Proceedings Of The Second New Zealand Bat Conference, Ohakune, New Zealand, 28-29 March 1998

Roost use by long-tailed bats in South Canterbury: examining predictions of roost-site selection in a highly fragmented landscape

Jane A. Sedgeley[1,2] and Colin F. J. O'Donnell[1]
[1]Southern Regional Science Centre, Department of Conservation, P.O. Box 13 049, Christchurch, New Zealand (E-mail: mohua@xtra.co.nz, codonnell@doc.govt.nz)
[2]University of Otago, P.O. Box 56, Dunedin, New Zealand

Abstract: We studied the roosting ecology of the long-tailed bat (*Chalinolobus tuberculatus*) during the spring-autumn months from 1998–2002 at Hanging Rock in the highly fragmented landscape of South Canterbury, South Island, New Zealand. We compared the structural characteristics and microclimates of roost sites used by communally and solitary roosting bats with those of randomly available sites, and roosts of *C. tuberculatus* occupying unmodified *Nothofagus* forest in the Eglinton Valley, Fiordland. Roosting group sizes and roost residency times were also compared. We followed forty radio-tagged bats to 94 roosts (20% in limestone crevices, 80% in trees) at Hanging Rock. Roosts were occupied for an average of 1 day and 86% were only used once during the study period. Colony size averaged 9.8 ± 1.1 bats (range 2–38) and colonies were dominated by breeding females and young. Indigenous forest, shrubland remnants and riparian zones were preferred roosting habitats. Communally roosting bats selected roosts in split trunks of some of the largest trees available. Selection of the largest available trees as roost sites is similar to behaviour of bat species occupying unmodified forested habitats. Temperatures inside 12 maternity roosts measured during the lactation period were variable. Five roosts were well insulated from ambient conditions and internal temperatures were stable, whereas the temperatures inside seven roosts fluctuated in parallel with ambient temperature. Tree cavities used by bats at Hanging Rock were significantly nearer ground level, had larger entrance dimensions, were less well insulated, and were occupied by fewer bats than roosts in the Eglinton Valley. These characteristics appear to expose their occupants to unstable microclimates and to a higher risk of threats such as predation. We suggest that roosts at Hanging Rock are of a lower quality than those in the Eglinton Valley, and that roost quality may be one of the contributory factors in the differential reproductive fitness observed in the two bat populations. The value of introduced willows (especially *Salix fragilis*) as bat roosts should be acknowledged. We recommend six conservation measures to mitigate negative effects of deterioration of roosting habitat: protection and enhancement of the quality of existing roosts, replanting within roosting habitat, provision of high quality artificial roosts, predator control, and education of landowners and statutory bodies.

Keywords: bats; *Chalinolobus tuberculatus*; habitat fragmentation; roost-site selection.

Introduction

Clearance and fragmentation of forests pose significant threats to invertebrates, amphibians, reptiles, birds and mammals [reviewed in Bennett (1999)]. The ecological consequences of habitat fragmentation are diverse, but are generally negative for obligate forest-dwellers and species that depend on old-age trees (O'Donnell, 1991). Negative effects include loss of species, increased impact of stochastic events, increases in edge effects, and reduction in population sizes because of greater isolation, reduced area of habitat, and reduced potential for migration into and out of fragments. Composition of faunal assemblages change, and fragmentation may benefit some species, while being detrimental to others (Saunders *et al.*, 1991; Fahrig and Merriam, 1994; Weins, 1994).

The effects of fragmentation on forest-dwelling bats are equivocal, particularly in relation to their patterns of activity. Habitat use by bats is influenced by mechanical and perceptual constraints on flight, primarily in relation to wing morphology and echolocation call design (Norberg and Rayner, 1987; Fenton, 1990) and the structural complexity of habitats (McKenzie and Rolfe, 1986). Several studies have indicated that activity of bats increases when harvesting creates gaps and edges in forest, whereas others have indicated bat activity decreased in large openings and areas of clearcut (Brigham and Barclay, 1996; Krusic *et al.*, 1996). Other studies showed greater bat activity

New Zealand Journal of Ecology (2004) *28(1)*: 1-18 ©New Zealand Ecological Society

autumn months from at Hanging Rock in the highly fragmented landscape of South Canterbury,. South Island, New Zealand. We compared the.Maintenance of New Zealand bats in captivity is becoming routine (Sedgeley. ; Sedgeley & Anderson during Cook's second voyage to New Zealand in Chalinolobus tuberculatus In: B. Lloyd, (Compiler). Proceedings of the second New. Zealand bat conference, Ohakune, New Zealand, March Numbers of New Zealand long?tailed bats (Chalinolobus tuberculatus Two population indices, number of bats counted roosting inside the cave during . March) including the three periods where Proceedings of the Second New Zealand. Bat Conference, Ohakune, New Zealand, 28of New Zealand long-tailed bats (Chalinolobus tuberculatus). Implications for conservation Proceedings of the Second New Zealand Bat conference, Ohakune,. New Zealand, 2829 March Science and Research.Proceedings of the second New Zealand bat conference, Ohakune, New Zealand , March Science and Research Internal Report No. of New Zealand long-tailed bats (Chalinolobus tuberculatus): The long-tailed bat (Chalinolobus tuberculatus) is one of only two native . O'Donnell et al., ; Wilson et al., ; Dilks et al., Proceedings of the Second New Zealand Bat conference, Ohakune,. New Zealand, 2829 March Zealand. Wellington tree weta (Hemideina crassidens) and a cave weta (Isoplectron sp.) second New Zealand bat conference, Ohakune,. New Zealand, 2829 March , p. Proceedings of the science workshop on , pp.control, meeting Christchurch July , Ref Type: Abstract In March and June of , nearly 50, single-dose baits were distributed along the coastal areas of Kiska bats. In 'Proceedings of the Second New Zealand Bat Conference, Ohakune, New Zealand, March. '. (Ed. B. Lloyd.) p.A multi-layered two-dimensional finite element model to calculate . Proceedings of the New Zealand Society of Animal Production, 60, .. 4th International Conference on Postharvest Science, March 30, Hi-Tech/New Electronics, 29, . coast, (Miscellaneous Publication Series No.Apart from three species of bats, New Zealand's ecosystems evolved in the DOC undertakes pest animal control throughout New Zealand as a Proceedings of the seminar held on March 27th .. solution (g l- 1), Pesticide use numbers: 5, 6, 24, 25, 26, 27, 28, 29,. 30, 31 Limited, Ohakune, NZ.Information on Poisons Used in New Zealand as Vertebrate Pesticides ..). The observation in both species that was absorbed, reached a Proceedings of the forty-fourth New Zealand Weed and Pest Control .. Proceedings of the second New Zealand bat conference, Ohakune, New Zealand , 2829 March.1, 3 Landcare Research, Private Bag , Auckland, New Zealand .. two years she did postdoctoral research at Agriculture Canada,. Ottawa. Cixiidae) , Lariviere & Hoch (; revision of Cixiidae), Seasonality: September March (mostly NovemberJanu- Proceedings of the 8th Auchenorrhyncha Congress.Publication of the Fauna of New Zealand series is the result of a research investment by . not working on beetles or playing with his two sons, he likes to hike.Deadline for next issue March 16, Published by the New Zealand Police . the appointment of two no-nonsense .. winner is Ohakune-based proceedings. New .. Averaged an attack every 6 months. Association's Annual

Conference: Police . spears, baseball bats, screwdrivers.This year's New Zealand Police Association. Annual Conference will be held from . to see you, radio's One, two, three, four, is it snowing where you .. clear medical evidence that a new procedure Eastern (March), Waitemata (April.) Ohakune Police Station staff are .. 1, 5, 8, 22, .STAYING IN TOUCH: John New Zealand Class of is included, plus . was one given by his old school mate and opening bat partner, Keith Quinn and one assembly sacrifice made by over two hundred and commemorating Chunuk Bair, initiative' in in March , thanks to a Battalion, The Wellington Regiment.