challenging (see, for example, Noss *et al.* 2012; Soulé 2013; Kareiva 2014).

Wildlife Service, that the conservation of biodiversity cannot be achieved by reserves alone and considerable resources are now invested in off-reserve and private conservation. I am also of the opinion that the people working in national and state conservation agencies throughout Australia are committed to protecting the continent's biota and apply as best they can the scientific principles of conservation management. Nonetheless, in my experience, the conservation of the natural environment in Australia continues to be compromised by politics, emotion, and ideology, with the demands of a growth economy a significant impediment to the application of the best conservation management principles (Recher 2015).

Hopefully my account of events as I experienced them will be of interest to persons tracing the history of reserve selection in Australia and of value to those seeking a better system of reserves for the conservation of Australia's biota. I also discuss the consequences for biodiversity conservation in Australia when politics, emotion, and ideology influence, direct, and dominate reserve selection and management to the exclusion of scientific advice and the needs of Australia's biota. As such, my experiences and ideas may provide guidance as to how the situation can be reversed and an effective, enduring system of reserves, complemented by off-reserve management, established in Australia.

## New South Wales Scientific Committee

I first experienced the politics of reserving land in Australia for nature conservation and the emotion and ideology of advocates for national parks as a member of the New South Wales Scientific Committee advising the Minister of Lands, Tom Lewis, on reserve selection from 1968 to 1973. This was shortly after the National Parks and Wildlife Service was established in 1967 replacing the Fauna Protection Panel and Reserves Branch of the Lands Department (Goldstein 1979; Whitehouse 1990). At that time, the National Parks and Wildlife Service lacked its own scientific or survey staff and information on the flora and fauna of New South Wales and areas of value for nature conservation was sourced through staff at the Australian Museum, the Royal Botanic Gardens, the CSIRO Division of Wildlife Research, and universities, as well as from non-government conservation organizations (NGO's), such as the Australian Conservation Foundation (Whitehouse 1990).

The Minister established the scientific committee in 1967 to advise him on "*the optimum sample of the various ecosystems throughout the State which should be reserved for scientific purposes from those lands still essentially in the natural state, or capable of being restored to something approximating the natural state*" (McMichael

1973, cited in Whitehouse 1990, p. 13). Between 1968 and 1971, the scientific committee submitted five reports to the Minister<sup>2</sup>. The first report reviewed proposals for national parks and nature reserves along the coast east of the New South Wales tablelands from Queensland to Victoria, listing 'long-standing' major proposals, such as the Tuross-Deua National Park and additions to the Morton National Park (Scientific Committee on Parks and Reserves (SCPP) 1968). The report briefly mentioned proposals for reserves in the Western Division, as well as 'outstanding' nature reserve proposals. The reserves proposed along the North Coast were those recommended by the Sim Committee enquiry into coastal mineral sands mining in 1965 (SCPP 1968), while others originated with the Fauna Protection Panel, conservation groups, and local interests. The second report (SCPP 1969) recommended reserves along the North, Central, and South Coasts. The introduction to the second report explained the need for a parks and reserve system basing that need on the requirements of biodiversity conservation and the importance of natural areas for recreation. It briefly described the methods used in selecting areas for reservation. Report No. 3 (SCPP 1971a) reviewed the requirements for reserves on the North Coast west of the Pacific Highway, north to the Queensland border, the Northern Tablelands, and south to, but not including, the Hunter River Valley. Biodiversity conservation, recreation, and the importance of natural areas for science and education were used to support the need for a reserve system. The fourth report (SCPP 1971b) covered the North and Central Western Slopes and near plains, the South-Western Slopes, and the Western Plains. Unlike the scientific committee's other reports it included a section on sites of geological, geomorphological, and archaeological value. The report was primarily a review of major ecosystems based on vegetation and made few specific recommendations for sites to be reserved. Instead the report highlighted land systems of importance where detailed surveys were required before meaningful recommendations for reserves could be made. The final report (SCPP 1971c) was prepared by G. Baur, D. Branagan, and G. Mosley. They proposed the creation of multiple-use parks to protect ecosystems, plants, and animals of areas that were important to conserve, but occurred in places that would otherwise not justify national park or nature reserve status. As I recall, there was considerable discussion within the scientific committee of the proposal, which received the committee's full support. The present conservation reserve system in New South Wales includes areas designated as State Conservation Areas and Regional Parks. Both allow activities, such as mining and walking dogs, that are not permitted in national parks or nature

<sup>2</sup> Until recently these reports were treated as 'Confidential to N.P.W.S. for use by staff only', but copies of the reports are available at the New South Wales and National Parks Service library in Hurstville.

reserves, although protection of natural values remains a priority. Thus, the New South Wales reserves system has evolved towards the concept of multiple-use parks, although not yet on the scale discussed within the scientific committee nor that proposed for the Myall Lakes region (see below).

I had no involvement with the first scientific committee report and was appointed to the Australian Museum in 1968 to assist the scientific committee with reserve selection along the north coast of New South Wales (Recher and Pyke 2012). I visited areas being considered for reservation, summarized their values, and prepared reports for the committee that eventually went to the Minister and the National Parks and Wildlife Service for action. I brought new areas, which I considered important for biodiversity conservation, to the attention of the committee and the National Parks and Wildlife Service. I also provided ecological advice on reserve design and management. Along with the other members of the scientific committee, I contributed to the preparation of reports 2 to 5, and wrote parts of reports 2, 3 and 4. After resigning, along with others, from the scientific committee in 1973 during a dispute with the Minister and the Service over the establishment of a reserve system, rainforest conservation (Somerville 2005), and the protection of remnant bushland on the Cumberland Plain and environs of western Sydney<sup>3</sup>, I represented the Australian Museum on the National Parks and Wildlife Service Advisory Council from 1981 to 1987 where I continued to have a special interest in reserve selection and management. My priority was the conservation of Australia's flora and fauna.

None of the scientific committee reports was based on what would now be considered acceptable biological surveys. Instead, I and the committee relied on existing knowledge and brief site visits. This was a time when little research had been conducted on repeatable, quantitative biological survey procedures, with few or no guidelines on how to conduct surveys available. This was especially true for fauna. Although survey and census techniques for some taxa, such as birds, were well established in Europe and North America (e.g., Blondel *et al.* 1970; Emlen 1971; International Bird Census Committee 1970), few had been trialled in Australia (Recher 1984, 1989) and none had been developed with the aim of establishing a comprehensive, adequate, and representative (CAR) reserve system for biodiversity conservation. Although I was unaware of it at the time, the Fauna Protection Panel had already identified a large number of areas for conservation as 'faunal [nature] reserves' (Strom 1990), but these were not specifically considered by myself nor the scientific

<sup>3</sup> Today the New South Wales Parks and Wildlife Service devotes considerable resources to the protection and management of biodiversity on the Cumberland Plain. This includes comprehensive biological surveys and is a significant and welcome change in attitudes within the service towards disturbed landscapes from those prevailing in the 1970's.

committee, with the exception of any mentioned in the first report, in advising the Minister on areas for conservation. At no time did National Parks and Wildlife Service staff bring to my attention the work and recommendations of the Fauna Protection Panel.

The process of reserve selection by the scientific committee was compromised by the small number of people available to conduct surveys, the poor understanding of New South Wales's flora and fauna (Starling 1990), and the limited time available in which to produce reports. In consequence, only the most obvious and best known taxa were used to justify reserve selection; these were higher plants and vertebrates, mainly birds and mammals. The nomination of reserves by the scientific committee was further limited by the restriction placed on the committee by the Minister to consider only 'Vacant Crown land', along with the committee's charter that emphasized 'natural or near natural' areas. Fortunately the expansion of the conservation reserve system in New South Wales was not restricted to vacant Crown land after the 1970's.

The first report of the scientific committee (report no. 2, SCPP 1969) that I was involved with focussed on the New South Wales coast, north of Newcastle. At that time there was considerable conflict on the North Coast between conservation values and mineral sand mining and the need to protect coastal habitats was considered a priority (Recher 1971a). The work of the scientific committee on the North Coast was preceded by the 1965 investigations and reserve recommendations of the Sim Committee inquiry into mineral sands mining. The Sim Committee recommended 10 reserves along the coast between Myall Lakes and Lennox Head (SCPP 1968). In the second report, the scientific committee endorsed the recommendations of the Sim Committee, but considered none was sufficiently large (> 50,000 ha) (SCPP 1969). The second report expanded on the work of the Sim Committee, recommending additional reserves, including three proposals exceeding 50,000 ha; Angourie-Red Rock (Yuraygir National Park), Point Plomer (Limeburners Creek National Park), and Myall Lakes National Park. An area of 50,000 ha was accepted by the scientific committee as the minimum area capable of sustaining a complete fauna.

A minimum area of 50,000 ha was adopted from studies of Bert Main and his colleagues in Western Australia (WA) who found that only islands > 50,000 ha in area off the coast of WA sustained a complete macropod fauna (Main and Yadev 1971). Main and Yadev (1971) used their island studies to estimate the minimal viable size for reserves on the mainland saying conservation areas on the mainland also needed to be at least 50,000 ha in extent to support a full mammal fauna. Although Main's work was from Western Australia, there were no other guidelines that the scientific committee

could use to justify larger, rather than smaller, reserves, with committee members aware of the needs of many animals for large areas of habitat.

The recommendations of the scientific committee for the North Coast were weakened by the need to accept mining within areas the scientific committee deemed of high conservation value. The committee was only able to recommend withholding especially important sites from mining. These were mostly small (some were only a few ha) with known populations of interesting plant species. As I recall, these were mostly eucalypts<sup>4</sup>. At the time, the arguments for protecting these areas seemed trivial to me, with sites justified because they represented the 'most southerly', or 'most northerly' known population of a species. Given the limited data available on plant species distribution within New South Wales, including along the coast, 'most northerly or southerly' claims would have been hard to prove. However, they may have had merit in protecting outlying and possibly genetically distinct populations from mining.

I now recognize the pressure on the Minister, the National Parks and Wildlife Service, and the Scientific Committee to promote national park reservation quickly. The Minister had been bold in creating the National Parks and Wildlife Service in 1967, bringing in Sam Weems from the United States National Parks Service as the first director, and faced opposition from within his own party over the entire concept of a national parks system. According to McMichael (1990, p.78), who served as Director of the National Parks and Wildlife Service from 1969 to 1972, '*Lewis's enthusiasm [for a conservation reserve system] was not always shared by other agencies, including some elements of his own Department...*'. The Fauna Protection Panel experienced similar resistance during the 1950's and 60's (Strom 1990).

No doubt Tom Lewis had already set his mind on becoming party leader and Premier, and saw the success of the National Parks and Wildlife Service as a central element in achieving that goal. I also think the Minister was sincere in his concerns for nature conservation and saw the National Parks and Wildlife Service as the best instrument to promote conservation in New South Wales, a view supported by McMichael (1990). It is possible that Lewis measured success by the creation of reserves and the establishment of a park system as rapidly as possible. He was also concerned that his successors would lack his commitment to the National Parks and Wildlife Service and the creation of a world class reserve system (McMichael 1990). The rapid development of Australia following WW II created intense competition among developers, land management authorities, forestry, agriculture, and

<sup>4</sup> There was considerable expertise of eucalypts on the scientific committee with George Baur, Forestry Commission (e.g., Baur 1989) and Lawrie Johnson, Royal Botanic Gardens, a specialist in eucalypt taxonomy (e.g., Pryor and Johnson 1971) members of the committee.

conservationists for land. During my tenure on the scientific committee and then on the Advisory Council, I observed intense antagonism towards national parks and the Service not only from land owners, who feared their lands would be taken from them<sup>5</sup>, developers, and mining interests, but by other natural resource management agencies within the New South Wales government. In my experience, resistance, including the blocking of transfers of land important for nature conservation, to national parks appeared particularly intense from State Fisheries and the parts of the Lands Department concerned with reserves and State Parks. This was an ongoing issue till at least the 1990's (Dan Lunney, *in litt.*; May 2015).

Despite recommendations for the protection of significant areas of rainforest in northern New South Wales (SCPP 1971a), I recall no opposition to reserve proposals arising from the recommendations of the scientific committee from the Forestry Commission of New South Wales. Possibly this was because State Forests were effectively excluded from consideration as parks by the restriction to Vacant Crown Land and because forestry had already secured the lands wanted for timber production. Conflict between the Forestry Commission and National Parks and Wildlife Service did develop during the 1970's and 80's as environmental groups fought to protect the state's rainforests and as opposition grew to clear-felling and other logging practices seen as damaging to forest values (Curtin 2004; Somerville 2005). With the establishment of the National Parks and Wildlife Service, many forestry graduates employed by the Forestry Commission took up positions with the Service and were instrumental in the implementation of park proposals, as well as formulating management guidelines. A consequence of this was the development and maintenance of professional respect at a personal level between individuals in national parks and forestry, something often overshadowed by the publicity surrounding opposition to forest logging.

Restricting recommendations by the scientific committee to Vacant Crown Land and essentially natural areas compromised the integrity of the Scientific Committee's reports and prevented application of basic principles of reserve design, such as minimizing edge effects and providing connectivity between reserves (Soulé *et al.* 2004; Mackey *et al.* 2007). Although I cannot be certain, I suspect the absence of site specific recommendations for conservation reserves on the western slopes and plains (SCPP 1971b) was as much the lack of Vacant Crown Land<sup>6</sup>, much less

<sup>5</sup> Although I am happy to be corrected, I am not aware of the Service compulsorily acquiring land for conservation. The threat of having lands taken from people who did not want to sell was used by opponents of national parks to create local opposition to the Service and the expansion of the reserve system. As is so often the case in politics, the aim was to create fear, not inform or be truthful.

<sup>6</sup> Most land on the slopes and plains was held under Crown Lease and effectively functioned as freehold, with all the political constraints



of ecosystems that were substantially undisturbed, as it was the need for detailed surveys. Taking a more recent perspective, D. Lunney (*in litt.*; May 2015) comments 'The requirement for 'naturalness' is still a significant constraint, with (e.g.) lack of tree cover being seen as a *prima facie* reason not to pursue reservation, regardless of groundcover/shrub diversity or other qualities. Since [for example] there are no 'natural' Yellow Box [*Eucalyptus melliodora*] Woodland remnants, the prospects of conserving this vegetation are currently poor.' Despite the lack of tree cover, reserves in the Western Division do include disturbed lands and the Western Slopes is currently considered a priority for reserve establishment in association with private land conservation and restoration (New South Wales National Parks & Wildlife Service 2008)).

The recommendations for reserves were further compromised by emotion and ideology among some National Parks and Wildlife Service staff and within NGO's representing the national parks movement. In addition, deliberations and advice of some members of the Committee, and later members of the National Parks and Wildlife Service Advisory Council, were affected by politics. Unlike the Australian Museum, at that time under the enlightened directorship of Frank Talbot, which encouraged its staff to communicate openly with the community, other public servants were constrained by the Westminster system of government whereby public servants, regardless of stature or experience are to be seen, not heard (Recher and Pyke 2012). As a result, many were reluctant to challenge Ministerial dictates, regardless of the conservation implications, and even fewer were prepared to speak publicly. I recall one senior public servant in the National Parks and Wildlife Service, who, when I questioned his failure to take a public stand in support of the Service, explained to me that 'he whispered in the Minister's ear'. I responded that the Minister was obviously hearing impaired and that he needed to yell, not whisper, if the Service was to have a lasting and meaningful impact on nature conservation in New South Wales.

## Emotion and Ideology

Almost everyone I've met who is a member of a conservation group or is a natural resource manager is passionate about the environment and the imperative of protecting nature. Almost all, however, are anthropocentric in these views and dogmatic as to the best way to protect the environment and conserve nature. All see conservation reserves, in one guise or another, as the best, if not the only, way to protect Australia's flora and fauna (for a discussion of cultural differences on this point see Adams 2008). As a group, I consider conservationists to be emotional, ideological,

associated in Australia with 'private land' (Recher 1978). If it has the funds, the service can purchase freehold and Crown Leases and did so early in the 70's.

and poorly educated in the environmental sciences, ecology, and resource management; if they are well-educated, too often science is set aside by politics, emotion, and ideology.

Nias (1995) expressed a different view of NGO's arguing that NGO's 'have been major driving forces behind the establishment of Protected Areas' (p. 377). He also argued that Australian NGO's have been important in the development and implementation of biodiversity conservation policies. Don McMichael, on reviewing this manuscript, commented that conservation groups "helped us to get done what we did by sometimes being so demanding that we were able to achieve what would not otherwise have been possible." I do not disagree with Nias or McMichael, but disagree as to the motives behind the actions and policies of conservation NGO's. These were and largely remain anthropocentric, emotional, and ideological, rather than being founded on science and the needs of other species. There are signs this is changing. The formation of an independent science council by The Wilderness Society (Australia) in 2000 to advise on the society's vision of WildCountry was game changing for a conservation NGO (Recher 2003). Although changes within the society's hierarchy led to the demise of the scientific committee, a legacy remains that appears to be changing the direction and role of conservation NGO's in Australia. This is evident in the programmes of land acquisition and threatened species management of Bush Heritage, the Nature Conservancy, and the Australian Wildlife Conservancy whose programs are based on sound and independent scientific advice. The increasing role of scientists in promoting new directions for conservation in Australia is also demonstrated in the recent peer-reviewed papers of the Pew Charitable Trusts on the Australian Outback outlining new directions for the conservation of arid Australia (e.g., Woinarski *et al.* 2014).

My frustration with conservation NGO's led me to convene a lecture series 'Ecology for Conservationists' at the Australian Museum in the mid-70's with the aim of making basic ecological principles available to conservation activists. Few conservation activists attended, but the lectures were popular with a wide cross-section of the public, had to be repeated, and led to the publication of *A Natural Legacy: Ecology in Australia* (Recher *et al.* 1979, 1986). Among other things, *A Natural Legacy* included a chapter on the principles of reserve selection and the design of a conservation reserve system (Lunney and Recher 1979, 1986). Unfortunately science and knowledge are always trumped by emotion and ideology among conservationists and by jobs and dollars among politicians and developers; the principles outlined in *A Natural Legacy*, as well as elsewhere in the literature (Slatyer 1975; Pickett and Thompson 1978; Diamond and May 1981; Harris 1984; Lindenmayer and Franklin 2002; Soulé *et al.* 2004; Mackey *et al.* 2007), are seldom applied.

During my tenure on the scientific committee and later on the National Parks and Wildlife Service Advisory Council, I frequently encountered ideological opposition to suggestions on reserve selection and the design of the reserve system. At all levels within the National Parks and Wildlife Service, the Advisory Council, and within nature conservation NGOs the criteria for reserve selection emphasized naturalness and recreation, particularly bush walking. In my opinion, this compromised the nature conservation values of the developing national parks system along the coast and near urban centres by excluding many disturbed, but biologically important, areas from inclusion in the reserve system. It also compromised attempts to create a CAR reserve system on the western slopes and plains where farming and pastoralism had significantly degraded the entire Western Division during the 19<sup>th</sup> Century (Denny 1994; Dickman 1994; Pickard 1994; Smith and Smith 1994). As D. Lunney (*in litt.*; May 2015) points out, these attitudes ignored the capacity of ecosystems to recover and the lengthy time needed for recovery.

Although the charter of the scientific committee emphasized the selection of lands in a 'near natural state' (McMichael 1973, cited in Whitehouse 1990, p. 13), neither the scientific committee nor I were instructed to ignore disturbed lands. To the contrary, the scientific committee was to recommend to the Minister '*the optimum sample of the various ecosystems throughout the State which should be reserved for scientific purposes*' (McMichael 1973, cited in Whitehouse 1990, p. 13). As a considerable area of the state was already highly disturbed by agriculture and urban development (Reed 1990; Strom 1990), it was already impossible to develop a representative reserve system without including disturbed lands. This was particularly so near urban centres, along the coast, and west of the Great Dividing Range. Therefore, my reports and advice to the committee, and through the scientific committee to the Minister and National Parks and Wildlife Service, while focussed on 'near natural' areas, also recommended reservation of disturbed and remnant habitats. I was especially concerned for habitats that would be lost as the population of New South Wales grew and growth along the coast sprawled. Having grown up in the United States and been witness to the impact of a growing and increasingly affluent population on Florida and California, I knew that the same uncaring and mindless destruction would happen along the New South Wales coast. Time has confirmed my concerns.

Particular examples of the conflicts over reserve selection, design, and management dominate my memory from the time I was a member of the Scientific Committee and the Advisory Council: Myall Lakes, the Hawkesbury River wetlands, remnant bushland

in western Sydney, littoral rainforest along the North Coast, and what is now the Scheyville National Park in northwestern Sydney. It was virtually impossible to get National Parks and Wildlife Service staff or representatives of environmental groups interested in anything other than wild lands and wild rivers. Although there were exceptions, in my experience the individuals most concerned about wilderness and least concerned about a representative reserve system dominated decision making. Although I am aware of the heavy burden of work National Parks and Wildlife Service staff had to endure and the competition (conflict) between departments over land and water (Strom 1990; Whitehouse 1990), biodiversity conservation was not the goal in the growth of the conservation reserve system in New South Wales during the 1970's and 80's. During my tenure on the scientific committee, proposals to protect the Hawkesbury wetlands and littoral rainforests (SCPP 1969) were seemingly ignored, as was the need to protect remnant urban bushland.

The response of many National Parks and Wildlife Service staff and representatives of conservation NGO's to proposals to conserve the ecological integrity of the Myall Lakes and of the Scheyville area illustrate the influence of politics, emotion, and ideology on reserve selection and management.

1. *Myall Lakes*: The Myall Lakes was a long-standing park proposal and seen by environmental groups as a 'wilderness' (Recher 1971b,c; Anon. 2002). However, it is near Newcastle and it was obvious to me, if no one else, that it would ultimately attract large numbers of holiday-makers. Land adjacent to the proposed park was ideal for residential development and, without strong environmental controls on the use and development of the catchment, the lakes around which the park was based were at risk of degradation as development progressed. The park proposed by the Sim Committee was small, had poor (narrow) boundaries, particularly along the western shore, and was to be highly and permanently disturbed by mining and associated roads.

To protect the lakes and mitigate the effects of mining and high visitor numbers, I proposed that the entire catchment of the lakes be protected as a 'regional park' within which existing activities could continue, but with strong controls to protect the lake's natural values. In effect, I recommended a Landscape or Multiple-use Park (SCPP 1971c) and had discussions with the State Planning Authority indicating that this was acceptable land use planning and achievable under existing legislation. It would have created a conservation area in excess of the 50,000 ha recommended by the scientific committee as the minimum area required for long-term biodiversity conservation. I also advocated a cessation

to mining within the proposed park boundaries and the removal of the mining road between Seal Rocks and Mungo Brush that had been constructed across the ancient system of dunes (the Moors) impeding natural water flows. Local development interests ensured the road remained despite the advice of the National Parks and Wildlife Service (Anon. 2002) and its removal having been made a condition of mining approvals<sup>7</sup>.

In an attempt to put political pressure on the government to act against mining and secure the Myall Lakes for future generations, I and others from the Australian Museum diverted Prince Phillip<sup>8</sup> and his entourage from the 'official' tour route the Prince was being taken on through mining areas at Myall Lakes. The Prince had been given a glowing account of post-mining rehabilitation and shown revegetation where it appeared that the original forest vegetation was being restored. Instead museum staff escorted him to more typical areas of restoration where revegetation was unsuccessful and explained that the high dunes forest had developed under a different climate, which was self-sustaining so long as the forest cover was not removed as in mining. The Prince did not appear pleased at the contrast between what he was being shown by museum staff and what he had been 'officially' shown by government and mining interests, but whatever discussions he had with the relevant Ministers, mining continued, the road remained, and the Myall Lakes National Park is a shadow of what it could have been.

The idea of a multiple-use park was opposed by leading environmentalists who saw it as diluting the purity of the national parks concept. The result for Myall Lakes is exactly as I forecast – a small park with poor boundaries<sup>9</sup>, high visitation impact, increasing development of the catchment, and water quality issues (Anon. 2002). It could have been different and the 'wilderness' so favoured by environmentalists might still exist had not politics, emotion, and ideology driven decision making.

2. *Scheyville National Park*: Commencing in the 1970's, Wyn Rohan-Jones and I sought to protect the Scheyville area in the northwestern Sydney metropolitan area

7 The road is now closed, but maintained as a walking track and access for fire fighting. According to local National Parks and Wildlife Service staff water does move between the two sides of the road.

8 At that time, Prince Phillip was President of the Australian Conservation Foundation (1971–75) and had been instrumental in the formation of the Foundation during the 1960's. He had been offered a tour of mineral sands mining areas because of the concern the conservation movement and the Foundation had over the impacts of mining on coastal ecosystems.

9 This continues to be the case, despite removal of in-holdings and additions to the park since the 1980's taking the size of the park to 48,000 ha. Including State Forests within the catchment, the conservation area within the catchment of the Myall Lakes exceeds 50,000ha. According to John Asquith (*in litt.*; January 2015), Bob Debus (New South Wales Minister for the Environment, 1999–2007) 'put in a huge effort' to link the Myall Lakes and Barrington Tops National Parks. This has not happened.

as a conservation reserve. We recognized the area as an important remnant of Cumberland Plain Gray Box *E. mollucana*/ Narrow-leaved Ironbark *E. crebra* woodland where several declining woodland birds (e.g., Speckled Warbler *Chthonicola sagittata*, Jacky Winter *Microeca fascinans*, Brown Treecreeper *Climacteris picumnus*) persisted. This was an effort that received limited support from within the National Parks and Wildlife Service and conservation groups. In my opinion, there was no effective support because Scheyville was highly disturbed, albeit a bush remnant with high biodiversity values<sup>10</sup>, and had competing demands for its development, including as a toxic waste disposal site, residential development, an airport, and a prison. Eventually support for conserving the area grew within the Service and against the plethora of competing interests was dedicated as a national park in 1996.

However, the first plan for the park coming from the National Parks and Wildlife Service to the Advisory Council in the 1980's resembled an amoeba more than a reserve, with all non-wooded areas deleted. Such a reserve would have been unmanageable and subject to rapid degradation. After I pointed out the problems with the Service's proposal, the park was eventually redrawn to include all of the Scheyville lands creating a reserve more than twice the size (954 ha) of the area Rohan-Jones and I had advocated. Unfortunately, subsequent management was dominated by ideology and regulation, not science, with cattle (considered exotic and incompatible with national park values) immediately removed. This allowed the unfettered growth of exotic grasses and the degradation of the habitat of bird species, such as Speckled Warbler and Jacky Winter, which had been a primary reason for protect Scheyville from development.

Nothing is simple when it comes to managing and restoring degraded habitats such as the Scheyville area. As Jonathan Sanders, New South Wales National Parks and Wildlife Service Area Manager for Scheyville, pointed out to me on reviewing an earlier version of this paper (*in litt.*; May 2015), removal of the cattle at Scheyville was a legal requirement and may have benefitted native plant species that the cattle grazed. It is unfortunate that removal of cattle was not accompanied by an ecologically balanced program of fire management nor was everyone with knowledge of Scheyville's fauna consulted. However, Sanders correctly defends the Service's actions by pointing to the absence of information on how to best use fire for management purposes at Scheyville. He also notes there has now been 14 years of research and practice in managing the reserve accompanied by a strong commitment within the Service to understand and restore Scheyville to its natural state.

10 Four seasonal samples of canopy invertebrates from Grey Box and Narrow-leaved Ironbark, a total of 40 trees or 10/season of each species, at Scheyville yielded nearly 1000 species of insects and spiders, almost all of which remain undescribed (Recher *et al.* 1996). Scheyville also has a rich avifauna, with ~ 100 species of terrestrial birds (Egan *et al.* 1997; Recher unpubl. data).

Having an emotional attachment to conservation is not always a negative force in conservation. Although I was frustrated with the responses to Myall Lakes, urban bushlands, and Scheyville, a Ministerial affinity for islands had positive outcomes for conservation with Long Island and Spectacle Island on the lower Hawkesbury River north of Sydney declared Nature Reserves by Tom Lewis without advice, so far as I know, from the scientific committee or advisory council. Long and Spectacle Islands were promoted as nature reserves to the Minister by the ranger in charge of Muogamarra Nature Reserve, whose name I regret I cannot recall. His actions were important in protecting not only the islands and their unique biota, but the scenic values of the lower Hawkesbury.

## Wilderness

It is my view that the emotion and ideology centred on wilderness has had significant adverse effects on biodiversity conservation and management contributing to the growth of an inadequate and unrepresentative system of conservation reserves. While Bob Carr was Premier of New South Wales (1995–2005), there was a significant expansion of the national parks system and large areas of New South Wales were declared ‘wilderness’ ([www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm](http://www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm); [en.wikipedia.org/wiki/Bob.Carr](http://en.wikipedia.org/wiki/Bob.Carr); accessed January 2015). It is also my opinion that their contribution to the conservation of New South Wales’ flora and fauna was marginal and political, as almost all were based on changes in tenure from one form of conservation reserve to another (e.g., state forest to national park or nature reserve). Only limited areas of Crown Lease land and freehold were acquired for nature conservation thereby excluding habitats under greatest threat from development and agriculture. From the 1960’s onwards there was, and is, strong antagonism among NGOs against logging native forests; conservationists did not see State Forests as part of the conservation estate. Thus, ending logging and transferring state forest lands to national parks was a way for politicians to don a green mantle and gain the conservation vote. By compromising essential long-term ecological research (LTER) projects designed to develop management strategies for the conservation of Australia’s flora and fauna changes in tenure and wilderness designations have had adverse effects on the long-term conservation of flora and fauna of New South Wales’ biota (Recher 2003; Recher and Lunney 2003).

Designation of the Nadgee Nature Reserve on the New South Wales South Coast as wilderness, for example, compromised research projects that had been established at Nadgee based on the reserve’s original designation as a priority reserve for scientific research (Recher and Lunney 2003; Lunney *et al.* 2012). I established studies of small mammals in Nadgee in 1969 as part of my advisory responsibilities with the scientific committee (Recher *et al.* 2009). When NPWS proposed to burn

coastal moors (heaths) in Nadgee in 1979 to recover Ground Parrot *Pezoporus wallicus* populations that were erroneously seen as in decline<sup>11</sup>, I organized a survey of bird populations on the moors (Recher 1981). I continued this work after the moors were burnt in the November 1980 wildfire (the moors had previously burnt in 1972), but had to terminate the project in 2000 when restrictions on vehicle use in the reserve made it physically impossible for me to conduct censuses. Thus, a project that had monitored heath birds at Nadgee since the late 60s, with counts that should have been repeated in 2005 and 2010, was terminated before the effects of the 1972 and 1980 fires were fully understood.

Restrictions on access to the ‘Nadgee Wilderness’ affect more than research. In 2013, National Parks and Wildlife Service effectively denied access to a group of scientists who asked to visit LTER sites in Nadgee by restricting them to a maximum of five hours on the reserve. According to Jim Shields (*in litt.*, 12 March 2015), the Far South Coast BirdWatchers club has been denied access for a field trip to Nadgee as this ‘would constitute unnatural disturbance to Ground Parrots and Ground Parrot habitat’. My 1979 survey of the heath avifauna and of Ground Parrot numbers would not have been possible without the assistance of the Cumberland Bird Observers Club (Recher 1981) and, with 30 years research experience on the Nadgee Moors, I fail to understand the reasons given to deny the South Coast club access or what ‘unnatural disturbance’ could possibly be. This is especially so given National Parks and Wildlife Service researchers burnt a large area of Impressa Moor in 1984 to test the use chemical fire retardants in fire control compromising established research plots on the moor.

There were also adverse impacts on LTER projects in Coolangubra State Forest on the Southern Tablelands and the catchment of the upper Hastings River in northern New South Wales being conducted by forestry ecologists when these were transferred to National Parks and Wildlife Service as national parks (South East Forests National Park and Werrikimbe National Park, respectively). Of 722 (0.5 km) monitoring transects established in New South

<sup>11</sup> There was a period in the late 70’s and early 80’s when National Parks and Wildlife Service managers adopted the view that Ground Parrots required heaths to be burnt every 7 to 8 years. Nadgee’s moors burnt in their entirety in 1972, so were at an age National Parks and Wildlife Service managers saw as requiring burning. No surveys of Ground Parrots had been conducted at Nadgee and the purported need to burn the moors was based on an incorrect interpretation of research conducted in Victoria that seemed to suggest the parrots were most abundant in younger heaths. This interpretation surfaced in draft park management plans along the New South Wales coast during my tenure on the National Parks and Wildlife Service Advisory Council reflecting the lack of adequate ecological training of some park managers requiring plans to be redrawn before the Advisory Council approved. The surveys I organized at Nadgee in 1979 found Ground Parrots abundant and indicated that there was no need to burn the moors at that time. Ground Parrots at Nadgee remained abundant on all parts of Impressa Moor 19–28 years post-fire till at least 2000 (Recher unpubl. data).



Wales State Forests by forestry ecologists during the 1990's (Kavanagh *et al.* 1995; Kavanagh and Stanton 2005; Shields 1990; Shields *et al.* 1987, 1994; State Forests of New South Wales 1994a,b;1995a,b,c,d), more than half are now in national park or wilderness areas and many of these are now difficult to access because of their reserve status thereby diminishing their research value and interfering with important monitoring programs (R. Kavanagh *in litt.*; 19 March 2015; J. Shields *in litt.*; 18 March 2015).

LTER studies are essential for understanding how communities respond to long-term environmental changes, such as those predicted to occur with global climate change, as well as catastrophic events, such as fire and storm (Likens 1989; Lindenmayer *et al.* 2012). Without such information it will prove difficult to manage communities and populations to ensure their long-term survival. Although not the view of everyone in the Service, the National Parks and Wildlife Service appears uninterested in these long-term studies continuing and, from personal experience, prevents necessary access to established research sites in areas designated as wilderness by denying or restricting vehicle access and movement. The justification given to me from National Parks and Wildlife Service staff responsible for Nadgee for denying the vehicle access necessary for researchers to continue long-term monitoring is so that persons walking in the reserve will not encounter vehicles and 'have their wilderness experience ruined'. Nadgee is not a wilderness<sup>12</sup> and its designation as such has done nothing to improve its conservation value.

## Discussion

In the decades following my involvement with reserve selection in New South Wales, there have been changes within the New South Wales National Parks and Wildlife Service (Papps and Wilson 1995). The Service developed a strong scientific section and commenced detailed surveys of the state's biota (e.g., DECC 2007) creating a searchable wildlife atlas of the State with more than 1 million records ([www.environment.nsw.gov.au/wildlifeatlas/about.htm](http://www.environment.nsw.gov.au/wildlifeatlas/about.htm); accessed August 2015). Regardless of their merits, these advances do not change history nor the conclusions I reach.

Politics, emotion, and ideology have driven the creation of Australia's conservation reserve system. Science and the ecological requirements of the vast majority of Australian taxa (arthropods, for example) were and are peripheral to the growth of the reserve system. As a result, Australian conservation reserves

are unrepresentative and most are too small for the long-term survival of all the species they are intended to protect (Hall 1988; Purdie 1995). Most are located on land unsuited for agriculture, forestry, mining, or residential development meaning that the richest and most productive habitats, along with many unique ecosystems, are poorly represented within the reserve system (Hall 1988; Burgin 1990; Shields 2003). Unfortunately the application of conservation science has not kept pace with the development the reserve system, so the 'scramble' for land for conservation dominated the selection process. Moreover, conservation scientists have not always shown leadership, a problem associated with science in general (Recher 2013, 2015).

Regardless of the reasons, the system of conservation reserves in Australia is fragmented, with individual reserves largely isolated in a matrix of disturbed habitats (Saunders *et al.* 1987; Burbidge and Wallace 1995). This is as true for New South Wales as it is for Australia as a whole. Despite a long history of biological survey in New South Wales and current practice, for most of the 20<sup>th</sup> Century few reserves were selected following biological surveys, with most selected opportunistically for reasons of outdoor recreation, scenic/tourist values, wilderness, or for political reasons (Strom 1979; Whitehouse 1990; Pressey 1990; Pressey *et al.* 1993; Craigie *et al.* 2014). As a consequence, large parts of continental biodiversity (ecosystems, taxa, and populations) are neither represented nor replicated within the system of reserves (Pressey *et al.* 1993; Purdie 1995; Watson *et al.* 2010). Whole groups of organisms, such as migratory and nomadic birds, requiring resources that are variable in distribution and abundance through time and space are disadvantaged by the lack of reserve replication and connectivity (Recher *et al.* 2010; Ford 2013). Unless changes are made, Australia's existing conservation reserve system means the end of evolution for Australia's flora and fauna, and the progressive loss of continental and regional biodiversity (Recher and Lim 1990; Recher 1999). Evolution will end because populations are small and isolated. Small populations mean that genetic diversity is diminished, with isolation reducing opportunities for genetic exchange. Together they mean there is less variety for natural selection to act on decreasing the capacity of species to adapt to changing environmental conditions such as those expected with climate change. In turn, this leads to an increased rate of loss of populations so that we can expect an accelerating loss of continental biodiversity (Recher and Lim 1990; Recher 1999).

Encouragingly there are signs that a new approach to biodiversity conservation in Australia is evolving. The Wilderness Society Science Council advocated a whole-of-landscape approach to nature conservation in Australia called WildCountry modelled after North America's Wildlands project (Recher 2003; [www.wildlandsnetwork.org](http://www.wildlandsnetwork.org); [www.wilderness.org.au/new-vision-nature](http://www.wilderness.org.au/new-vision-nature): accessed December 2014). This is a 'new vision' for conservation

<sup>12</sup> From any of my bird census transects on Impressa Moor I routinely counted up to 27 different water craft adjacent to the reserve. These ranged in size from recreation fishing boats, to commercial trawlers, luxury ocean liners, and container ships. In 2000, surfers were regularly landed on Nadgee's beaches by commercial operators where they then camped. Fish spotting light aircraft flew over the moors and adjacent ocean at low altitudes and commercial jets past overhead. Nadgee also has a long history of Aboriginal and European land use including harvesting wildlife, use of fire to clear bush, and the grazing of cattle.

that emphasizes connectivity across the landscape at continental scales (Soulé *et al.* 2004; Mackey *et al.* 2007). Projects already in action in Australia include Gondwanalink that is restoring connections between the South West forests and the Great Western Woodland of Western Australia (de Blas 2007; www.gondwanalink.org: accessed December 2014) and the ambitious Great Eastern Ranges corridor from the Australian Alps (Victoria) to the Atherton Tablelands (Queensland), a distance exceeding 2800 kms (Mackey *et al.* 2010).

In 2014, the Pew Charitable Trust published *'The Modern Outback'* (Woinarski *et al.* 2014) calling for a different future for Outback Australia, a future in which the entire Outback is managed as a single landscape conserving and enhancing the 'essential connections between living and non-living elements'. This whole-of-landscape vision recognizes the importance of conservation reserves, but also acknowledges that the ecological processes on which both wildlife and people rely for their well-being occur on scales that cannot be accommodated within any single reserve or system of reserves. Only by managing the Outback, an area of 5.6 million km<sup>2</sup> embracing 73% of the Australian continent, as a whole can the conservation of the Outback's flora and fauna, as well as its people, be achieved. The whole-of-landscape approach to nature conservation requires the co-operation of all land managers and owners regardless of land tenure. The need in New South Wales for a new, landscape scale approach to biodiversity conservation, embracing the co-operation of the entire community is described in detail in the report of the Independent Biodiversity Legislation Review Panel (Byron *et al.* 2014).

There are ways to facilitate conservation on private land based around the recognition of the economic value and ecosystem services provided by biodiversity. It is now possible to obtain economic rewards, through the protection and enhancement of biodiversity on private land, sourced from non-government funding (Byron *et al.* 2008; Shields 2008; Mckenney and Kiesecker 2010). The Biodiversity Banking Act (New South Wales 2005) and its attendant regulations are one such source of funding. Funding is derived from private sources (e.g., developers, philanthropists, local government). These market driven mechanisms for conservation are frequently opposed by NGO's and some scientists, but provide additional biodiversity capital (Byron *et al.* 2008; Burgin 2008; EDO New South Wales 2012; NCC New South Wales 2014).

## The New South Wales Scientific Committee

Regardless of what procedures are applied to reserve selection and design in 2015, the creation of a conservation reserve system in New South Wales has been a scramble between competing interests for land. Unlike modern initiatives, such as WildCountry and Gondwanalink, historically there was no vision and no attempt for whole-of-landscape conservation and management. This

is a harsh criticism as the scientific committee, the Fauna Protection Panel, the National Parks and Wildlife Service, the Minister, and conservation NGOs were simply responding to the political pressures and prevailing conservation ideologies of the era. The restrictions put on the scientific committee by the Minister significantly compromised the ability of the scientific committee and the Service to recommend and establish a more representative reserve system (Reed 1990). Nonetheless, the recommendations of the scientific committee provided a framework for New South Wales's reserve system and most of the areas the scientific committee recommended for reservation are now protected (Reed 1990).

From the beginnings of the national park movement in America and Australia in the 19<sup>th</sup> Century, setting aside natural areas was accepted as the best way, perhaps the only way, to conserve nature (Adams 2008), although, as Lunney (2014) points out this was not obvious when Royal National Park in New South Wales was dedicated in 1879. It was a view I accepted too readily (Recher 1971a). As the scientific committee recognized, conservation reserves were also seen as important to people for recreation and escape. In proposing the conservation of remnant vegetation in the Sydney Basin, Multiple-use Parks (SCPP 1971c), and protecting the Myall Lakes through whole-of-catchment management, the scientific committee anticipated the new vision for conservation embraced by WildCountry and The Pew Trust vision for the Outback. Where the conservation movement failed was in not understanding the importance of 'off-reserve' conservation and the biodiversity, social, and educational values of disturbed areas. The ideology and emotion of wilderness and pristine landscapes driven by leaders in the conservation movement severely compromised the development of a CAR reserve system in New South Wales. The emphasis on wilderness continues to adversely affect conservation planning in Australia (Craigie *et al.* 2014); many challenge the concept of wilderness arguing it is a cultural construct (Adams 2008). Off-reserve conservation and the importance of disturbed lands for biodiversity conservation are now accepted (Hale and Lamb 1997; Adams 2008), but much was lost during the early years of reserve development in New South Wales.

This does not mean that the 'end of evolution' is inevitable. As illustrated by the Pew Trust vision for the Outback (Woinarski *et al.* 2014) and the recommendations of Byron *et al.* (2014), it is possible to change how biodiversity conservation is managed in Australia. For example, both the Wilderness Society (Australia) (P. Robertson, pers comm., December 2015) and Birds Australia (L. Fox, pers comm., December 2014) promote the conservation of the Great Western Woodland in Western Australia as a single interactive landscape. In this vision, conservation reserves are an important and continuing land use, but only part of an overall conservation strategy where the needs of

people, as well as that of the land are met. With both, the conservation of nature and natural values remain priorities across the entire landscape. The recommendations of the Biodiversity Review Panel (Byron *et al.* 2014) adopt a similar approach for New South Wales as a whole,

integrating nature conservation on public and private land. The alternative is to continue to fragment the land, with nature confined to small and increasingly isolated patches where evolution will inevitably fail and biodiversity lost.

## Acknowledgements

My thanks to Jim Shields who helped with understanding the impact of changing the tenure of State Forests to National Park on long-term forest research. Deborah Andrew, John Asquith, Michael Calver, Rod Kavanagh, Dan Lunney, Don McMichael, Paul Recher, Jonathan Sanders, Jim Shields, and Frank Talbot kindly read a draft of the paper and provided helpful advice on how it could be improved, including from one that it not be published, a view I took seriously and much appreciated. Over a long career of research in Australia, my work leading to the development of the opinions and ideas

presented was generously supported and encouraged by the Australian Museum, the Australian Research Council, Curtin University, Edith Cowan University, the Forestry Commission of New South Wales, the Ian Potter Foundation, Harris–Daishowa Pty. Ltd., Murdoch University, the New South Wales National Parks and Wildlife Service, the University of Sydney, the University of New England, and the World Wildlife Fund among others. I am most grateful for their generosity and to my many colleagues who never fail to challenge my ideas and who accept the strength of my opinions as being ‘me’.

## References

- Adams, M. 2008. Foundational myths: Country and conservation in Australia. *Transforming Cultures eJournal* 3 (1): <http://epress.lib.uts.edu.au/journals/TfC> (accessed 4 August, 2015).
- Anon. 2002. *Myall Lakes Plan of Management*. New South Wales National Parks and Wildlife Service, Hurstville.
- Baur, G.N. 1989. *Forest Types in New South Wales*. Forestry Commission of New South Wales, Research Note No. 17.
- Blondel, J., Ferry, C., and Frochot, B. 1970. La methode des indices ponctuels d'abondance (IPA) ou des releves d'avifaune par 'stations d'ecoute'. *Alauda* 8: 55–71.
- Burbidge, A. A. 1990. Comment on wildlife conservation in Australia state of the nation. *Australian Zoologist* 26: 63–66. <http://dx.doi.org/10.7882/AZ.1990.116>
- Burbidge, A. A. and Wallace, K. J. 1995. Practical methods for conserving biodiversity. Pp. 11–26 in *Conserving Biodiversity: Threats and Solutions*. edited by R.A. Bradstock, T.D. Auld, D.A. Keith, R.T. Kingsford, D. Lunney, and D.P. Siversten. Surrey Beatty & Sons, Chipping Norton.
- Burgin, S. 1990. National Parks and Wildlife: Nature conservationists or political puppets? *Australian Zoologist* 26: 75. <http://dx.doi.org/10.7882/AZ.1990.119>
- Burgin, S. 2008. BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation. *Biodiversity and Conservation* 17: 807–816. <http://dx.doi.org/10.1007/s10531-008-9319-2>
- Byron, N., Craik, W., Keniry, J., and Possingham, H. 2014. *A Review of Biodiversity Legislation in New South Wales: Final Report*. Office of Environment and Heritage, Sydney.
- Byron, R., Fox, J., and Carroll, N. (eds). 2008. *Conservation and Biodiversity Banking*. Earthscan, London.
- Craigie, I. D., Pressey, R. L., and Barnes, M. 2014. Remote regions – the last place where conservation efforts should be intensified. A reply to McCauley *et al.* (2013). *Biological Conservation* 172: 22 – 222. <http://dx.doi.org/10.1016/j.biocon.2014.02.032>
- Curtin, R. A. 2004. The history of fauna conservation in the State Forests of New South Wales. Pp. 1022 – 1038 in *Conservation of Australia's Forest Fauna* (2<sup>nd</sup> ed.), edited by D. Lunney, Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- de Blas, A. 2007. Reconnecting country at a landscape scale. *Ecos No.* 136: 4.
- DECC. 2007. *Terrestrial Vertebrate Fauna of the Greater Southern Sydney Region, Vols. 1–5*. Department of Environment and Climate Change (New South Wales), Hurstville.
- Denny, M. 1994. Investigating the past: an approach to determining the changes in the fauna of the Western Division of New South Wales. Pp. 53–64 in *Future of the Fauna of Western New South Wales*. edited by D. Lunney, S. Hand, P. Reed, and D. Butcher. Transactions of the Royal Zoological Society of New South Wales, Mosman, NSW, Australia.

- Diamond, J. M. and May, R. M. 1981.** Island biogeography and the design of natural reserves. Pp. 163–186. in *Theoretical Ecology, Principles and Applications*. Blackwell Scientific Publications, Oxford. 2<sup>nd</sup> ed.
- Dickman, C. R. 1994.** Native mammals of western New South Wales: past neglect, future rehabilitation? Pp. 81–92 in *Future of the Fauna of Western New South Wales*. edited by D. Lunney, S. Hand, P. Reed, and D. Butcher. Transactions of the Royal Zoological Society of New South Wales, Mosman, NSW Australia.
- EDO NSW. 2012.** Submission: The review of the NSW Biobanking and Offsets Scheme. >[www.edonsw.org.au/submission\\_the\\_review\\_of\\_the\\_nsw\\_biodiversity\\_banking\\_andoffsets\\_scheme](http://www.edonsw.org.au/submission_the_review_of_the_nsw_biodiversity_banking_andoffsets_scheme)< pdf; (accessed 6 August, 2015).
- Egan, K. H., Farrell, J R., and Pepper–Edwards, D. L. 1997.** Historical and seasonal changes in the community of forest birds at Longneck Lagoon Nature Reserve, Scheyville, New South Wales. *Corella* 21: 1–16.
- Emlen, J. T. 1971.** Estimating breeding season bird densities from transect counts. *The Auk* 94: 455–468.
- Ford, H. A. 2013.** Are we underestimating the threat to Australia's migratory land birds? *Pacific Conservation Biology* 19: 303–311.
- Goldstein, W.(ed).1979.** Parks and Wildlife Centenary Issue. *Parks and Wildlife* 2.
- Hale, P and Lamb, D. (eds). 1997.** *Conservation Outside Nature Reserves*. Centre for Conservation Biology, Univ. of Queensland, St. Lucia.
- Hall, C. M. 1988.** The “worthless lands hypothesis” and Australia's national parks and reserves. Pp. 441–458 in *Australia's Ever Changing Forests*. edited by K. J. Frawley and N. Semple, Dept. of Geography and Oceanography, Australian Defense Force Academy, Canberra.
- Harris, L. D. 1984.** *The Fragmented Forest. Island Biogeography Theory and the Preservation of Biotic Diversity*. University of Chicago Press, Chicago.
- Kareiva, P. 2014.** New conservation: Setting the record straight and finding common ground. *Conservation Biology* 27: 634–636. <http://dx.doi.org/10.1111/cobi.12295>
- Kavanagh, R .P., Debus, S., Tweedie, T., and Webster, R. 1995.** Distribution of nocturnal forest birds and mammals in north–eastern New South Wales: relationships with environmental variables and management history. *Wildlife Research* 22: 359–377. <http://dx.doi.org/10.1071/WR9950359>
- Kavanagh, R. P and Stanton, M. 2005.** Vertebrate species assemblages and species sensitivity to logging in the forests of north–eastern New South Wales. *Forest Ecology and Management* 209: 309–341. <http://dx.doi.org/10.1016/j.foreco.2005.02.009>
- International Bird Census Committee. 1970.** Recommendations for an international standard for a mapping method in bird census work. *Bird Study* 16: 248–255.
- Likens, G. E. 1989.** *Long-term Studies in Ecology: Approaches and Alternatives*. Springer, NY.
- Lindenmayer, D. B. and Franklin, J. F. 2002.** *Conserving Forest Biodiversity: A Comprehensive Multiscaled Approach*. Island Press, Washington DC.
- Lindenmayer, D. B., Likens, G. E. and fourteen others. 2012.** Value of long–term ecological studies. *Austral Ecology* 37: 75–757.
- Lunney, D. 2014.** Integrating history and ecological thinking: Royal National Park in historical perspective. *Proceedings of the Linnean Society (NSW)* 136: 157 – 199.
- Lunney, D., Fox, A., Catling, P, Recher, H. F., and Lunney, H. W. M. 2012.** A contribution to the ecological history of Nadgee Nature Reserve, on the south coast of New South Wales. Pp. 217–246 in *Australia's Ever–changing Forests VI: Proceedings of Eighth National Conference on Australian Forest History*. edited by B.J. Stubbs, J. Lennon, A. Specht, and J. Taylor. Australian Forest History Society, Kingston, ACT, Australia.
- Lunney, D. and Recher, H. F. 1979.** National parks: A museum, a garden and an asylum. Pp. 184 – 199 in *A Natural Legacy: Ecology in Australia*. edited by H.F Recher, D. Lunney, and I. Dunn. Pergamon Press, Sydney.
- Lunney, D. and Recher, H. F. 1986.** The living landscape: An ecological view of national parks and nature conservation. Pp. 294 – 328 in *A Natural Legacy: Ecology in Australia*, edited by H.F Recher, D. Lunney, and I. Dunn. Pergamon Press, Sydney. 2<sup>nd</sup> edition.
- Mackey, B. G., Soulé, M. E., Nix, H. A., Recher, H. F., and five others 2007.** Applying landscape–ecological principles to regional conservation: the WildCountry Project in Australia. Pp. 192–213 in *Key Topics in Landscape Ecology*. edited by J. Wu and R.J. Hobbs. Cambridge University Press, Cambridge.
- Mackey, B., Watson, J., and Worboys, G. L. 2010.** *Connectivity Conservation and the Great Eastern Ranges Corridor*. Dept. Environment, Climate Change and Water New South Wales, Sydney.
- Main, A. R. and Yadev, 1971.** Conservation of macropods in reserves in Western Australia. *Biological Conservation* 3: 123–133. [http://dx.doi.org/10.1016/0006–3207\(71\)90014–0](http://dx.doi.org/10.1016/0006–3207(71)90014–0)
- McKenney, B. A. and Kiesecker, J. M. 2010.** Policy development for biodiversity offsets: a review of offset frameworks. *Environmental Management* 45: 165–176. <http://dx.doi.org/10.1007/s00267–009–9396–3>



- McMichael, D. F. 1973.** Further case studies in selecting and allocating land for nature conservation: New South Wales. Pp. 53–56 in *Nature Conservation in the Pacific: Proceedings of the Symposium on Nature Conservation in the Pacific of the 12<sup>th</sup> Pacific Science Congress*. edited by A. B. Costin and R. H. Groves, ANU Press, Canberra.
- McMichael, D. F. 1990.** The selection of land for nature conservation purposes in New South Wales. *Australian Zoologist* 26: 78. <http://dx.doi.org/10.7882/AZ.1990.121>
- Mott, J. J. and Bridgewater, P. B. 1992.** Biodiversity conservation and ecologically sustainable development. *Search* 23: 284–287.
- NCC NSW. 2014.** Submission on the draft NSW biodiversity offsets policy for major projects. >[www.environment.nsw.gov.au/resources/biodiversity/offsets/68NatureConservationCouncilofNSW.pdf](http://www.environment.nsw.gov.au/resources/biodiversity/offsets/68NatureConservationCouncilofNSW.pdf). (accessed 6 August, 2015).
- Nias, R. C. 1995.** The role of non-government organizations in the development of international and national policies for the conservation of biological diversity. Pp. 375 – 379 in *Conserving Biodiversity: Threats and Solutions*. edited by R. A. Bradstock, T. D. Auld, D. A. Keith, R. T. Kingsford, D. Lunney, and D. P. Sivertsen, Surrey Beatty & Sons, Chipping Norton.
- New South Wales National Parks & Wildlife Service. 2008.** *New South Wales National Parks Establishment Plan 2008*. Department of Environment & Climate Change, Sydney South, Australia.
- Noss, R. F., Dobson, A. P., and eleven others. 2012.** Bolder thinking for conservation. *Conservation Biology* 26: 1–4. <http://dx.doi.org/10.1111/j.1523-1739.2011.01738.x>
- Papps, D. J. and Wilson, P. D. 1995.** Biodiversity conservation in New South Wales: the role of the National Parks and Wildlife Service. Pp. 391 – 409 in *Conserving Biodiversity: Threats and Solutions*. edited by R. A. Bradstock, T. D. Auld, D. A. Keith, R. T. Kingsford, D. Lunney, and D. P. Sivertsen, Surrey Beatty & Sons, Chipping Norton.
- Pickard, J. 1994.** Do old survey plans help discover that happened to western New South Wales when Europeans arrived? Pp. 65–74 in *Future of the Fauna of Western New South Wales*. edited by D. Lunney, S. Hand, P. Reed, and D. Butcher. Transactions of the Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Pickett, S. T. A. and Thompson, J. N. 1978.** Patch dynamics and the design of nature reserves. *Biological Conservation* 13: 27–36. [http://dx.doi.org/10.1016/0006-3207\(78\)90016-2](http://dx.doi.org/10.1016/0006-3207(78)90016-2)
- Pressey, R. L. 1990.** Reserve selection in New South Wales: Where to from here? *Australian Zoologist* 26: 70–75. <http://dx.doi.org/10.7882/AZ.1990.118>
- Pressey, R. L. 1994.** Ad hoc reservations: Forward or backward steps in developing representative reserve systems. *Conservation Biology* 8: 662–668. <http://dx.doi.org/10.1046/j.1523-1739.1994.08030662.x>
- Pressey, R. L., Humphries, C. J., and three others. 1993.** Beyond opportunism: Key approaches for systematic reserve selection. *TREE* 8: 124–128. [http://dx.doi.org/10.1016/0169-5347\(93\)90023-I](http://dx.doi.org/10.1016/0169-5347(93)90023-I)
- Pryor, L. D. and Johnson, L. A. S. 1971.** *A Classification of the Eucalypts*. ANU, Canberra.
- Purdie, R. 1995.** Conserving biodiversity – threats and solutions: overview. Pp. 410–416 in *Conserving Biodiversity: Threats and Solutions*. edited by R. A. Bradstock, T. D. Auld, D. A. Keith, R. T. Kingsford, D. Lunney, and D. P. Sivertsen. Surrey Beatty & Sons, Chipping Norton.
- Recher, H. F. 1971a.** Do we need more national parks? *Search* 2: 22–26.
- Recher, H. F. 1971b.** The Myall Lakes: Now. *Australian Natural History* 17: 34–39.
- Recher, H. F. 1971c.** The Myall Lakes: Tomorrow. *Australian Natural History* 17: 72–77.
- Recher, H. F. 1976.** An ecologist's view: the failure of our national parks. *Australian Natural History* 18: 398–405.
- Recher, H. F. (Chairman). 1978.** *The Definition of Key Environmental Problems in Land Conservation*. New South Wales Land Conservation Study Group, Sydney. January 1978.
- Recher, H. F. 1981.** Bird communities of heathlands and their management and conservation requirements. Pp. 27–40 in *Heaths in New South Wales*. edited by C. Haigh, N.S.W. Parks and Wildlife, July 1981.
- Recher, H. F. 1984.** Use of bird census procedures in Australia: a review. Pp 3–14. in *Methods of Censusing Birds in Australia*. edited by S. Davies. Royal Australasian Ornithologists Union Report No. 7.
- Recher, H. F. 1989.** Counting terrestrial birds: use and application of census procedures in Australia. *Australian Zoological Reviews* 1:25–45.
- Recher, H. F. 1990a.** Wildlife conservation in Australia: State of the nation. *Australian Zoologist* 26: 5–10.
- Recher, H. F. 1990b.** Response to conserving what? – The basis for nature conservation reserves in New South Wales 1967–1989. *Australian Zoologist* 26: 83–84. <http://dx.doi.org/10.7882/AZ.1990.124>

- Recher, H. F.** 1999. The state of Australia's avifauna: a personal opinion and prediction for the new millennium. *Australian Zoologist* 31: 11–27. <http://dx.doi.org/10.7882/AZ.1999.003>
- Recher, H. F.** 2003. WildCountry. *Pacific Conservation Biology* 8: 221–22.
- Recher, H. F.** 2013. What makes this old scientist grumpy. Pp. 1–8 in *Grumpy scientists: the ecological conscience of a nation*, edited by D. Lunney, P. Hutchings, and H. F. Recher. Royal Zoological Society of New South Wales, Mosman, New South Wales, Australia. <http://dx.doi.org/10.7882/fs.2013.004>
- Recher, H. F.** 2015. Failure of science, death of nature. *Pacific Conservation Biology* 21: 2 – 14. <http://dx.doi.org/10.1071/PC14907>
- Recher, H. F. and Lim, L.** 1990. A review of the status of Australia's terrestrial vertebrate fauna. *Proceedings Ecological Society Australia* 16: 287–301.
- Recher, H. F. and Lunney, D. H.** 2003. Wilderness obsession: A threatening process. *Nature Australia* 27(9): 84.
- Recher, H. F., Lunney, D., and Dunn, I. (eds.).** 1979. *A Natural Legacy: Ecology in Australia*. Pergamon Press, Sydney. 276 pp. 1<sup>st</sup> ed.
- Recher, H. F., Lunney, D., and Dunn, I. (eds.).** 1986. *A Natural Legacy: Ecology in Australia*. Pergamon Press, Sydney. 350 pp. 2<sup>nd</sup> ed.
- Recher, H. F., Lunney, D., and Matthews, A.** 2009. Small mammal populations in a eucalypt forest affected by fire and drought. I. Long-term patterns in an era of climate change. *Wildlife Research* 36: 143–158. <http://dx.doi.org/10.1071/WR08086>
- Recher, H. F., Majer, J. D., and Davis, W. E., Jr.** 2010. The eucalypt woodlands of Western Australia: Lessons from the birds. Pp. 63–72 in *Temperate Woodland Conservation and Management*, edited by D. Lindenmayer, A. Bennett, and R. Hobbs. CSIRO Publ., Collingwood.
- Recher, H. F., Majer, J. D., and Ganeshanandam, S.** 1996. Birds, insects and eucalypts: On the relation between foliar nutrients and species richness. *Forest Ecology and Management* 85: 177–96. [http://dx.doi.org/10.1016/S0378-1127\(96\)03758-9](http://dx.doi.org/10.1016/S0378-1127(96)03758-9)
- Recher, H. F. and Pyke, G.** 2012. A History of Environmental Ornithology at the Australian Museum. Pp. 395–425 in *'Contributions to the History of Australian Ornithology. Vol. 2'* edited by W. E. Davis, Jr., H. F. Recher, and W. E. Boles, Memoirs of the Nuttall Ornithological Club, No. 18.
- Reed, P.** 1990. An historical perspective on: Conserving what? The basis for nature conservation reserves in New South Wales 1967–1989. *Australian Zoologist* 26: 85–91. <http://dx.doi.org/10.7882/AZ.1990.125>
- Saunders, D. A.** 1990. The landscape approach to conservation: community involvement, the only practical solution. *Australian Zoologist* 26: 49–53. <http://dx.doi.org/10.7882/AZ.1990.109>
- Saunders, D. A., Arnold, G. W., Burbidge, A. A., and Hopkins, A. J. M. (eds)** 1987. *Nature Conservation: the Role of Remnants of Native Vegetation*. Surrey Beatty & Sons, Chipping Norton.
- Scientific Committee on Parks and Reserves (SCPP).** 1968. *Report No. 1*. New South Wales National Parks and Wildlife Service, Sydney.
- Scientific Committee on Parks and Reserves (SCPP).** 1969. *Report No. 2. Park and Reserve Proposals, the Coastal Areas of New South Wales*. New South Wales National Parks and Wildlife Service, Sydney.
- Scientific Committee on Parks and Reserves (SCPP).** 1971a. *Report No. 3. Park and Reserve Proposals, the Tablelands and North Coast of New South Wales*. New South Wales, Sydney.
- Scientific Committee on Parks and Reserves (SCPP).** 1971b. *Report No. 4. Park and Reserve Proposals, the Western Slopes and Plains of NSW*. NSW NPWS, Sydney.
- Scientific Committee on Parks and Reserves (SCPP).** 1971c. *Report No. 5. Park and Reserve Proposals. Multiple Use Parks*. NSW NPWS, Sydney.
- Slatyer, R. O.** 1975. Ecological reserves: size, structure and management. *Australian Academy of Sciences Report* 19: 22–38.
- Shields, J. M.** 1990. The effects of logging on bird populations in south-eastern New South Wales. Ph.D. Thesis, University of Washington, Seattle.
- Shields, J. M.** 2003. Wildlife Management in NSW Native Forests. Pp. 963–940 in *Conservation of Australia's Forest Fauna (2<sup>nd</sup> edn)*, edited by D. Lunney. Royal Zoological Society of NSW, Mosman, NSW, Australia.
- Shields, J. M.** 2008. Australia's biodiversity offsets. Pp. 205–220 in *Conservation and Biodiversity Banking*, edited by R. Byron, J. Fox, and N. Carroll, N. Earthscan, London.
- Shields, J., Kavanagh, R. and Rohan Jones, W.** 1987. Forest avifauna of the upper Hastings River. In: *Birds of Eucalypt Forest and Woodlands: Ecology, Conservation and Management*, edited by A. Keast, H. F. Recher, H. Ford, and D. Saunders. Surrey Beatty & Sons, Sydney.
- Shields, J., Stanton, M., and Longmore, W.** 1994. Birds of the Tumbarumba State Forests. Unpublished Report. Forest Research and Development Division, State Forests of NSW. Oratava Avenue, Pennant Hills, NSW, PO Box 100 Beecroft. NSW Australia.

- Smith, P. and Smith, J. 1994.** Historical change in the bird fauna of western New South Wales: ecological patterns and conservation implications. Pp. 123–148 in *Future of the Fauna of Western New South Wales*, edited by D. Lunney, S. Hand, P. Reed, and D. Butcher. Transactions of the Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- Somerville, J. G. 2005.** *Saving the Rainforest – The New South Wales Campaign 1973 – 1984*. >[https://www.coolongwilderness.org.au/.../saving\\_the\\_rainforest\\_pdf](https://www.coolongwilderness.org.au/.../saving_the_rainforest_pdf); (accessed 16 July, 2015).
- Soulé, M. 2013.** The ‘new conservation’. *Conservation Biology* 27: 895–897. <http://dx.doi.org/10.1111/cobi.12147>
- Soulé, M., Mackey, B., Recher, H. F., and five others. 2004.** The role of connectivity in Australian conservation. *Pacific Conservation Biology* 10: 266–279.
- Starling, J. 1990.** Comments on an article by J. Whitehouse. *Australian Zoologist* 26: 79–80. <http://dx.doi.org/10.7882/AZ.1990.122>
- State Forests of NSW. 1994a.** *Fauna Impact Statement. Proposed Forestry Operations in Eden Management Area. Environmental Impact Statement*. State Forests of NSW, Pennant Hills.
- State Forests of NSW. 1994b.** *Eden Management Area Environmental Impact Statement*. State Forests of New South Wales. State Forests of NSW, Pennant Hills.
- State Forests of NSW. 1995a.** *Fauna Impact Statement for Dorrigo Management Area*. State Forests of NSW, Pennant Hills, Sydney.
- State Forests of New South Wales 1995b.** *Fauna Impact Statement for Tenterfield Management Area*. State Forests of New South Wales, Pennant Hills, Sydney.
- State Forests of New South Wales. 1995c.** *Tenterfield Environmental Impact Statement*. State Forests of New South Wales, Sydney.
- State Forests of New South Wales. 1995d.** *Urbenville Management Area Environmental Impact Statement*. State Forests of New South Wales.
- Strom, A. 1979.** Some events in nature conservation over the last forty years. *Parks and Wildlife* 2: 65–73.
- Strom, A. 1990.** Response to: Conserving what? – The basis for nature conservation reserves in New South Wales 1967–1989. *Australian Zoologist* 26: 94–96. <http://dx.doi.org/10.7882/AZ.1990.129>
- Watson, J. E. M., Evans, M. C., and seven others. 2010.** The capacity of Australia’s protected-area system to represent threatened species. *Conservation Biology* 25: 324 – 332. <http://dx.doi.org/10.1111/j.1523-1739.2010.01587.x>
- Whitehouse, J. F. 1990.** Conserving what? – The basis for nature conservation reserves in New South Wales 1967–1989. *Australian Zoologist* 26: 11–21. <http://dx.doi.org/10.7882/azoo.26.1.21886x4307560u33>
- Woinarski, J., Trail, B., and Booth, C., 2014.** *The Modern Outback: Nature, People, and the Future of Remote Australia*. Pew Charitable Trusts, Sydney.
- Wyborn, C. 2011.** Landscape scale ecological connectivity: Australian survey and rehearsals. *Pacific Conservation Biology* 17: 121–131.