Summary of Marbled Murrelet Habitat Low-Level Aerial Survey and Mapping Techniques

Sue McDonald, RPBio and Sally Leigh-Spencer, RPBio

Introduction

Marbled murrelet low-level aerial surveys and rankings are carried out using the *Standard Methods for Identifying and Ranking Nesting Habitat of Marbled Murrelets (Brachyramphus marmoratus) in British Columbia using Air Photo Interpretation and Low-level Aerial Surveys* (Burger, 2004) as a guideline and using the standard 6-class provincial ranking system described. A three step process is currently applied to produce coastal murrelet habitat maps representing the low-level aerial classification. First, a model of potential marbled murrelet nesting habitat is produced as a digital layer for an area using variables representing certain key murrelet habitat features. Variables, including stand age, tree height, and elevation, are extrapolated from inventory datasets. Second, low-level aerial surveys are used to check for the presence and abundance of other key features, such as nest platforms and epiphyte cover, which are not detectable from the Geographic Information Systems (GIS) database. Third, during post-processing the aerial survey information is used to refine the digital base line map polygons and assign final habitat quality ranks to all polygons.

Model

Marbled Murrelet potential habitat is modeled for entire landscape units using some of the parameters from the Marbled Murrelet Recovery Team Most and Moderately Likely Features: elevation (<1500), stand age class (8 and 9) and tree height class (≥3). The model is created using the best available forest cover (preferably the Vegetation Resources Inventory (VRI)). Gaps in the forest cover coverage are filled in using, in order of preference, other sources of forest cover, the Marbled BC Coastal Marbled Murrelet Habitat Suitability Maps or a visual assessment using a digital image. An attempt is made to model potential habitat across the entire landscape unit regardless of land status excepting large tracts of private land.

The resulting model is overlayed on a digital image (SPOT5 or better) with unique polygon numbers and other features such as water, roads, and park and landscape unit boundaries. A georeferrenced image, for loading into a moving map program (eg Oziexplorer), is produced at a scale that best fits the survey area. Alternately, if a digital image of the combined layers is not produced, a shape file of the modelled polygons may be imported into the moving map program as a GIS file with other map backgrounds (eg NTS).

Aerial Survey

A laptop computer, with Oziexplorer GPS mapping software, interfaced with a GPS is used to locate the polygons. The georeferenced image is then loaded. This allows one to track the 'real-time' location in relation to the habitat polygons. A Bell 206 Jet Ranger is used to fly over the polygons in a pattern that maximizes viewing. With Oziexplorer, flight paths are recorded and waypoints taken. Waypoints are taken at fairly regular

intervals and at points where the habitat ranking changes or where there are noteworthy features for referencing changes when mapping. A majority of polygons will have more than one waypoint. Large polygons generally are covered with more than one flight line, consequently numerous waypoints and corresponding rankings are applied to the larger polygons. All Most Likely modeled habitat is surveyed, if time is short Moderately Likely habitat identified by age class 8 and height class 3 may be excluded. During aerial surveys, if areas outside of the modelled polygons appear to be higher quality habitat, waypoints and rankings are recorded.

The aerial surveys and habitat rankings are conducted using the provincial low-level aerial survey standards (Burger 2004). The six-class provincial rating standard is used to rank all polygons assessed. The field ranking of nesting habitat suitability is assigned based on the presence and relative abundance of potential nest platforms, the cover and thickness of epiphytes and the canopy complexity and structure. Areas of forest with no suitable structure (eg recent cut block) are considered a 6 or nil habitat.

For surveying a large area, such as an entire landscape unit, it is inefficient to fill out an appendix 3 data form (Burger 2004) for each waypoint taken, even if using a spreadsheet format. Up to 1000 waypoints may be taken in one day and a lot of ground is covered. If a data form was to be filled out for each waypoint the area covered would decrease significantly and costs of the survey would increase due to the expense of helicopter time. The two methods of recording data that have been developed are:

1) A few full data forms are filled out at the beginning of the survey, representing each habitat class (to refresh your eye and ensure you are following the ranking categories) and then the survey is completed using a simplified spreadsheet. The spreadsheet data consists of: date, surveyors, weather, polygon number, waypoint number, habitat ranking, and notes. The notes field is to record factors influencing the ranking decision or other pertinent information.
2) No data forms are filled out but the simplified datasheet contains a few more pieces of information including date, surveyors, weather, polygon number, waypoint number, habitat ranking, notes as well as tree species, % of canopy with large trees and % canopy with platforms.

In the helicopter, the front seat observer, experienced with marbled murrelet nesting habitat ranking, is responsible for navigating and logging waypoints (using a laptop and Oziexplorer program) and ranking habitat. The left rear observer is responsible for recording data and confirming rankings. If the pilot and rear seat observer are experienced in habitat ranking they are also able to assist in the site evaluation and report on habitat visible to them.

GIS Post-Processing

For the modeled polygons to have the waypoint ranking applied to them, the information recorded from the laptop(s) in the helicopter is downloaded and translated into a format useable in GIS software. Digital images (SPOT5 or better) along with forest cover, contours, water features, and other layers are used as tools to help to transform modeled

polygons into ranked polygons according to the waypoint rankings and notes taken. Polygons may be split, merged or redrawn depending on the field data. Attempts are made to delineate as much habitat with as much detail as possible but if a small patch is not visible on the image or with forest cover and other layers than it may not be defined. Most of the ranked polygons are created using a forest cover inventory with the final ranked linework updated using a variety of tools. The minimum mapping unit is variable with it being dependent on the inventory used to create the model, the other datasets (eg imagery) and the detail of data collected in the field. Generally the minimum mapping unit could be considered around 2-3 ha but some habitat can be delineated down to 1 ha. It should be noted that the best information available is used but in most cases the final linework should be considered a soft boundary.

Planning

Habitat ranking is the key data that is used for further planning and analysis. The polygonal data is most appropriately used at a smaller scale such as 1:20000 (and not 1:5000) and thus should be used for planning at a tactical level. This data may be used for purposes such as determining the amount of suitable habitat in a particular landscape, habitat distribution, and Old Growth Management Area or other landscape unit planning exercises. For exercises such as delineating Wildlife Habitat Areas, further work to determine exact boundaries may need to be undertaken. The waypoint data and corresponding notes used in conjunction with the ranked polygons are valuable tools, if more detailed information is needed on an area.

References

Burger, Alan E. 2004. Standard Methods for Identifying and Ranking Nesting Habitat of Marbled Murrelets (*Brachyramphus marmoratus*) in British Columbia using Air Photo Interpretation and Low-level Aerial Surveys. Ministry of Water, Land and Air Protection, Biodiversity Branch, Victoria, BC. Available at: http://wlapwww.gov.bc.ca/wld/documents/fia_docs/mamu_standard.pdf

MMRT (Marbled Murrelet Recovery Team). 2003. Marbled Murrelet Conservation Assessment 2003, Part B – Marbled Murrelet Recovery Team advisory document on conservation and management. Canadian Wildlife Service, Delta, BC. Available at: http://www.sfu.ca/biology/wildberg/bertram/mamurt/PartB.pdf