

## **Searcher Efficiency Trials**

In order to estimate incidence of bird mortality from collisions with meteorological towers, terrestrial/wetland biologists with Natural Resource Solutions Inc. (NRSI) conduct weekly searches for dead birds during fall bird monitoring studies. In addition, predator scavenge rates and the rate of carcass decomposition are also studied.

Given the structural complexity of some of the sites it can be difficult to ascertain the level of searcher accuracy for locating dead birds. Furthermore, bird size and colour may also limit searcher efficiency at some meteorological towers. To refine searcher efficiency during mortality surveys biologists at NRSI tested their ability to locate a variety of bird species in habitats similar to those found around meteorological towers at wind turbine developments throughout Ontario.

### **Methods:**

NRSI personnel evaluated searcher biases for detecting dead birds at meteorological towers. Plots were searched using the same parallel transect method used at meteorological towers, however observers were tested individually. Trials took place in Waterloo, Ontario near Rim Park in early November 2005.

Eight test plots were setup in habitats similar to those at meteorological towers; cultural meadow; cultural thicket and disturbed bare ground. The number of birds distributed within plots was selected from a random list ranging from 0-6. Thus, searchers wouldn't know how many, if any, birds were located within a test plot. The majority of dead birds were provided by the Royal Ontario Museum or were collected by biologists during other biological surveys.

Observers were given a set time to complete a dead bird search of a plot. Times allotted to complete each search varied depending on the size and structural complexity of the test plot. Table 1 displays the numbers of plots per habitat, the area of each plot, and the time allotted to complete a search of each plot. Six of the eight test plots occurred in cultural meadow. This was a result of limited site availability. However cultural meadow community is also representative of the majority of sites around meteorological towers. One plot occurred in a cultural thicket and another with <25% ground cover.

Herbaceous ground cover was the dominant cover type in cultural meadow plots. Dominant species included Goldenrod (*Solidago canadensis*), Queen Anne's Lace (*Daucus carota*), Common Teasel (*Dipsacus fullonum*) and White Clover (*Trifolium repens*) and various grasses (*Poaceae*) and sedges (*Carex* sp.). Willow shoots (*Salix* sp.) 2-4m in height, were the dominant cover type in the cultural thicket plot. Structural complexity of each habitat is based on ground cover and vegetation height.

**Table 1. List of Habitats, Plots, Plot Areas and Time Allocated to Complete Bird Mortality Searches.**

Habitat	Plot #	Plot Area (m <sup>2</sup> )	Time Limit (minute)
Cultural Meadow	1	2860	30
	2	1800	25
	3	3250	25
	4	3040	25
	5	2624	20
	6	3040	30
Cultural Thicket	7	1122	25
Disturbed Bare Ground	8	2162	15

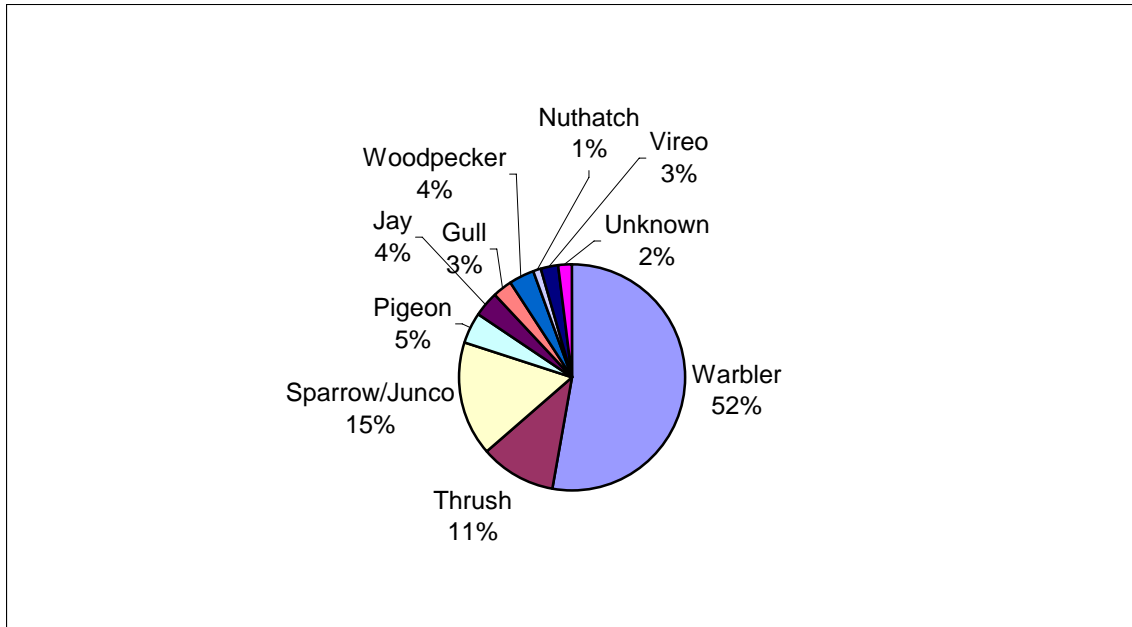
Table 2 lists bird species used during searcher efficiency trials. Some bird carcasses were too damaged to be identified to species. Searchers recorded the tag numbers of each bird they found before returning collected birds to the tester for random redistribution. Each bird was placed in a size category small (11.5-14.5 cm), medium (14.5-18.5 cm) and large (30-49 cm). Small birds were further subdivided into female and male birds. A total of 35 birds were used in searcher efficiency trials.

**Table 2. Species List of Birds Used in Searcher Efficiency Trials.**

Common Name	Scientific Name
Canada Warbler	<i>Wilsonia canadensis</i>
Tennessee Warbler	<i>Vermivora peregrine</i>
Nashville Warbler	<i>Vermivora ruficapilla</i>
Mourning Warbler	<i>Oporonis philadelphia</i>
Magnolia Warbler	<i>Dendroica magnolia</i>
Yellow Warbler	<i>Dendroica petechia</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Blackburnian Warbler	<i>Dendroica fusca</i>
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Song Sparrow	<i>Melospiza melodia</i>
Fox Sparrow	<i>Passerella iliaca</i>

American Tree Sparrow	<i>Spizella arborea</i>
Veery	<i>Catharus fuscescens</i>
Gray-Cheeked Thrush	<i>Catharus minimus</i>
Vireo Sp.	<i>Vireo sp.</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Red-breasted Nuthatch	<i>Sitta Canadensis</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Rock Dove	<i>Columba livia</i>
Ring-billed Gull	<i>Larus delawarensis</i>

Figure 1 displays the distribution of bird groups used in the searcher efficiency trials. Warblers comprised the majority of birds used during the trials.



**Figure 1. Distribution of Bird Families Used in Searcher Efficiency Trials.**

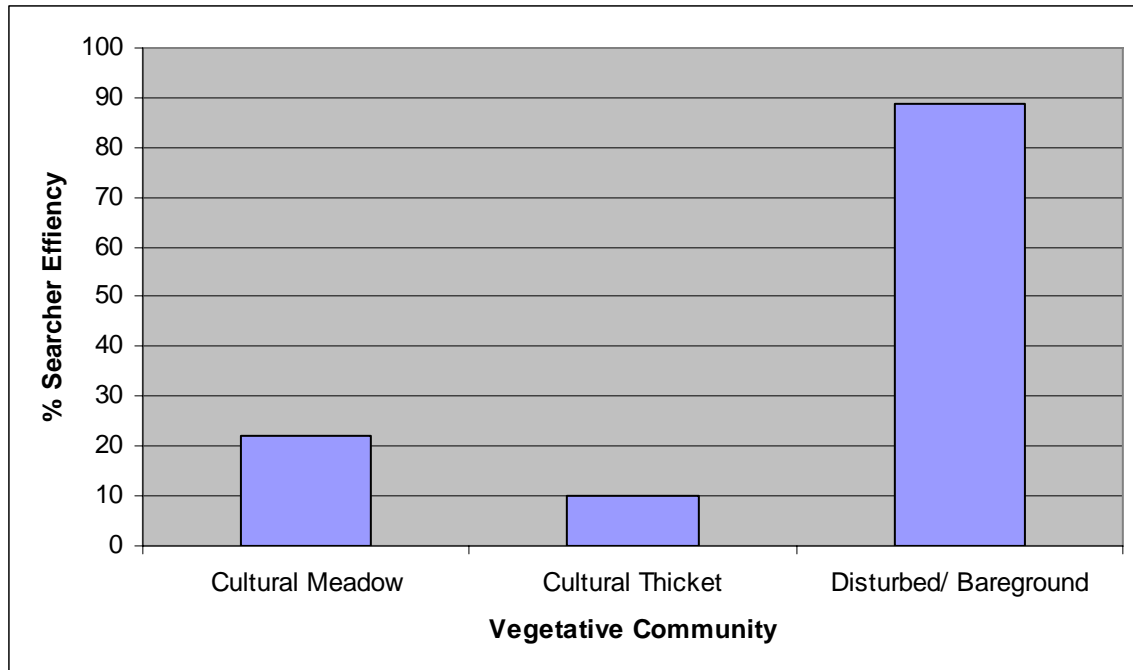
**Results:**

Individual searcher efficiency ranged from 7.7-45.0% and average searcher efficiency was 26.3%. This broad range of results is likely a function of habitat cover type and/or structural complexity rather than searcher effort. Table 3 lists individual searcher efficiency scores.

**Table 3. Percent Searcher Efficiency.**

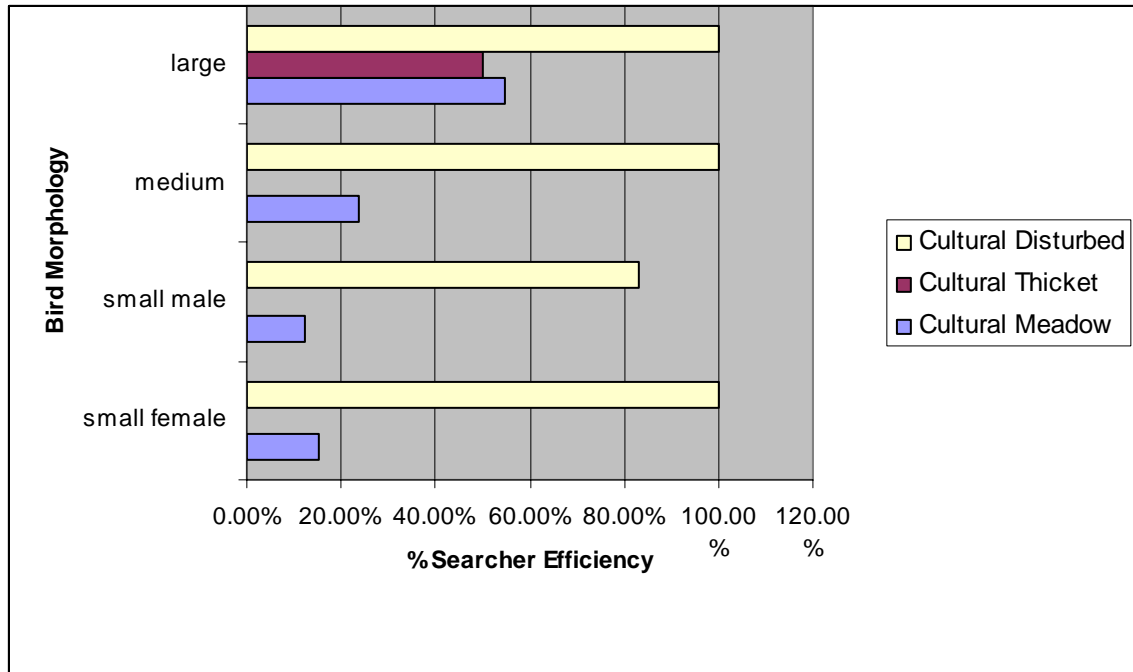
<b>Searcher</b>	<b>Percent Efficiency</b>
A	22.2%
B	25.0%
C	45.0%
D	45.4%
E	13.0%
F	25.0%
G	7.7%
H	26.7%
<b>Average Searcher Efficiency</b>	<b>26.3%</b>

Figure 2 shows searcher efficiency in the three community types. From the results it is apparent that habitat cover type and structural complexity is associated with searcher efficiency.



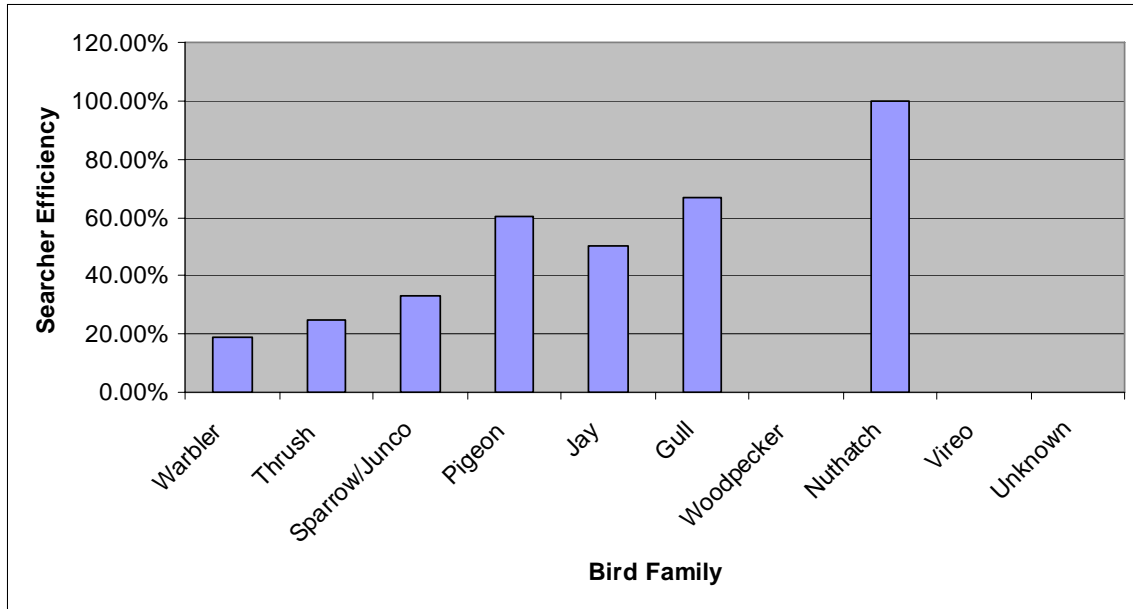
**Figure 2. Percent Searcher Efficiency by Vegetative Community.**

Figure 3 displays searcher efficiency as a function of bird size. Not surprisingly larger birds were the easiest to locate in all habitats. In fact, large birds were the only birds located in the most structurally complex community (cultural thicket). No small female or medium size birds were distributed in the cultural thicket plot. The disturbed/bare ground plot had 100% searcher efficiency in three of four bird size categories. Only one bird (yellow warbler) was not found here, which was likely result of its cryptic colour and small size. Searcher efficiency was slightly higher for small female birds (15.4%) than for small male birds (12.5%) in the cultural meadow and cultural disturbed plots (100% for small females and 83.3% for small males).



**Figure 3. Percent Searcher Efficiency by Bird Size.**

Figure 4 displays searcher efficiency for bird families. Overall it appears that the unknown bird and vireo were hardest to locate. However, when correcting for sample size it appears that warblers were the most difficult group of birds to locate across all habitats. Tennessee warblers were the hardest species to locate and ring-billed gulls were the easiest. Three of four Tennessee warblers used in the study were never retrieved.



**Figure 4. Percent Searcher Efficiency for Bird Families.**

### **Conclusion:**

Overall, the results indicate that both bird size and community types are both determinants of searcher accuracy for locating dead birds around meteorological towers. A bird mortality study conducted at Buffalo Ridge Wind Resource Area, Minnesota yielded similar results. Osborn et al. (2000), found that bird size, cover type and vegetation height all influence observer effectiveness when locating dead birds. However, bird size was the biggest determinant of searcher success in locating carcasses in that study.

### **References**

- Kingsley, A. and B. Whittam (Bird Studies Canada). 2005. Wind Turbines and Birds: A Background Review for Environmental Assessment. Prepared for Environment Canada.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Osborn, R.G., K.F. Higgins, R.E. Usgaard, C.D. Dieter and R.G. Neiger. 2000. Bird Mortality Associated with Wind Turbines at the Buffalo Ridge wind Resource Area, Minnesota. *American Midland Naturalist* 143: 41-52.

