UTILIZING REMOTE SENSING TECHNOLOGIES TO IDENTIFY MATSCHIE'S TREE KANGAROO (*DENDROLAGUS MATSCHIEI*) HABITAT

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

ENVIRONMENTAL SCIENCE

UNIVERSITY OF RHODE ISLAND

2005

Abstract

Matschie's tree kangaroos (*Dendrolagus matschiei*) are arboreal marsupials endemic to the Huon Peninsula in Papua New Guinea. *D. matschiei* face growing threats due to rising human population levels and are currently listed by the International Union for the Conservation of Nature (IUCN) as endangered. The Tree Kangaroo Conservation Program (TKCP) has been working with local landowners since 1996 and is currently in the process of establishing an 85,000 hectare Conservation Area within the nation's borders, protecting tree kangaroos and the habitat in which they are found. Past research conducted by the TKCP provided a regional habitat quality assessment of the species. However, specific information about the habitat variables driving site selection are still largely unknown due to the cryptic nature of the species and the general inaccessibility of the country. The use of GPS-based telemetry systems provides the ability to identify the precise position of animals on a daily basis and affords the opportunity to collect the habitat variables at these tracked locations. As a pilot study, Televilt GPS-Posrec GPS collars (model C200) were placed on three sexually mature females in April 2004. These devices are designed as "store-on-board" GPS dataloggers that automatically collect and store positional information and have a VHF component that allows for the manual tracking of animals using traditional radio-telemetry devices. The objectives of my research were: (1) to evaluate the performance of these GPS collars in a remote and topographically diverse location, (2) to compare the capabilities of two moderate resolution satellite sources (Landsat-7 ETM+ and Spot-4) at discriminating dominant forest types within a heterogeneous tropical rainforest, and (3) to investigate the habitat variables collected at individually tracked *D. matschiei* locations.

Vegetation plots sampled by TKCP field botanist and staff indicate that forests were dominated by four canopy species (*Quintinia ledermannii*, *Decaspermum forbesii*, *Dacrydium nidulum*, and *Saurauia capitulata*). *D. matschiei* were frequently radio-tracked in *D. nidulum* (60.7% of tracked locations), but very seldom in the other three dominant canopy species (*Q. ledermanii*, 1.4%; *D. forbesii*, 2.9%; *S. capitulata,* 4.3%). All tests investigating the first- and second-order properties of the spatial point processes demonstrated clear evidence of clustering. Moderate resolution satellite imagery provided an improved vegetation map, but the overall classification accuracy (Landsat-7 ETM+, 69.0%; Spot-4, 72.4%) was low due to the complex structure of each of the forest communities and the limited spatial and spectral resolutions of each of the satellite sources. The performance of the GPS collars was evaluated by comparing the results of positions collected via satellite with those collected by radio-telemetry. Fixed kernel home ranges calculated from satellite GPS data were similar to those from radio-telemetry data and the degree of clustering was not dependent on the data source used.

My results indicate that Televilt GPS-Posrec GPS collars offer a cost-effective means to obtain spatial statistics on animals in remote locations, even though the total number of fixes collected was low (20.0% success rate). Radio-telemetry, however, is necessary to collect the specific habitat variables at individual point locations, especially when the home ranges of animals are small and remote sensing data are not available to provide detailed vegetation maps. This research represents a significant advance in the amount of information known about the species and suggests that *D. matschiei* may not be a habitat generalist.