

Red gum forests
Forests Assessment
Natural Resources Commission
GPO Box 4206, Sydney NSW 2001

15th October 2009

To Whom It May Concern:

I would like to provide some recommendations for the new management of river red gum forests in New South Wales. These forests have been massively degraded and require our urgent protection to ensure their survival for future generations.

My research on a native mammal (the yellow-footed antechinus) on the Murray River floodplains showed that floods were beneficial, while removal of fallen timber and of large trees were detrimental, to the animals. Management actions, which should be undertaken, are described in the following extracts from Lada and Mac Nally (2008):

“Restoration of the habitat along the river (i.e. through towns, by providing fallen timber among the existing trees) to increase connectivity, and maintenance of high effective population sizes within the forests (e.g. by increasing fallen-timber volumes and stopping logging), should be undertaken by conservation managers wherever practicable.”

“Small floods almost certainly are beneficial to yellow-footed antechinus, and environmental flows should continue to be used for spring inundations of floodplains. Currently, it is uncertain if large floods, artificially prolonged over summer are detrimental to yellow-footed antechinus. Given dramatic declines in yellow-footed antechinus population sizes following absence of floods for 2 (and 3) years, we recommend one spring flood in ≤ 3 years.”

“Every large tree should be protected, including along roads. Returning large trees into the landscape will require long-term planning by planting trees and allowing small/medium ones to reach large sizes.”

“Although replenishment of fallen timber on the forest floor may be very

challenging across large areas of forest because of scarcity of large trees available to produce fallen timber (in box-ironbark forests, in particular), efforts should be made to at least prevent remaining logs from being removed. However, it should be possible to supply fallen timber across small areas of forest. We believe there is a compelling case for volumes of at least 66 m³ /ha for river red gum forests based on experimental evidence.”

Please find attached abstracts from manuscripts describing my studies in Campbells Island, Koondrook and Millewa forests. Key points are highlighted in bold. I would gladly provide copies of full manuscripts if you require them.

Yours faithfully,

Dr Hania Lada

Hania Lada, James R. Thomson, Ralph Mac Nally, Greg Horrocks and Andrea C. Taylor (2007). Evaluating simultaneous impacts of three anthropogenic effects on a floodplain-dwelling marsupial *Antechinus flavipes*. *Biological Conservation*, 134: 527-536.

Abstract

Regulation of river flows has altered floodplain ecosystems around the world. Floods are less frequent, which leads to reduction of favourable environmental conditions for many terrestrial and aquatic organisms adapted to natural flooding regimes. **In Australia, the Murray River floodplains have been subjected to decline in inundations, to extensive logging and to removal of fallen timber. The yellow-footed antechinus (*Antechinus flavipes*) is the only small, native, ground-dwelling/semi-arboreal mammal on most floodplains of south-eastern Australia,** yet the effects of floods on its population dynamics largely are unknown. Here, we found positive effects of proximity to flooding, higher woodloads and of abundance of large, hollow-bearing trees on antechinus numbers. **Mean trapping rates of antechinuses were lowest in 2003 following a 3-year period with no inundation, higher in 2004 following the first breeding season during a small, controlled flood in 2003, and higher again in 2005, following a small, controlled flood in 2004. In 2004 and 2005, trapping rates declined with distance from floodwaters. This study provides evidence for the benefits of using management flows to inundate floodplains, conserving large trees and ensuring high woodloads in floodplains for sustaining populations of the yellow-footed antechinus.**

Hania Lada, Ralph Mac Nally, and Andrea C. Taylor (2008). Responses of a carnivorous marsupial (*Antechinus flavipes*) to local habitat factors in two forest types. *Journal of Mammalogy*, 89: 398–407.

Abstract

Ecosystems around the world have been degraded or destroyed by human activities, which include regulation of river flows, clearance of vegetation and removal of fallen timber. In south-eastern Australia much of the original vegetation was converted to farmland. Remaining forests such as hilly box-ironbark, and floodplain river red gum (*Eucalyptus camaldulensis*), are mostly re-growth. The yellow-footed antechinus (*Antechinus flavipes*) inhabits both types of forests and is the only small, native, carnivorous mammal on most floodplains in south-eastern Australia. **In this region, flood frequency has been reduced by regulation of river flows, which has led to decline in conditions favourable for flood-adapted terrestrial and aquatic organisms.** Here, we compared numbers of *A. flavipes* in box-ironbark forests and in river red gum forests that were: 1) deprived of floods; 2) partially inundated with environmental flows; 3) flooded naturally; and 4) watered in large, artificial floods. **We found that abundance of *A. flavipes* on floodplains and in box-ironbark forests increased with larger volumes of fallen timber and with greater numbers of large, old trees. In river red gum forests, numbers of second-year females increased with proximity to flood locations. For conservation purposes, we recommend preservation of large trees, restoration of fallen-timber on forest floor and spring flooding of floodplains.**

Hania Lada, James R. Thomson, Ralph Mac Nally and Andrea C. Taylor (2008). Impacts of massive landscape change on a carnivorous marsupial in south-eastern Australia: inferences from landscape genetics analysis. *Journal of Applied Ecology*, 45: 1732–1741.

Abstract

1. In much of the world, fauna has been adversely affected by human actions, including conversion of forests to farmland, logging and regulation of river flows. Landscape genetics data can provide information about dispersal and gene flow across the landscape, identifying barriers and facilitators of gene flow. Landscapes of central Victoria, Australia, have been altered extensively in the last 160 years. Much vegetation has been cleared or degraded, and only forest patches of mainly re-growth remain, yet some forest-dependent species like the yellow-footed antechinus *Antechinus flavipes* persist. The antechinus has good dispersal capabilities and is the only native, small, carnivorous mammal on most floodplains. We use antechinus as a model to understand species persistence in fragmented landscapes.

2. We analysed variation at 11 microsatellite loci and the control region of mitochondrial DNA to infer past and contemporary gene flow among *A. flavipes* populations. To explore genetic connectivity, we used least-cost path methods, which assign different ‘friction’ costs to vegetation, cleared land, roads and rivers.

3. Populations from 11 forests formed six distinct genetic groups, and with few exceptions, animals from nearby forests clustered together despite the intervening Murray River or farmland with only narrow vegetation corridors between them.

4. Genetic connectivity was aided by corridors of vegetation and inhibited by cleared land.

5. Synthesis and applications. Our approach, capitalizing on inferences on both historic and contemporary gene flow, provides management agencies with key information on metapopulation dynamics in landscapes. Rather than merely maintaining existing vegetation upon which this (and many other) species depend, the genetic information also informs where future plantings should be prioritized to facilitate demographic and genetic exchange among sub-populations of species. **Moreover, the decline in condition (‘health’) of riparian trees in this region must be reversed by provision of flooding**

flows; otherwise, metapopulation dynamics will become even more disarticulated than at present.

Hania Lada and Ralph Mac Nally (2008). Decline and potential recovery of yellow-footed Antechinus in parts of south-eastern Australia: A perspective with implications for management. *Ecological Management & Restoration*, 9: 120–125.

Abstract

The extent and intensity of European-induced changes to ecosystems in south-eastern Australia mean that remaining habitats, despite being degraded, are of high conservation value. Given the extinction of several species of native mammals in the last 160 years in the area, and conservation concerns regarding others, it is important to provide conservation managers with sufficient information to prevent further extinctions and maintain evolutionary potential of the species. A native, carnivorous marsupial, the Yellow-footed Antechinus (*Antechinus flavipes*) exists within these massively altered landscapes. We present conceptual models, derived from the literature, of persistence of populations of Yellow-footed Antechinus both before European colonization and in the 21st century. **We conclude that preservation of large trees, restoration of fallen-timber volumes, spring flooding of floodplains and presence of vegetation corridors between forests should be undertaken to prevent local extinctions of Yellow-footed Antechinus. From historic and current gene flow, we identify remnant woodland and forest groupings that we consider should be managed as coherent units.**