

DESCRIPTION OF TWO MARBLED MURRELET TREE NESTS IN THE WALBRAN VALLEY, BRITISH COLUMBIA

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ABSTRACT—We discovered 2 marbled murrelet (*Brachyramphus marmoratus*) tree nests in West Walbran Valley on the west coast of Vancouver Island, British Columbia, by observing murrelet behavior during dawn surveys and climbing potential nest trees. Both nests were in old-growth Sitka spruce (*Picea sitchensis*) trees. They were unoccupied when found but each had distinct fecal rings and contained eggshell fragments, indicating that they had been used recently. These were the first marbled murrelet nests found in British Columbia and the first nests located in Sitka spruce trees within the murrelet's range in North America.

Marbled murrelets (*Brachyramphus marmoratus*) are widely distributed in the nearshore waters of British Columbia (Campbell et al. 1990), with 45,000–50,000 breeding birds in the population (Rodway 1990, Rodway et al. 1992). Research before 1990 focused primarily on birds at sea (Sealy 1974, Carter 1984, Sealy and Carter 1984), few forest surveys had been conducted, and no marbled murrelet nests had been documented in the Province. Nesting evidence, derived from records of young discovered at inland locations and probable nests found during logging operations (Carter and Sealy 1987b, Campbell et al. 1990), indicated that murrelets likely nested in coastal old-growth forests in British Columbia. These forests are threatened by logging and development, especially on Vancouver Island. Because of these and other threats, the marbled murrelet was listed as threatened in British Columbia in 1990 (Rodway 1990).

To learn more about marbled murrelet distribution, activity, and habitat use, surveys were conducted in the Carmanah and Walbran valleys on the west coast of Vancouver Island in 1990 and 1991 (Manley et al. 1992). In areas where below-canopy behavior was common, we initiated intensive searches for nests by climbing trees. Here we describe 2 nests found during these intensive searches.

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METHODS

The Walbran Valley is located on the west coast of Vancouver Island, 100 km northwest of Victoria, British Columbia. This watershed drains into the Pacific Ocean in Pacific Rim National Park. Walbran Valley and neighboring Carmanah Valley contain some of the last coastal old-growth forest on southern Vancouver Island (Moore 1991).

Surveys for marbled murrelets were conducted in the Carmanah and Walbran valleys (see Fig. 1 in Manley et al. 1992; Fig. 1 in Jordan and Hughes 1995) in 1990 and 1991 (Paton et al. 1990). We searched for nests by climbing 7 trees where we observed landings by marbled murrelets and another 10 potential nest trees (large-diameter trees with large mossy branches) in areas of high murrelet activity. Measurements, photos, video, and a sample of nest substrate and eggshells were taken at each nest site (Royal B.C. Museum E2397, E2398). Forest cover was measured using 25-m radius plots centered on the nest tree. Each plot was divided into 4 quadrants, where species and diameter of all trees and snags > 10 cm dbh were recorded. Numbers of fallen trees, canopy closure, and dominant understory species were also recorded in each quadrant. We completed an additional 25-m radius circular plot for the 1990 nest tree because it was located on the edge of a road. The plot was placed with the nest tree on the edge to assess forest characteristics of the nest stand.

RESULTS

We located 1 nest in each year in the West Walbran Valley, 12.8 km inland and 190 m above sea level. This area included a flat valley bottom with a braided network of flowing and standing water that wound through large Sitka spruce (*Picea sitchensis*) and dense ground

shrubs, including salmonberry (*Rubus spectabilis*) and stink currant (*Ribes bracteosum*). The dominant spruce trees were well spaced and had large crowns. Areas slightly higher in elevation had small stands of western hemlock (*Tsuga heterophylla*) and amabilis fir (*Abies amabilis*). The sides of the valley included a more closed canopy of western red cedar (*Thuja plicata*), western hemlock, and amabilis fir.

The first nest was found on 3 August 1990, 2 days after we observed a murrelet land in the tree. Surveys the following 2 mornings, before JDK climbed the tree, revealed no further activity. In 1991, the forest in the vicinity of the 1990 nest was surveyed for murrelet activity from 13 April to 13 August. Murrelets were observed landing in 6 trees within 100 m of the 1990 nest on 3 and 4 June, and 12 and 18 July. All landings occurred in 172–261-cm dbh Sitka spruce 28–2 min before sunrise. Other behaviors observed in this area included below-canopy flights by single and pairs of birds, buzzing (low flights with audible wingbeats), and calling from stationary points. We climbed 6 landing trees and 10 other potential nest trees (large-diameter trees with large mossy branches) in the area beginning 15 August, 17 days after dawn activity had ceased. On 24 August 1991, an unoccupied nest site was found 168 m from the 1990 nest at a bearing of 70°.

Nest-Tree Characteristics

Both nests were located in Sitka spruce trees with broken tops and large crowns comprising more than half the total height of the tree. The 1990 nest tree was 68-m tall with 200-cm dbh, and the 1991 nest tree was 70-m tall with 260-cm dbh. Sitka spruce stumps of similar diameter in a nearby cutblock were 300–400 yr old (M. Wareing, pers. comm.).

The 1990 nest site was on a 7.6-m long, 24-cm diameter branch, projecting at 341°. The nest was 40.9 m from the ground, 3.4 m from the trunk, and 20 cm proximal to a vertically projecting, umbrella-shaped branch. This branch, together with 2 others, completely covered the nest from above. The nest cup was a shallow, oval depression (13.0 × 14.5 × 2.5 cm) centered on the limb with its long axis oriented along the axis of the branch. Moss (*Antitrichia curtispindula*) was 4-cm thick on most of the branch but was 10-cm thick under the nest. Licorice fern (*Polypodium glycorrhiza*) rhizomes grew along

the length of the limb. The feces ring around the lip of the nest consisted of small, discrete droppings (0.8–1.5 cm). A short, dead branch near the nest had worn and compressed moss where the adults landed upon arrival at the nest. The nest cup contained spruce needles, small spruce twigs, eggshell fragments, and down feathers. Samples of the nest contents were collected and feathers were determined to be those of a near-fledging marbled murrelet (R. W. Campbell, Royal B. C. Museum, Victoria, pers. comm.). Eggshell fragments up to 6 mm were pale, dull, olive green, with spots of dark brown, black and purplish grey (R. W. Campbell, pers. comm.). When this nest was re-examined in January 1991, the fecal ring had disappeared and *P. glycorrhiza* was sprouting from the middle of the nest cup. Eggshell fragments were still present in the nest cup and the landing area remained obvious.

The 1991 nest was 42 m above the ground, next to the trunk on a dead limb 18.5 cm in diameter, oriented at 222°. The limb was horizontal for 1.2 m, and the remaining 2 m was broken off and hung vertically. The nest cup was irregularly oval (15.0 × 13.0 cm) with a straight side located against the tree trunk. The nest cup was 5 cm deep with well-defined edges that appeared to have been cut into the moss. The cup contained spruce needles and eggshell fragments similar to those described for the 1990 nest. Moss was 6.0–7.5-cm deep on the branch and included *A. curtispindula* and *Isothecium myosuroides*. We found 2 landing pads on the nest branch and 1 on another branch. The moss cover was obviously worn off the branch in 2 distinct areas perpendicular to the branch, at 17–27 cm and again at 65–77 cm from the nest. The moss on top of the branch between these pads was distinctly flattened. Moss was also worn off a 15-cm area on a branch 1.2 m directly above the nest branch. A 10 × 13-cm oval depression that resembled an old nest cup was on another dead branch 2 m directly below the nest, although it did not contain feces or eggshell fragments.

Nest-Site Characteristics

Sitka spruce trees had the largest mean diameter and highest basal coverage adjacent to both nest trees. The nest trees were the largest (1991) and second largest trees (1990) within the 25-m radius plots.

The 1990 nest tree was 130 m from West Walbran Creek and 12 m from the edge of a gravelled logging road. Gravel and debris from the road bed covered the base of the nest tree. In the plot centered on the nest tree, half of the area was gravel and road (S and W quadrants). In the other half of the plot, there were 11 trees > 10 cm dbh (not including the nest tree). In the plot with the nest on its edge, there were 46 trees including 2 other large spruce trees with diameters of 207 and 159 cm.

The 1991 nest tree was located 25 m from West Walbran Creek. One spruce tree, 190-cm dbh, was located in the plot 6 m from the nest tree. Quadrants NW and NE of the nest tree were open (< 5% canopy cover) and included mostly shrubs although 7 live trees were present. Canopy cover was 60% and 30% in the quadrants SE and SW, respectively, of the nest tree.

DISCUSSION

In this study, tree climbing and observations of murrelet flight behavior were used to search for and successfully locate murrelet nest sites within a suspected nesting stand. By climbing trees after the breeding season it was possible to confirm that murrelets recently nested in West Walbran Valley based on the presence of fecal rings and eggshell fragments. However, information on hatching success, fledging success, and predation on nests cannot be determined without behavioral observations.

The nests we described were similar to other nests in the Pacific Northwest, which were situated in large conifers (\bar{x} = 211 cm dbh, \bar{x} = 66 m tall) and on relatively large limbs (14–61 cm diameter) with moss substrates (79% of nests) (Hamer and Nelson 1995a). Although the 1990 nest was the first to be found in a Sitka spruce, murrelets are now known to nest in this species in Alaska, Oregon, and nearby areas in British Columbia (Jordan and Hughes 1995, Hamer and Nelson 1995a, Naslund et al. 1995, Nelson and Peck 1995). Sitka spruce often had well-covered platforms adjacent to and distant from the trunk, providing suitable nest sites for murrelets. To date, 5 of the 6 nests found in the Carmanah/Walbran area have been located in spruce trees (Jordan and Hughes 1995; A. E. Burger, Univ. Victoria, unpubl.). However, tree species were not searched for murrelet nests in an unbiased manner. In West Walbran Valley,

we concentrated our searches in spruce trees (N = 16), because we observed murrelets landing in them and because they were the largest trees in the area. In this valley, spruce trees are common in valley-bottom and alluvial areas, and are often accessible from nearby creeks and trails, unlike trees on slopes and ridges.

Both nests showed distinct landing pads, which from observations at other nests were known to have been created by birds landing repeatedly at these locations (Nelson and Peck 1995). Both nest trees were near canopy openings. The 1990 nest branch was located above clearings of an adjacent road, and the 1991 nest branch projected over a clearing of shrubs that extended for 25 m to Walbran Creek. Flying into the nest from below appeared to be the clearest path into both nests. We observed a murrelet approach the 1990 nest by flying low along a logging road then rising steeply into the tree crown. Although we did not observe birds at the 1991 nest, the nest branch was accessible from below as all the branches directly beneath it were dead and had no foliage. However, both nests were located near openings where observers had a greater chance of observing landings, so the characteristics of these flight paths may be biased.

These were the first marbled murrelet nests found in British Columbia and the first nests located in Sitka spruce trees within the murrelet's range in North America. The discovery and characteristics of these nests are important for providing a foundation from which to find more nests, further describe murrelet nesting habitat, and develop habitat management plans for this species in British Columbia.

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