APPENDIX D

Models for Determining Habitat Suitability

Introduction

Habitat suitability models were used to identify areas within the conservation area that provide habitat values for different types of wildlife. Two species (pileated woodpecker and black-tailed deer) and one species group (bats) were selected for the analysis. The models were developed using biophysical data collected within the conservation area, existing models applicable to the selected species, and expert opinion of the ecology and habitat requirements of each species.

As a base for mapping habitat suitability, the consultants used biophysical polygons previously mapped for this study. The biophysical polygons represented a classification of the mountain according to parameters such as vegetation, soils and watercourses. These polygons were evaluated according to criteria that reflected the habitat requirements of each species under consideration. For each species, a polygon was given a rating of low, moderate or high habitat suitability.

Species Selection

Three species were selected for the analysis: pileated woodpecker, black-tailed deer and bats. All three species have been observed on Burnaby Mountain and are expected to reside there either seasonally or year-round. Due to the frequent and consistent human use of Burnaby Mountain, the consultants chose to develop habitat models for species that represent a range of tolerances to human disturbance. In this case, bats are the most tolerant of humans while pileated woodpeckers are the least tolerant. Deer residing in urban areas are moderately tolerant to human disturbances depending upon the season and frequency of encounters. For Burnaby Mountain Conservation Area, disturbance may be caused by the direct alteration of habitat (e.g., the presence of facilities or roads), or by human use of an area frequented by wildlife (e.g., pedestrian and bicycle traffic along trails).

It is acknowledged that species-specific models do not provide an indication of habitat suitability for all species. However, selecting a species that benefits from the same habitat characteristics as other species, can help provide an understanding of the habitat values of an area to certain types of wildlife, for example, birds. For introductory purposes, these three species were selected to highlight potentially important habitat areas on Burnaby Mountain.

A. Bats

Species

This model may apply to the following bat species:

little brown bat (Myotis lucifugus)
Yuma bat (M. yumanensis)
California bat (M. californicus)
long-legged bat (M. volans)
western long-eared bat (M. evotis)
Keen's long-eared bat (M. keenii)
big brown bat (Eptesicus fuscus)
silver-haired bat (Lasionycteris noctavegans)
hoary bat (Lasiurus cinereus)

Habitat Requirements

The availability of suitable roosting habitat is likely of primary importance for bats. Foraging areas are less important, yet are variable based on their quality, and proximity to roosting habitat. Parameters of the model include:

Roosting habitat:

- wildlife trees with cavities/loose bark, typically in old growth stands
- wildife tree patches (i.e., facilitate roost switching)
- lofts, under roofs, behind walls in old buildings (barns, houses)

Foraging habitat:

- foraging areas (riparian - slow moving open water; forest edges)
- low elevation (terrestrial); all elevations (riparian)

B. Black-Tailed Deer

Species

Columbian black-tailed deer (Odocoileus hemiones colunbianus) are a sub-species of mule deer which are found in many parts of southwestern B.C. and on Vancouver Island. Black-tailed deer have been sighted on Burnaby Mountain for many years. While deer sightings were common in the past, few deer have been reported recently and there is some concern by Burnaby staff and local environmentalists that the population may be in decline.

Habitat Requirements

Black-tailed deer are predominantly browsers, using forest cover for escape and shelter. Parameters of the model include:

Food:
Diet changes annually and seasonally in response to changes in the availability of forage. Diets are composed primarily of browse species, especially during the winter when deer consume more browse than forbs or grasses. Deer consume a higher concentration of woody vegetation, higher species diversity and less grasses than those of other ungulates such as elk and sheep. As snow melts in the spring, deer will forage less on woody vegetation and more on the newly emerging grasses that appear first on south facing slopes. This new growth is important to deer in regaining a positive energy balance lost during the winter months. As spring progresses, grasses become less important while more forbs and leaves of deciduous trees and shrubs are eaten.

Cover:
Cover may serve more than one purpose for deer including *security* from predators and humans; *thermal protection* from the elements; and *interception of snow* which can bury food and impede movement (Bunnell 1990). The cover requirements for black-tailed deer are variable. Generally, deer prefer areas that provide an interspersion of open grassland and forest, which provide both forage and protection from predators and inclement weather. Large, unbroken homogenous forested stands or open grassland devoid of shrubs and trees are unfavourable areas.

Other Habitat Considerations:
Winter weather conditions, particularly snow depth, can be a major limiting factor for deer. Snow depths greater than 30cm may become restrictive. Snowfall on Burnaby Mountain during the winter is relatively light and transient at lower elevations, and snow is not a significant restricting factor. However, topography, elevation and aspect can have a significant influence on temperature, exposure to wind, and snow levels.

Habitat Suitability Model:
The model for deer was based on a habitat suitability index developed for mule deer (of which black-tailed deer are a subspecies). The original model, developed for an area in Alberta, was modified as appropriate to make it relevant to Burnaby Mountain (e.g., topography was given more consideration, preferred vegetation was modified). A winter scenario was used. The winter period is most stressful for deer and habitats used during the winter are considered critical and are frequently limited in availability.

C. Pileated Woodpecker

Species
Birds make good species to use as indicators of the health of the Burnaby Mountain habitat because they are 1) ubiquitous, 2) include a wide variety of species with coexisting behaviours and habitats, 3) are sensitive to environmental disturbance because they are short-lived, mobile, and differ in their environmental requirements,

and 4) habitat use can be studied relatively easily for many species (Martin and Finch 1995).

The pileated Woodpecker *(Dryocopus pileatus)* was selected for modeling in this study. The pileated woodpecker is an uncommon, habitat 'specialist', intolerant of direct human disturbance. It excavates and drills into bark for food and nests in tree cavities.

Habitat Requirements

Pileated woodpeckers breed in deciduous-coniferous forest, open woodland, parks, and wooded suburbs (Ehrlich et al. 1988), and is resident in mature coniferous forests on the south coast (Campbell et al. 1990). It is absent from agricultural areas and small woodlots – they require large territories that they defend throughout the year (Ehrlich et al. 1988; Bonar and Bessie 1996). 75% of the diet is insect (carpenter ants), some fruit, acorns, nuts, and sap during the nonbreeding season. They forage on downed as well as standing coarse woody debris.

They Require a minimum dbh of 25.6 cm before they will excavate a suitable nest cavity (Campbell et al. 1990). Most recorded nest sites in B.C. have been in deciduous trees, but other sites include coniferous trees and powerpoles. Living trees were used more often than dead trees. Most nests are located between 6.4 and 12.2 m in height (Campbell et al. 1990). The largest available trees seem to be preferred (Bonar and Bessie 1996). It is assumed that this will be similar for trees used for roosting.

Habitat Suitability Model

A year-round model would be applied to the pileated woodpecker because it is a year-round resident. Habitat assessments for the pileated woodpecker are being rated relative to available habitat types in the study area.

Pileated woodpecker habitat is generally considered to be high in the following habitat types:

- Mixedwood stands or conifer dominated stands (four year-round use);
- Stands with the largest diametre trees;
- Stands with snags.
- Relatively open stands (as there is some indication that they avoid dense stands).