



## Individual legacy trees influence vertebrate wildlife diversity in commercial forests

M.J. Mazurek\*, William J. Zielinski

US Forest Service, Pacific Southwest Research Station, 1700 Bayview Dr., Arcata, CA 95521, USA

Received 15 October 2003; received in revised form 14 December 2003; accepted 7 January 2004

### Abstract

Old-growth forests provide important habitat elements for many species of wildlife. These forests, however, are rare where lands are managed for timber. In commercial forests, large and old trees sometimes exist only as widely-dispersed residual or legacy trees. Legacy trees are old trees that have been spared during harvest or have survived stand-replacing natural disturbances. The value of individual legacy trees to wildlife has received little attention by land managers or researchers within the coast redwood (*Sequoia sempervirens*) region where 95% of the landscape is intensively managed for timber production. We investigated the use of individual legacy old-growth redwood trees by wildlife and compared this use to randomly selected commercially-mature trees. At each legacy/control tree pair we sampled for bats using electronic bat detectors, for small mammals using live traps, for large mammals using remote sensor cameras, and for birds using time-constrained observation surveys. Legacy old-growth trees containing basal hollows were equipped with 'guano traps'; monthly guano weight was used as an index of roosting by bats. The diversity and richness of wildlife species recorded at legacy trees was significantly greater than at control trees (Shannon index = 2.81 versus 2.32; species = 38 versus 24, respectively). The index of bat activity and the number of birds observed was significantly greater at legacy trees compared to control trees. We found no statistical differences between legacy and control trees in the numbers of small mammals captured or in the number of species photographed using remote cameras. Every basal hollow contained bat guano and genetic methods confirmed use by four species of bats. Vaux's swifts (*Chaetura vauxi*), pygmy nuthatches (*Sitta pygmaea*), violet-green swallows (*Tachycineta thalassina*), and the long-legged myotis (*Myotis volans*) reproduced in legacy trees. As measured by species richness, species diversity, and use by a number of different taxa, legacy trees appear to add significant habitat value to managed redwood forests. This value probably is related to the structural complexity offered by legacy trees. The presence of a basal hollow, which only occur in legacy trees, was the feature that appeared to add the greatest habitat value to legacy trees and, therefore, to commercial forest stands. The results of our study call for an appreciation for particular individual trees as habitat for wildlife in managed stands. This is a spatial resolution of analysis that, heretofore, has not been expected of managers. The cumulative effects of the retention of legacy trees in commercial forest lands could yield important benefits to vertebrate wildlife that are associated with biological legacies. © 2004 Elsevier B.V. All rights reserved.

**Keywords:** Biodiversity; Legacy tree; Biological legacy; Forest management; Managed forests; Northwestern California; Redwood; *Sequoia sempervirens*; Basal hollows; Wildlife communities; Bats; Small mammals; Birds

### 1. Introduction

The conservation of old-growth forests has received much attention in recent decades with the heart of the

\* Corresponding author. Tel.: +1-707-825-2995;  
fax: +1-707-825-2901.  
E-mail address: [mmazurek@fs.fed.us](mailto:mmazurek@fs.fed.us) (M.J. Mazurek).