

CORRESPONDENCE

Management for the conservation of Leadbeater's Possum (*Gymnobelideus leadbeateri*) — a reply

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WE welcome the opportunity to respond to Lindenmayer and Norton (1993) on behalf of those involved in management of the endangered Leadbeater's Possum. We agree that much can be learned from overseas experience, including work on the Northern Spotted Owl in USA. However, we do not share those authors' jaundiced and negative views about our developing management strategies and believe that comparisons with proposed conservation measures for the Northern Spotted Owl, as presented, are misleading. Their paper is particularly disappointing in view of the substantial achievements made towards conserving Leadbeater's Possum during the past two years. These have been:

1. to produce a set of management strategies that have been accepted by the forest management authorities and implemented in the forest;
2. to ensure that all ash forest older than 120 years is excluded from logging within the range of Leadbeater's Possum, and that no living trees older than 120 years are logged;
3. to establish a zoning system which identifies and protects the best current habitat for the possum at any given time (i.e., forest with high densities of old hollow-bearing trees, and forest with intermediate levels of old trees and abundant wattles);
4. to support and conduct high-quality research programmes, and assist workers including Dr Lindenmayer to obtain federal funds for projects such as Metapopulation Viability Analysis (MVA);
5. to implement a range of programmes to determine the current distribution of habitat resources, by interpretation of air photos (completed for 50 per cent of the ash forest, mapping

individual old stands and trees, alive or dead), supplemented with ground and helicopter surveys of resources such as hollow-bearing trees below the forest canopy;

6. to transfer this information to a Geographical Information System (GIS), which will be used to predict the distribution of habitat over time under various scenarios of management and stochastic events, and to modify strategies accordingly;
7. to begin addressing the paramount question of developing new habitat by a range of measures including allowing strips of forest to grow to maturity around groups of logging coupes, and developing new silvicultural systems with overwood retention; and
8. to establish a Leadbeater's Possum Management Team, to ensure that management is indeed adaptive and responsive to new information.

We are proud of these achievements and look forward to taking the next steps to ensure a secure future for this special marsupial. Some of the most important next steps are to complete the resource assessment, continue the GIS analysis and combine this with results of research and MVA to work out spatial strategies for reserves and areas where new habitat will be developed. The option presented by Tanton and Norton (1991) is just one of many possibilities and a simplistic one that omits some important existing and potential habitat. The relative merits of developing new habitat by regrowing strips, large stands or scattered trees remains an open question that requires further research. Existing data suggest that the most effective strategy may be to retain and regrow a scattering of old trees among regrowth as this provides the ideal mix of resources needed by the possum (old trees for hollows and

nest material, wattles for winter food, eucalypts for other food and dense vegetation for mobility; Smith 1982; Smith *et al.* 1985). Dr Lindenmayer has undertaken to provide some of his data that will help resolve these questions. Of course we are also using general management principles such as the five espoused by Thomas *et al.* (1990), but with caution because one of the main lessons of biogeography is surely that it is dangerous to generalize without considering knowledge of the organisms and ecosystems in question, and the scale and pattern of existing habitat (e.g., Bennett 1987).

We accept that current habitat is declining more quickly than new habitat can be made in the short term, mainly because of the collapse of dead hollow-bearing trees (stags) in regrowth forest, the time-lag to replace them, and logging in about 1 per cent of the forest each year. That is why the species is considered endangered. Hence we must move quickly to ensure that new habitat is developed in the right places, and that logging does not fragment future habitat or close off important options for future management. These aspects are being addressed as a crucial part of our adaptive management. They were not discussed in detail in the draft management strategies (Macfarlane and Seebeck 1991), partly because resource assessment data were incomplete and some research results were unavailable.

The paper by Lindenmayer and Norton tabulates some "key aspects" of the issues involving both species. One difference in particular should be highlighted, i.e., the home range of the Leadbeater's Possum (1–3 ha) compared with that of the Northern Spotted Owl (1 200–3 000 ha). In view of this large difference, it would be surprising if the same scale of management were

appropriate for each species. Also, it should be noted that diet and social structure are dissimilar.

Two other differences were not discussed, but are very relevant to the management of the two species. One concerns the nature of the forests, and the other concerns the habitat preferences of the animals. The coniferous forests inhabited by Spotted Owls are largely old-growth except where they have been logged, and most logging is in old-growth forest. The eucalypt ("montane ash") forests inhabited by Leadbeater's Possums have been subject to more frequent severe fires, and now consist mainly of regrowth with varying densities of older trees (dead or alive), and patches of old forest of varying size and shape. The regenerating trees grow rapidly after disturbance and stands regenerating from wildfires in the first half of this century (including 1939 when 75% of the ash forests burned) are now suitable for logging. Extensive areas of old-growth occur in the water catchments (patches up to 3 000 ha) but most other patches are smaller than 100 ha. Old ash forests are important as a relatively stable habitat for Leadbeater's Possum and for a range of other fauna including the threatened Sooty Owl. One of our first actions was to reserve all areas of ash forest older than 120 years, but these areas do not fall neatly into the sort of ideal configuration of reserve advocated by Lindenmayer and Norton. We were limited by reality, in terms of the distribution and extent of old growth. The mean density of Leadbeater's Possum in old ash forest has been estimated as one animal per 3 ha (Lindenmayer *et al.* 1993), so already habitat has been retained for substantial numbers of animals, far in excess of the 200 estimated as a minimum viable population in stable habitat by Lindenmayer *et al.* (1993).

The other important difference concerns the ecology of the animals. Northern Spotted Owls depend on old-growth, but although Leadbeater's Possums need old hollow trees, they also benefit from elements of the regrowth forest such as wattles and dense vegetation. Their highest densities occur in regrowth forest with high densities of wattles and remaining old trees (Smith and Lindenmayer 1992). Although it is more expensive to retain and regrow old trees among

regrowth than in mature stands, the benefits to Leadbeater's Possum will be greater and trials are in progress to develop silvicultural systems that produce this desired structure of forest. A major multi-disciplinary research project is in progress to examine the costs and benefits of a range of silvicultural systems for many purposes (Squire 1990); Dr Lindenmayer participated in this project while he was employed by us from 1990 to 1992. A closer parallel with Spotted Owl is provided by the Sooty Owl which shows a preference for old ash forests (Milledge *et al.* 1991), but it also inhabits a wide range of wet forests in eastern Australia. It will benefit from our reservations of old ash forest as part of Leadbeater's Possum management.

Some negative comments in the paper by Lindenmayer and Norton require response, although we prefer to focus on the future. The strategies were released in 1991 after four years of work in developing them in co-operation with scientists (including Dr Lindenmayer) and land managers — not after a "delay of several years". The success of this process is indicated by the fact that the strategies received sufficient acceptance for immediate implementation (apparently in contrast to the Spotted Owl recommendations). We are accused of not using all available information, but much of this was not available when the management strategies were drafted and some, which we have requested, has not yet been supplied to us. The public comments received have been useful in planning changes to management but the time for major review will be when resource assessment is complete and results of previous research and Metapopulation Viability Analysis are available.

Dr Lindenmayer has made an important contribution to our understanding of Leadbeater's Possum ecology, building on the pioneering work of Dr Andrew Smith. He and others, including Dr Norton, have helped to raise the profile of the issue through multiple publications in Australian and international journals. However, their suggested resolutions have failed to recognize that our challenge is to conserve Leadbeater's Possum in all forests regardless of land-use. They have not offered realistic and practical prescriptions for conserving

Leadbeater's Possum in parts of the forest where timber production is permitted. No matter how "scientifically valid" conservation strategies may be, they will be of no benefit to the species if they cannot be applied on the ground. Nevertheless, we will continue to invite biological and ecological experts, such as Dr Lindenmayer, to work co-operatively with us in exploring future directions for the management of Leadbeater's Possum.

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REBUTTAL

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MR. MACFARLANE and Mr. Loyn have failed to recognize the main thrust of the recent article comparing the development of management strategies for the conservation of the Northern Spotted Owl in the Pacific Northwest of the USA and Leadbeater's Possum in Central Victoria (Lindenmayer and Norton 1993). The key issue was **not** to compare the biology of the respective taxa; that would be nonsensical. Rather, it was to highlight that, unlike the management of Leadbeater's Possum (Macfarlane and Seebeck 1991), conservation strategies for the Northern Spotted Owl have now been developed that are ecologically defensible and scientifically valid (Murphy and Noon 1992).

The acceptance of the management strategies for Leadbeater's Possum by the Timber Industry does not mean that they are ecologically sound. Indeed, the scientifically-based criticisms elucidated by Lindenmayer and Norton (1993) are valid and they underpin concerns expressed by Smith and Lindenmayer (1992) that Leadbeater's Possum could be totally eliminated from timber production forests. Montane ash forests where Leadbeater's Possum occurs, or has the potential to occur, continue to be logged using the clearfelling technique — a practice that has **not** changed with the implementation of the management strategies. The short rotation time and the amount of forest that is logged make clearfelling a major threatening process which is incompatible with the conservation of the

species. Furthermore, there is no evidence to show that present prescriptions will mitigate the impacts of logging on Leadbeater's Possum, particularly as the existing management zones create only deferred timber harvesting areas (see Lindenmayer and Norton 1993). Finally, there is no indication that the Government of Victoria is willing to either: (1) continue to appropriately fund studies of alternative logging practices under the Silvicultural Systems Project (Wilson 1991; Barnett 1993), and/or (2) implement key findings from such studies and employ modified timber harvesting techniques; probably as a result of a legislated over-commitment to produce timber and pulpwood (Barnett 1993).

Clearly the attempts to conserve Leadbeater's Possum are hampered by the speed of landscape modification and habitat destruction that far outstrips the pace of bureaucratic change. I hope that in the near future these difficulties will be remedied and the management strategies for the conservation of the species will evolve to a more advanced level, as has occurred in the case of the Northern Spotted Owl.

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animal kingdom is just as potent for selecting what survives.

In 1995, we will have another chance to see how the conservation of invertebrates is progressing. Another conference on the theme will be held in Melbourne. For registration of interest contact: Dr Alan Yen, Invertebrate Survey Department, Museum of Victoria, 71 Victoria Crescent, Abbotsford, Victoria 3067, Australia. The book of the 1993 conference papers will be available in early 1994. If you interested in purchasing a copy, do not hesitate to contact me.