

A Natural Heritage Assessment of Forests Owned by the County of Norfolk Based Upon Breeding Bird Inventories



**Produced for
The County of Norfolk**

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EXECUTIVE SUMMARY

As part of an effort to evaluate the ecological significance of forest tracts owned by the County of Norfolk, breeding bird inventories were conducted in summer 2003 by Bird Studies Canada in 23 forest tracts managed by the County. A complimentary botanical inventory was also conducted.

Sites were scored according to six breeding bird attributes: species richness, number of forest-interior species, a sum of the regional bird conservation priority scores for Norfolk County, a sum of the conservation priority scores assigned to Bird Conservation Region-13, a sum of the BCR-13 scores adjusted for effort, and the number of federally-listed species at risk. Ten of the 23 sites received above median values for composite breeding bird scores, and were considered to have the highest conservation value.

Sites were also scored independently according to a series of botanical attributes. A preliminary composite score based upon a combination of the bird and vegetation scores was derived to produce a provisional composite ranking. Based upon composite bird and botanical attributes, 11 of the 23 sites were provisionally nominated for designation as natural heritage woodlands worthy of special protection for older growth attributes.

At the same time, almost every site scored above the median in at least one attribute, so it will be important to manage portions of all forest properties owned by the County in appropriate ways.

INTRODUCTION

Because of its southerly position within the Carolinian Zone and because of its relatively large proportion of forest cover, Norfolk County contains some of Canada's most important and most threatened ecosystems.

Recently, the Long Point Region Conservation Authority, the largest single owner of forest lands in the County, decided to designate 25% of its forest holdings as "natural heritage woodlands." Within the region, Norfolk County also owns a very significant area of forested land. While a significant portion of these county-owned forests are in conifer plantation, much of the County's forests are naturally vegetated. Many of these forests are also relatively undisturbed, and some are approaching old growth conditions – one of the rarest habitats remaining in Canada's Carolinian Zone. There is a local, provincial and national desire and need to manage Norfolk County's natural forests for the conservation and enhancement of natural heritage values. As such, this report assesses County-owned forest lands with particular reference to their breeding bird communities. It complements a separate report (Ambrose and Waldron 2004) that assesses the same properties in terms of their botanical value, particularly as it relates to older growth forest conditions.

METHODS

In total, 23 forested sites (encompassing about 1285 acres) owned by Norfolk County were selected for study by the County's Forest Conservation Services department (Table 1). Throughout this report, the sites are identified by the County's alphanumeric code, the prefix of which refers to the following townships: C = Charlotteville; H = Houghton; NW = North Walsingham; SW = South Walsingham; and W = Windham.

Though listed by the County as separate sites, SW7 and SW8 were conjoined, and so they were treated as a single unit for our purposes. A number of other county-owned forests in the region were not selected for study by the County (C7, C10, H2, T1, W2, W3, WD1, and WD2).

A reconnaissance visit was made to each site in advance of the actual surveys, to locate the sites and their access points. The basic survey method was a rapid assessment technique designed to provide an inventory of breeding birds. All sites were surveyed in the early morning hours, when birds are most active, at the height of the breeding season (5 June to 2 July). Each area was surveyed once under favorable weather conditions (i.e., windy and stormy days were avoided). One site (SW6) was visited twice, because the first visit was made on a slightly stormy morning.

In order to minimize observer differences associated with level of field experience and hearing abilities, a single observer (McCracken) surveyed all but two of the sites. These two were surveyed by highly-experienced field personnel (Jody Allair and Matt Timpf) on the same date.

The surveyor(s) walked slowly through the forest interior, starting at sunrise, and identified all bird species that were detected by sight and sound within the area boundaries. All representative habitats were surveyed at each site, though large, discrete conifer plantations were usually avoided. The entire area of each property was traversed, with the intent being to locate any

singing individual within 150-200 metres of the observer. A handheld GPS unit was used in conjunction with enlarged printouts of Ontario Breeding Bird Atlas topographic maps to ensure that the surveys were conducted within the county-owned boundaries of the forest properties.

The target was to adequately cover each site within about 100-200 minutes of survey effort, depending on accessibility, complexity of habitat types, overall forest size, and the complexity of the breeding bird community itself. The primary objective was to locate as many species as possible at each site, within reasonably comparable limits of search effort. Birds clearly not associated with the target forest, including flyovers and those associated with adjacent habitats, were not recorded.

All surveys had to be completed by 10:30 a.m. EDT. No evening or nocturnal surveys were carried out. Hence, owls and other nocturnal/crepuscular species were not surveyed.

In order to provide an estimate of relative abundance of each species, all birds were tallied as each site was traversed, ensuring not to double-count individuals. At most sites, a single, unlimited-distance, 5-minute point count was also conducted and incorporated into the tallies.

All records of significant species, including federally-listed species at risk and regionally rare species (as determined by McCracken (1987) were further documented. The number of individuals, the GPS location (NAD83) of the observation, and any additional relevant details were recorded. If time permitted, some additional effort was devoted to nest searches for species at risk.

Site Scoring

Each site was scored according to the following six attributes:

- 1) *Species Richness*: This was the total number of bird species recorded in the forest.
- 2) *Norfolk County Bird Conservation Priority Score*: This attribute provides a measure of the site's importance within the local jurisdictional context of Norfolk County. It was based on the species scores provided by Couturier (1999), ranked from 0 (low conservation priority) to 4 (high conservation priority). The individual species scores were then summed to provide the total site score.
- 3) *Forest-Interior Bird Score*: This was the number of forest-interior species at each site, as defined by Freemark and Collins (1989).
- 4) *Bird Conservation Region (BCR)-13 Conservation Priority Score*: Similar to the Norfolk County Bird Conservation Priority Score above, the BCR-13 score provides a measure of site importance relative to the entire Lower Great Lakes Region, which is identified jointly by Canadian and American Partner's In Flight as BCR-13. These species scores were downloaded from the Partners in Flight species assessment database (www.rmbo.org/pif/scores/scores.html). Individual species scores were then summed to provide an overall BCR-13 score for each site.

- 5) *BCR-13 Score Adjusted for Effort*: This is simply the site's total BCR-13 score noted above, corrected for survey effort (i.e. per unit hour). The two scores were deemed to contain somewhat different informational value.
- 6) *Species at Risk Score*: This is simply the sum of the number of federally-listed species at risk that were recorded for each site. Regionally rare species were not scored, since it was felt that they should have been adequately addressed in the Norfolk County Bird Conservation Priority Scoring system.

Table 1. List of Norfolk County forest sites surveyed in 2003.

Site Code	Date(s) Surveyed	Survey Effort (minutes)	Area (acres)	Surveyor
C1	June 12	120	25	J. McCracken
C2	June 13	185	90	J. McCracken
C4	June 11	120	175	J. McCracken
C5	June 20	195	157	J. McCracken
C6	June 17	120	28	J. McCracken
C8	June 22	110	20	J. McCracken
C9	June 22	125	30	J. McCracken
C11	June 21	120	50	J. McCracken
H1	July 1	140	50	J. McCracken
NW1	June 15	110	50	J. McCracken
NW2	June 16	120	25	J. McCracken
NW3	June 30	160	16	J. McCracken
NW4	June 27	125	50	J. McCracken
NW5	June 18	90	13	J. McCracken
SW2	July 2	75	50	J. Allair
SW3	June 7	165	99	J. McCracken
SW4	June 6	225	60	J. McCracken
SW6	June 5 & 29	225	70	J. McCracken
SW7-8	July 2	200	108	M. Timpf
W1	June 26	145	74	J. McCracken
W4	June 25	25	1	J. McCracken
W5	June 25	95	20	J. McCracken
W6	June 23	105	25	J. McCracken

RESULTS AND DISCUSSION

About 1270 acres were surveyed over the course of 52 field hours of effort. While most of the county's conifer plantations were deliberately left out of the study, most of the study sites did in fact include some small to medium-sized areas of plantation mixed in with the rest of the forest.

In total, 69 species of breeding birds were recorded. A total of 1017 individuals was tallied. A complete list of species and numbers for each site is provided in Appendix A.

Common Species of Breeding Birds

Frequency of occurrence of individual species of breeding birds is highly correlated with their relative abundance in a logarithmic pattern (e.g. see Figure 1). In descending order, the 10 most widespread species found in 2003 were: Red-eyed Vireo, Scarlet Tanager, American Crow, Eastern Wood-Pewee, Blue Jay, Chipping Sparrow, Black-capped Chickadee, Rose-breasted Grosbeak, Ovenbird, and Great Crested Flycatcher (Table 2). Nine of these species were also among the most abundant (Table 2). American Robin, Brown-headed Cowbird, Indigo Bunting, and Veery were also quite common. Together, all of these species typify Norfolk region's forest bird community.

Figure 1. Relationship between frequency of occurrence and abundance of individual species of breeding birds in Norfolk County forests in 2003. Each point represents a species.

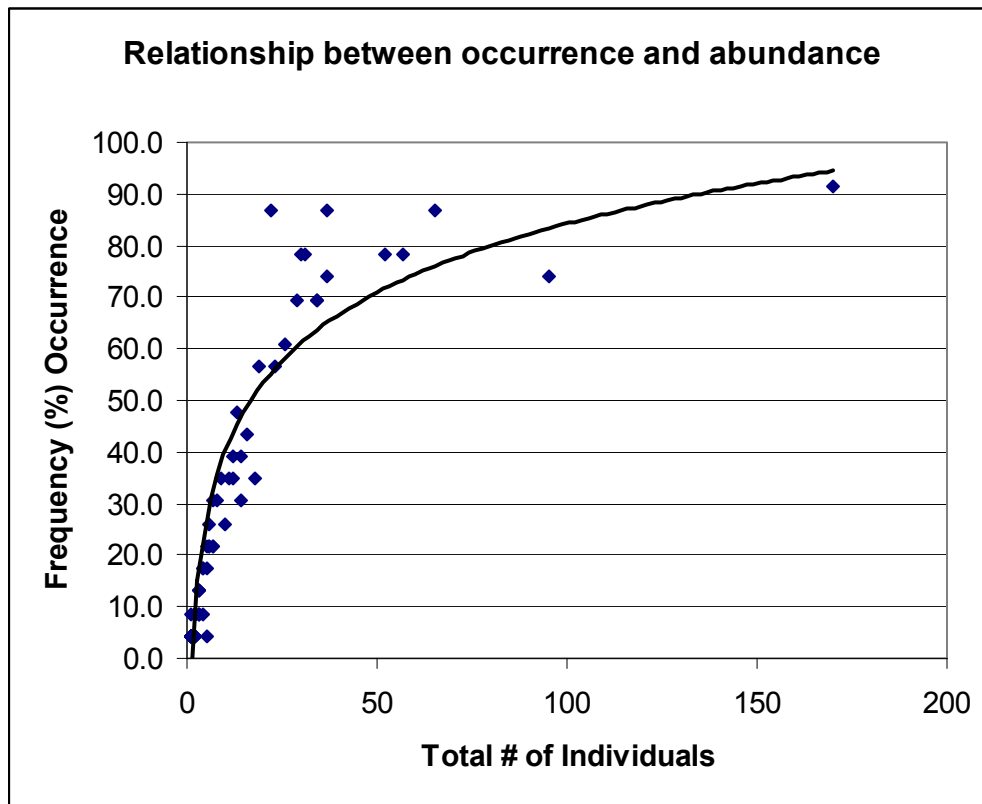


Table 2. Abundance and ubiquity of breeding bird species in 23 Norfolk County forests in 2003 (listed in descending order of occurrence).

Species	Total Number Counted	Percent Occurrence
Red-eyed Vireo	170	91.3
Scarlet Tanager	37	87.0
American Crow	22	87.0
Eastern Wood-Pewee	65	87.0
Blue Jay	30	78.3
Chipping Sparrow	57	78.3
Black-capped Chickadee	31	78.3
Rose-breasted Grosbeak	52	78.3
Ovenbird	95	73.9
Great Crested Flycatcher	37	73.9
Indigo Bunting	29	69.6
American Robin	34	69.6
Brown-headed Cowbird	34	69.6
Veery	26	60.9
Northern Cardinal	23	56.5
Hooded Warbler	19	56.5
Baltimore Oriole	13	47.8
Wood Thrush	16	43.5
Chestnut-sided Warbler	14	39.1
Common Grackle	12	39.1
Song Sparrow	18	34.8
Northern Flicker	9	34.8
Downy Woodpecker	12	34.8
Pine Warbler	11	34.8
White-breasted Nuthatch	8	30.4
Common Yellowthroat	14	30.4
Eastern Towhee	7	30.4
Red-breasted Nuthatch	10	26.1
American Goldfinch	6	26.1
Gray Catbird	6	21.7
Blackburnian Warbler	7	21.7
Mourning Warbler	6	21.7
Pileated Woodpecker	5	21.7
Yellow Warbler	7	21.7
Hairy Woodpecker	4	17.4
Wild Turkey	4	17.4
Yellow-billed Cuckoo	5	17.4
Northern Waterthrush	3	13.0
Mourning Dove	3	13.0
Wood Duck	3	13.0
Cerulean Warbler	2	8.7
Swamp Sparrow	3	8.7
Green Heron	2	8.7
Blue/Golden-winged Warbler	2	8.7

Species	Total Number Counted	Percent Occurrence
Ruffed Grouse	3	8.7
Yellow-throated Vireo	3	8.7
Black-billed Cuckoo	4	8.7
American Woodcock	1	8.7
Cooper's Hawk	2	8.7
Hermit Thrush	2	8.7
Mallard	2	8.7
Ruby-throated Hummingbird	2	8.7
Belted Kingfisher	1	4.3
Red-winged Blackbird	2	4.3
Turkey Vulture	1	4.3
Purple Finch	1	4.3
Eastern Kingbird	1	4.3
Red-bellied Woodpecker	1	4.3
Yellow-bellied Sapsucker	2	4.3
American Redstart	5	4.3
Yellow-rumped Warbler	1	4.3
Cedar Waxwing	1	4.3
Winter Wren	2	4.3
House Wren	1	4.3
Black-throated Blue Warbler	1	4.3
Carolina Wren	1	4.3
Brown Creeper	1	4.3
Blue-headed Vireo	2	4.3
Blue-gray Gnatcatcher	1	4.3

Bird Species Richness

Sixty-nine bird species were detected during the surveys (see Appendix A). At individual sites, species richness ranged from 11 species to 34 (mean = 20; see Table 5). The top 5 sites were: SW6 (34 species), H1 (30 species), SW7-8 and C5 (27 species each), and SW4 (26 species). The sites with the fewest species were: C8 (11 species), W4 (12 species); and SW2 (13 species).

Bird species richness is largely, but not entirely, a function of forest size (see Figure 2). An obvious outlier in Figure 2 is the C4 site, which had surprisingly low species richness despite the fact that it was the largest forest surveyed. It is possible that this site was visited when weather conditions were not optimal for bird activity (my field notebook record for the visit notes that the site was “very quiet!”). This site was also more uniformly mature than many of the other sites, and it is known that forest bird diversity declines somewhat in climax successional stages. Interestingly, this same site (“Pine Grove Forest”) was intensively studied in 1985-86 during the regional Natural Areas Inventory (Gartshore et al. 1985), and its breeding bird community also seemed to be unusually depauperate at that time.

Bird species richness is also very much a function of the amount of survey effort. Species accumulation curves per unit of effort classically show that the relationship is logarithmic and

not linear. Not surprisingly, this holds true for the species accumulation curve for Norfolk County forests after over 50 hours of effort (see Figure 3). However, the relationship is quite linear in the initial few hours.

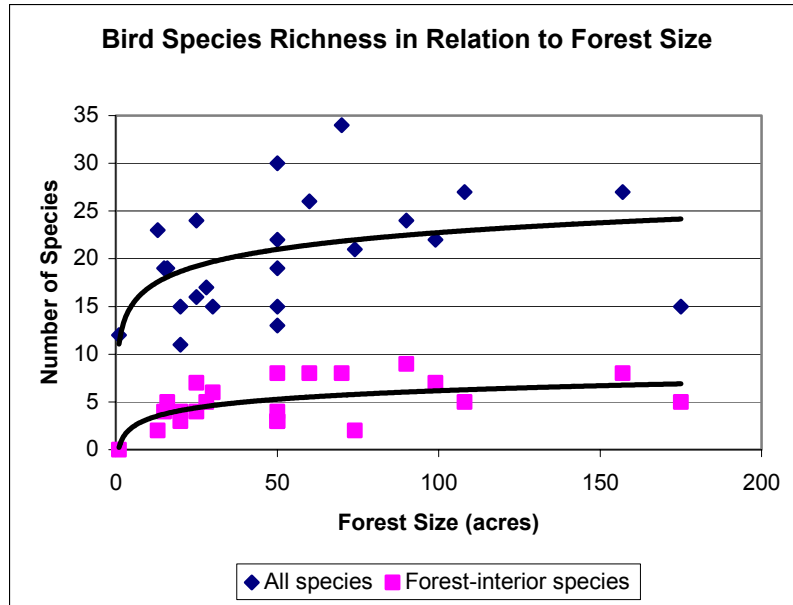


Figure 2. Measures of bird species richness in Norfolk County forests in relation to forest size in 2003. Each point represents a different forest site.

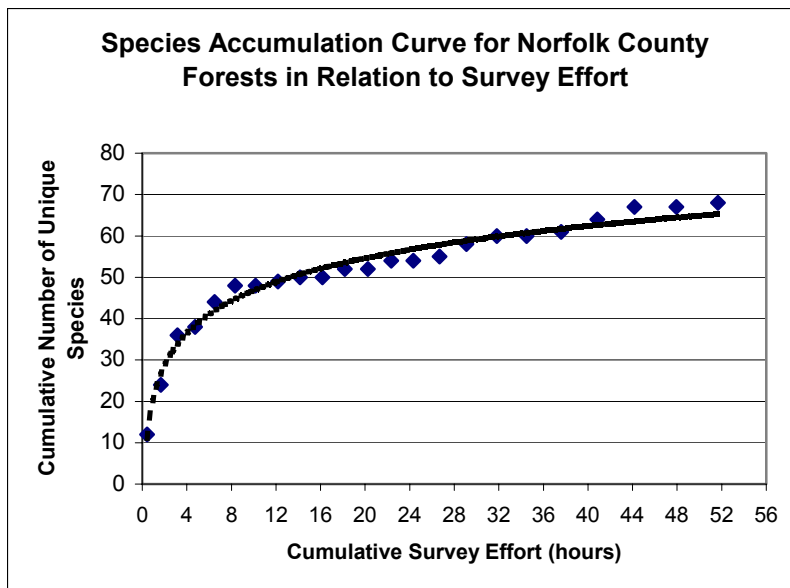


Figure 3. Bird species accumulation curve for Norfolk County forests in relation to survey effort.

Forest-Interior Bird Species Richness

Representing about 28% of overall species richness, 19 species that are associated primarily with forest-interior habitat were detected during the surveys (see Appendix A). Individual sites supported between 0 and 9 forest-interior species (mean = 5; see Table 5).

Sites supporting the most forest-interior species were C2 (9 species); and C5, H1, SW4, and SW6 (8 species each). Sites with the fewest forest interior species were W4 (0 species), and NW5 and W1 (2 species).

As might be guessed, forest-interior bird species richness is partly a function of forest size (Figure 2). Although site C4 again appeared to support fewer forest-interior species than might be expected for such a large forest, the site performed considerably better in this regard than it did for total species richness. In fact, forest-interior species accounted for 33% of site C4's richness, which was the fourth highest proportion among the 23 forests studied.

Forest-interior species richness is also a reflection of overall richness, though the correlation is only moderate (Figure 4).

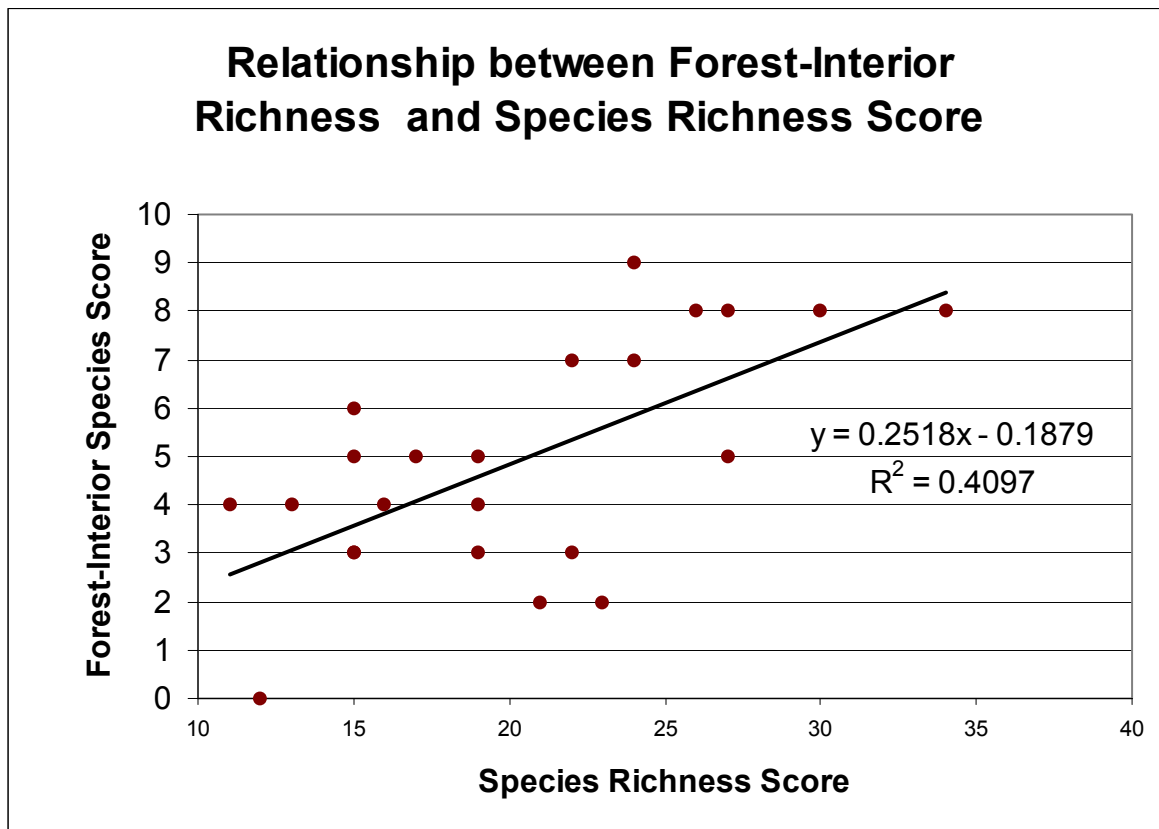


Figure 4. Relationship between Norfolk County bird conservation priority score and species richness at individual forest sites.

Norfolk County Conservation Priority Score

In terms of bird conservation priority scores for Norfolk County, the top 5 sites were: SW6 (35 points); SW4 and H1 (31 points each); C2 (30 points); and SW7-8 (26 points; see Table 5).

Scores for this attribute are largely a function of overall species richness (see Figure 5), which is again in turn partly driven by forest size. Still, it does give somewhat different information about the conservation value of the sites. For example, while sites C9, C11 and W5 all had 15 species, site C9 was clearly more valuable than the others in terms of conservation priority score (score = 15 versus scores of only 8 and 6 for the other two sites).

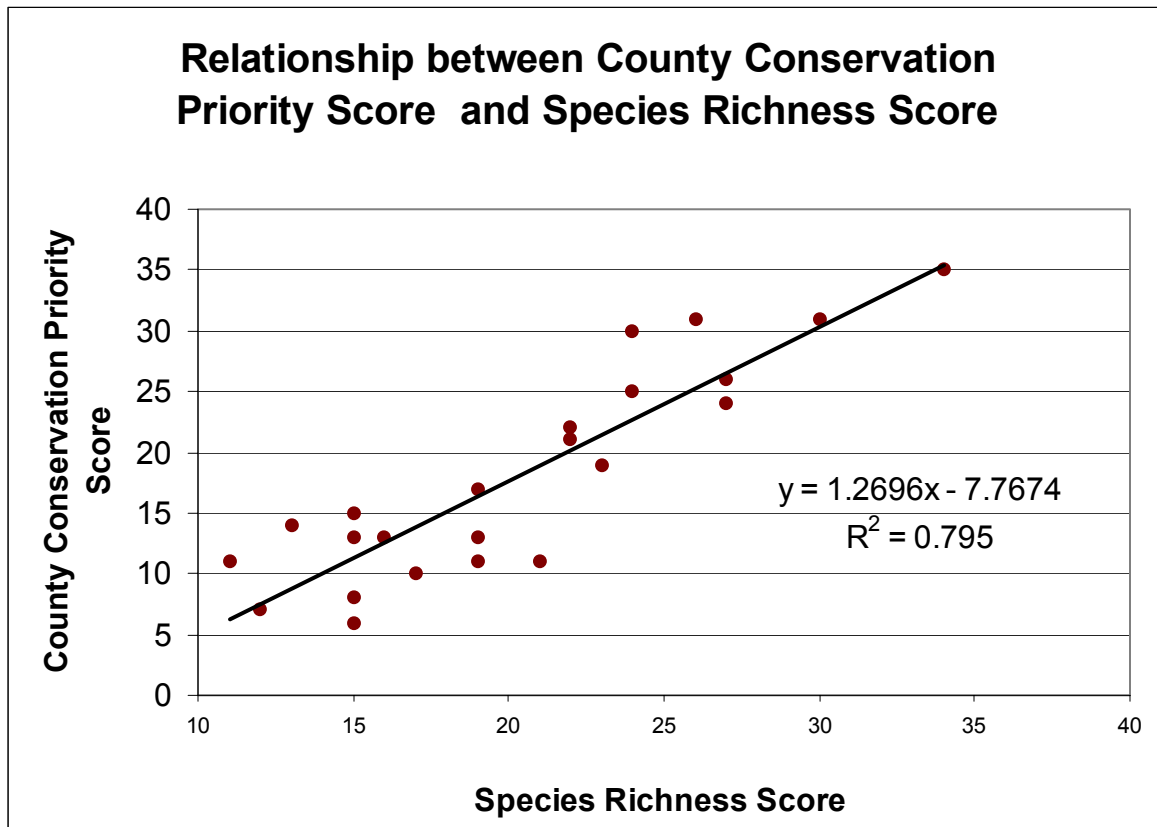


Figure 5. Relationship between Norfolk County bird conservation priority score and species richness.

Bird Conservation Region–13 Priority Score

With respect to BCR-13 priority scores, the top 5 sites were: SW6 (548 points); SW7-8 (501 points); H1 (485 points); C5 (427 points); and SW4 (419 points; see Table 5). This attribute was very strongly linked to overall species richness (Figure 6). Nevertheless, it did elevate the priority status of one site (SW7-8) in particular.

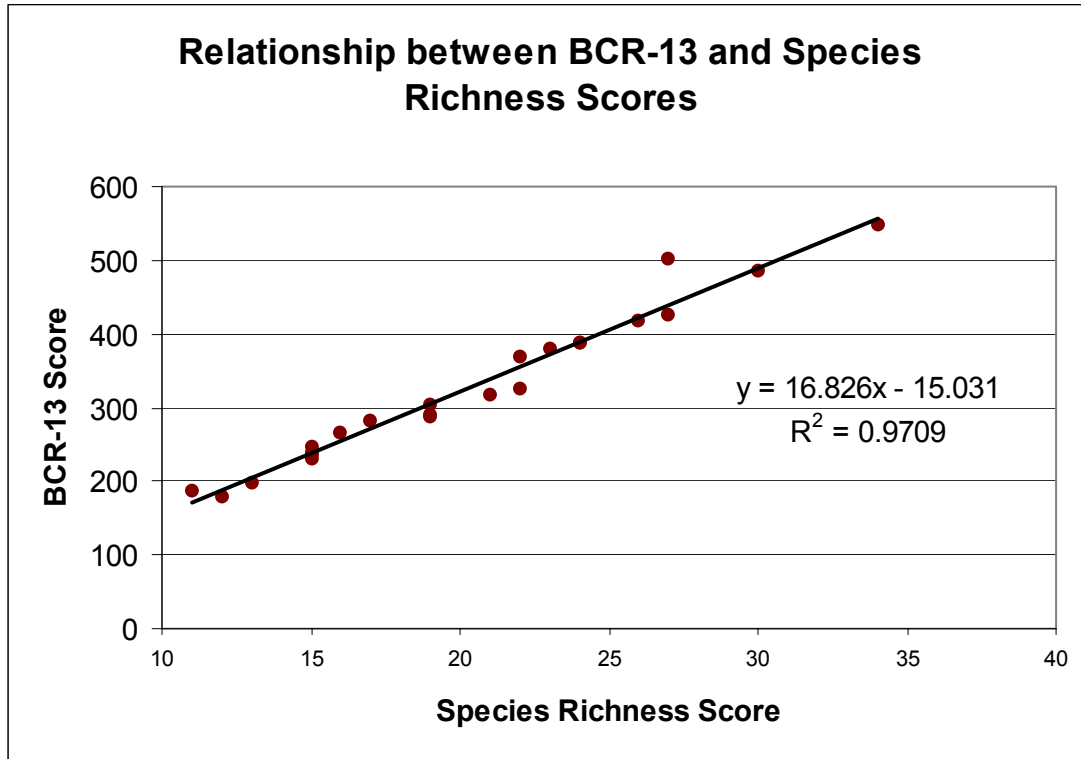


Figure 6. Relationship between bird conservation priority score for BCR-13 and species richness.

Bird Conservation Region–13 Priority Score Adjusted for Effort

As noted earlier, species richness is very much dependent on amount of survey effort, and that the relationship becomes increasingly logarithmic as the amount of effort increases. Because the relationship is nearly linear in the initial couple hours of survey effort, I chose to adjust the BCR-13 attribute on a linear scale (see Methods), rather than logarithmic, though a logarithmic adjustment would modestly improve the scoring.

When adjusted for amount of survey effort, the top 5 ranked sites, in descending order, were: NW5, H1, NW1, NW2, and W6. These sites also tended to score highly in other attributes, with the possible exception of site W6 (see Table 5). Apart from its adjusted BCR-13 score, site W6 scored above the median only for the Norfolk County conservation score.

Adjusting the BCR-13 scores to take effort into account showed a positive relationship between this score and overall species richness (Figure 7). However, the correlation was far weaker than it was for the unadjusted BCR-13 score (Figure 6). Scoring systems can take advantage of different layers of information in different ways. Survey effort is important, but only up to a point.

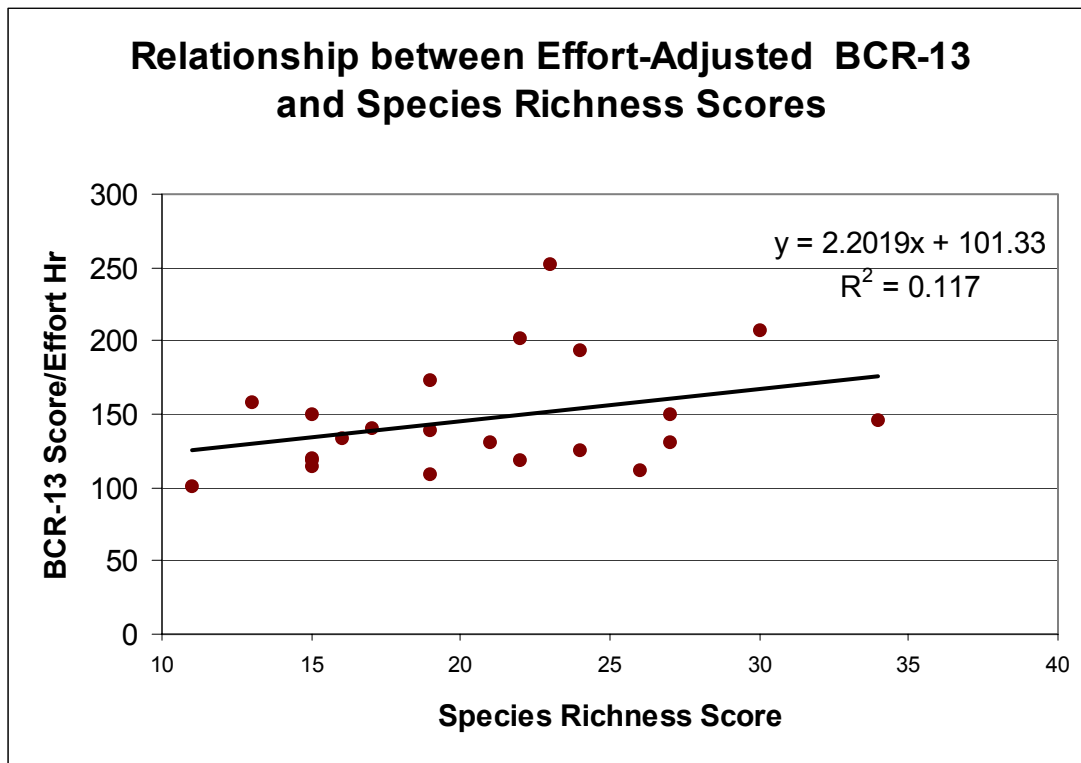


Figure 7. Relationship between effort-adjusted BCR-13 score and species richness. Site W4 was removed from the analysis because of its very small size (1 acre) and small amount of effort (25 survey minutes).

Significant Species of Breeding Birds

Thirteen “significant species” were found during the inventories, including two federally-listed species at risk (see Table 3). The discovery of a total of 19 Hooded Warblers at 13 of the 23 (57%) sites visited was quite surprising. In comparison, in almost identical breeding bird surveys conducted in Long Point Conservation Authority forests in 2002, Hooded Warblers were recorded in only 4 of the 15 (27%) sites visited by Lepage (2002). It would appear that the county-owned forests have a disproportionately high value for this species.

The Hooded Warbler is a threatened species in Canada. While its population has been recovering in southwestern Ontario in recent years, the forests of Norfolk County still support the bulk of the Canadian population. There is little question that the continued survival of the species in Canada is still heavily dependent on the health of the Norfolk County population. As such, the national recovery plan for Hooded Warblers (and Acadian Flycatcher) explicitly identifies Norfolk County forests as a key priority region for protection and conservation.

All sites were also assessed in terms of their ability to function as potential habitat for Prothonotary Warbler and Acadian Flycatcher – two endangered species that were not detected during the surveys, but were anticipated. Based upon known habitat requirements for these two species, several sites were ranked as having “high” potential for these two species (Table 4). While these assessments were not used in the overall scoring scheme, they should provide future management guidance with regard to the protection of highly-specialized habitats for endangered species.

Table 3. Significant species records in 2003. Federally-listed species at risk are marked with + (special concern) or ++ (threatened). Regionally rare species are marked with *.

Species	Forest I.D.	Date	UTM zone	UTM Easting	UTM northing	Details
Cooper's Hawk*	SW6	29 June	17NH	542034	4722246	Nest with young
Cooper's Hawk*	W1	26 June	17NH	539600	4755755	Agitated pair
Red-bellied Woodpecker*	SW6	29 June	17NH	542350	4722725	Male calling
Blue-headed Vireo*	SW3	7 June	17NH	542150	4726300	2 singing males
Carolina Wren*	W4	25 June	17NH	541225	4745224	Singing male
Winter Wren*	C2	13 June	17NH	544750	4738100	Singing male in hemlock ravine
Hermit Thrush*	C2	13 June	17NH	544250	4738025	Singing male in hemlock ravine
Hermit Thrush*	SW3	7 June	17NH	541800	4726500	Singing male in plantation
Blue/Golden-winged Warbler*	NW1	15 June	17NH	534300	4736050	Singing male
Blue/Golden-winged Warbler*	SW4	6 June	17NH	542510	4725200	Singing male
Black-throated Blue Warbler*	C9	22 June	17NH	552188	4729550	Singing male in dense shrubby gap
Yellow-rumped Warbler*	C5	20 June	17NH	549734	4740943	Singing male
Blackburnian Warbler*	C2	13 June	17NH	545050	4737800	2 singing males
Blackburnian Warbler*	H1	1 July	17NH	524200	4732100	Singing male
Blackburnian Warbler*	NW2	16 June	17NH	534400	4733800	2 singing males
Blackburnian Warbler*	SW4	6 June	17NH	542280	4724600	Singing male
Blackburnian Warbler*	SW6	5 & 25 June	17NH	541900	4722500	Territorial male
Cerulean Warbler +	H1	1 July	17NH	5242260	4732550	Singing male
Cerulean Warbler +	SW4	6 June	17NH	542250	4724520	Singing male
Hooded Warbler ++	C1	12 June	17NH	543487 543257	4738139 4737958	2 singing males in natural gaps
Hooded Warbler ++	C2	13 June	17NH	545100 544713 545086 545200	4737660 4737924 4737505 4737292	4 singing males (including 2 pairs and 1 nest with eggs)
Hooded Warbler ++	C4	11 June	17NH	544817	4735339	Singing male in natural gap
Hooded Warbler ++	C5	20 June	17NH	549928	4740570	Singing male in natural gap
Hooded Warbler ++	C8	22 June	17NH	552480 552350	4730092 4730240	2 singing males in natural gaps
Hooded Warbler ++	C9	22 June	17NH	552020	4729310	Singing male
Hooded Warbler ++	H1	1 July	17NH	524250	4732684	Pair
Hooded Warbler ++	NW2	16 June	17NH	534346 534450	4734100 4733780	2 singing males
Hooded Warbler ++	NW3	30 June	17NH	533300 533111	4734030 4733795	2 singing males (including nest with young)
Hooded Warbler ++	SW2	2 July	17NH	539426	4725959	Singing male
Hooded Warbler ++	SW3	7 June	17NH	541830	4726160	Singing male in natural gap

Species	Forest I.D.	Date	UTM zone	UTM Easting	UTM northing	Details
Hooded Warbler ++	SW4	6 June	17NH	542383 542117	4725048 4724909	2 singing males (including nest with eggs)
Hooded Warbler ++	W6	23 June	17NH	545700	4742350	Singing male in plantation
Purple Finch*	NW5	18 June	17NH	541025	4735153	Singing male

Table 4. Norfolk County-owned forest sites that support particularly suitable, potential nesting habitat for Endangered species of birds.

Site I.D.	Species of Interest	Ideal Habitat
SW4	Prothonotary Warbler Acadian Flycatcher	The mature swamp forest in the northeast part of Backus Woods is ideal for both species.
SW6	Prothonotary Warbler Acadian Flycatcher	The mature swamp forest in the southwest part of Backus Woods is ideal for both species
C2	Acadian Flycatcher	The hemlock ravine along Trout Creek (extreme north end of site) is ideal for this species, as well as Louisiana Waterthrush (federally-listed as a species of Special Concern).
W1	Prothonotary Warbler	Swamp forest at the southwest end of this site is ideal for this species.
SW7-8	Prothonotary Warbler	Swamp forests (including buttonbush swamp) scattered in the South Walsingham forest are ideal for this species.

Site Rankings According to Breeding Bird Attributes

Sites were scored according to six breeding bird attributes: species richness, number of forest-interior species, a sum of the regional bird conservation priority scores for Norfolk County, a sum of the conservation priority scores assigned to Bird Conservation Region-13, a sum of the BCR-13 scores adjusted for effort, and the number of federally-listed species at risk. Raw scores for each of these attributes are presented in Table 5.

In keeping with the approach adopted for the botanical surveys, for each bird attribute, scores that exceeded the median values were considered to rank as having high conservation importance. For each site, the number of high-score rankings were then tallied to give a composite summary score (maximum score of 6). The median values of the summary scores were then calculated. Summary scores that exceeded the median value were then considered to have the highest overall conservation value for breeding birds (see Table 5).

Ten sites stood out (see Figure 8 and Table 5). The top-ranked site was H1 (6 points), followed by NW2, SW4 and SW6 (5 points each); followed by C2, C5, NW1, NW5, SW3, and SW7-8 (4 points each). These sites are considered to have the highest conservation value in terms of their breeding bird communities. In addition, seven sites that did not score in the top rankings supported one or more Hooded Warblers – a federally-listed species at risk. Management of these sites will also require some level of conservation attention.

It is important to point out that several visits to a site may be required to detect all breeding species. More intensive inventories could reveal different patterns, particularly if rare and uncommon species were actually present, but not detected, during the surveys. This could partly explain the low scores obtained for site C4, for example. Additionally, some species may not occupy a given breeding territory every year. Hence, the scores calculated for each site should be considered somewhat provisional.

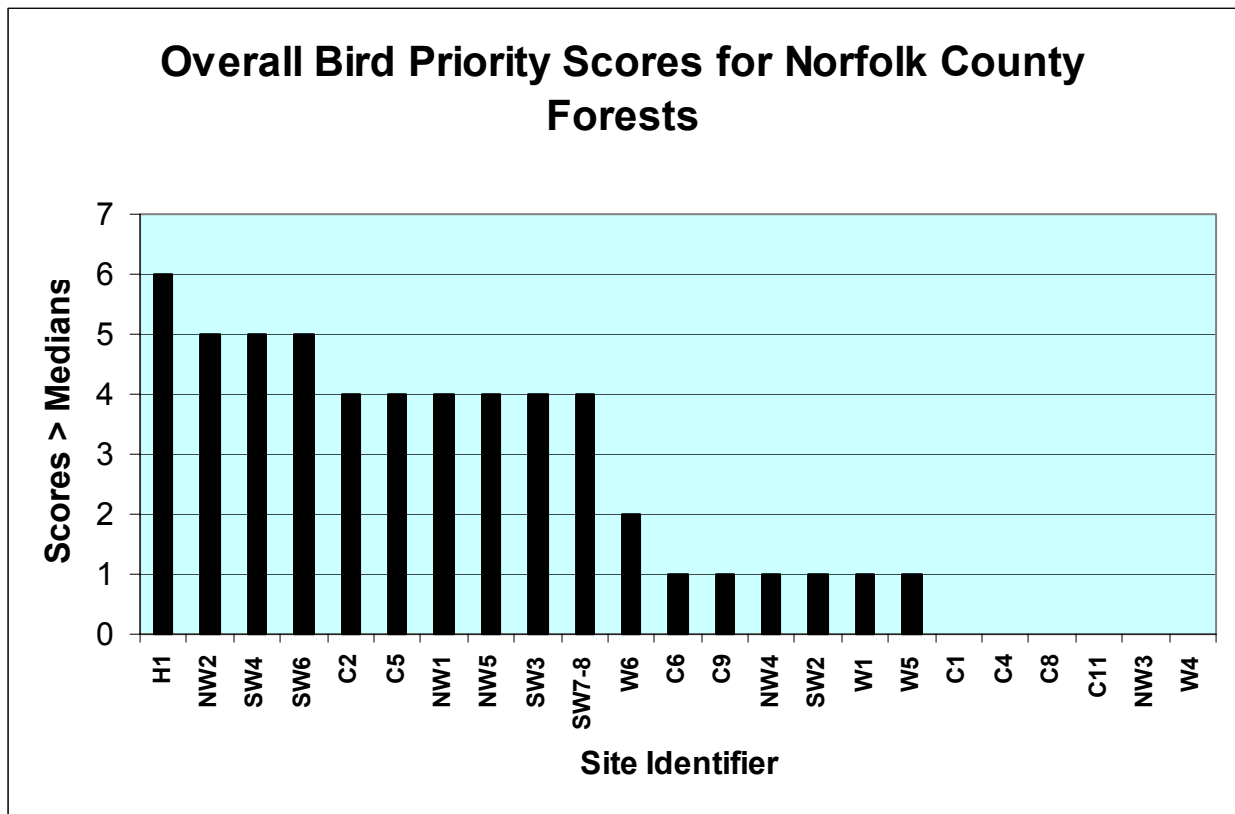


Figure 8. Total number of attributes that scored above the median values for each forest site in Norfolk County for each of six bird conservation attributes. Sites scoring >3 are considered to be of high conservation value for breeding birds.

Table 5. Summary scores for Norfolk County forest sites for each of six breeding bird attributes. Scores greater than the median for each attribute are bolded and italicized. Sites having scores exceeding the median for at least four of the attributes are considered to have very high conservation priority for breeding birds and are shaded. Sites that did not score as highly, but held at least one federally-listed species at risk, also merit special management attention.

Site	Species Richness Score	County Conservation Priority Score	Forest Interior Score	BCR-13 Priority Score	BCR-13 Priority Score/hr	Species at Risk Score	Scores >Median
C1	16	13	4	266	133	1	0
C2	24	30	9	387	126	1	4
C4	15	13	5	230	115	1	0
C5	27	24	8	427	131	1	4
C6	17	10	5	282	141		1
C8	11	11	4	186	101	1	0
C9	15	15	6	248	119	1	1
C11	15	8	3	239	120		0
H1	30	31	8	485	208	2	6
NW1	22	21	3	369	201		4
NW2	24	25	7	388	194	1	5
NW3	19	13	5	291	109	1	0
NW4	19	11	3	289	139		1
NW5	23	19	2	379	253		4
SW2	13	14	4	198	158	1	1
SW3	22	22	7	327	119	1	4
SW4	26	31	8	419	112	2	5
SW6	34	35	8	548	146		5
SW7-8	27	26	5	501	150		4
W1	21	11	2	317	131		2
W4	12	7	0	179	NA		0
W5	15	6	3	237	150		1
W6	19	17	4	303	173	1	2
Medians	19	15	5	303	136	1	2

Assessing Conservation Value in Relation to Breeding Bird and Vegetation Attributes

Conservation values cannot realistically be assessed based upon breeding bird criteria alone. Many other biological and biophysical indicators are naturally important, including area size, connectivity, forest stand age and structure, presence of wetlands, presence of significant plants and plant communities, unusual soils, etc. These all need to be part of the overall assessment exercise. As such, a cursory attempt is made below to ascertain conservation value based upon a combination of both the breeding bird community and the vegetation community scores. Scores for vegetation attributes were taken from Ambrose and Waldron (2004).

In order to weight each attribute equally, raw scores for each bird and vegetation attribute were first adjusted to a score of between 0-1, by simply dividing each raw score by the highest raw score for a particular attribute. The adjusted scores for the six bird attributes were then summed to provide a composite adjusted score for birds (maximum possible score = 6). The same was done for the vegetation attributes (maximum possible score = 7).

The composite bird and vegetation summary scores were then plotted against one another to detect the nature of any correlation. A weak, but significant positive correlation was found (see Figure 9), indicating that both measures had merit.

The adjusted bird and vegetation scores were then summed to provide an overall composite score for each site (maximum possible score = 13). The results are depicted graphically in Figure 10.

Again, sites that scored above the median value were considered to have the most conservation importance. Eleven sites had combined scores that exceeded the median (see Table 6). Eight of these sites also rated above median values for vegetation attributes, while nine of them rated highly for breeding bird attributes. Hence, there was very good overlap and agreement in the selection of the top 11 sites.

Two additional sites (NW5 and W6) scored highly for breeding bird attributes alone, while three sites (SW2, C6 and C8) scored highly for vegetation attributes alone. These additional 5 sites also merit conservation attention.

Interestingly, there was also good overlap between site size and composite bird/vegetation scores. Seven of eight sites (88%) that were larger than the median acreage fell into the highest conservation classes (Table 6). Hence, size is indeed important.

Finally, eight of the county-owned properties that were surveyed are part of forest tracts that were originally designated as “Significant Natural Areas” by Gartshore et al. (1987):

- C2 is part of the Trout Creek Natural Area;
- C4 is the Pine Grove Forest Natural Area;
- C8 and C9 are part of Turkey Point Natural Area;
- SW3 is part of St. Williams Forest Natural Area;
- SW4 and SW6 are part of Backus Woods Natural Area;
- SW7-8 is part of South Walsingham Sand Ridges/Big Creek Floodplain Natural Area.

With the exception of site C8, all of these same sites also yielded high bird and vegetation total scores. Even C8 scored higher than the median for breeding bird attributes. The fact that all sites, residing within a portion of Norfolk’s previously-identified Significant Natural Areas, also scored highly in the 2003 surveys, corroborate their importance.

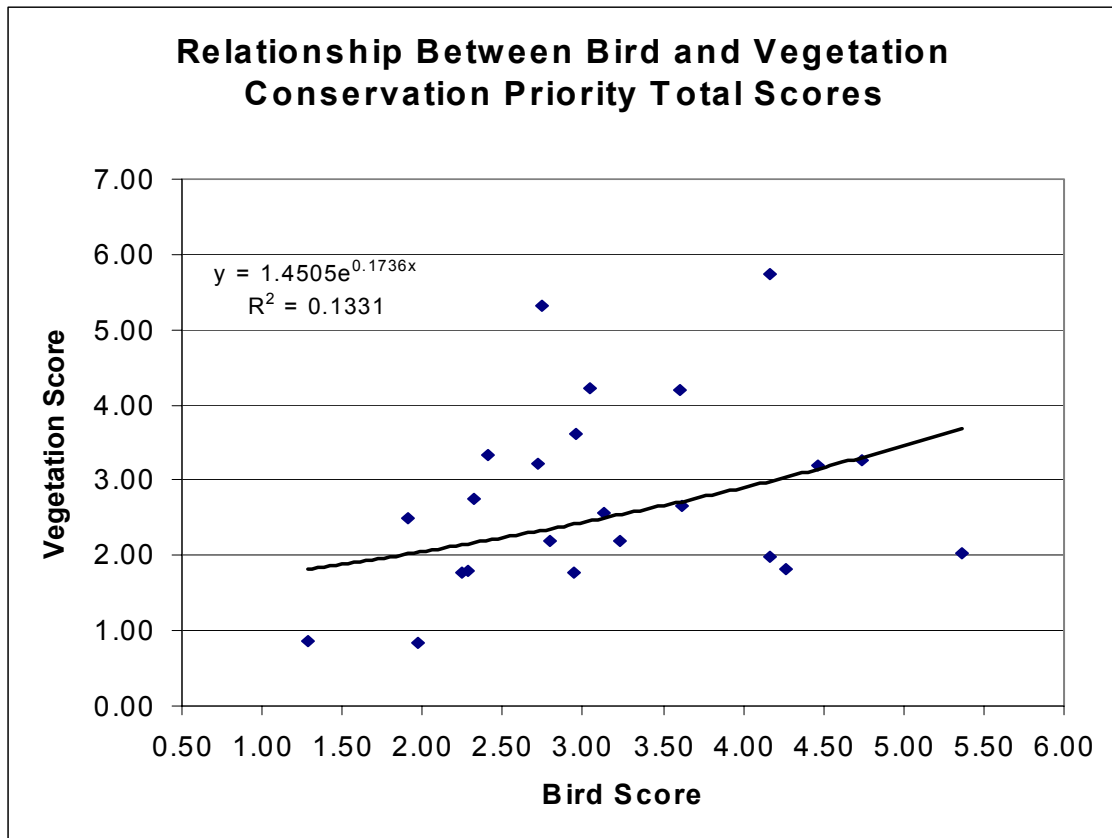


Figure 9. Relationship between composite breeding bird and vegetation conservation priority total scores.

Site Scores According to Birds, Vegetation and a Combination of the Two

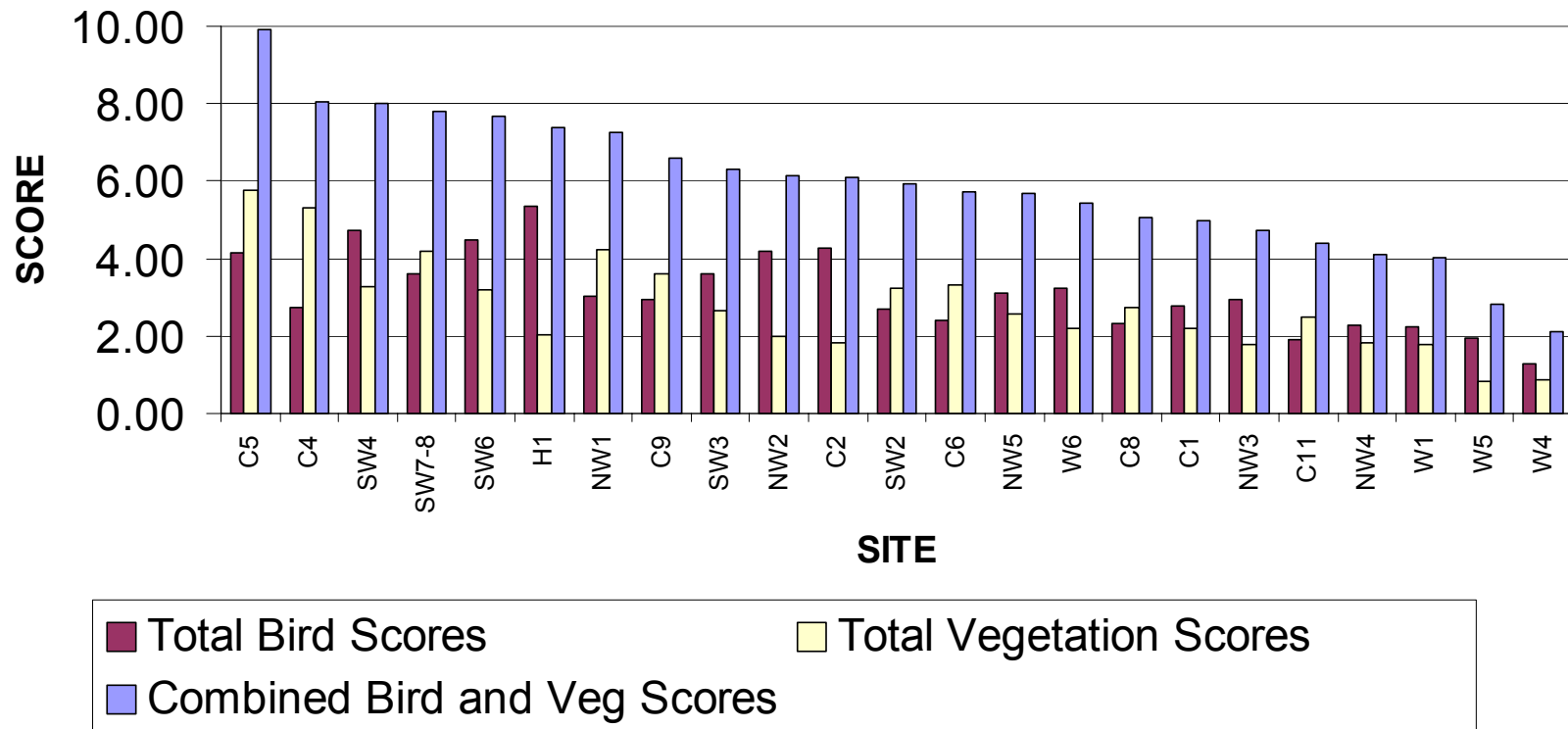


Figure 10. Overall composite scores of Norfolk County forest sites as assessed by breeding bird criteria and vegetation community criteria. Sites appear in descending order of importance, based upon composite scores for breeding bird and vegetation attributes.

Table 6. Summary table showing relative score totals for breeding birds, vegetation and combined scores for both. Sites are listed in descending order of total bird and vegetation scores. For each attribute, scores above the median value are shaded.

Forest Site	Size (acres)	Total Weighted Bird Scores (max = 6)	Total Weighted Vegetation Scores (max = 7)	Total Bird & Veg Scores (max = 13)
C5	157	4.17	5.75	9.92
C4	175	2.74	5.33	8.07
SW4	60	4.75	3.26	8.00
SW7-8	108	3.60	4.20	7.80
SW6	70	4.47	3.19	7.66
H1	50	5.36	2.02	7.38
NW1	50	3.05	4.23	7.28
C9	30	2.96	3.62	6.58
SW3	99	3.62	2.67	6.29
NW2	25	4.17	1.98	6.15
C2	90	4.27	1.82	6.09
SW2	50	2.71	3.23	5.94
C6	28	2.41	3.33	5.75
NW5	13	3.13	2.56	5.69
W6	15	3.23	2.20	5.43
C8	20	2.32	2.75	5.07
C1	25	2.80	2.19	4.99
NW3	16	2.95	1.77	4.71
C11	50	1.91	2.50	4.41
NW4	50	2.28	1.81	4.09
W1	74	2.25	1.78	4.03
W5	20	1.97	0.85	2.82
W4	1	1.28	0.85	2.13
Medians	50	2.96	2.56	5.94

RECOMMENDATIONS

1. Based upon the results from this study, it is recommended that Norfolk County consider designating all non-conifer plantation portions of the following top-ranked sites for protection under a natural heritage woodlands policy:

C5
C4
SW4
SW7-8
SW6
H1
NW1
C9
SW3
NW2
C2
SW2
C6
NW5
W6
C8

2. Together, the top-ranked sites comprise 1040 acres, but not all of the acreage that was surveyed is natural forest. A significant proportion, likely a minimum of 10%, consists of conifer plantation. Natural heritage woodlands, consisting of non-plantation forest, should be set aside for older growth protection. At the same time, a long-term goal of converting conifer plantations is generally encouraged.
3. Sites selected for natural heritage protection should have Ecological Lands Classification (ELC) mapping completed, and the boundaries of the protected areas should be clearly delineated. In consultation with other stakeholders, a broad-based management policy for these forests should be drawn up and adopted. Site-specific management plans for each parcel may also be appropriate.
4. Even in conifer plantations, the County should abide by the Provincial Policy Statement regarding the occurrence of species at risk. Consultation with relevant recovery teams is recommended as part of the forest management planning process.
5. Breeding bird inventories, closely patterned after the 2003 effort, should be repeated every 5-10 years at all designated and candidate sites.

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Appendix A.

Species detected during the Norfolk County surveys in 2003, with the numbers of individual territorial males recorded for each site. Habitat used by forest species is based on Freemark & Collins (1989): I/E = forest interior and edge, I = forest interior, E = edge. The conservation priority score for each species is based on Couturier (1999) for the Norfolk County region. Partner's in Flight priority scores for Bird Conservation Region 13 (BCR-13) were taken from www.rmbo.org/pif/scores/scores.html. Federally-listed species at risk are marked with ++ (threatened) or + (special concern). Regionally rare species are based upon McCracken 1997 and are marked with *.

Species	Habitat use ¹	Cons. priority score	BCR Score	C1	C2	C4	C5	C6	C8	C9	C11	H1	NW1	NW2	NW3	NW4	NW5	SW2	SW3	SW4	SW6	SW7-8	W1	W4	W5	W6	Frequency of occurrence
Green Heron	Na	1	16														1				1						2
Wood Duck	Na	1	17																	1	1		1				3
Mallard	Na	0	14																	1			1				2
Turkey Vulture	Na	2	11				1																				1
Cooper's Hawk*	I	2	17																		1		1				2
Ruffed Grouse	I/E	2	18	2			1																				2
Wild Turkey	I/E	1	17									1		1	1											1	4
American Woodcock	E	1	22														1				1						2
Mourning Dove	E	0	10								1	1	1														3
Black-billed Cuckoo	I/E	3	22																		3	1					2
Yellow-billed Cuckoo	I/E	2	17									1	1				2					1					4
Ruby-throated Hummingbird	E	3	17															1					1				2
Belted Kingfisher	E		19																					1			1
Red-bellied Woodpecker*	I/E	4	14																		1						1
Yellow-bellied Sapsucker	I/E	3	15										2														1
Downy Woodpecker	I/E	0	15		1			1				3			1	1			1		2	2					8
Hairy Woodpecker	I	0	15				1	1		1				1													4
Northern Flicker	I/E	0	18	1				1			1	2		1			1								1	1	8
Pileated Woodpecker	I	3	14			1	1							1	1				1								5
Eastern Wood-Pewee	I/E	0	20	3	2	3	5	3	2	5	1	5	4	3	1		1	2	3	3	3	3	6	5		5	20

Species	Habitat use ¹	Cons. priority score	BCR Score	C1	C2	C4	C5	C6	C8	C9	C11	H1	NW1	NW2	NW3	NW4	NW5	SW2	SW3	SW4	SW6	SW7-8	W1	W4	W5	W6	Frequency of occurrence
Yellow-rumped Warbler*	I	1	11				1																				1
Blackburnian Warbler*	I	3	17		2							1		2						1	1						5
Pine Warbler	I	3	16		2					1	1	1							2		1	2				1	8
Cerulean Warbler +	I	4	24									1								1							2
American Redstart	I	3	15																			5					1
Ovenbird	I	1	17		8	6	8	3	4		2	9	1	6	1	1		2	13	10	10	8			3		17
Northern Waterthrush	I	3	13					1												1	1						3
Mourning Warbler	E	3	18		2									1			1			1		1					5
Common Yellowthroat	I/E	0	16				2				1			2			2				1	5		1			7
Hooded Warbler ++	I	4	17	1	4	1	1		2	1		1		2	2			1	1	1						1	13
Scarlet Tanager	I	3	18	2	3	1	1	2	2	1	1	1	4	2		1	1	1	4	3	1	3			2	1	20
Eastern Towhee	I/E	3	18		1							1	1	1	1	1										1	7
Chipping Sparrow	E	0	15	1	5	1	1			2	3	1	3	3	2	7		1	12	2	3	5	3			2	18
Song Sparrow	E	0	14					1				1					4			1	2	6	2	1			8
Swamp Sparrow	E	3	16				2															1					2
Northern Cardinal	I/E	0	9			1	1			1		2		2	2	3			4	1	1	2	2			1	13
Rose-breasted Grosbeak	I/E	0	19	5	4	1	8	5	2	4	3	2	3	3			2		1		2	2	2		2	1	18
Indigo Bunting	E	0	15	1	2		1					3	1	3	1	3		2	1	3	1	2	3		1	1	16
Red-winged Blackbird	E	0	14														2										1
Common Grackle	E	0	15									1				1	1	1	2		1		3	1	1		9
Brown-headed Cowbird	E	0	14		5	3						2	2	2	1	2	1		2	2	3	3	1	1	2	2	16
Baltimore Oriole	E	0	22				1	2				1	1		1	1	1			1	2		1			1	11
Purple Finch*	I/E	2	17														1										1
American Goldfinch	E	2	14									1					1				1	1	1	1			6