

NESTING OF BREEDING BIRDS ON AN ELECTRIC UTILITY LINE RIGHT-OF-WAY

by W.C. Bramble, R.H. Yahner, and W.R. Byrnes

Abstract. A nesting study of breeding birds on an electric transmission line right-of-way (ROW) was made in central Pennsylvania in 1991 and 1992. Active nests of 13 bird species were found on the ROW, and 5 of the most common species nested on both handcut and herbicide-treated ROW segments. The average nesting success for all bird species in both years combined was 68%. A nesting success of 70% was obtained on a mowed plus herbicide (cut stubble) ROW unit, 68% on a selective basal spray unit, and 67% on a handcut unit. Shrubs were the most commonly used nesting cover. However, grass and forb cover was also used for nesting by field sparrows and common yellowthroats, in particular, both of which had a 100% nesting success on the ROW.

A nesting study of breeding birds was made on an electric utility line right-of-way (ROW) in the Allegheny Mountain Region of central Pennsylvania in 1991 and 1992. This was done to help explain large increases in the ROW bird population observed from June to August (2). We were particularly interested in learning whether or not these increases were due to nesting and subsequent rearing of young on the ROW, or simply to an influx from other areas in August.

Specific objectives of the study were 1) to determine if bird species commonly observed on the ROW also use the ROW for nesting, 2) to compare nesting success on handcut versus herbicide-sprayed ROW treatment units, 3) to evaluate relative use of ROW shrub and herbaceous plant species as nesting cover, and to compare nest location on wire and border zones.

The importance of shrubs for successful nesting of birds on electric transmission line ROW has been emphasized by several investigators. A 50% nesting success for 14 nests located in grass cover was reported from a study on an electric transmission line ROW in Maryland that was mowed annually (4). In the same study, a 75% nesting success for 12 nests was found in shrub cover that had been developed by selective basal

sprays at 2-3 year intervals.

A study on an electric transmission line ROW in New York state found that the 6 most common bird species nested in shrubs or low trees (5). As a result, selective basal sprays were recommended to preserve shrubs for nesting cover.

For comparison with nesting success of birds on ROW, it is important to note that in a study of avian ecology in aspen stands in central Pennsylvania from 1985-1987, a 51% nesting success was found for 95 nests (6). Nests that were located near the ground and concealed by dense low vegetation were found to be less susceptible to avian predation than nests located at more than 0.5 ft. above ground.

Methods

Three ROW treatment units that had been given maintenance treatments in 1987 using the wire zone-border zone method were selected for study (Figure 1). These units were 500 to 700 feet long and 180 feet wide.

The treatments selected were:

- *Handcutting.* Trees and tall shrubs were clearcut

WIRE ZONE/BORDER ZONE METHOD

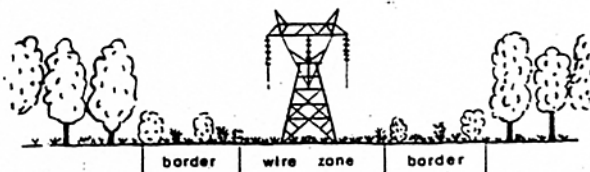


Figure 1. Diagram of a 230 kV line and right-of-way showing designated wire and border zones. A low plant cover is present on the wire zone with a tall shrub cover on the border zone. Target trees have been controlled on both zones.

on the wire zone which produced a tree sprout cover type. Trees only were selectively cut on the border zones which produced a tree sprout-shrub cover type.

- **Selective Basal Spray.** Trees and tall shrubs were selectively sprayed on the wire zone with a mixture of Access (1.5%) in water (98.5%); while tree only were selectively sprayed on border zones. This produced a shrub cover type on both wire and border zones.
- **Mowing Plus Herbicide Spray.** The entire wire zone was mowed and a broadcast spray of Tordon (0.75%) and Garlon (0.75%) in water (98.5%) applied to the cut stubble. The border zones were given a selective basal spray of Weedone CB undiluted. A grass-forb cover type was produced on the wire zone and a shrub cover type on the border zones.

Systematic bird nest searches were begun on the 3 units in early June of 1991 and 1992 and continued at 2- to 4-day intervals until the middle of July to determine nesting success. A nest was considered successful if one or more young were fledged. When a nest was found, it was monitored until it was either destroyed, depredation occurred on the eggs or young, or the young were fledged. Presence of young or family groups near abandoned nests also was recorded.

Results

A total of 42 nests of 13 bird species was found on the 3 ROW units (Table 1). In general, all ROW treatment units provided favorable habitats for nesting bird species that have been commonly found on the ROW (2).

Nesting success. Nesting success on the 3 ROW units averaged 66% for the years 1991 and 1992 combined (Table 1). This compared favorably with the 50% and 75% nesting success observed on ROW in Maryland (5), and with the 51% in aspen stands in central Pennsylvania (6).

Of the bird species found nesting on the ROW, 8 used the basal spray unit, 8 the handcut unit, and 5 used the mowing plus herbicide unit (Table 2). All 6 of the most common species nested successfully on the basal spray unit. Five of the common 6 species nested successfully on the handcut unit and 3 of 6 on the mowing plus

herbicide unit.

In addition to the species listed in Table 1, a downy woodpecker (*Picoides pubescens*) was observed taking food into a cavity in a red oak (*Quercus rubra*) snag located on the ROW-forest edge. This was noted as a successful nesting at that time and correlated well with observations of frequent use of the ROW and the adjoining forest edge in 1982 and 1983 (1).

The percent of successful nests among the treatment units for all species combined ranged from 67% on the handcut unit to 70% on the mowing plus herbicide unit (Table 2). The important "number of young fledged," which has been used for nesting success, was very similar among the treatment units and ranged from 1.6 to 2.1.

Location of nests on ROW treatment units.

The largest number of nests (6.4 per acre) was found on the selective basal spray unit, and the lowest on the handcut unit (3.9 per acre) (Table 2). This difference was probably due to greater abundance of desirable shrubs on the basal spray unit. The mowing plus herbicide unit (5.6 nests per acre) had shrub cover only on the border zones.

The total number of bird species nesting per acre, 2.5 to 2.9, was similar for the 3 treatment units studied. This was probably due to the presence of shrubs on all units. Thus, the lack of shrubs on the wire zone of the mowing plus herbicide unit was compensated for by the presence of tall shrubs on the border zones.

Use of plant cover types for nesting. Of the total nests found on the ROW, 31 were in a shrub cover type, 9 were in the grass-forb cover type, and 2 were in the tree sprout cover type (Table 3). Nests of 2 common species, gray catbirds and indigo buntings, were found only in shrub or tree sprout cover types. These nests were usually located 1.7 to 4.0 feet above ground. The other common species were found nesting in both shrub and grass-forb cover types.

Several species usually regarded as forest birds (3), such as red-eyed vireo, veery, and rose-breasted grosbeak, were found nesting on the ROW borders in witchhazel. In addition, the thicket-inhabiting cedar waxwing and yellow-billed cuckoo also used witchhazel for nesting.

Table 1. Number of eggs produced, number of young fledged, and nesting success of breeding-bird species on the ROW for 1991 and 1992, combined.

Bird species	No. nests	Initial no. eggs	Final no. eggs	No. young fledged	Total per nest	Avg. nesting success %	
Common species							
Chestnut-sided warbler	6	22	23	14	2.3	61	
<i>Dendroica pensylvanica</i>							
Field sparrow	8	22	24	24	3.0	100	
<i>Spizella pusilla</i>							
Gray catbird	5	11	16	9	2.0	56	
<i>Dumetella carolinensis</i>							
Rufous-sided towhee	6	18	21	13	2.2	62	
<i>Pipilo erythrophthalmus</i>							
Common yellowthroat	2	4	4	4	0.0	100	
<i>Geothlypis trichas</i>							
Indigo bunting	4	8	8	7	3.5	88	
<i>Passerina cyanea</i>							
Average		14	16	12	2.2	78	
Other species							
Song sparrow	2	3	4	3	1.5	74	
<i>Melospiza melodia</i>							
Yellow-billed cuckoo	1	5	5	2	3.0	60	
<i>Coccyzus americanus</i>							
Black-billed cuckoo	4	3	7	3	1.0	57	
<i>Coccyzus erythrophthalmus</i>							
Red-eyed vireo	1	0	4	2	2.0	50	
<i>Vireo olivaceus</i>							
Veery	1	1	3	0	0.0	0	
<i>Hylocichla fuscenscens</i>							
Cedar waxwing	1	5	5	3	3.0	60	
<i>Bombycilla cedrorum</i>							
Rose-breasted grosbeak	1	4	4	3	3.0	75	
<i>Pheucticus ludovicianus</i>							
Average		3	5	3	2.3	54	
All species	Total avg.	42	9	11	8	2.3	66

In this connection, it should be noted that 2 plant cover types were present on the mowing plus herbicide unit, which consisted of a tall shrub cover on border zones plus a grass-forb cover on the wire zone. This meant the tall shrubs were available for such species as catbird and indigo bunting and grass-forb cover for field sparrow, towhee, song sparrow, and yellowthroat.

Use of wire and border zones for nesting. More nests and more species nested on the border zones than on the wire zones of the basal spray and mowing plus herbicide spray units

(Table 4). This appeared to be due to the abundance of tall shrub cover (witchhazel, mt. laurel, and blackberry) on the border zones. These shrubs are the sole nesting cover used by gray catbird, black-billed cuckoo, chestnut-sided warbler, and indigo bunting.

In contrast, equal numbers of nests were present on the wire and border zones of the handcut unit. This was probably due to the presence of tall and medium height shrubs on both zones and the occurrence of small openings with grass-forb cover also in both zones.

Table 2. Summary of bird nesting on each of three ROW treatment units in 1991 and 1992.

	ROW treatment			Avg.
	Handcut	Selective basal spray	Mowing plus herbicide	
No. nests Total	12	18	10	13.3
Per acre	3.9	6.4	5.0	5.1
No. species Total	8	8	5	7.0
Per acre	2.6	2.9	2.5	2.7
Clutch size	3.0	2.8	2.8	2.9
Young fledged/nest	1.6	1.8	2.1	1.8
Nesting success	67%	68%	70%	68%

Plant species used for nesting. Shrub species were most favored for nesting cover on the ROW (Table 3). Of these, blackberry (*Rubus allegheniensis*) was by far the most commonly used species (11 nests). It was followed by witchhazel (*Hamamelis virginiana*) (8 nests), Mt. laurel (*Kalmia latifolia*) (7 nests), and blueberry (*Vaccinium* spp.) (5 nests). Two nests were found on oak sprouts (*Quercus* spp.) and 2 on bear oak (*Quercus ilicifolia*).

Although forbs and grasses were used to a lesser extent, they were important to certain species such as the field sparrow, the most common species on the ROW, and towhee. The forbs used for nesting were hayscented fern (*Dennstaedtia punctilobula*) and goldenrod (*Solidago* spp.). These

Table 3. Use of plant species for bird nesting.

Bird species	No. nests	Plant species	No. nests	Height above ground
Field sparrow	8	Blueberry	1	0
		Mt. Laurel	2	1.5 - 3.0
		Bear oak	1	0.7
		Hay scented ferns	2	0 - 0.3
		Poverty grass	1	0
		Sedge	1	0.3
Refous-sided towhee	6	Blackberry	2	0
		Blueberry	2	0
		Hay scented fern	1	0
		Bare oak	1	2.3
		Blackberry	4	1.4 - 3.0
Chestnut-sided warbler	6	Witchhazel	1	2.0
		Oak sprouts	1	2.5
		Mt. Laurel	3	3.9 - 4.0
Gray catbird	5	Blackberry	1	1.8
		Witchhazel	1	7.8
		Blackberry	3	1.7 - 2.5
Indigo bunting	4	Oak sprouts	1	3.5
		Witchhazel	2	5.1 - 8.0
Black-billed cuckoo	4	Mt. Laurel	2	1.8 - 5.0
		Blackberry	1	1.0
Song sparrow	2	Goldenrod	1	0
		Blueberry	1	1.3
Common yellowthroat	2	Tall fescue	1	0.4
		Witchhazel	1	5.7
Red-eyed vireo	1	Witchhazel	1	5.7
Cedar waxwing	1	Witchhazel	1	5.5
Yellow-billed cuckoo	1	Witchhazel	1	6.8
Rose-breasted grosbeak	1	Witchhazel	1	0.5
Verry	1	Blueberry	1	
Total	42	Total	42	

Table 4. Location of bird nests on ROW wire and border zones of treatment units.

Treatment unit	Wire zone		Border zone	
	Species	No. nests	Species	No. nests
Hand cutting	Gray catbird	1	Gray catbird	1
	Field sparrow	3	Cedar waxwing	1
	Indigo bunting	1	Chestnut-sided warbler	1
	Towhee	1	Red-eyed vireo	1
			Towhee	1
			Yellow-billed cuckoo	1
	Total	6	Total	6
Selective basal spray	Chestnut-sided warbler	2	Black-billed cuckoo	3
	Field sparrow	1	Gray catbird	3
	Indigo bunting	1	Chestnut-sided warbler	1
	Towhee	2	Indigo bunting	2
	Yellow throat	1	Song sparrow	2
			Yellow throat	1
	Total	7	Total	12
Mowing plus	Field sparrow	4	Black-billed cuckoo	1
	Towhee	1	Chestnut-sided warbler	2
			Rose-breasted grosbeak	1
			Towhee	1
			Veery	1
			Total	6
	Total	5		



Figure 2. Chestnut-sided warbler nest with 4 eggs located in blackberry on the ROW border zone on 6/11/91.

species not only form large patches on the ROW wire zone, but are also common in openings in shrub cover. The common grasses used for nesting were poverty grass (*Danthonia spicata*) and tall fescue (*Festuca elatior*).

Discussion

This study has indicated that the common species of birds found on the ROW do nest successfully on the ROW plant cover provided by the 3 maintenance methods used, namely, selective basal spraying, mowing plus herbicide spraying, and handcutting. Use of the wire zone-border zone method was important to retention of valuable shrub cover on the ROW.

Although shrubs were the most frequently used plant cover for nesting, the common grasses and forbs were also important for several common bird species typically found on the ROW, such as the field sparrow. This emphasized the value of a diverse plant cover that included both shrub and



Figure 3. Common yellowthroat nest with 4 eggs located in blueberry on the ROW wire zone on 6/4/91.

grass-forb cover types.

Nesting success for all species combined was relatively high (68%) when compared to success in aspen stands in central Pennsylvania (51%), and similar to success on the electric transmission line ROW in Maryland (50 to 75%). Nesting success for common species averaged 75% in our study.

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Literature Cited

1. Bramble, W.C., W.R. Byrnes, and M.D. Schuler. 1984. *The bird population of a transmission right-of-way maintained by herbicides*. J. Arboric. 10(1):13-20.
2. Bramble, W.C., R.H. Yahner, and W.R. Byrnes. 1992. *Breeding-bird population changes following right-of-way maintenance treatments*. J. Arboric. 18(1):23-32.
3. Bull, J. and J. Farrand. 1977. Audubon Field Guide to North American Birds. (Eastern Region). Knopf, N.Y. 715 p.
4. Chasko, G.G. and J.E. Gates. 1981. Avian breeding success in relation to grassland and shrubland habitats within a 130 kV transmission line corridor. Proceedings 2nd Symp. on Environ. Concerns in Rights-of-Way Management, Ann Arbor, MI, p. 68-1 to 68-12.

5. Malefyt, J. de Waal. 1987. Effects of herbicide spraying on breeding songbird habitat along electric transmission rights-of-way. Proceedings 4th Symp. on Environ. Concerns in Rights-of-Way Manage. Indianapolis, IN, p. 28-33.
6. Yahner, R.H. 1991. *Avian nesting ecology in small even-aged aspen stands*. J. Wildlife Manage. 55:155-159.

*Department of Forestry and Natural Resources
Purdue University
1159 Forestry Building
West Lafayette, IN 47907-1159
and
School of Forest Resources
Pennsylvania State University
University Park, PA 16802.*

Résumé. Une étude sur les nids d'oiseaux dans l'emprise d'une ligne de transport était menée en Pennsylvanie centrale en 1991 et 1992. Les nids occupés de 13 espèces d'oiseaux ont été compilés dans l'emprise et cinq des espèces retrouvées étaient à la fois présentes dans les secteurs coupés manuellement et ceux traités à l'herbicide. La moyenne de réussite de nidification de toutes les espèces dans les deux types de secteurs combinés ensembles était de 68%. Un taux de succès de nidification de 70% a été enregistré sur une unité de l'emprise où il y avait eu fauchage avec application d'herbicide (sur la souche), de 68% sur une unité où un arrosage sélectif à la base a été employé et de 67% sur une unité coupée manuellement. Les arbustes étaient le milieu le plus régulièrement employé. Cependant, les couverts d'herbacées ou de graminées étaient aussi utilisés par le moineau et la fauvette masquée en particulier, les deux ayant des taux de succès de nidification de 100% dans l'emprise.

Zusammenfassung. Eine Nestbaustudie von brütenden Vögeln entlang einer Überlandleitung 'right-of-way (ROW)', wurde 1991 und 1992 in zentral-Pennsylvania durchgeführt. Auf der ROW wurden aktive Nester von 13 Vogelarten gefunden. Fünf von den häufigsten Arten nesteten auf den handgeschnittenen und auf den herbizidbehandelten Abschnitten der ROW. Der durchschnittliche Bruterfolg bei allen Arten über beide Jahre lag bei 68%. Ein Bruterfolg von 70% wurde auf einem Abschnitt erreicht, wo gemäht und ein Herbizid angewendet wurde, 68% auf einem ausgewählten gespritzten Streckenabschnitt und 67% auf einem handgemähten Abschnitt. Als Nestbauschutz wurden überwiegend Sträucher genutzt. Gras und Gestrüpp wurde von Spatzen und gemeiner Goldammer auch als Schutz genutzt, besonders bemerkenswert, da diese einen Bruterfolg von 100% entlang der ROW hatten.