



FORESTCHECK: Terrestrial vertebrate associations with fox control and silviculture in jarrah forest

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Background

Forests are important habitat for almost half of Australia's terrestrial vertebrates. Timber harvesting is a significant form of disturbance in areas of the jarrah forest outside conservation reserves. Ground-dwelling vertebrate fauna, mammals and, to some extent, reptiles have been studied in relation to timber harvesting in many Australian forests, while the response of frogs to disturbance has been less well studied. Vertebrates that use hollows are considered to be especially sensitive to timber harvesting in eucalypt forests; and in the south-west about 75% of mammals are considered to use hollows to some extent. Investigation of the distribution, abundance and characteristics of hollow logs and tree hollows and their predicted availability to hollow users has informed silvicultural guidelines on habitat tree retention. Knowledge of the effects of timber harvesting on a wide range of terrestrial vertebrates in jarrah forest, developed through the 'Kingston study' (Burrows *et al.* 1994) and other smaller studies (see Wayne *et al.* 2011 and references therein), has directly informed improvements to timber harvesting practices, including habitat provisions, predator control and fauna habitat zones. Monitoring of vertebrate populations at broader spatial and temporal scales will provide improved understanding of the responses of fauna to timber harvesting.



The FORESTCHECK project contributes to adaptive management of Western Australian forests by providing timely and relevant information about the implementation, effectiveness and biodiversity consequences of silvicultural practices in jarrah forest. FORESTCHECK monitoring takes place at five locations within four jarrah forest ecosystems at 48 sampling grids. Grids represented examples of reference forest (never harvested or forest that had not been harvested for at least 40 years) and forest subject to either gap release or shelterwood/selective cut silvicultural treatments during the period 1988–2002.

Grids were surveyed over a five-year period with grids from one of the five locations sampled in spring and autumn each year using pitfall traps and wire cages.

Left: Common brushtail possums benefits from fox control, and declines related to timber harvesting are short-term.

Findings

- Forty one terrestrial vertebrate taxa (eight frogs, 22 reptiles, 11 mammals) were recorded from 1,165 captures. The study was sufficiently powerful to detect differences in species richness and abundance between treatments that were greater than 23% and 37% respectively. However, some arboreal and hollow dependent species that require specialised sampling techniques were not detected on FORESTCHECK grids. They include the southern brush-tailed phascogale (*Phascogale tapoatafa*), western ringtail possum (*Pseudocheirus occidentalis*) and bats.
- Fox control had the strongest effect on terrestrial vertebrates, with baited areas supporting significantly more individuals (three-fold increase) than unbaited areas. The common brushtail possum, woylie (*Bettongia penicillata*), western pygmy possum (*Cercartetus*

concinus), chuditch (*Dasyurus geoffroi*), and bob-tailed lizard (*Tiliqua rugosa*), were particularly more abundant in fox-baited forest.

- Significant regional differences were found that reflect geographic and bioclimatic variation within the south-west. Distinction between southern jarrah communities and the northern communities was evident. Half of the species were recorded from only one or two ecosystems. Only 17% of species were common to all five ecosystems.
- Shelterwood harvest sites had significantly higher species richness and different community structure to external reference sites. These differences resulted from a greater prevalence within shelterwood of some reptile species including: the south-west crevice skink (*Egernia napoleonis*), common dwarf skink (*Menetia greyii*), red-legged ctenotus (*Ctenotus labillardieri*), and southern blind snake (*Ramphotyphlops australis*). These reptiles appeared to have been advantaged by changes in forest structure and diversity.
- The most abundant mammals, the common brushtail possum and woylie, did not display strong responses to silvicultural treatment suggesting that previous findings of an immediate reduction in common brushtail possums after timber harvesting (Morris *et al.* 2001) are short-term and transitory.
- The effects of silvicultural treatment on terrestrial vertebrate community structure, overall species richness and overall vertebrate abundance were secondary to the effects of fox control and regional/temporal variation.



Left to Right: bob-tailed lizard (*Tiliqua rugosa*), crevice skink (*Egernia napoleonis*), and chuditch (*Dasyurus geoffroi*) benefit from either fox control or timber harvesting

Management Implications

Disturbance associated with silviculture treatments will temporarily favour some species and disadvantage others. For most species there is no apparent effect, while for some there is insufficient data to reliably assess responses.

The silvicultural treatments examined by FORESTCHECK did not negatively impact on terrestrial vertebrate fauna at the species or community level. This indicates that treatments were within tolerance thresholds of the species and communities recorded.

Most of the variation in terrestrial vertebrate richness, abundance and community structure is explained by ecosystem differences, and the beneficial effect of fox control on those species vulnerable to fox predation.

These findings relate to examples of silviculture practice implemented prior to the *Forest Management Plan 2004–2013* which introduced additional measures to mitigate impacts of disturbance to biodiversity at the whole of forest, landscape and operational scales. These measures include fauna habitat zones and an increased number and type of habitat trees.

References

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