

## DO BLACK-THROATED GREEN WARBLERS IN NORTHEAST B.C. REQUIRE RIPARIAN FOREST?

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*Abstract* -- Literature about Black-throated Green Warblers in British Columbia generally states that the species requires riparian habitat. This was not my impression during bird surveys in the Peace River district. This study showed that warblers were farther from water than were random points. There was a significant ( $p < 0.001$ ) difference between (a) distances from singing Black-throated Green Warblers to the nearest waterbody ( $n = 262$ , average distance = 270 m), and (b) distances from randomly selected points to the nearest waterbody ( $n = 300$ , average distance = 188 m). Apparently this species avoids riparian habitat in northeastern British Columbia.

*Key words:* Black-throated Green Warbler, *Dendroica virens*, riparian, habitat, Peace River, British Columbia, survey, preference, selection, forest type.

### INTRODUCTION

The Black-throated Green Warbler (*Dendroica virens*, hereafter B-t Green Warbler) is a relatively recent addition to the avifauna of B.C.; having colonized the Peace River area from neighbouring Alberta during the latter half of the 1900s (Campbell *et al.* 2001). The species is currently 'Blue-Listed' (of Special Concern) in both provinces (Alberta 2001; B.C. 2003). As a species of management interest in both provinces, numerous status reports have been compiled, which summarize information on the species' life history and habitat requirements. The majority of reports for B.C. emphasize the need for riparian mixedwood forests (mixed conifer and deciduous) as breeding habitat (e.g. Enns and Siddle 1996; Cooper *et al.* 1997; Blood and Barkhouse 1998; Fraser *et al.* 1999; Campbell *et al.* 2001). Alberta reports are in agreement with the requirement for mature mixedwood forest, but mention the riparian aspect only in passing (Semenchuk 1992; Norton 1999). See Collins (1983) and Morse (1993), however, for discussion on the range of forested habitats used by this species in eastern and central North America.

During the past 14 years I have done bird surveys in the Peace River area of northeastern B.C., and this has led me to believe that the B-t Green Warbler is not at all dependent on riparian forest. In fact, the highest densities I have encountered were in mature/old aspen-spruce mixedwood stands on upland sites. General perceptions can be misleading, however, so I tested the concept as outlined in this paper.

### METHODS

If B-t Green Warblers are dependent on riparian forest, then they should be found closer to waterbodies (on average) than are random locations. Therefore I tested distances from identified bird locations to the nearest waterbody, against distances for random points in the same area.

Locations for 262 male B-t Green Warblers, as determined by Global Positioning System (GPS) were extracted from an existing data set of Red- and Blue-listed warbler locations. These locations were not detected through random sampling. Rather, large areas that were of forest management interest (i.e. containing harvestable timber) were selected, and logging roads, seismic lines, pipelines and other trails were used as transects, along which surveys were conducted. The transects were traversed by foot, bicycle, all-terrain vehicle or pickup truck. Efforts were made to reduce the effect of vehicle noise on detection of birds. For example, a stop was made every 100 m in order to listen for 20-30 seconds.

Warbler songs could easily be heard over 50 m away, so there were no 'gaps' in coverage. When a warbler was heard singing, the surveyor found and marked the tree it was singing from, then continued on to the next bird. GPS location and vegetation sampling was done at a later date in order to maximize survey time during the relatively brief singing period. This procedure was adopted because the purpose of the original survey was to document the presence of selected bird species, particularly B-t Green Warblers and Connecticut Warblers (*Oporornis agilis*), within the areas of management interest, but not necessarily to detect all birds along the survey route. In addition, the survey gathered information on habitat being used in these areas. The two species of particular interest occupy different habitats.

For comparison purposes, a number of random point locations were generated within the same range of latitude and longitude as the warbler points. This was done with a random number generator which creates Universal Transverse Mercator coordinates. Both data sets were then plotted in relation to waterbody information provided by B.C. TRIM (Terrain Resource Information Mapping) using ARCVIEW<sup>®</sup> geographic information system. An example is presented in Figure 1. All TRIM rivers, creeks, lakes and wetlands were considered as 'sources' of riparian areas. The width of specific riparian areas is unknown in this exercise; tiny trickles may flow through a broad drainage

and have a relatively wide riparian influence. Conversely, large rivers may flow through steep gorges and have minimal riparian influence on forests high above. Field experience has shown that a small proportion of TRIM creeks do not actually exist on the ground; apparently because of errors in aerial photo interpretation. In these cases, however, there is always an identifiable drainage pattern and low-lying ground, often with riparian characteristics -- even without surface water. The reverse case of an existing stream missing from TRIM data is extremely rare.

Thus, as a measure of the warbler's affinity for riparian areas, the distance from each bird location to the nearest TRIM waterbody was measured (to the line indicating streams or nearest edge of river, lake or wetland). The same procedure was then repeated for all of the random points (see Figure 2). All measurements were done at an approximate scale of 1:1000.

#### Potential Bias:

There are several potential sources of bias associated with this manner of identifying locations. Are the birds representative? While it is possible that some birds were migrating or not singing on territory, the surveys were conducted between late May and late June, when most B-t Green Warblers should be establishing or defending territories in acceptable habitat. All habitats along the transects were surveyed, i.e. the surveyor did not 'skip' habitat that looked 'unsuitable'. It might be argued that the transect locations were biased, because roads typically avoid riparian areas. There appeared to be no consistent bias in this regard. While some roads might avoid low-lying areas as a general route, they can also cross many streams. Some roads actually ran parallel to watercourses.

Some factors reduced the potential bias. Warblers were frequently detected a considerable distance from the transect. Subsequent detections were also common (birds that could not be detected from the road were heard farther off once the surveyor had reached the 'original' singing bird). Thus, the sample width of the transects was variable, and not limited to ~50 m. In addition, potential bias associated with road locations becomes irrelevant when considering seismic lines and pipelines, which were also used as transects. Readers from other areas might think that the sound of running water in riparian areas would drown out the warbler songs, thereby reducing the number of detections near water. In reality, few of the creeks or rivers presented a noise problem. The terrain in the study area has rather gentle relief, and water flow is usually low and slow (aside from springtime runoff and after a major rain). Accordingly, although the sampling strategy was 'haphazard' rather than random, there does not appear to be any procedural reason for the warbler locations to be systematically biased with regard to distance from riparian areas. It is unlikely that warblers are randomly distributed across a natural landscape; they are almost certainly clumped in areas of suitable habitat.

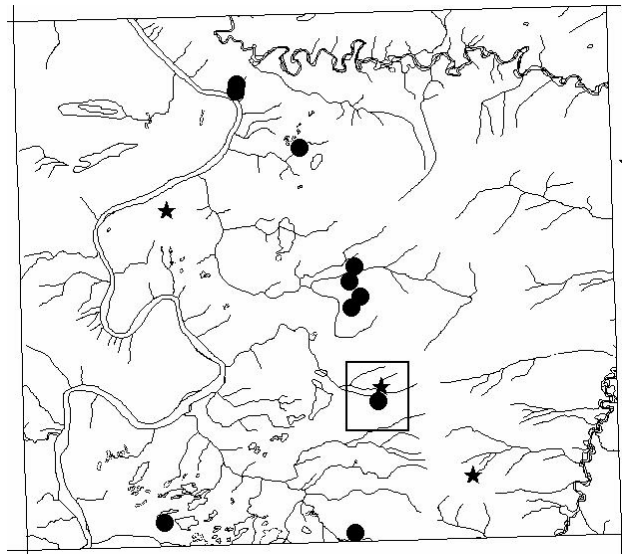


Figure 1. Mapsheet 93P.065 showing all TRIM waterbodies. Murray River is on the left, with Coldstream Creek at top and bottom right. Ten dots represent warbler locations, while three stars represent random locations. Area within the box is shown at smaller scale below.

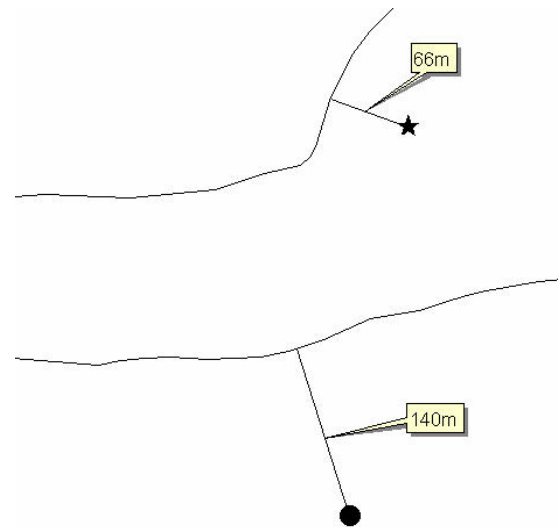


Figure 2. Close-up view of a section of Figure 1. In this case, the random point was found to be 66 m from the nearest waterbody, while the warbler was found to be 140 m away.

## RESULTS

The mean distance-to-water for warbler locations was 270 m ( $n = 262$ ) while the mean distance for random points was 188 m ( $n = 300$ , see Figure 3). This is a significant difference ( $p < 0.001$ ;  $t$ -test with unequal variances). The 95% confidence limits do not overlap (Figure 4). This result indicates an *avoidance* of waterbodies (and associated riparian zones) rather than a preference. Even if there had been no statistical difference between the means, the null hypothesis of 'no difference' would not have been rejected and there would again have been no evidence to suggest warbler preference of riparian forest.

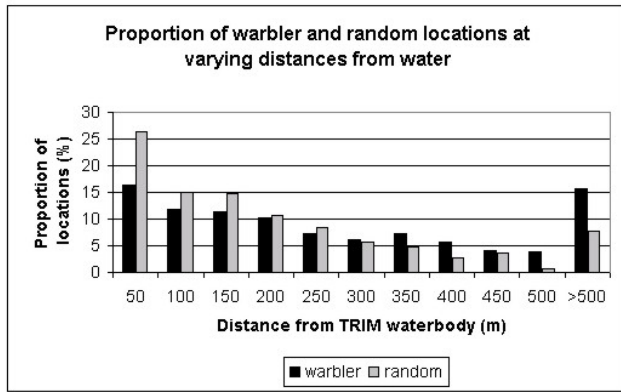


Figure 3. Proportions of warbler locations and random locations at various distances from water.

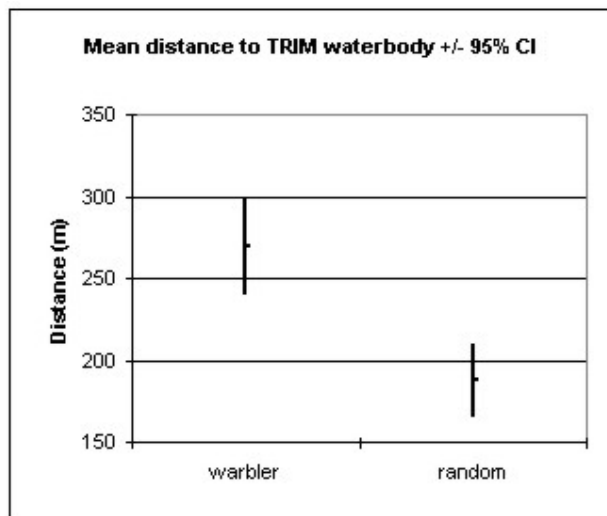


Figure 4. Mean distances to TRIM waterbody, plus and minus 95% confidence limits.

## DISCUSSION

The results suggest that B-t Green Warblers may be avoiding riparian habitat; at least warbler locations are situated farther from waterbodies than random points. This is a surprising result, because the species has been documented in riparian habitat (Enns and Siddle 1996). To further investigate the possibility of avoidance, it would be useful to document warbler habitat use in blocks of forest containing both riparian and upland habitat.

Until then, however, and in light of the findings from this study, it is worth considering two questions: (1) *Why would B-t Green Warblers avoid riparian forest?* and (2) *Why does so much of the B.C. literature claim the opposite?* I can only speculate on the answers.

Riparian habitat exists as a band of moisture-influenced vegetation extending outward from a waterbody. This band may be less than a metre or over 100 m in width, depending on a number of factors. In any case, however, it tends to be longer than it is wide (e.g. a ring around a lake or wetland,

or a strip along a stream or river). The linear nature of the habitat means that there is a higher edge-to-area ratio than for non-linear habitat blocks. It has been suggested that B-t Green Warblers avoid edges and prefer 'interior' forest conditions (Germaine *et al.* 1997; Norton 1999). Thus, although the tree species found in riparian habitats may be suitable, it is possible that there is insufficient 'core' habitat in many cases. The argument is admittedly tenuous, however, since locally I have noticed no obvious avoidance of abrupt or subtle edges by this species (except in agricultural landscapes; e.g. Hobson and Bayne 2000). See also Blood and Backhouse (1998).

There is no question that *some* B-t Green Warblers occupy riparian mixedwood habitat in northeastern British Columbia. How this came to be known as the primary or required habitat in the B.C.-based literature is uncertain. Part of the reason likely stems from the general scarcity of published literature on the topic; a few papers are cited frequently, and statements are perpetuated. Most of the B-t Green Warbler habitat citations can be traced back to Enns & Siddle (1996) and Francis and Lumbis (1979). Enns & Siddle (1996) tallied 50 Black-throated Green Warblers during 33 field days in 1992 (some of this time was spent outside the geographic range of the warbler). About half of the B-t Green Warblers encountered were found in riparian habitat - just as many were found in upland mixedwood habitat, yet the "proposed habitat model" for the species includes only "mixed, tall white spruce and poplar stands within the Boreal White Spruce-Balsam Poplar Riparian habitat type". Was omission of upland habitats an oversight? The often-cited report by Francis and Lumbis (1979) states that *two* territories were found in riparian balsam poplar / aspen forest with a few scattered tall white spruce.

A related factor is that much of the past work on northeastern B.C. birds (especially the Red- and Blue-listed species) has been done by visitors to the area, often working under time constraints. There is a tendency to look for the species where it is 'expected' (that being mature riparian mixedwood forest, according to the literature) and the entire exercise becomes a self-fulfilling prophecy. These issues are acknowledged by Enns and Siddle (1996). That the species is typically considered 'uncommon and local' (e.g. Campbell *et al.* 2001) supports the notion that assessments are made by evaluating its status within this 'expected' habitat, where it *is* uncommon and local. The species is actually common and quite widespread in the region (Phinney 1998, South Peace Bird Atlas Society, unpublished data).

Confirming that B-t Green Warblers in northeastern B.C. are not dependent on riparian forest has implications for managing the species within the province. The status of the species is not as tenuous as was once thought, and more effective habitat modelling and management is now possible. Despite this more optimistic status assessment, there are still factors that warrant continued concern for the species in B.C. The B-t Green Warbler appears to have the

most limited distribution of any 'listed' warbler in northeastern B.C., being largely restricted to the Peace River area. There are records from farther north at Tuchodi River, but the status of the species in that area is uncertain (Campbell *et al.* 2001; Cooper *et al.* 1997). Timber harvesting will have a detrimental effect on warbler numbers. Most plans call for rotation ages in managed forests to be less than the ages of stands currently used by this species. In addition, government policy effectively prohibits the re-establishment of 'salt and pepper' mixedwood forest that the warbler prefers. Instead of mixedwood, pure coniferous or deciduous stands are regenerated, limiting future B-t Green Warbler habitat to the interface of these stand types. Thus, it seems certain that the local population of this species will ultimately decline, but it is doubtful that it will disappear from the province altogether.

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