Summary of Marbled Murrelet Habitat Air Photo Interpretation Mapping Techniques

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INTRODUCTION

Mapping of potential Marbled Murrelet habitat using air photo interpretation is done in accordance with *Standard Methods for Identifying and Ranking Nesting Habitat of Marbled Murrelets in British Columbia, Part Two: Air Photo Interpretation* (Burger, 2004). The interpretation focuses on identifying murrelet habitat criteria related to forest canopy structure and complexity using a 6-level ranking system. Air photo interpretation does not provide assessment of the presence and abundance of potential nest platforms, or of epiphyte cover.

Decisions on which habitat quality ranks to include as "suitable nesting habitat" depends on the management objectives, spatial scales of the mapping, regional habitat differences and local amounts of existing habitat. Generally ranks 1-3 (Table 2), or 1-4 in some situations, are considered more likely to include suitable habitat than lower ranks and hence are valuable for management planning (Burger et al, 2009).

RANKING SYSTEM

The forest stand attributes used to assign the murrelet ranking are associated with structures that murrelets need for nesting, stand access, and protection provided by the canopy around the nest site against weather and predation risk (Burger et al, 2009). These include stand age, height, canopy closure, and vertical and canopy complexity. An experienced interpreter is required to evaluate the forest structure and use the ranking system.

A general description of the ranking system used in the protocol for air photo interpretation of Marbled Murrelet habitat is available in the standards (Burger 2004 and Burger et al, 2009). The intent is to rate habitat quality higher as key habitat features are more prevalent and improve likelihood for nesting.

AIR PHOTO INTERPRETATION PROCESSES

Air photo interpretation of potential murrelet habitat on the BC central coast has recently been carried out using two processes:

- hard copy air photos viewed with stereoscopes;
- digital air photos viewed with PurVIEW ArcGIS Desktop extension, that provides a stereo-viewing environment that enables 3D visualization and data capture. Other software is available for 3D visualization using other platforms to provide the same map product.

Both of these processes follow the same standards and result in the same end product which is mapping that identifies the ranking of potential marbled murrelet habitat across a landscape. Both processes use the same photography; the difference is in how the data is captured and put into map form.

Air photo interpretation of the interest area may begin with a blank slate in which the air photos are used to delineate polygons that reflect the ranking system. These polygons can be transferred to the base map in a variety of ways, and result in a map that is divided into areas based entirely on their murrelet rank.

In BC, the Vegetation Resources Inventory (VRI) is a photo based inventory program that provides mapping of polygons based on vegetation characteristics such as species, age and height, which can be used as a base map for murrelet polygon delineation since age and height are two of the forest structure components which are used in the murrelet habitat ranking. If the VRI mapping is used, then each of the VRI polygons is assessed and assigned a murrelet habitat rank, or a polygon can be divided if more than one murrelet rank is present. Minimum mapping unit is usually approximately 5 hectares, although smaller polygons would be delineated where the boundaries are particularly distinct, for example, for distinctions between non forest and forest, or for air photo rank 1 & 2 stands.

Hard copy air photos

Hard copy photos and a stereoscope have been used for forest inventory purposes for many decades. The interpreter either delineates murrelet habitat polygons or uses existing polygon delineation, such as VRI mapping, as a base. The delineation can be done in number of ways:

- Directly onto the photographs in stereo, in which case the linework can be photogrammetrically transferred to form the map. This method requires the most steps and therefore takes the most time.
- By viewing the photographs in stereo and sketching onto a hardcopy ortho or satellite image, using TRIM (Terrain Resource Information Management digital maps) features such as streams if available to guide line placement. The linework into GIS is done as a separate step.
- By delineating directly into a GIS environment, also using ortho or satellite imagery and TRIM features to guide line placement.
- If VRI mapping is used as a base, the existing polygons can be overlaid on the ortho or satellite imagery either in hard copy format or in GIS, and division of these polygons can be done as above.

If the hard copy photos are used in conjunction with delineation into GIS, the murrelet rankings can be entered directly into the corresponding data sheet for the map. Otherwise the rankings can be noted on the photographs or sketched maps and entered into a spreadsheet as a separate step.

Digital photography

Digital photography has been used over the past decade for forest inventory purposes and has replaced hard copy photos in many applications. Overall, the use of digital photography is more efficient than using hard copy photos as there are less steps in the process and less materials to handle. It requires specialized computer software and hardware.

The delineation is done directly in the GIS environment while viewing the photos in 3D. This can be done, as with the hard copy photos, by starting with a blank slate and delineating polygons directly for murrelet ranking, or by using an existing base such as the VRI mapping. If the VRI mapping is used as a base, the existing polygons can be divided or amended as desired for murrelet ranking. The ranks are entered directly into the associated database.

Tips for airphoto interpretation are available in Burger et al. (2009).

REFERENCES

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