NOMINATION NO. 377

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

Habitat fragmentation as a threatening processes for fauna in Victoria.
(Potentially Threatening Process)

Date of preliminary recommendation: 21 July 1997
Date of final recommendation: 18 August 1998
Date of consideration: 19 September, 3 November, 3 December 1996, 26 March, 12 May, 21 July 1997, 29 September 1998. **File No.:** 96/0974

Validity:

The nomination is for a valid item and the prescribed information was provided.
In the opinion of the SAC the process is adequately defined and described.

The nominated process is habitat fragmentation as a potentially threatening process for fauna in Victoria. Habitat fragmentation is the process by which natural habitats are subdivided leaving remnants amidst an altered landscape. The process involves: an overall loss of habitat, a reduction in size of remaining fragments; and increased separation and isolation of remaining fragments by intervening land use.

Commonly observed examples of fragmented habitats in Victoria are patches of forest or woodland retained amongst rural landscapes, and small natural areas amidst expanding urban environments. Fragmentation may also be visibly less obvious: for example, remnants of native grassland amongst introduced pasture grasses or remnants of old-growth forest amongst regenerating forest.

Habitat fragmentation has occurred in all major habitat types and in all regions of Victoria, but to varying extents. The extent and severity of fragmentation generally corresponds with the extent of overall habitat loss within an area.

Habitat fragmentation has a number of impacts on species populations. For some species, fragmentation isolates the resources that animals require on a daily or seasonal basis. With decreasing size of fragments, the size of populations that these can support also decreases. Many fragments are too small to support even single individuals for species that require large home ranges, or only small populations may be present. Small populations are particularly vulnerable to fluctuation and extinction due to chance events (demographic, genetic, environmental, catastrophes) and over time they disappear from remnants.

A direct consequence of fragmentation is the increasing influence of edge effects and disturbance processes that arise outside the fragment, with disruptive effects on the ecology of the habitat fragment and the status of its species.

Changes in species richness are also a consequence of habitat fragmentation. Large remnants support more species than small remnants. Thus as habitat fragmentation becomes more intense and the size of fragments decreases, the number of species supported and the composition in each remnant declines. Fragmentation results in a simplification in the composition of faunal communities and a greater dominance by common and generalist species that can cope with surrounding environments and their land use.

The loss of species or alteration of environmental conditions due to fragmentation also leads to changes in ecological processes such as predator-prey relationships, competitive interactions, food webs, seed dispersal, plant pollination, shrub regeneration, nutrient recycling and maintenance of successional mosaics by natural disturbance. These disruptions can in turn lead to further decline or loss of species dependent on natural processes.

The range of flora or fauna affected or potentially affected was adequately stated in the nomination.

Significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the **Flora and Fauna Guarantee Act 1988**, and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 1991.

Evidence that criteria are satisfied:

Criterion 5.1 *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.*

Evidence:

Habitat fragmentation poses a significant threat to a number of fauna across the State. Examples of Victorian threatened species for which habitat fragmentation is a major factor in their decline are:

Striped Legless Lizard - The remaining habitat of the Striped Legless Lizard *Delma impar* is very limited in area and severely fragmented. As a result the species probably occurs in fairly small isolated populations and is thus exposed to chance catastrophic events. Such events could lead to extinction of local populations.

Mountain Pygmy Possum - Clearing of alpine rock scree habitat and road construction have been identified as threats to Mountain Pygmy Possum *Burramys parvus* populations by reducing the amount of habitat and isolating populations. The tunnel at Mt. Hotham was constructed to restore connectivity to a population that had become fragmented by road development. The linking of habitat has enabled individuals to move between areas previously separated by a man-made obstacle, highlighting the effect of habitat fragmentation on small populations.

Red-tailed Black Cockatoo - The Red-tailed Black Cockatoo *Calyptorhynchus magnificus* utilises different habitats for feeding, nesting and roosting. Feeding habitat is concentrated on public land (Brown Stringybark woodlands in reserves), while the known nesting habitat occurs mainly on private land (large hollow-bearing trees, particularly Red Gums). Most of the feeding habitat is located on 30 or so fragmented blocks of Crown Land, varying from less than 100 to 1 100 ha. Much of the private land has been cleared for agriculture. The long-term survival of the population depends on feeding, roosting and nesting habitats; and, because of the division between nesting and food habitat, complementary management of private and public land is essential.

Rufous Bristlebird - The range of the Rufous Bristlebird *Dasyornis broadbenti* in Victoria has decreased because of loss of habitat through clearing for agriculture and coastal urban development causing fragmentation of habitat and extinctions of local populations. Continued coastal development is likely to result in further habitat fragmentation. Efforts to minimise isolation of populations and to restore connectivity are prominent among the intended management actions for the species.

Sub-criterion 5.1.1 *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of two or more taxa.*

Evidence:

Taxa most at risk from habitat fragmentation include many that are recognised as threatened, those with limited and/or disjunct distributions and those highly susceptible to competition. Examples are: Black-eared Miner *Manorina melanotis*, Superb Parrot *Polytelis swainsonii*, Grey-crowned Babbler *Pomatostomus temporalis*, Red-tailed Black Cockatoo *Calyptorhynchus magnificus*, Rufous Bristlebird *Dasyornis broadbenti*, Striped Legless Lizard *Delma impar*, Eltham Copper Butterfly *Paralucia pyrodiscus lucida*, Mountain Pygmy Possum *Burramys parvus*, Squirrel Glider *Petaurus norfolcensis* and Brush-tailed Phascogale *Phascogale tapoatafa*.

Criterion 5.2 *The potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of a range of flora and fauna..*

Evidence:

At the level of whole communities, fragmentation results in the loss of species, changes to the composition of assemblages and changes to ecological processes. There is widespread evidence that habitat fragmentation results in the decline and loss of species from fragments, and that such losses may lead to local and regional extinctions. Changes resulting from fragmentation are not immediate, but become evident over years or decades as, for example, animal populations slowly decline to extinction on a local then regional scale, tree regeneration fails and trees eventually die without replacement, plant populations decline from lack of dispersal, etc.

Sub-criterion 5.2.1 *The potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of two or more taxa.*

Evidence: Taxa at risk from habitat fragmentation include: Black-eared Miner *Manorina melanotis*, Superb Parrot *Polytelis swainsonii*, Grey-crowned Babbler *Pomatostomus temporalis*, Red-tailed Black Cockatoo *Calyptorhynchus magnificus*,

Rufous Bristlebird *Dasyornis broadbenti,* Striped Legless Lizard *Delma impar*, Eltham Copper Butterfly *Paralucia pyrodiscus lucida*, Mountain Pygmy Possum *Burramys parvus*, Squirrel Glider *Petaurus norfolcensis* and Brush-tailed Phascogale *Phascogale tapoatafa*

Additional Information

- Bennett (1990) provides a detailed case-study of the effects of forest fragmentation on the mammalian fauna of south-western Victoria.

Advertisement for public comment

In accordance with the requirements of Section 14 of the **Flora and Fauna Guarantee Act 1988**, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:
"The Age" - on 15 July 1998
"The Weekly Times" - on 15 July 1998
"The Sunraysia Daily" - on 15 July 1998
The *Government Gazette* - on 16 July 1998
Submissions closed on 14 August 1998.

Further evidence provided:

Two submissions were received, although no evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the taxon is eligible for listing.

Documentation

The published information and research data provided to the SAC have been assessed. Based on the available evidence, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Final Recommendation of the Scientific Advisory Committee

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because primary criteria 5.1 and 5.2 have been satisfied. The SAC also concludes that sub-criteria 5.1.1 and 5.2.1 have been satisfied and that primary criterion 5.1 or 5.2 are satisfied as a consequence of sub-criteria 5.1.1 and 5.2.1 being satisfied.

The Scientific Advisory Committee recommends that the nominated item be supported for listing on Schedule 3 of the **Flora and Fauna Guarantee Act 1988**.

Selected references:

Barrett, G. W., Ford, H. A. & Recher, H. F. (1994) Conservation of woodland birds in a fragmented rural landscape. *Pacific Conservation Biology* **1**: 245-56

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Clark, T. W., Warneke, R. M. & George, G. G. (1990) Management of small populations. pp: 1-18 *in* T. W. Clark and Seebeck, J. H. (eds.) *Management and conservation of small populations*. Chicago Zoological Society: Brookfield, Illinois.

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Crome, F. H. J. & Bentrupperbaumer, B. (1993) Special people, a special animal and a special vision: the first steps to restoring a fragmented tropical landscape. pp: 267-79 *in* D. A. Saunders and R. J. Hobbs (eds.) *Nature conservation 3: The reconstruction of fragmented ecosystems*. Surrey Beatty & Sons: Chipping Norton, NSW.

Fahrig, L. (1997) Relative effects of habitat loss and fragmentation on population extinction. *J. Wildl. Mgt.* **61** (3): 603-10.

Hobbs, R. J. (1993) Effects of landscape fragmentation on ecosystem processes in the Western Australian wheatbelt. *Biological Conservation* **64**: 193-201.

Lovejoy, T. E. *et al.* (1986) Edge and other effects of isolation on Amazon forest fragments. *in*: Soule, M. E. [ed] *Conservation Biology: The Science of Scarcity and Diversity*, pp: 257-85. Sinauer Associates: Sunderland, Maryland, USA.

Loyn, R. H. (1985) Birds in fragmented forests in Gippsland, Victoria. pp: 323-31 *in*: Keast, A. *et al.* [eds] *Birds of eucalypt forests and woodlands: Ecology, Conservation, Management.* Surrey Beatty and Sons: Chipping Norton, Sydney.

Margules, C. R. & Milkovits, G. A. (1994) Contrasting effects of habitat fragmentation on the scorpion *Cercophonius squama* and an amphipod. *Ecology* **75**: 2033-42.

Pahl, L. I., Winter, J. W. & Heinsohn, G. (1988) Variation in responses of arboreal marsupials to fragmentation of tropical rainforest in north eastern Australia. *Biological Conservation* **46**: 71-82.

Recher, H. F. & Lim, L. (1991) A review of current ideas of the extinction, conservation and management of Australia's vertebrate fauna. *Proceedings of the Ecological Society of Australia* **16**: 287-301.

Saunders, D. A., Hobbs, R. J. & Margules, C. R. (1991) Biological consequences of ecosystem fragmentation: A review. *Conservation Biology* **5**: 18-32.

Endorsement by the Convenor of the Scientific Advisory Committee **Date**

9-10-98

D. L. Macmillan

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Convenor