

# BAY-BREASTED WARBLER

*Dendroica castanea*

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## Species Information

### Taxonomy

The Bay-breasted Warbler is a neotropical migrant songbird. It is one of 12 species of warbler in the genus *Dendroica* that breed in British Columbia (Campbell et al. 2001). No subspecies are recognized (AOU 1957; Cannings 1998). It seems to be closely related to the Blackpoll Warbler (*Dendroica striata*), with which it overlaps in range, as there have been three records of hybridization (Williams 1996).

### Description

A small songbird about 14 cm in length. In breeding plumage, the male has a black face; chestnut crown, throat, and sides; cream-coloured patch on the sides of the neck; a cream-coloured belly; and two bold white wing stripes contrasting with the otherwise dark olive, streaked upperparts. The female is similar in pattern but is significantly duller in colour. In the fall, adult males, females, and young of year have olive green upperparts with two white wing bars and dull yellowish underparts.

### Distribution

#### Global

The Bay-breasted Warbler breeds from the south-eastern Yukon, southwestern Mackenzie and north-eastern British Columbia, across Canada throughout the boreal forest to southwestern Newfoundland, and south into the United States from northern Minnesota east to Maine. This species winters mainly in the Panama as well as south into northern Colombia and western Venezuela (AOU 1983; Campbell et al. 2001).

### British Columbia

In British Columbia, Bay-breasted Warblers have been reported primarily in the Taiga Plains and Boreal Plains ecoprovinces, from near Kwokullie Lake and along the Liard River, at Mile 513 of the Alaska Highway, south through Moberly and One Island lakes (Cooper et al. 1997). Extralimital records include Tetana Lake, Yoho National Park, and Indianpoint Lake (Godfrey 1986), and west end of Williston Lake (Price 1993).

#### *Forest regions and districts*

Northern Interior: Fort Nelson, Peace

#### *Ecoprovinces and ecosections*

TAP: ETP, FNL

BOP: HAP, KIP, PEL

NBM: HYH, LIP

#### *Biogeoclimatic units*

BWBS: mw1, mw2

#### *Broad ecosystem units*

BA, PR

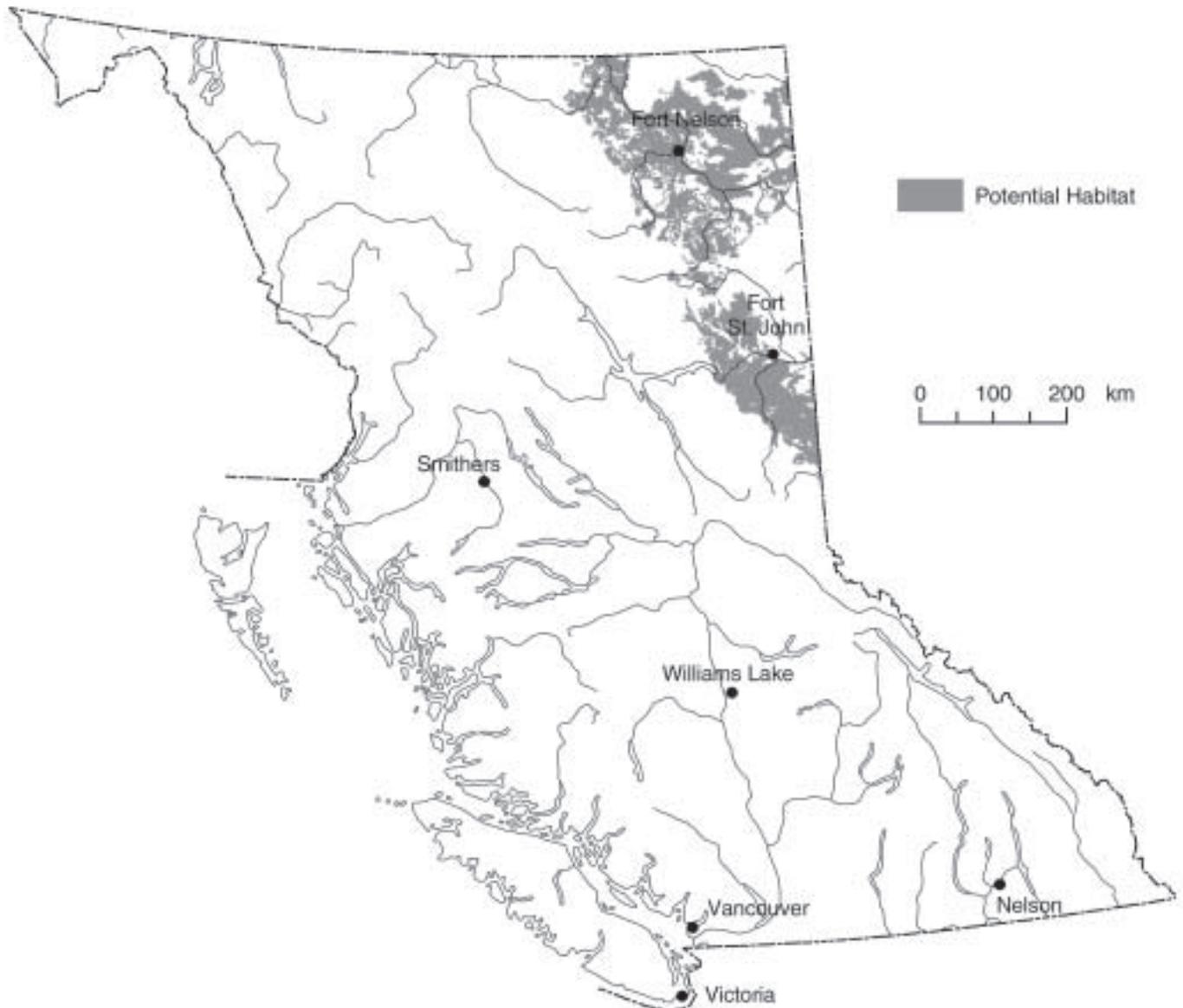
#### *Elevation*

230–760 m (Bennett and Enns 1996;  
Campbell et al. 2001)

### Life History

Very little is known about the ecology of the Bay-breasted Warbler in British Columbia, therefore most of the following information is inferred from studies in other areas.

## Bay-breasted Warbler (*Dendroica castanea*)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several ecosystem classifications (Ecoregion, Biogeoclimatic and Broad Ecosystem Inventory) as well as current knowledge of the species' habitat preferences. This species may or may not occur in all areas indicated.

## Diet and foraging behaviour

During the breeding season, the Bay-breasted Warbler is a specialized forager, spending most of its time in the shady, interior branches of the middle and upper coniferous canopy (Bent 1953; MacArthur 1958). Morse (1978) also noted Bay-breasted Warblers in deciduous habitats, foraging at medium to medium-low heights. Its diet is mainly insectivorous, composed of a variety of adult and larval insects, spiders, and spider and insect eggs (Bent 1953; MacArthur 1958; Sealy 1979; Morse 1980). Lepidopteran larvae (e.g., spruce budworms) are the primary food source during the breeding season (Morse 1978). The diet switches to mainly fruit during the winter in the tropics when insects are scarce (Rappole 1995; Williams 1996).

## Reproduction

The Bay-breasted Warbler is probably seasonally monogamous although mate-switching is possible (Sealy 1979; Williams 1996). Upon arriving on the breeding grounds, males select nesting territories, defending them from conspecific males. The female builds the nest with some assistance from the male (Baicich and Harrison 1997). Clutch size ranges from three to seven eggs and is strongly influenced by food supply with larger clutches (six or seven eggs) typical during periods of high food abundance (Bent 1953; Morse 1978; 1989; Peck and James 1987). In northeastern British Columbia, egg laying probably begins in mid-June (Campbell et al. 2001). Eggs are incubated by the female for 12–13 days, nestlings fledge after 10–12 days, and both parents continue to feed young for several days, post-fledging (Bent 1953; Baicich and Harrison 1997). A single brood is likely raised annually in British Columbia, as is usual for neotropical migrants (Morse 1989).

## Site fidelity

Bay-breasted Warblers respond to budworm outbreaks and may become super-abundant during infestations and then decline or disappear entirely from area within a few years after the outbreak (Morse 1980). Thus, site fidelity is likely low, lasting roughly as long as the outbreak period.

## Home range/territory size

There are no data for nesting territory size or breeding density in British Columbia, but this warbler is one of the least abundant warblers in British Columbia (Cooper et al. 1997). Elsewhere, most density data are for periods of budworm outbreak, including one study in Ontario, where densities of up to 230 pairs/km<sup>2</sup> were recorded (Williams 1996).

## Dispersal and movements

Spring migrants enter northeastern British Columbia through Alberta and begin arriving in mid- to late May, with the majority probably arriving in late May and early June (Pinel et al. 1993).

After nesting is completed, adults probably begin to migrate south in mid- to late July, followed by juveniles through August (Salt 1973; Pinel et al. 1993).

## Habitat

### Structural stage<sup>1</sup>

6: mature forest (80–140 yr)

7: old growth (>140 yr)

## Important habitats and habitat features

### Nesting

In northeastern British Columbia, Bay-breasted Warblers are found almost exclusively in mature white spruce forest, either in pure stands or mixed with clumps of aspens (*Populus tremuloides*), birch (*Betula papyrifera*), and balsam poplar (*Populus balsamifera*) (McTaggart-Cowan 1939, Erskine and Davidson 1976; Siddle 1992; Enns and Siddle 1992). This species also uses riparian coniferous or mixedwood corridors with multi-layered canopy and frequent openings (Campbell et al. 2001).

Some common characteristics of nesting habitat include a high proportion of old spruce (wildlife tree classes 3–5) with dead lower branches, a relatively closed upper canopy, a sparse but patchy sub-canopy, and an understory dominated by highbush-cranberry (*Viburnum edule*), paper birch (*Betula occidentalis*), dogwood (*Cornus nuttallii*), or Sitka alder

<sup>1</sup> Suitability increases with age.

(*Alnus viridis* ssp. *fruticosa*) (Cooper et al. 1997; Campbell et al. 2001).

Bay-breasted Warblers usually nest in coniferous trees; preferring spruce or fir, although they also occasionally nest in deciduous trees or shrubs (Bent 1953; Sealy 1979; Peck and James 1987). Nests are bulky cups of grass, small twigs, and caterpillar webs lined with fine rootlets and hair (Baicich and Harrison 1997). Nests are usually placed on a horizontal branch, near the trunk or along a main branch, and may be 2–18 m above ground, although 4.6–7.6 m is most common (Bent 1953; Peck and James 1987; Baicich and Harrison 1997). Only one nest has been documented for British Columbia, and its location on a spruce branch, 8 m above the ground, is consistent with nest microhabitat found elsewhere (Campbell et al. 2001).

An abundant prey base is an essential nesting habitat feature. Breeding distribution and abundance is strongly tied to presence of eastern spruce budworm (*Choristoneura fumiferana*) (MacArthur 1958; Morse 1978, 1989; Welsh 1987).

### Foraging

Birds probably forage mainly within the nesting habitat, therefore feeding and nesting habitat requirements are the same.

## Conservation and Management

### Status

The Bay-breasted Warbler is on the provincial *Red List* in British Columbia. Its status in Canada has not been determined (COSEWIC 2002).

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

BC	AB	AK	NWT	Canada	Global
S2B, S2N	S2S3B	SR	S?	N5B	G5

## Trends

### Population trends

Throughout this species range, local population trends are closely correlated with outbreaks of the eastern spruce budworm and, therefore fluctuate dramatically (Bennett and Enns 1996; Williams 1996; Cooper et al. 1997). In eastern North America, several studies have shown stable long-term trends, but significant recent short-term declines (Hill and Hagan 1991; Hagan and Johnston 1992). Across Canada, Breeding Bird Survey data suggest populations are declining (Erskine et al. 1992).

Overall Bay-breasted Warbler populations may be declining slightly (Williams 1996). Although there are no population trend data for British Columbia, considering the widespread population declines of many neotropical migrants (Morton and Greenberg 1989; Terborgh 1989; Finch 1991), the limited number of records for Bay-breasted Warblers in British Columbia, and the fact that this species relies on a habitat in decline, it is probable that populations are stable or declining (Cooper et al. 1997; Fraser et al. 1999), rather than increasing.

### Habitat trends

Pure stands of large spruce, the preferred habitat of Bay-breasted Warbler, are relatively rare in the northeast and are being harvested at rates that the B.C. Ministry of Forests has described as non-sustainable (MOF 1992).

## Threats

### Population threats

Bay-breasted Warblers are rarely parasitized by Brown-headed Cowbird (Williams 1996); however, the impact of nest parasitism can be severe on neotropical migrants, especially in fragmented forests (Brittingham and Temple 1983; Askins et al. 1990; Finch and Stangel [editors] 1993). The lack of parasitism on this species is undoubtedly because it typically breeds in boreal forests away from cowbird concentrations. Brown-headed Cowbird parasitism will undoubtedly increase with habitat fragmentation.

Fragmentation of habitat increases edge habitat favoured by predatory species such as jays, crows, magpies, and some small mammals. Because the probability of predation on forest songbird nests increases with increasing forest fragmentation, it is probable that Bay-breasted Warblers will face increasing predation intensity as forests are cleared (Wilcove 1985; Yahner and Scott 1988; Askins et al. 1990; Cooper et al. 1997).

Rappole (1995) lists Bay-breasted Warbler amongst the neotropical migrants with a high probability of declining in the next decade, with winter being the most vulnerable period due to habitat loss within a relatively restricted winter range.

Migrating warblers suffer mortality from natural environmental factors such as inclement weather and from human-related factors such as collision with light towers (Williams 1996). It is expected that predation of nestlings by small mammals and birds, particularly corvid species, impacts reproductive success (Morse 1989; Williams 1996; Cooper et al. 1997).

### **Habitat threats**

The primary threat to the Bay-breasted Warbler in British Columbia is the harvesting of mature and old-growth white spruce stands within its restricted range in the Boreal Plains and Taiga Plains eco-provinces. Loss or deterioration of forest habitat has been widely blamed for declines in breeding populations of many forest warbler species (Titterton et al. 1979; Askins and Philbrick 1987; Terborgh 1989; Saunders et al. 1991; Hagan and Johnston 1992; Maurer and Heywood 1993). There is no evidence to suggest that the Bay-breasted Warblers will respond differently (Cooper et al. 1997).

Bay-breasted Warblers have been observed in British Columbia in stands that have been logged selectively for very large spruce with substantial, but unquantified, amounts of moderate-sized spruce remaining; this finding suggests that a certain amount of selective logging may be compatible with this warbler (Enns and Siddle 1992).

Stands favoured by Bay-breasted Warblers are often targeted for salvage or sanitation logging and, once harvested, require considerable time (>100 years)

before they regenerate to a stage suitable for this species. Fire is also more likely to occur in selectively logged upland areas with optimal Bay-breasted Warbler habitat due to high fuel accumulation and site-related factors such as slope and aspect (Parminter 1983; Cooper et al. 1997).

Habitat is also lost or fragmented by other activities such as clearing for agriculture, road building, transmission lines, and oil and gas exploration (Cooper et al. 1997). In addition, the use of pesticides to control budworm outbreaks may threaten the quality of habitat (Williams 1996; Cooper et al. 1997).

### **Legal Protection and Habitat Conservation**

The Bay-breasted Warbler, its nests, and its eggs are protected from direct persecution in Canada by the *Migratory Birds Convention Act*. In British Columbia, the same are protected under the provincial *Wildlife Act*.

Several Class A parks, such as Taylor Landing (2.4 ha) and Kiskatinaw River (154 ha), are within the known range and habitat type of Bay-breasted Warbler, although none include significant amounts of old-growth white spruce forest. One ecological reserve, Fort Nelson River, may have small amounts of suitable habitat for Bay-breasted Warbler and the Andy Bailey Recreation Area (196 ha) contains some black and white spruce riparian forest.

Most other nesting habitat is on Crown land; therefore, habitat conservation may be partially addressed by the old forest retention targets (old growth management areas), riparian reserves, and wildlife tree retention areas as required under the results based code.

Since Cape May and Bay-breasted Warblers use similar habitats, reserves for one species will likely be useful for the other.

### **Identified Wildlife Provisions**

Habitat management for this species is best conducted at the landscape level. Because populations are very local, are dispersed in a large

geographic area, and respond so directly to prey availability, old growth management areas, riparian management areas, and protected areas scattered throughout the BWBS may be the best approach to managing habitat for this species.

### Sustainable resource management and planning recommendations

- ❖ Maintain suitable nesting habitat by maintaining old spruce forest.
- ❖ Incorporate old spruce into (1) old growth management areas (OGMAs); (2) areas constrained for other management objectives (e.g., visual quality, recreation, ungulate winter range, terrain concerns); or (3) stand level reserves such as wildlife tree retention areas and riparian management areas.
- ❖ Areas selected should include spruce forests with evidence of declining health for their potential for future spruce budworm outbreaks. Other characteristics of good habitat are stands of old-growth black or white spruce >140 years, a relatively closed upper canopy, open patches in mid-canopy, and an understorey dominated by highbush-cranberry, paper birch, dogwood, or Sitka alder.
- ❖ Specific wildlife tree and old forest retention objectives for this species should be considered in the BWBSmw1 and BWBSmw2 in Fort Nelson, and Peace forest districts. Blocks should be assessed to identify potentially suitable WTR areas. The attributes listed in Table 1 should be used to design suitable WTR areas for this species.

**Table 1.** Preferred WTR area characteristics for the Bay-breasted Warbler

Attributes	Characteristics
Size (ha)	≥5 ha
Location	BWBSmw1, BWBSmw2
Features	trees with dead lower branches; understorey dominated by highbush-cranberry, paper birch, dogwood, or Sitka alder
Tree species	white spruce
Age/structure	≥80 years; structural stages 6–7
Wildlife tree class	3–5

- ❖ Restrict salvage or harvest and avoid insecticide use.
- ❖ Maintain WTR area over the long term.

### Wildlife habitat area

#### Goal

Although this species is likely best managed at the landscape level, it may be appropriate to establish WHAs where strategic level planning objectives cannot address critical areas for the species.

#### Feature

Establish WHAs only within highly suitable nesting habitat (i.e., in mature or old spruce forest) where concentrations (>3 pairs/10 ha) of Bay-breasted Warblers regularly occur.

#### Size

Typically between 10 and 30 ha but will depend on site-specific factors.

#### Design

WHAs should include old spruce forest on flat topography with a relatively closed upper canopy, open patches in mid-canopy and an understorey dominated by highbush-cranberry, paper birch, dogwood, or Sitka alder. Minimize edge habitat wherever possible.

### General wildlife measure

#### Goals

1. Ensure WHA is windfirm.
2. Maximize interior forest conditions.
3. Minimize disturbance during the nesting season (1 June to 31 July).

#### Measures

##### Access

- Do not construct roads, trails, or other access routes.

##### Harvesting and silviculture

- Do not harvest.

##### Pesticides

- Do not use pesticides.

## Additional Management Considerations

Forestry practices that promote microhabitat diversity by providing uneven-aged forests may benefit this species.

Avoid prime Bay-breasted Warbler habitat when planning seismic explorations, transmission lines, and other access routes.

## Information Needs

1. Distribution.
2. Habitat use preferences.
3. Population estimates and trends.

## Cross References

Cape May Warbler

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