

Marbled Murrelet

PROJECT NAME: Sooke Hills Wilderness and Mount Wells Regional Parks

Scientific Name: *Brachyramphus marmoratus*

Species Code: B_MAMU

Status: **Red-listed** (Includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations.)

Threatened (COSEWIC - A species likely to become endangered if limiting factors are not reversed.)

I. DISTRIBUTION

Ecoregions

COM: NWC, HEL, KIR, NAB, NAR, APM, BOR, EPR, NPR, OUF, SPR, SKP, WQC, NWL, NIM, WIM

GED: LIM, NAL, FRL, GEL, SGI, SOG

Biogeoclimatic Units

CDF, CWH, MH

Broad Ecosystem Units

CB, CD, CG, CH, CP, CS, CW, DA, ES, FR, HB, HL, HS, IM, IS, LL, LS, MF, RB, RD, RR, RS, SR, YB, YM, YS

Provincial Range

Marbled Murrelets occur from the Bering Sea to central California. Marbled Murrelets have been recorded in most inshore marine areas of BC (Sealy, 1975a; Carter, 1984; Sealy and Carter, 1984), with the largest concentrations of breeding birds found on the east coast of Moresby Island (Queen Charlotte Islands), certain inlets on the mainland coast, and off SW Vancouver Island from Clayoquot Sound to Port San Juan (Campbell *et al.*, 1990; Rodway, 1990; Rodway *et al.*, 1992; Burger, 1995). During the breeding season, murrelets are found offshore of late successional and old-growth forests, located mostly within 60km of the coast (Ralph *et al.*, 1995).

Elevational Range

Marbled Murrelet nests in BC averaged 321 m above sea level but the elevation range extended from 14 to 1100 meters above sea level (Ralph *et al.*, 1995). The absence of large trees and platforms at high altitudes limits suitable habitat (Burger, 1995).

Provincial Context

The BC population of Marbled Murrelets is estimated to be approximately 45,000-50,000 breeding birds (Rodway *et al.*, 1992). Loughheed *et al.* (1998) estimated the approximately 5000 birds in Desolation Sound.

Project Area:	CRD Parks Sooke Hills Watershed
Ecoprovince:	Georgia Depression
Ecoregions:	Eastern Vancouver Island
Ecosections:	Nanaimo Lowlands (NAL)
Biogeoclimatic Zones:	CDFmm, CWHxm1

Project Map Scale: 1:20,000

II. ECOLOGY AND KEY HABITAT REQUIREMENTS

General

The Marbled Murrelet belongs to a group of diving seabirds known as alcids or auks, which inhabit cool, temperate waters of the northern hemisphere, and include such species as puffins, murre, auklets, and guillemots. The recent decline of Marbled Murrelet populations has been attributed to the loss and degradation of nest sites as old-growth forests are harvested and fragmented; and associated increases in nest predation; oil spills; and possibly fish net drowning (Burger, 1997).

Though widespread, this species has a clumped distribution pattern that is determined during all seasons by the availability of food, and in summer by both food and nesting habitat. Important foraging sites include tidal rips through narrow passages, shelves at the mouths of inlets, and shallow banks. Large feeding concentrations have been reported at Sechart Inlet, Cortes Island, Flores Island, Barkley Sound, Clayoquot Sound and off the West Coast Trail. In British Columbia, Marbled Murrelets are largely restricted to the relatively sheltered inshore water (usually <40m in depth), where their principal prey are sand lance, juvenile herring, anchovies and other small schooling fish. Other prey include epipelagic crustaceans, mainly larger euphausiids and mysids, juvenile rockfish, juvenile salmon and small seaperch (Sealy, 1975a; Carter, 1984; Vermeer *et al.*, 1987).

Marbled Murrelets nest in natural platforms in the canopy of old-age forests. They typically nest in old-growth coniferous stands located on valley bottoms and the lower portions of forested slopes with moderate gradients. Large diameter old-growth trees with large moss-covered limbs

are used for nesting platforms. Nesting stands generally have multi-layered canopies with openings in the canopy for access, and trees well spaced allowing three dimensional corridors of space for flight routes (Hamer and Nelson, 1995). Nests have been found in Sitka spruce, western redcedar, yellow cedar, Douglas-fir, western hemlock and mountain hemlock (FPC, 1997). Nesting habitat for the Marbled Murrelet may occur up to 85 km inland from salt water, but is likely more important within 30 km of the ocean (FPC, 1997).

The reproductive rate of this species is extremely low as only one egg is laid each year (FPC, 1997). The breeding season is protracted, extending from mid-April through late September (Rodway et al., 1992). Eggs are laid from mid-May through late June and early July at Langara Island (Sealy, 1974), and slightly earlier in Barkley Sound (Carter, 1984). Hammer and Nelson (1995) gave the incubation period in BC as May 2 to July 4, the nestling period as 1 June to 30 August, and the duration of the breeding season as 118 days. Chicks hatch after an estimated 30 day incubation period and remain in the nest for 26-36 days (Sealy, 1974; Nelson and Hamer, 1995). Both members of the pair incubate and deliver food to the chick at the nest. Fledged chicks have been reported on the water from May 28 (unusually early) through October 5, but were most common in July (Sealy, 1974; Rodway et al., 1992; Hamer and Nelson, 1995).

Known predators of adult Marbled Murrelets include Peregrine Falcons, Bald Eagles, Northern Goshawks, and Sharp-shinned Hawks. In forested habitat, jays, ravens, crows and owls prey on chicks and eggs. Western Gulls have taken chicks at sea.

III. HABITAT USE: LIFE REQUISITES AND SEASONS

The limiting factor for Marbled Murrelet populations appears to be nesting habitat (Burger, 1997).

- **Reproductive habitat (RE) - Security-Thermal Habitat (ST)**

Known Marbled Murrelet nests in British Columbia are located in low elevation old-growth and mature coniferous forests, with multi-layered canopies (>2), a high composition of low elevation conifer trees and, on the lower two-thirds of forested slopes, with moderate gradients (Hamer and Nelson, 1995). Several forest stand structural characteristics show strong correlations with known Marbled Murrelet nesting habitat. These include density of trees with platforms, density of large trees, epiphyte cover and mean dbh of all trees (Rodway and Regehr, 1999; Bahn et al., 1999). Marbled Murrelet nests are typically in the largest diameter old-growth trees available in the stand, on limbs covered with moss. Stand structure and the processes within a stand may be more important than tree size alone in producing nesting platforms and suitable murrelet nesting habitat (Hamer and Nelson, 1995). Potential nesting trees should have large limbs > 15 m above the ground, with nesting platforms greater than 18 cm in diameter (branch and moss or duff combined) available (Marbled Murrelet Recovery Team, 1994). Certain species such as Sitka spruce and western hemlock tend to have more platforms (Rodway and Regehr, 1999).

Most of the Marbled Murrelet nests in BC have been found in the CWH biogeoclimatic zone (Burger, 1995). Within this zone, detection frequencies were highest in the moister ecosections and in low elevation forests (Burger, 1995). Nests and moderately high levels of activity were also found in some forest patches in the subalpine Mountain Hellock zone on the southern mainland of BC (Burger, 1995). An assessment of nesting habitat for Marbled Murrelets in the Coastal Douglas-fir zone on southeastern Vancouver Island identified several suitable nesting stands that contained structural characteristics known to be important for nesting. Occupied

detections indicating near-nest activities were reported within the Greater Victoria Water District lands but no nests were found (Burger et al., 1999). If Murrelets in this area behave as like murrelets in other parts of the Pacific Northwest, then urbanization and increased fragmentation, conditions being met in the CDF, will likely result in increased predation on Marbled Murrelet eggs and chicks. There has been no evidence of nesting in the subalpine scrub forest, lowland bog forest, or alpine tundra (Burger, 1995).

Marbled Murrelet nesting habitat requirements are defined by the following list of criteria summarized from the Marbled Murrelet Recovery Team (1994) and the Forest Practices Code (1999):

- Age Class – Class 9 (250 years of age) is preferred, but class 8 is acceptable if older forest is not present.
- Height Class – In the CWH or CDF zones Classes 5 (37.5-46.4 m) or 6 (46.5-55.4 m) are preferred. In the MH zone Class 4 (28.5-37.4 m) is acceptable if higher height class is not present or appropriate classes of CWH or CDF are not present.
- Nest platforms – Nesting platforms greater than 18 cm in diameter (branch and moss or duff combined) should be available
- Distance from Salt Water – All habitat within 85 km of salt water is potential murrelet breeding habitat. Habitat within 30 km is preferred, although the strip of habitat directly adjacent to the ocean is unattractive to murrelets due to the increases in predation, lack of moss on branches and increased exposure to coastal storms (Rodway and Regehr, 1999; Hamer, 1995).
- Biogeoclimatic Zone – CWH and CDF are preferred over MH but all are zones contain potentially suitable nesting habitat.
- Elevation – Prime nesting habitat is located between sea level and 600 m. All habitat below 1200 m is considered potential nesting habitat.
- Fragmentation – Larger contiguous areas are preferred over smaller contiguous area and fragmented areas.

IV. SEASONS OF USE

Table A12 identifies the nesting season months for Marbled Murrelets. Security/thermal (ST) habitat will be rated for Marbled Murrelets over these months.

Table A12. Monthly Life Requisites for Marbled Murrelet.

Month	Season	Life requisites
April	Reproductive	Security & Thermal
May	Reproductive	Security & Thermal
June	Reproductive	Security & Thermal
July	Reproductive	Security & Thermal
August	Reproductive	Security & Thermal

September	Reproductive	Security & Thermal
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V. HABITAT USE AND ECOSYSTEM ATTRIBUTES

Table A13 outlines how each life requisite relates to specific ecosystem attributes (e.g., site series/ecosystem unit, plant species, canopy closure, age structure, slope, aspect, terrain).

Table A13. Relationship between Terrestrial Ecosystem Mapping (TEM) attributes and each life requisite for Marbled Murrelet Life Requisites and Associated TEM Attributes

Life Requisite	TEM attribute
Security & Thermal	<ul style="list-style-type: none"> • site -elevation, slope, structural stage, aspect • vegetation – tree species, tree height, canopy layers, understory vegetation, • mensuration – large dbh, number of suitable platforms

VI. Ratings

A 4-class rating scheme of high (H), moderate (M), low (L), and nil (N) is recommended by the Resource Inventory Committee (1999) due to the intermediate level of knowledge on habitat use of Marbled Murrelets. This rating scheme is defined in Table A14 below.

Table A14: Habitat capability and suitability 4-class rating scheme (RIC, 1999)

% of Provincial Best	Rating	Code
100% - 76%	High	H
75% - 26%	Moderate	M
25% - 6%	Low	L
5% - 0%	Nil	N

Provincial Benchmark (coastal British Columbia)

Ecosection: Windward Island Mountains (WIM)

Biogeoclimatic Zone: CWH (Coastal Western Hemlock)

Broad Ecosystem Unit: variable depending on platform availability; CB, CD, CG, CH, CP, CS, CW, DA, ES, FR, HB, HL, HS, IM, IS, LL, LS, MF, RB, RD, RR, RS, SR, YB, YM, YS

Habitats: old-growth forest with appropriate stand structure (i.e., age class, height class, platform availability, low elevation forests), and low stand closure.

Ratings Assumptions

1. Forest stands with structural stage 6 or 7 will be rated class High or Moderate Marbled Murrelet nesting habitat.
2. Plots with large dbh (ca. 80 cm), tall trees (37.5 - 55.4 m), with > 3 suitable nesting platforms / branches (≥ 18 cm dbh), trees with deformations and mistletoe growths suitable for nesting platforms, and epiphyte cover on branches will be rated class High Marbled Murrelet nesting habitat.
3. Plots without large dbh, tall trees, but with 2 – 5 suitable nesting platforms (≥ 18 cm dbh branches) will be rated Moderate to Low nesting habitat. These plots can be assigned

moderate habitat because in such instances we assume that all nesting platforms cannot be accurately assessed from the ground.

4. Plots without large dbh, tall trees will be rated Nil Marbled Murrelet nesting habitat.

Table A15. Summary of general habitat attributes for Marbled Murrelets.

Habitat Use	Specific Attributes for Suitable Marbled Murrelet Nesting Habitat
Security/ Thermal	<p>Structural Stage:</p> <ul style="list-style-type: none"> • Structural stages 1 to 5 have no nesting value due to the absence of potential nesting platforms. • Structural stage 7 is assumed to provide the most suitable nesting habitat. Stage 7 stands have the largest stature trees (providing more potential nesting platforms) and more open forest structures generating access and flyways. Hamer and Nelson (1995) report that decadence, unusual limb deformations, tree damage, and dwarf mistletoe blooms, all common in old growth and mature stands, also appear to create nest platforms. <p>Vegetation Characteristics:</p> <ul style="list-style-type: none"> • Stand closure is often low (50%) in stands used for nesting (Hamer and Nelson, 1995). • The most important nest tree species within BC are likely Sitka spruce and western hemlock. Douglas-fir and western redcedar may also be used (Hamer and Nelson, 1995). • Rodway and Regehr (1999) reported that vegetation site series with poorer nutrient and moisture regimes in Clayoquot Sound generally contained less of the forest structural characteristics important to nesting murrelets <p>Other:</p> <ul style="list-style-type: none"> • In CWHvh1, the coastal strip is not as attractive to nesting murrelets. Although suitable habitat is present low detections were observed (Rodway and Regehr, 1999). The CWHvh1 may have higher value in sheltered bays or inlets as more protection for nests is afforded.

VII. REGIONAL HABITAT VALUES

Burger et al. (1999) conducted an assessment of nesting habitat for Marbled Murrelet in the Coastal-Douglas (CDF) fir zone on SE Vancouver Island in 1998. Although Burger et al. (1999) did not find any nests, they did find suitable nesting habitat in the CDF. In addition, audio-visual surveys during the breeding season confirmed the presence of murrelets in the Greater Victoria Water District (GVWD). Burger et al. (1999) concluded that Marbled Murrelets are almost certainly nesting in the GVWD lands. The lack of random systematic sampling did not allow drawing reasonable conclusions about habitat values and correlations with nesting habitat in the CDF zone. However, Burger et al. (1999) did conclude that uncritical assignment of Marbled Murrelet nesting habitat based exclusively on stand age would lead to an overestimation of available habitat as all old-age stands did not provide suitable habitat. Burger et al. (1999) suggested that habitat inventory work be complimented with audio-visual surveys along with ground truthing work.

VIII. LITERATURE CITED

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