Rights of birds and rights of way

Vegetation management on a railroad causeway and its effect on breeding birds

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INTRODUCTION

CONCERN FOR ENVIRONMENTAL IMPACT has often focused on sites *e.g.,* housing developments, strip mines, power stations, factories, rather than on the cross-country corridors that connect them. But this neglect is now being corrected, in part owing to the magnitude of land involved: the total right-of-way (hereafter, ROW) area occupied by powerlines, pipelines, roads and railways in the United States exceeds the size of New England (Egler 1975) and mileage in electric power ROW alone is expected to increase two and one-half times in the next 12 years (Rowell 1976). Apart from the vast extent of these areas, it is significant that the great majority of Americans know their country only by its rights-of-way.

Management of vegetation on ROWs may include mowing, burning, herbicide spraying, or selective cutting, and generally produces wildlife habitat different from the surrounding land. There may be an increase in diversity and abundance of birds along the edges of the corridor; however, one long-term study of the effects of construction of a major highway in New Hampshire showed a change in species composition of the breeding bird community with no increase in diversity and a decrease in abundance (Hebert 1958-1968). The width of powerline ROWs can be an important factor influencing bird community makeup (Anderson *et al.,* 1977). Management may differently affect summer and resident birds (*ibid.*) or breeding, feeding, and other behavior (LeGrand 1971). The complex influences of habitat alterations on individual species were examined with the help of multivariate statistical analysis in one recent study (Shugart *et al.,* 1974). Others have credited ROWs with helping to maintain gene flow between populations of an endangered species (Jackson 1976). Summarily, the relationship between ROW management and bird communities is a complicated one, varying with management techniques, ROW size, species, behavior, season, and region.

Most ROW bird surveys have been made along electric transmission lines through forested regions. In a continuous forest it is extremely difficult to separate, unambiguously, edge populations from those of the ROW and the forest (LeGrand 1971). This study involved a railroad causeway across tidal river shallows, where the separation of edge effect from surrounding habitat is easier to determine. In fact these causeways are biogeographical islands of pure edge (see aerial photo) with apparently very dense breeding bird populations.

STUDY AREAS

THE CONRAIL (FORMERLY NEW YORK CENTRAL) railroad, completed 1851, follows the east bank of the tidal Hudson River and often crosses shallow embayments on fill causeways. Our counts were on two such causeways in northern Dutchess County, New York, Tivoli North Bay (hereafter, NB) and Vanderburgh Cove — Suckley Cove (hereafter, VS), Figures 1-4 The NB causeway is continuous, 2.0 km long, while the VS causeway comprises two strips totaling 2.0 km separated by a short length of terrestrial railway. The causeways are mostly about 25 m wide, but a small portion of VS is almost 50 m. The area of each census strip is about five hectares. The margins of the causeways are occupied by belts of vegetation about six m wide on each side of the tracks, predominantly dense shrub thickets two-three m high with scattered trees over four m and a narrow herbaceous border under one m high near the tracks This vegetation is heterogeneous but these species are characteristic: trees: maples (*Acer* spp.), Black Locust (*Robinia pseudoacacia*), ashes (*Fraxinus* spp.), Cottonwood (*Populus deltoides*), willow (*Salix* sp.), Tree-of-heaven (*Ailanthus altissima*), vine: Virginia Creeper (*Parthenocissus quinquefolia*); shrubs False Indigo (*Amorpha fruticosa*), Staghorn Sumac (*Rhus typhina*), Honeysuckle (*Lonicera* x *bella*); herbs: Ragweed (*Ambrosia artemisiifolia*), Purple Loosestrife (*Lythrum salicaria*), Soapwort (*Saponaria officinalis*), Umbrellawort (*Oxybaphus nyctaginea*), Milkweed (*Asclepias syriaca*). Causeway VS has trees on both sides whereas NB has trees only on the west A list of railroad flora and descriptions of the river shore are in Kiviat (1978).

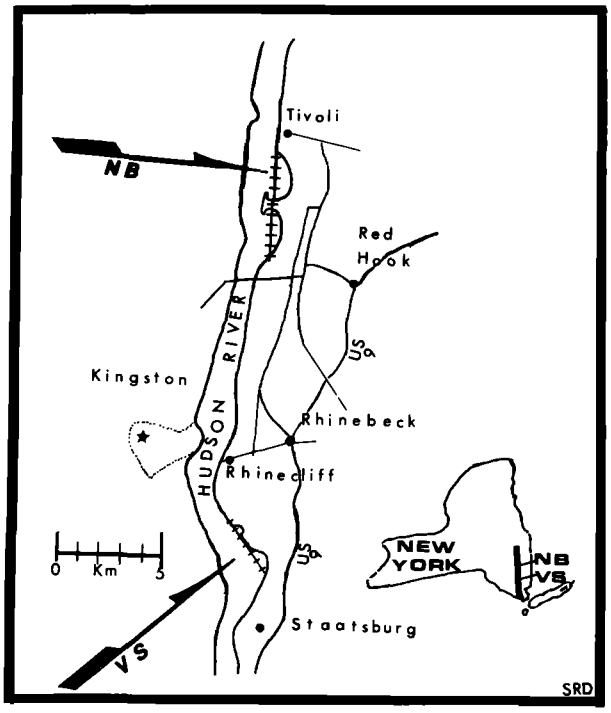

Fig. 1. Location of the study areas, North Bay (NB) and Vanderburgh Suckley Coves (VS), of the Hudson River.

Utility lines with poles *ca.* 25 m apart run through the vegetation on the east side of each causeway, and every 3-4 years this side is herbicided or cut to keep taller-growing woody plants out of the wires. In January 1977, the east side of NB was cut with a brush-hog to soil level, whereas the VS east side had not been managed for about 3 years and the vegetation there was similar to the west side. By June 1977, the east side of NB was lush with herbs and shrub sprouts to 0.7 m tall, and this growth reached 1.7 m in June 1978. We did not make bird counts before 1977, but frequent qualitative observations sug-

gested approximately similar bird communities on both sides Thus NB can be regarded as an experimental plot, and VS as a control plot.

Fig. 2. Aerial photo of Vanderburg Cove showing embayment, railroad causeway, and Hudson River.

The ends of our census strips were 50-100 m (railway distance) from the land-connected ends of the causeways, and all parts of the strips were 70-700 m from the nearest mainland or island forest. We saw very little evidence that bird territories spanned this gap, with the umimportant exception of flicker and phoebe. Tidal shallows and a few islands in the mainstream of the Hudson River adjoin the causeways on the west, and freshwater tidal marshes and shallows on the east. At NB Purple Loosestrife and Cattail (*Typha augustifolia*) bordered much of the causeway on the east, but at VS the census strip was bordered by aquatic plants unsuitable for nest substrate. The ROW vegetation is variable the length of the railway from Albany to New York City, and our census strips should not be considered typical.

METHODS

TO MAKE A COUNT, we walked the causeway tracks abreast once starting *ca.* 0445 EDT when it was light enough to visually identify birds. We noted the singing and non-singing birds ahead of us, each on his own side, on the vegetation, ground, utility poles and wires. A bird that flushed across the tracks was counted on the side from which it came. We made one count/strip/year: in 1977 on June 13 (NB) and June 21 (VS), and in 1978 on June 7 (NB) and June 15 (VS). Later counts at VS may partially explain the lower totals there (Table 1). Each count took about 1.5 hours and we noticed considerable diminution of singing by the end. No counts were made on rainy or windy mornings. Qualitative observation later in the summer 1978, yielded information about foraging behavior. Our one-sample method did not allow statistical assessment of variability, and Figures 5 and 6 should be interpreted cautiously as the percentages are based on samples of fewer than 50 birds.

RESULTS AND DISCUSSION

RESULTS OF THE BREEDING bird censuses are found in Table 1 and Figs. 5 and 6 which show the frequency of occurrence of the birds on the west and east sides.

Yellow Warbler: One of the more markedly displaced groups was the singing Yellow Warblers, indicated by their occurrence on the west side of the causeway at unmanaged VS (57%) as opposed to managed NB (94%). This difference was somewhat diminished in the second year after cutting, when the east side of NB had grown up. In view of the large number of Yellow Warblers on the west side of NB (45 as opposed to a total of 33 on both sides at VS in 1977) it is difficult to argue that cutting had a negative effect there, especially if one assumes that the pre-management populations at NB and VS were comparable. On the contrary, the data suggest that cutting increased the total number of nesting pairs by creating diversity in their habitat.

During the census period at NB we observed very little flushing of this species in either direction. Later, during the nesting

Fig. 3. Comparison of vegetation between cut (left) and uncut (right) sides at a typical point along North Bay railroad causeway, June 1978.

Fig. 4. Photo taken along North Bay railway causeway, June 1978. Note difference in vegetation between the cut (east) and uncut (west) sides.

period, singing remained a west side activity, but there was considerable foraging on the east side. For instance, frequently a Yellow Warbler was seen flying from west to east with food. It is unclear whether this apparent territory expansion was the result of 1) increased feeding needs of the later period, 2) later flowering of plants (and consequently of their insect pollinators) on the disturbed, sunny, east side, or 3) the absence of suitable perches on the east side. In any case the foraging areas on the east side seemed less vigorously defended. If this represents a true territory expansion midway in the breeding cycle it would be contrary to the findings of Odum and Kuenzler (1955).

Song Sparrow. Cutting improved the nesting habitat on the east side of NB for this species. The effect was more noticeable in the tally of total (singing and non-singing) Song Sparrows (only 23% on the west side) and more marked in the second year after cutting (19%). There was some flushing across the tracks during the census period and much crossing in the nestling period so the Song Sparrows appeared almost equal on either side of NB at this time.

Gray Catbird: The vegetation management at NB sharply accentuated what may have been a slight preference for nesting on the west side prior to cutting; a change from 61% to 90%. The absence of flushing across the tracks (either in the census or in later observation periods) showed that the need for cover is the limiting factor for this species in this situation. For the two previous species, cutting had a mixed effect: reducing nesting opportunities on one side but favoring foraging strategies that utilize both sides. In the case of the catbirds, cutting seems to have simply forced them out. We were surprised that this latter was not the typical response, *i.e.*, that cutting had not in general diminished the bird community but changed it in complex ways. The June bird counts told some of the story but it was the later behavioral observations that opened our eyes to the complexity of the response to this disturbance.

Red-winged Blackbird: This species nests primarily in the emergents of the marsh immediately to the east of the causeway and much less in the ROW vegetation than its presence there suggests. It is not clear that it uses the causeway for foraging, but apparently in the main for perching on telephone wires and in treetops. Cutting underneath the wires seems to have reduced its preference for perching on them. Almost all of the individuals of this species, as well as those of the Common Grackle, were males that did little singing or displaying. They may have been non-breeders.

Table 1. Breeding Bird Censuses — Hudson River Railway Causeways.
Numbers indicate counts of singing birds. Numbers following in parentheses indicate counts of total birds, singing and non-singing. Species are listed in order of abundance. *Indicates a significant difference between numbers of singing individuals on the west and on the east side of the causeway. (X2, 5%). Density figures are based on the estimation of each study area as 5 hectares.

	1977				*1978*			
	NB-W	*NB-E*	*VS-W*	*VS-E*	*NB-W*	*NB-E*	*VS-W*	*VS-E*
Yellow Warbler	36*(45)	1(1)	16*(26)	4(7)	26*(28)	3(6)	7(10)	13(16)
Song Sparrow	9(10)	12(28)	5(11)	7(11)	1*(5)	7(22)	6(10)	6(7)
Gray Catbird	8*(11)	0(1)	4(7)	4(8)	11*(17)	2(2)	7(9)	3(3)
Red-winged Blackbird	3(22)	1(17)	1(14)	3(41)	1(12)	1(19)	2(12)	7(51)
Am. Robin	4(6)	2(2)	0(3)	2(3)	3(5)	1(5)	1(3)	1(5)
Willow Flycatcher	0	0	0	0	2(3)	6(6)	0	0
E. Kingbird	0	0(1)	0	0(1)	2(3)	2(4)	0	0
N. Oriole	2(2)	0	1(1)	0	0(2)	0	0	0
Am. Goldfinch	1(4)	0(3)	0(4)	0(3)	2(2)	0(7)	0(1)	0(2)
Cardinal	2(2)	0	0	0	0	0	0	0
E. Phoebe	0	0	0	0	0	1(1)	0	0
Barn Swallow	0	0	0	0	0	0	0	1(2)
Com. Yellowthroat	1(1)	0	0	0	0	0	0	0
Am. Redstart	1(1)	0	0	0	0	0	0	0
Com. Grackle	0(8)	0	0(3)	0(1)	0(1)	0	0(2)	0(20)
Brown-headed Cowbird	0	0	0	0(1)	0(1)	0	0	0(1)
Mourning Dove	0	0	0(1)	0(1)	0	0	0	0
Bank Swallow	0	0(2)	0	0	0	0	0	0
Cedar Waxwing	0(1)	0	0(1)	0	0	0	0	0
Com. Flicker	0	0	0	0	0(1)	0	0	0
Tree Swallow	0	0	0	0	0	0(1)	0	0
Unidentified	0	0	0	0	0	0	0	3
Strip totals Species	12	8	10	10	12	10	7	9
Individuals	67*(113)	16(55)	27(71)	21(77)	48*(80)	23(73)	23(47)	31(110)
Density (individuals/km²)	1660(3360)		960(2960)		1420(3060)		1080(3140)	

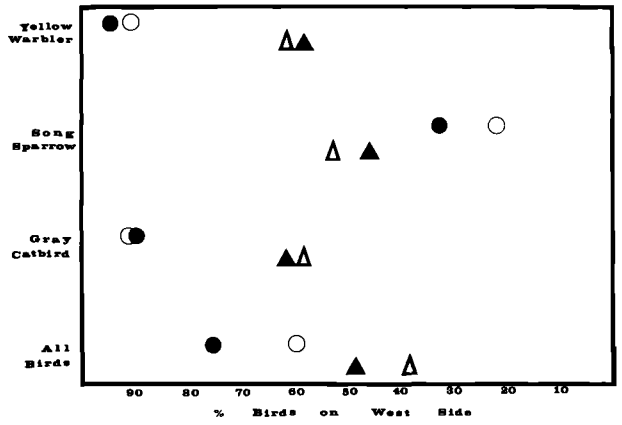

Fig. 5. Proportion of individuals of major species counted on west and east sides of North Bay and Vanderburgh-Suckley census strips, 1977-78 data averaged. The horizontal axis of the graph shows percentage of individuals counted on the west side, i.e., the farther to the left on the graph, the more frequently the group was found on the west side. Open circles = all individuals at NB; solid circles = singing males only at NB; open triangles = all individuals at VS; solid triangles = singing males only at VS.

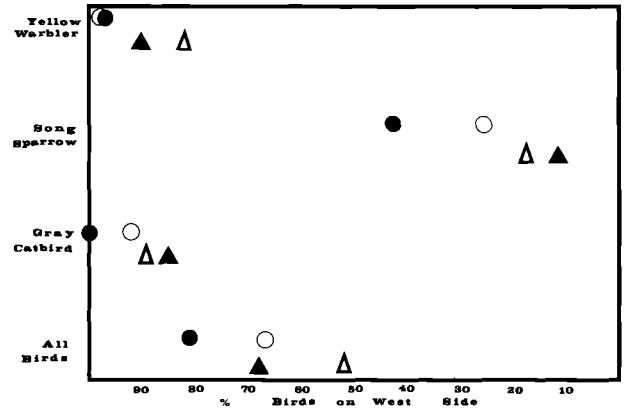

Fig. 6. Changes in proportion of individuals of major species on west (uncut) and east (cut) sides of North Bay census strips from 1977 to 1978. Open circles = all individuals in 1977; solid circles = singing males only in 1977; open triangles = all individuals in 1978; solid triangles = singing males only in 1978.

All Birds: The preference of singing birds for the west (uncut) side of NB, especially in 1977 (81%), is a predictable consequence of management. As the vegetation increased in height and structure in 1978, the difference was less pronounced (68% of the singing birds preferred the west side). This pattern held true for most species, but note Song Sparrow above. In 1977 more birds flushed across the tracks at NB from east to west than vice versa. At VS directions appeared to be equal. Densities of singing males along the causeways (see Table 1) compare with some of the highest densities recorded in the *American Birds* Breeding Bird Census (Van Velzen 1978). Even more remarkable is the density in terms of nesting substrate, which would be approximately double the tabulated figures since the vegetation covers only one-half of the study causeways. Nevertheless, the vegetational volume is not large on these plots despite the locally dense shrub growth. This unusually high breeding bird density per vegetational volume is one of the interesting features of this study area. Chi-square analysis of west side *vs* east side singing populations (Table 1) bore out impressions of the significant differences related to cutting. The clear-cut results from this non-parametric test suggested the use of percentages in graphing the results, despite the small sample size. More censuses need to be taken to establish a standard error of the method and more field work is needed to observe the behavior of the various species at different times of the day and of the breeding cycle.

CONCLUSIONS

THE BREEDING BIRDS OF NB responded to vegetation cutting along one side of the railroad causeway in complex ways depending on their nesting, foraging, display, and defensive preferences and limitations. It will be necessary to consider such life history complexities in planning and managing future rights-of-way to control their effects on birds and other wildlife. In view of the impending proliferation of rights-of-way, the difference between thoughtful and thoughtless management may be considerable.

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