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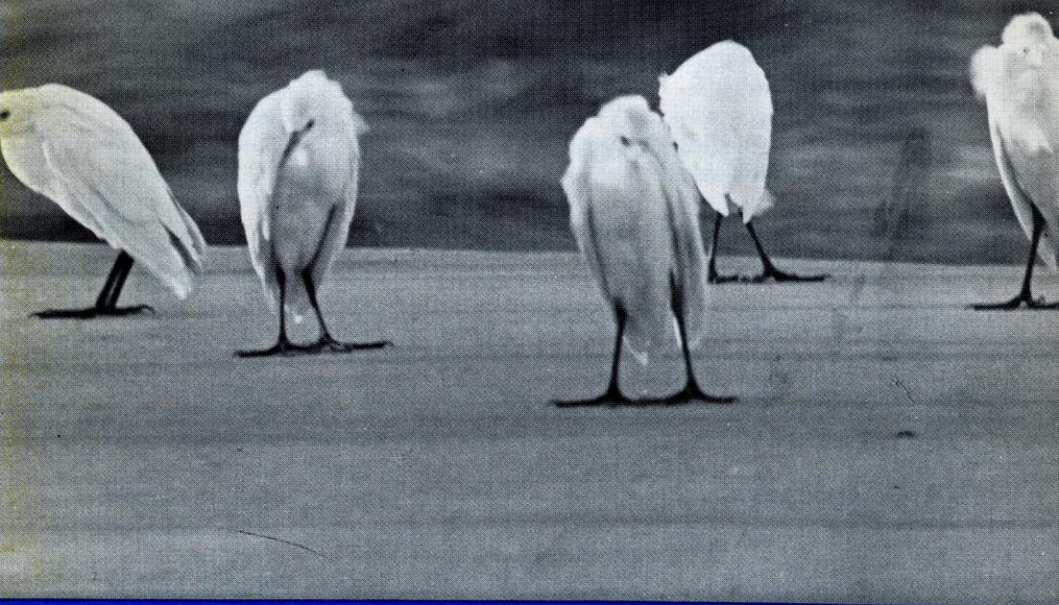
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The Passenger Pigeon

Fall 1979
Volume 41, No. 3

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Effect of Forest Fragmentation on Bird Populations

By Chandler S. Robbins

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Introduction

Birds are sensitive indicators of habitat conditions, because each bird species has its own distinctive breeding range and habitat requirements. Habitats can be managed to increase or decrease abundance of bird species, using information derived from correlating bird populations with quantitative descriptions of the habitats in which they nest. Likewise, the presence or even abundance of certain species can be predicted on the basis of geographical location and habitat descriptions (Robbins, 1978).

The purpose of this presentation is to discuss a relatively new concept in forest management; this is the dependence of many of the neotropical migrants on extensive tracts of forest. Just as many species of birds are restricted to certain types of habitats (woodland, prairie; desert, tundra), some species are adapted to living in the interior of an extensive forest while others utilize habitat boundaries such as wood margins and hedgerows. Each species has evolved over thousands of years and its populations have reached a state of equilibrium within its particular preferred environment. When habitat conditions change as a result of plant succession, climatic changes, or various influences brought about directly or indirectly by man, changes in the survival potential of the species occur. When these changes favor a species, the population may spread into the favorable habitats and increase in size. When altered habitat conditions result in increased mortality or lowered reproductive rate, the population will decline unless it can be supported by immigration from nearby areas where a high reproductive rate produces a surplus of individuals. If a supply of invading individuals is not available or is insufficient to make up for the deficit, the population may decrease to a new lower equilibrium or even disappear entirely from the region of altered habitat.

I should like first to present the results of some recent studies relating changes in breeding bird populations to changes taking place in the environment. After that I shall suggest some guidelines for management of forests so as to benefit those nongame bird species that are disappearing from our landscape as a result of failure to take their needs into consideration.

Area Sensitivity

In the eastern and north central forest regions of the United States, there are many species of birds that are dependent upon extensive forest systems. In recent decades these species have been retreating in the face of fragmentation of forest by such impacts as suburban sprawl, super highways,

transmission lines, reservoirs and surface mining. These sensitive birds have all but disappeared from suburban and highly agricultural areas.

Bird students have been aware of the sharp decline in breeding populations of flycatchers, vireos, warblers, and other long-distance migrants in woodland in and near the District of Columbia (Criswill et al. 1978). These decreases have been attributed by various investigators to a variety of causes, including sewer and highway construction, predation, greater human use, storm damage, pesticides, and loss of habitat both in the vicinity of the study plots and in the wintering grounds.

Ornithologists in both Europe and America have shown that more species can be found nesting in large study plots than in small ones (Oelke 1966, Moore and Hooper 1975). This conclusion seems obvious, because birds are patchily distributed in most habitats, which in itself is a result of the fact that most habitats are structurally heterogeneous. The main reason for increased avian diversity in large tracts, however, was overlooked by these authors.

Bond (1957), studying bird populations in woodlots in southern Wisconsin, was the first person to report that many species of small songbirds are dependent on relatively large forest tracts during the breeding season. MacArthur and Wilson (1963, 1967) demonstrated the relation between oceanic island avifaunas and the size and degree of isolation of the islands. They also suggested that the same equilibrium between colonizations and extinctions might exist on fragmented woodlots. In oceanic or mainland models, the number of breeding species increases with "island" size and decreases with distance from sources of repopulation. Whitcomb (1977) has summarized the implications of MacArthur and Wilson's widely accepted equilibrium theory of island biogeography, and discussed its implications for biotic diversity. He pointed out that: 1) as many as 92 percent of the breeding birds in some forests are migratory, 2) most of these are area-sensitive species that cannot persist in the face of forest fragmentation and 3) they are not replaced by other species.

New Jersey Studies

In 1972 Galli et al. (1976) and Forman et al. (1976) studied bird populations on 30 forest fragments in central New Jersey. They used analysis of variance to detect those species dependent upon the size of the forest fragment. Their forests varied in size from 0.01 ha to 24 ha. Unfortunately, they did not present comparable data from a large area of continuous forest for comparison with their forest fragments. Furthermore, only one of their fragments was greater than 10 ha in size. As a result, although they found that half of the forest species using their study plots were dependent on forest area, those species that are most critically dependent on area were lacking from all of their plots and so were not recognized as being area dependent.

Sources of Maryland Data

During the breeding seasons of 1974-76, R. F. Whitcomb and colleagues undertook a more extensive study of area sensitivity of eastern deciduous forest birds (Whitcomb et al., 1979). Realizing the urgency of obtaining a broad base of bird populations data from forested plots of many sizes and degrees of isolation, they used four techniques. Breeding Bird Census (Williams 1936) and Point Survey data (Whitcomb et al., loc. cit.) from 30 forest fragments ranging in size from one to 121 hectares were sup-

plemented with data obtained from Breeding Bird Survey Miniroutes (Bystrak 1978) and Breeding Bird Atlas (Klimkiewicz and Solem 1978) results. They used bird counts from 185 Miniroute stops scattered throughout Howard County, Maryland and 700 stops throughout Prince Georges County; each of these Miniroutes points was covered twice. The Atlas data, gathered by members of the Maryland Ornithological Society, showed which species were detected in each of the 25 square kilometer blocks throughout Montgomery County and 6.25 square kilometer blocks throughout Howard County.

Characteristics of Area-Sensitive Species

Whitcomb et al. (1979) computed an index of area sensitivity for each forest bird species by dividing the average number of territories detected at sampling points within small (6-14 ha) forest islands by the number detected in large (80+ ha) forest tracts. They noted strong correlations between the area sensitivity of many bird species and their regional distribution and abundance in forest habitats. When they compared area sensitivity of each forest bird species with characteristics of its breeding biology, they found that most of the species sharply reduced by forest fragmentation have the following characteristics: 1) they are long-distance migrants that winter primarily in the New World tropics; 2) they are obligate inhabitants of forest interior; 3) they tend to nest on or near the ground; 4) they build nests in the open rather than in the protection of cavities; 5) they raise only a single brood of young per year; and 6) they have a comparatively small clutch size.

In contrast, many bird species that are adapted to reproducing successfully under forest edge conditions are permanent residents or short-distant migrants that arrive early in the season and attempt two or more broods per season. The average nest height of these species is greater, more nest in cavities, and raise many more young per year. The edge-inhabiting bird species have a much higher chance of reproductive success in areas where predation from mammals, jays, and grackles is higher, nest parasitism from cowbirds is higher, and disturbance from humans is higher, because of a higher reproductive potential. On the other hand, some neotropical migrants that specialize in edge or scrub habitat (e.g., Prairie Warbler, Orchard Oriole, Blue Grosbeak) show some of the same tendencies for lower reproductive effort and higher sensitivity.

Area Sensitive Species

The area-sensitive forest interior species recognized by Whitcomb et al. include not only the Yellow-billed Cuckoo, Great Crested Flycatcher, Eastern Wood Pewee, Wood Thrush, Red-eyed Vireo, Black-and-white Warbler and Scarlet Tanager recognized by Galli and her colleagues, but also the Whip-poor-will, Pileated Woodpecker, Acadian Flycatcher, Veery, Yellow-throated Vireo, Worm-eating Warbler, Northern Parula Warbler, Ovenbird, Louisiana Waterthrush, Kentucky Warbler, Hooded Warbler, and American Redstart, as well as such wide-ranging species as hawks and owls.

Effects of Forest Fragmentation

A few specific examples will emphasize the dependence of area-sensitive species upon large tracts of undisturbed forest interior, tracts greatly in excess of the 1-5 ha territory size actually defended by most small migratory nongame birds during the breeding season.

Laurel

In 1952, I moved into my present home beside the Patuxent River gorge on the outskirts of Laurel in central Maryland. At that time the forest along the river was interrupted 3/4 km below me by the City of Laurel, but continued essentially unbroken for 14 km upstream (fig. 1a). The contiguous forest totaled about 5260 ha at that time, but it became progressively more fragmented during the ensuing 25 years. First Rocky Gorge Reservoir was created 3/4 km upstream from my home; next, Interstate Route 95 was constructed between my home and the reservoir; and then the hillside directly across the river was cleared of trees (fig. 1b).

Although my woods and the remaining contiguous area of forest totaling about 40 ha have not changed appreciably in character, the following birds that nested here 25 years ago have gradually disappeared: Broad-winged Hawk, Whip-poor-will, Yellow-throated Vireo, Black-and-white Warbler, Worm-eating Warbler, Ovenbird, Louisiana Waterthrush, Kentucky Warbler, and Hooded Warbler (table 1). The Acadian Flycatcher, Eastern Wood Pewee, Wood Thrush, Red-eyed Vireo, Northern Parula Warbler and Scarlet Tanager still nest here nearly every year, but in reduced numbers; and one pair of Red-shouldered Hawks still remains--perhaps receiving recruitment from the thriving population on the Patuxent Wildlife Research Center 8 km downstream.

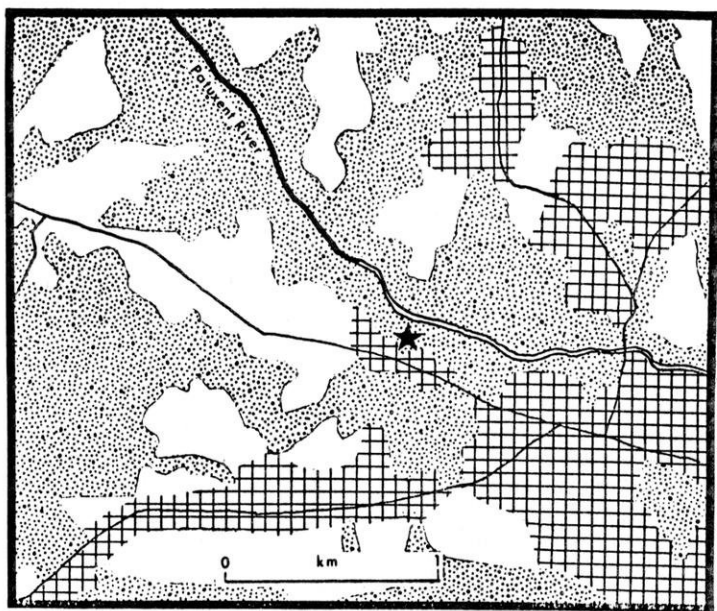


Figure 1a. -- Vicinity of Laurel, Maryland, showing forest cover (dots), fields (white), urban areas (small squares), and main highways (black lines) as indicated in 1951. Woods referred to in the text are marked with a star. (USGS 7.5-min. Laurel, Md., quadrangle, 1951)

Site	Laurel	Cabin John	Rock	Glover-	Seton	Patuxent
Plot size (acres)	--	18.75	80	Archbold	Belt	WRC
Forest area				35	36	90 135
Years	1953-54 77-78	47-48 76-77	48-49 74,77	59-60 76-77	47 75-76	59 72
Broad-winged Hawk	X ¹ 0	5.0 0	1.0 0		3.0 1.5	0 3.0
Yellow-billed Cuckoo	X X					
Whip-poor-will	X 0					
Ruby-throated Hummingbird	X X	5.0 0	3.0 0		4.0 ²	2.0 1.5
Great Crested Flycatcher	X X	14.5 5.0	4.5 ¹	14.0 0	8.0 0	0 0.5
Acadian Flycatcher	X X	34.5 34.5	27.0 1.0	25.5 3.0	33.0 18.1	25.0 14.5
Eastern Wood Pewee	X X	26.5 8.0	7.0 2.0	8.5 1.0	19.0 20.1	4.0 0.5
Wood Thrush	X X	21.5 0	20.0 8.5	32.0 4.5	40.0 81.9	20.5 14.0
Veery						
Yellow-throated Vireo	X 0	9.5 0	8.0 0	3.5 0	19.0 2.1	0 ¹ 3.5
Red-eyed Vireo	X X	74.5 40.0	52.0 18.5	31.5 12.5	100.0 92.4	50.0 50.5
Black-and-white Warbler	X 0	V ³ 0	3.5 0		11.0 0	3.5 0
Worm-eating Warbler	X 0	V 0			3.0 0	
Northern Parula Warbler	X X	70.5 8.0	0.5 0	11.5 0	4.0 ¹	3.5 2.0
Ovenbird	X 0		49.0 12.0	8.5 2.0	53.0 22.9	14.5 8.5
Louisiana Waterthrush	X 0	5.0 0	0 0.5	¹ 0		4.5 2.0
Kentucky Warbler	X 0	28.0 0	1.0 0	8.5 0	17.0 9.7	11.0 5.0
Hooded Warbler	X 0	11.0 0	5.0 0	15.0 0	8.0 1.4	19.0 0.5
American Redstart		68.0 13.5		34.0 ¹		9.0 7.0
Scarlet Tanager	X X	13.5 0	9.0 6.5	8.5 0	26.0 12.5	15.5 7.5
Mean species per year		31.0 21.5	26.5 21.5	42.0 26.5	28.0 25.5	32.0 47.0
Percent change in species		-31	-19	-37	-9	¹ 47
Mean pairs/100 acres		658.5 364.0	223.1 126.9	718.6 453.6	437.0 390.3	289.4 260.5
Change in total population		-45	-43	-37	-11	-10
Pairs of long-distance migrants/100 acres	16 ⁴ 9 ⁴	387.0 109.0	190.5 54.5	232.5 80.5	349.0 262.6	184.0 180.5
Change in long-distance migrants	-44 ⁴ 4	-72	-71	-65	-25	-35

Table 1. Population changes of long-distance migrants.

1X Present, but density not determined

2¹ Present in very small numbers, less than one-half territory

3V Visitor not nesting in study plat

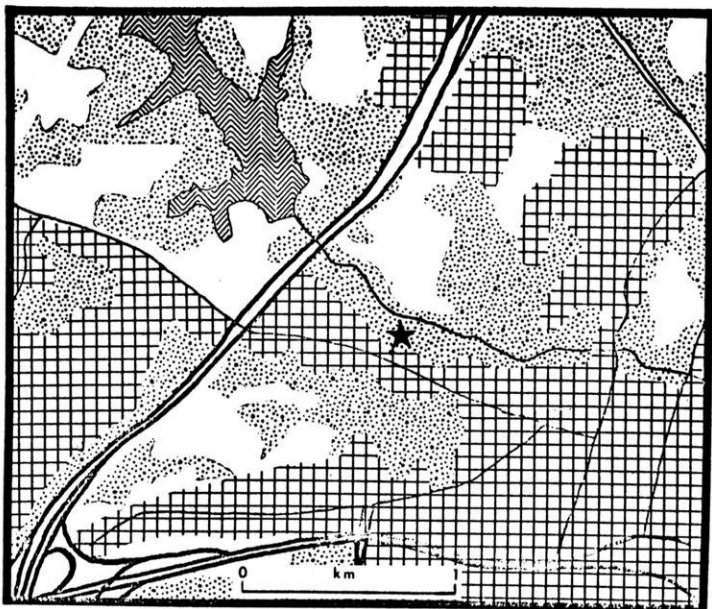


Figure 1b.--Same area in 1971, showing Rocky Gorge Reservoir, Interstate Route 95, Maryland Route 198 (bottom), and severe fragmentation of woodland. (USGS 7.5-min. topographic map, 1965, photorevised 1971)

Cabin John Island

A second example of a drastic change in bird population is evident on Cabin John Island in the Potomac River 4 km northwest of Washington, D.C., where breeding bird populations have been studied almost annually since 1947. This island is more than 500 m long and has an average width of 150 m (fig. 2a). Although vegetation of the island itself has not changed appreciably during the study period, there has been significant road construction, particularly the George Washington Memorial Parkway on both sides of the river, that has fragmented the formerly continuous forest that flanked both shores (fig. 2b). Many of the other nearby forests have yielded to housing developments.

During the 30-year study, five species that had originally been represented by two or more breeding pairs disappeared completely. These were the Wood Thrush, Yellow-throated Vireo, Kentucky Warbler, Hooded Warbler, and Scarlet Tanager. Three other less common species, the Yellow-billed Cuckoo, Ruby-throated Hummingbird, and Louisiana Waterthrush, also disappeared (table 1). Several other species declined 46% or more: Great Crested Flycatcher, Eastern Wood Pewee, White-breasted Nuthatch, Red-eyed Vireo, Northern Parula Warbler, and American Redstart (Thatcher 1948, Criswell and Gauthey 1977, and Criswell et al. 1948). The only neotropical migrant that did not decrease from 1947-48 to 1976-77 was the Acadian Flycatcher.

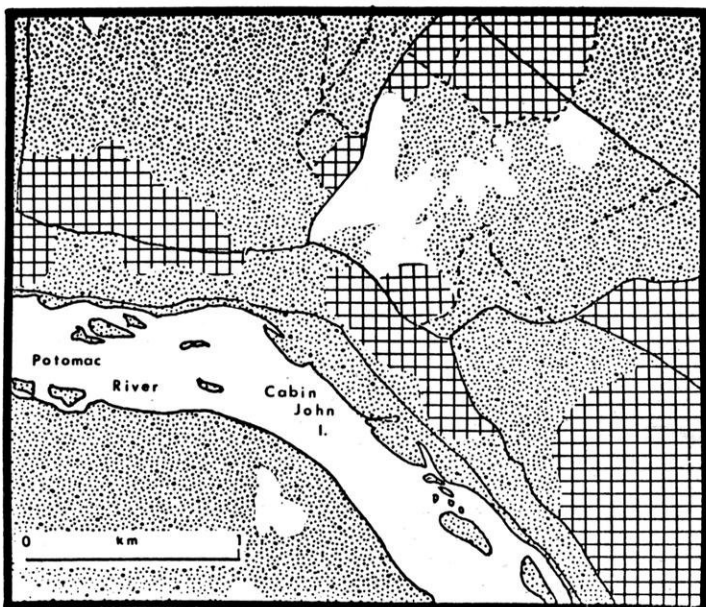


Figure 2a.--Vicinity of Cabin John Island as shown in 1951. (USGS 7.5-min. Falls Church Va.-Md. quadrangle, 1951) Shading as in figure 1.

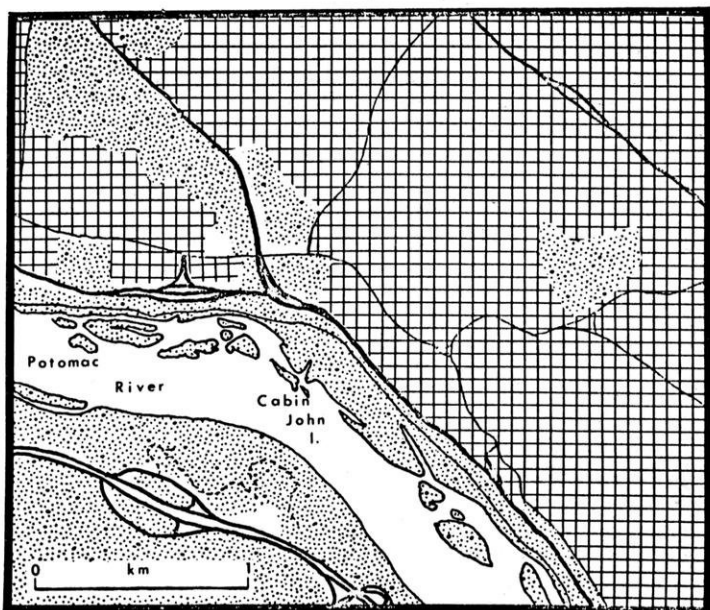


Figure 2b.--Same area in 1971, showing urban expansion and fragmentation of forest by major highways. (USGS 7.5-min. Falls Church, Va.-Md. quadrangle, 1965, photo-revised 1971).

Rock Creek Park

Two similar long-term studies have been conducted in Rock Creek and Glover-Archbold parks, major wooded areas within the District of Columbia. Rock Creek Park is a long, narrow, sparsely wooded area of about 800 ha along Rock Creek. It is completely surrounded by city and for many years has not been connected to the narrow strip of forest along the Potomac River by even a wooded corridor. Near the center of Rock Creek Park is a 26 ha study plot in which breeding birds have been censused intermittently since 1947. The original study plot (of 32 ha) was part of a 345 ha tract bordered on the north by Military Road and on the south by Porter Street. Beach Drive, Glover Road, Tilden Street and several minor roads traverse the 345 ha wooded tract, but the total amount of contiguous woodland present has changed very little during the 30-year period of the study. There has been an increase in automobile traffic and in pedestrian use of both the study plot and the park in general. Comparing (table 1) the early studies of Thatcher (1949) with more recent studies by Denney et al. (1974) and Criswell et al. (1978) one notes that the Yellow-billed Cuckoo, Ruby-throated Hummingbird, Yellow-throated Vireo, Northern Parula Warbler, Kentucky Warbler, and Hooded Warbler no longer breed in the study plot. Other species that have decreased by more than 50% during this period are the Great Crested Flycatcher, Acadian Flycatcher, Eastern Wood Pewee, Wood Thrush, Red-eyed Vireo, and Ovenbird. Recent surveys indicate that changes recorded within the plot are characteristic of the entire Rock Creek Park forest system.

Glover-Archbold Park

Glover-Archbold park and adjacent wooded areas comprise about 75 ha of woodland that are connected by a narrow corridor to the fringe of woods along the Potomac River. Breeding birds in the park have been censused annually since 1959. Except for the results of sewer construction in 1963, there has been no major change in the habitat of the study plot.

Neotropical migrants that were found nesting on the 14 ha study plot in 1959 or 1960 but were absent in 1976 and 1977 were Broad-winged Hawk, Great Crested Flycatcher, Yellow-throated Vireo, Northern Parula Warbler, Kentucky Warbler, Hooded Warbler, and Scarlet Tanager. The following additional species decreased more than 60% during the same period: Acadian Flycatcher, Eastern Wood Pewee, Wood Thrush, Red-eyed Vireo, Ovenbird, and American Redstart.

Seton Belt Mature Woodlot

In 1947, Stewart and Robbins (1947) censused the breeding bird population in a 15 ha plot within a fine stand of about 16 ha of mature tulip-tree-oak forest in southern Prince Georges County, Maryland. The results showed an exceptionally high density of breeding birds, 1,080 territorial males per km². There was no evidence of cutting or burning, and the owner claimed that it was a remnant of virgin forest. It is believed to be the largest such remnant on the coastal plain of Maryland.

This woodlot was censused again in 1975 and 1976 (Whitcomb et al. 1977) using the same boundaries and techniques as in 1947. Their report includes a map showing the location of this South Tract plot with relation to highways and nearby woods. The population changes in density of neotropical migrants are shown in table 1.

Species	Frequency ¹	Critical size ²	
		Acres	Hectares
Red-shouldered Hawk	14	250	100
Yellow-billed Cuckoo	137	750	300
Red-bellied Woodpecker	225	10	4
Hairy Woodpecker	22	10	4
Great Crested Flycatcher	146	25	10
Acadian Flycatcher	53	80	30
Eastern Wood Pewee	127	10	4
Blue Jay	262	10	4
Tufted Titmouse	294	10	4
Carolina Wren	300	25	10
Wood Thrush ³	304	250	100
White-eyed Vireo	117	80	30
Yellow-throated Vireo	27	250	100
Red-eyed Vireo ³	276	250	100
Black-and-white Warbler	24	750	300
Prothonotary Warbler	9	250	100
Worm-eating Warbler ³	9	750	300
Northern Parula Warbler	19	250	100
Pine Warbler	71	80	30
Ovenbird ³	84	6550	2650
Louisiana Waterthrush	6	250	100
Kentucky Warbler	32	80	30
Hooded Warbler	17	80	30
Scarlet Tanager	133	250	100
Summer Tanager	45	250	100

Table 2. Preliminary estimates of minimum forest areas required to sustain viable breeding populations of area-sensitive forest birds, based on 500 Breeding Bird Survey stops in central and eastern Maryland.

1 Number of stops at which the species was found.

2 Area at which the sharpest decrease occurred.

3 See text for comment.

Patuxent Wildlife Research Center

In 1959, I censused the breeding bird population in an undisturbed 36 ha portion of the mature deciduous forest along the Patuxent River in Prince Georges County, Maryland. The census plot was a mosaic of well drained and poorly drained floodplain with small islands of the neighboring river terrace, into which one-third of the plot projected. This plot, by virtue of its size, lack of disturbance, habitat diversity, and location within a 3000 ha forest on the Patuxent Wildlife Research Center and adjacent Fort George G. Meade, contained the entire avian species pool of the eastern deciduous forest of coastal plain Maryland. Breeding populations of the neotropical migrants are listed in table 1; for populations of the other species see Stamm et al. (1960). The bird population was subsequently sampled annually by 12 days of netting each summer through 1972, and breeding bird censuses were repeated every few years.

Timber was not cut in or near the study plot; however, all of the following disturbances probably contributed to the change in avian populations shown in table 1: 1) One corner of the plot was permanently flooded by construction of a duck pond in a nearby field; in addition to loss of forest from the study plot itself, the flooding brought an array of edge species (plant and animal) into the plot. 2) Construction of Rocky Gorge Reservoir upstream just before the beginning of the study altered the flooding regime of the tract; instead of being inundated periodically for short intervals several times each year, the water table is lower and the floods are fewer but more catastrophic. 3) Effluent from the Laurel sewage treatment plant now provides a substantial part of the total flow of the Patuxent River during the Summer months. 4) In 1962, as part of a simulated pesticide study, 174

breeding birds including 169 individuals of neotropical species were netted and removed from the plot to study the rate of re-population. The intent was to return the removed birds to the plot; however, the cooperating agency that was caring for the birds could not keep them alive and thus none of the warblers and flycatchers survived. The banding operation is known to have resulted in the death of nearly one percent of the birds handled, including a Black-and-white Warbler, the only breeding species that disappeared completely during the 1959-72 interval. This particular female, captured within hearing of her vociferous nestlings, apparently died from exhaustion attempting to get free of the net.

The Pattern

The pattern is quite clear. It is essentially the same group of species that are declining in each study plot, and these birds are the long-distance migrants. The permanent resident species, on the other hand, tend to maintain their populations despite suburban sprawl and forest fragmentation; the short-distance migrants that have adapted to survival in edge habitats, such as jays, House Wrens, catbirds, robins, starlings, blackbirds and towhees, also are maintaining their populations.

Summarizing table 1 (in which the data are presented in the original English measurements of the investigators): there was an overwhelming decrease in every long-distance (neotropical) migrant except the Veery; there was a decrease in density of breeding birds in every plot, even those with minimum disturbance; and the percentage decrease in long-distance migrants was consistently much greater than the decrease in the total population. If the densities of long-distance migrants are subtracted from the total densities, the sum of the densities of permanent residents and short-distance migrants in all five plots dropped from 984.5 to 968.2, a decrease of only 1.7%.

The only species that showed increases in any of the study plots in table 1 (out of 96 pairs of observations) were the following: Great Crested Flycatcher and Yellow-throated Vireo, both present in very small numbers, increased at Patuxent; the vireo was present every year, while the flycatcher nested erratically. There were very small increases in the Eastern Wood Pewee on the Seton Belt tract and the Red-eyed Vireo at Patuxent. The Wood Thrush increased substantially on the Seton Belt tract. The Veery, a recent invader from more northern breeding grounds, established itself or increased on three plots. And the Louisiana Waterthrush increased by a fraction of a territory in Rock Creek Park.

A Sample Species, the Worm-eating Warbler

Let us consider briefly the breeding distribution in Maryland of one of the species that no longer nests in any of the study plots in figure 1, the Worm-eating Warbler. The map in *Birds of Maryland and the District of Columbia* (Steward and Robbins 1958) showed this species as nesting throughout the Ridge and Valley, Piedmont, and Western Shore Coastal Plain Sections except for the highly agricultural Hagerstown, Middletown, and Frederick valleys and the flat bayshore necks of Baltimore, Harford, and Cecil counties. It also nested in forested areas along the Pocomoke River and its main tributaries and at seven isolated spots elsewhere in the State. A portion of the present-day distribution, based on the *Breeding Bird Atlas of the Piedmont Counties of Montgomery and Howard* (Klimkiewicz and Solem 1978),

is shown in figure 3. This species is strictly limited to the few remaining extensive areas of woodland.

Supporting Evidence from Breeding Bird Survey

To further test the area sensitivity of forest species and to gather information on the minimum forest area required to maintain populations of various species, comparisons were made between bird counts and habitat factors at 500 Breeding Bird Survey (Robbins and Van Velzen 1969) stops scattered through central and eastern Maryland. Each 3-minute Breeding Bird Survey stop was visited annually in the early morning in June, and data for the years 1974-78 were used in the analysis. Thirty habitat parameters were recorded at each stop. One of these was a measure of the acreage of contiguous forest in and adjacent to the quarter-mile radius counting circle. I should stress that the measurement of amount of woodland included not just the wooded area within the quarter-mile circle, but it also included all contiguous forest connected to woodland within the counting circle. For purposes of the analysis the forest was categorized into units expressed as powers of three. For example, forest plots of less than 1 acre (0.4 ha) were coded 0, those between 3^1 and 3^2 (3 to 9 acres, 1.2 to 3.6 ha) were coded 1, those between 3^2 and 3^3 (9 to 27 acres, 3.6 to 10.9 ha) were coded 2, etc. The highest category encountered was coded 8 (between 6,561 and 19,683 acres, 2,655 and 7,966 ha).

Correlation coefficients were computed for 72 bird species with the recorded abundance of each bird at each stop (5-year sum) matched against each of the following habitat parameters: Percentage of coniferous, deciduous, and mixed woods within a circle of 400 m (one-quarter mile) radius, and

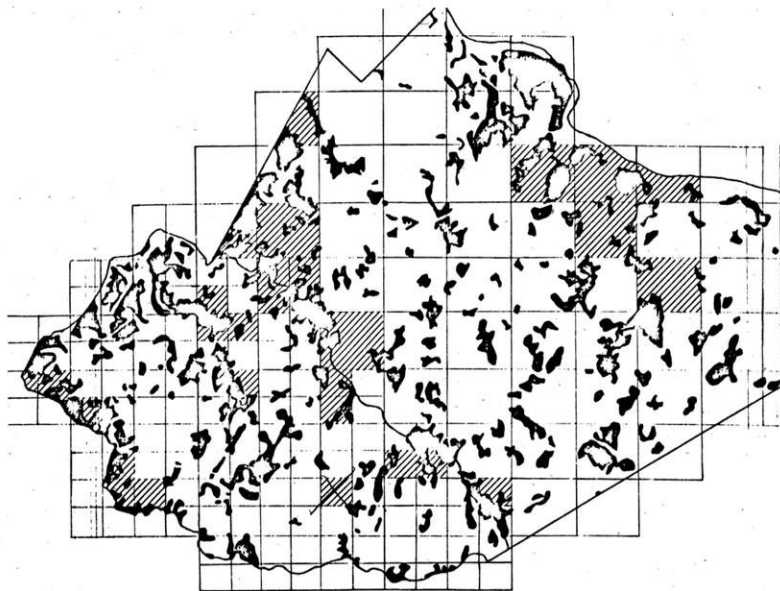


Figure 3.--Distribution of forest and of breeding Worm-eating Warblers in Montgomery and Howard Counties, Maryland. Data from Breeding Bird Atlas.

height of the canopy; percentage of brush, plowed, cultivated, pasture, hay, lawn and fallow land, and of tidal estuaries, salt, brackish, and fresh marsh, and disturbed or industrial areas; number of houses and of visible snags; presence of hedges, electric wires, fences, streams and ponds; height of shrubs and width of roadside shoulder; also whether the road was paved, the time of morning when the bird counts were made, and the area of contiguous forest as described in the previous paragraph.

Considering only those correlations that were highly significant ($p \leq .01$) when each bird species was compared with each of 29 environment factors, the only factor that was correlated with the abundance of more than half of the bird species was the area of contiguous forest (41 species). Other factors with a large number of highly significant correlations were: percentage of deciduous woods (36 species), percentage of coniferous woods, percentage of mixed woods and number of houses (24 species each), percentage of hayfield (23 species), and presence of fences (22 species).

Supporting Evidence from the Allegheny Mountains

In the Allegheny Mountains of Western Maryland and Western Pennsylvania, Deanna Dawson and colleagues from the Migratory Bird and Habitat Research Laboratory studied breeding bird populations with relation to numerical habitat descriptions in the summer of 1978. They included in their list of variables the same area measurement of contiguous forest that I had used in the above Breeding Bird Survey analyses. Their habitat variables were measurements of the tree size and density, shrub cover, canopy cover, ground cover, tree species, slope, etc., a list of criteria almost entirely different from those used in the Breeding Bird Survey analysis. It is important to note, however, that the one factor with the largest number of significant correlations with bird populations was the same one that was found to be most significant in the Breeding Bird Survey analysis--the area of contiguous woodlands.

Determining Area Requirements for Sensitive Species —

Problems in Making Estimates

Having established that there is a strong relationship between the extent of contiguous woodland and the populations of certain species of birds, the next question is one of defining the amount of contiguous forest needed for each of the area-sensitive species. Rough estimates can be obtained in several ways. One is to find the smallest forest fragment on which the species maintains at least one territory during the nesting season. The chief problem with this approach is that it does not take isolation into account. For example, MacClintock et al. (1977) found that a small fragment minimally isolated from a large continuous forest supported many of the neotropical migrant species characteristic of the larger woodland. Howe and Jones (1977) also pointed out that the least isolated of the small woodlots in southern Wisconsin supported the most species. Thus, any given small woodland is an integral part of a regional habitat mass that supports a regional population of the species in question. Sub-units of this regional habitat mass are inadequate, by themselves, to support a population of sufficient size to retain genetic flexibility and to buffer against normal oscillations that characterize all populations. Also, it is difficult or impossible to know whether a given nesting attempt is successful, or even whether a singing male has a mate. Furthermore, it would be dangerous to

draw conclusions from a single instance, which might be atypical. A pair of birds may succeed in rearing young in a year of super-abundant food. In years when food is in short supply, weather is abnormally wet, or predation is exceptionally high, nesting might be a complete failure. Thus, the critical area required for survival of an area-sensitive species is the area in which young can be produced in sufficient numbers to replace adult attrition under the poorest conditions of weather, food availability, competition from other wildlife, and other disturbances. All in all, the diversity of interacting factors presents a complex situation, and the investigator must exercise extreme caution in proposing "safe" definitions of forest area required.

Estimates from Breeding Bird Survey

To approach the problem in another way, I have computed for each area category the percentage of Breeding Bird Survey stops at which each area-sensitive species was recorded, using 5 years of data from 500 roadside stops in central and eastern Maryland. In this way I can determine not only the smallest forest fragment in which the species was recorded, but can determine at what point the frequency of occurrence begins to decrease as contiguous forest area decreases. Admittedly this method is biased to some degree merely by the proportion of the quarter-mile circle that is wooded, regardless of whether the woods are continuous or fragmented. In spite of this bias, there is for each species at least one point at which there is a noticeable decrease in frequency of occurrence. These points are summarized for many of the area-sensitive species in table 2, in order to give a preliminary estimate of the area sensitivity of each species.

From other breeding population data we know that figures in table 2 for the Worm-eating and Hooded Warblers are lower than the size these species require. This discrepancy results from an inadequate sample size for these species. Several of the other species registered an additional sharp decline at a lower size level: Ovenbird at 10 ha, and Wood Thrush and Red-eyed Vireo at 4 ha. The management concept shown by these studies is that large blocks of forest are necessary for the survival of nongame bird communities.

Management Implications and

General Management Principles

From these early studies on forest fragmentation we can make some recommendations for management of forests to maintain migratory nongame bird populations. First, a large undisturbed forest area needs to be maintained at all times. Where managed forests are contiguous with large natural areas (fig. 4a), such natural areas could serve as a nucleus for population maintenance. When the entire forest is subject to management, it is probably preferable to use a rotation program under which a large contiguous tract remains undisturbed at any one time. Ideally, rotation would occur in an orderly manner, such as a circular path with several hundred hectares cut in one or two years. The adjoining area would be cut several years later, and so on, in such a fashion that the bird population would move from one managed area to an adjacent one as the various seral stages moved across the landscape and as the area of mature forest gradually moved from one spot to another (fig. 4b).

Robert Whitcomb has pointed out (pers. comm.) that when running Breeding Bird Survey routes in the West Virginia mountains he has been im-

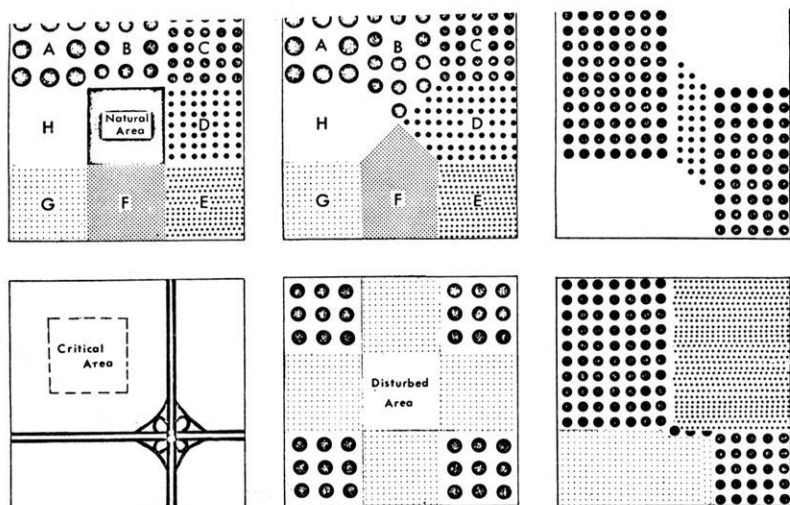


Figure 4.--Management implications for forests surrounded by other land use. Shading simulates age of forest.

- Ideal management, with best opportunity to preserve all bird species present.
- Good management, providing maximum adjacent habitat of each seral stage.
- Avifauna can be preserved by planting to connect isolated woods with other forest.
- Presence of highways or other disturbance requires change in management strategy.
- Severe fragmentation leads to extinction of area-sensitive species.
- Effects of fragmentation can be reduced by leaving connected wooded corridors.

pressed with the great variety and abundance of warblers in areas heavily lumbered and disturbed by strip mining. Although most of the woods are in early and middle stages of growth, management has been in large units and the avian species pool has been preserved. Another advantage of managing forests in units of several hundred hectares is that disturbance in any given season is restricted to a small part of the entire management area. Conversely, if timber is harvested in many small isolated plots in the same season, the operations will impact not only the birds in the several plots, but also those along many access trails in other portions of the management area. Aesthetically, management of much smaller units might be more pleasing; but if we wish to maintain the integrity of the entire ecosystem, fragmentation into small blocks (fig. 4e) should be avoided where possible.

In states where forests are already greatly fragmented, one should view a forest management plan in the context of the adjoining forest areas and strive to coordinate management practices with nearby land owners in an effort to prevent inadvertent loss of area-sensitive species through simultaneous destruction of sources of avian re-population.

These recommendations are derived from research on bird populations; however, they might apply to other forms of life as well. Special management techniques should be considered for locally sensitive species.

Snags

During the past six years several investigators have emphasized the value of snags to wildlife (Conner 1978). There is no question that presence of snags

will increase populations of hole-nesting species, especially in the early successional habitats with few natural cavities. Snags also are used as perches for many species other than cavity nesters. While snags increase the populations of some species, however, they may cause a decrease in others by introducing edge conditions into a forest interior. I doubt that anyone will challenge the benefits of leaving snags at or near the edge of a managed forest, but one must consider the consequences of permitting snags to be retained intentionally in forest interior situations. The principal problem is that snags are used by cowbirds for watching the activities of other species in whose nests they will lay their own eggs. Mayfield (1977) found the Brown-headed Cowbird to be one of the most serious threats to survival of the endangered Kirtland's Warbler (Mayfield 1977). The introduction of cowbirds into forest interior situations where they do not normally occur (Lowther and Johnston 1977) will have a detrimental effect upon many of the neotropical insect-eating migrants that are restricted to the forest interior. The forest interior specialists are not adapted to compete with nest parasitism from the cowbird. Nearly all build open nests that are easily found by the cowbird, and most also raise only a single brood per year so that cowbird parasitism may destroy the entire annual production.

I am not saying that snags are bad in all interior situations, but I would like to stress that if use of snags is promoted in the forest interior such snags should be clustered in a few areas rather than permitted to exist throughout a managed forest. Furthermore, when feasible, I recommend that tall snags that break the canopy be removed and shorter snags within the canopy be retained. This is because cowbirds tend to select exposed perches.

Bear in mind that snags at or near a forest edge will frequently attract nesting Starlings, and the Starlings in turn compete with native hole-nesting species, especially flickers, Red-headed Woodpeckers, and bluebirds.

Reservoirs

One of the greatest disasters that can befall a forest bird community is the creation of a reservoir. In large sections of north central and northeastern United States the most extensive wooded areas are those in stream valleys. When such valleys are impounded for water supply, flood control or recreation purposes, the most moist and generally most productive forest areas are destroyed, and, many of the adjacent upland forest areas are fragmented to the point that they can no longer support the area-sensitive species of migratory birds. As an example, I would like to refer again to Rocky Gorge Reservoir near my home (fig. 5). Within the flooded basin of the reservoir, all the lowland forest was destroyed. In addition, the remaining upland has been fragmented so that at the present time there is not a single point in the former continuous forest that is more than 300 meters from the edge of the forest. While small numbers of many of the area-sensitive species still persist on these fragments, it is almost certain that these populations are doomed. The close proximity of edge conditions throughout the area must inevitably lower reproductive rates of the present population, and there is no longer an adjacent more mesic forest of higher productivity that can serve to offset losses in the peripheral population.

My reason for citing this example is that by means of proper long-range planning it would have been possible to protect or plant forest in strategically located areas adjacent to the impoundment prior to construction of the reservoir. If some of the areas marked with heavy dashed lines in figure 5

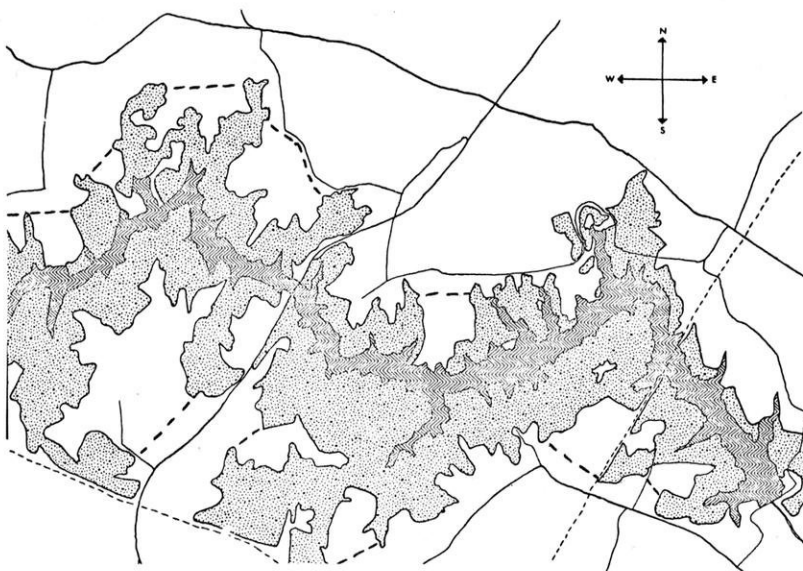


Figure 5.--Excessive fragmentation by Rocky Gorge Reservoir could have been prevented by planting forest within the dashed lines prior to destroying the original forest.

had been planted to forest before the area along the river was cut, several large areas of contiguous forest could have been retained, giving additional protection to the watershed and also providing refuge areas that could have served to perpetuate most of the avifauna typical of the original forest.

Corridors

One way in which the loss of area-sensitive species from forest fragments can be decreased is by leaving (or planting) corridors that connect the fragment with a larger forested area (fig. 4f; see also MacClintock et al. 1977). The corridor concept has also been used successfully during the non-breeding periods to bring woodland birds closer to residential areas. Very few studies have documented effects of corridor width on bird populations, so no specific recommendations can be made now regarding the preferred width of such corridors or the extent that they are beneficial to certain species. Right now, I can only recommend retention of even a narrow corridor to prevent complete isolation of forest fragments. The corridor concept could also be carried too far. If a large number of small fragments were connected by corridors from the same source of re-population, birds from a main forest might be enticed into fragmented woodlots where increased predation, competition from edge species, and other factors would prevent successful rearing of young (Whitcomb et al. 1979).

Management Recommendations

The following 16 recommendations stress steps that can be taken to retain the obligate forest-interior species in the breeding population. Nearly all of the edge species and those of the various seral stages will find suitable habitat regardless of the management techniques employed; these species are not so dependent upon large contiguous areas of similar habitat. Thus,

the edge species of birds are not in danger of being eliminated from the species pool.

1. Avoid unnecessary fragmentation of forests (fig. 4e).
2. Manage in large blocks, or in such a way that small blocks are adjacent to more extensive forest.
3. In long-range plans designate tracts that will be mature or nearly mature at each stage in the management plan, and design normal management operations in such a way that re-population of disturbed areas can proceed via wooded connections or over the smallest possible gaps in forest cover.
4. When possible, use a fairly uniform plan of rotation cutting (fig. 4a,b) so that the oldest sections at any time are adjacent to each other and the younger stages are adjacent to themselves, making the maximum usable area available to each bird species, no matter what its requirements.
5. Plan cooperatively with adjacent landowners so that maximum re-population potential of those species that require extensive mature or near mature forest can be achieved.
6. In areas where mature forest is limited, consider preserving one or more strategically located mature tracts to serve as sources of avian re-population.
7. In any management plan designate areas that are especially sensitive during any particular period of the year; and by posting or other means keep disturbance such as camping, hiking, picnicking, fishing, surveying, marking, or cutting to a minimum during the nesting season (May through August).
8. When public use is part of a forest management plan, restrict activities to the edge of a sensitive area rather than permitting them to extend into its center.
9. Retain vegetational diversity to the extent feasible, because many studies have demonstrated a direct relation between vegetational diversity and avian diversity.
10. Pending concluding of more definitive studies on minimum habitat area requirements of various avian species, think in terms of 1,000 contiguous hectares (2,500 acres) of forest canopy as a desirable goal to preserve most or all of the avian species pool.
11. In smaller tracts (even down to 2 ha or less) it is beneficial to maintain the maximum contiguous woodland with the least amount of edge.
12. Management units that approach a square in shape are more effective in preserving forest-interior birds than are long, narrow ones--especially when managed tracts are small. The portions of a forest that are most beneficial to neotropical migrants are several hundred meters or more away from the forest edge.
13. Leave snags along forest edge or in patches in the forest interior, but not throughout the forest. In the forest interior select for preservation those snags that will not extend above the canopy of the nearly mature forest.

14. In any management plan consider the disruptive effects of other projects such as existing or proposed super-highways, impoundments, transmission line corridors, or sewer lines (fig. 4d). Check with appropriate agencies on the timing of new construction, to avoid inadvertent loss of a critical area at the wrong time.
15. With reference to recommendation 14, provide mitigation planting as long ahead of the impending disturbance as possible (fig. 5).
16. If wooded fragments must be isolated from the forest proper, retain a connecting corridor, such as along a stream; or if an island of forest has already been separated, consider planting a corridor to reconnect it (fig. 4c,5).

APPENDIX

Scientific Names of Birds

Nonpasserines

Broad-winged Hawk	<i>Buteo platypterus</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Ruby-throated Hummingbird	<i>Archilochus colubris</i>

Flycatchers

Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Acadian Flycatcher	<i>Empidonax virescens</i>
Eastern Wood Pewee	<i>Contopus virens</i>

Thrushes

Wood Thrush	<i>Hylocichla mustelina</i>
veery	<i>Catharus fuscescens</i>

Vireos

Yellow-throated Vireo	<i>Vireo flavifrons</i>
Red-eyed Vireo	<i>Vireo olivaceus</i>

Wood Warblers

Black-and-white Warbler	<i>Mniotilta varia</i>
Worm-eating Warbler	<i>Helmitheros vermivorus</i>
Northern Parula Warbler	<i>Parula americana</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Louisiana Waterthrush	<i>Seiurus motacilla</i>
Kentucky Warbler	<i>Oporornis formosus</i>
Hooded Warbler	<i>Wilsonia citrina</i>
American Redstart	<i>Setophaga ruticilla</i>
Scarlet Tanager	<i>Piranga olivacea</i>

Other Species Mentioned

Red-shouldered Hawk	<i>Buteo lineatus</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
House Wren	<i>Troglodytes aedon</i>
Kirtland's Warbler	<i>Dendroica kirtlandii</i>
Prairie Warbler	<i>Dendroica discolor</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Orchard Oriole	<i>Icterus spurius</i>
Blue Grosbeak	<i>Guiraca caerulea</i>

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Reflections On A Birding Weekend

May 27 - 30, 1978

By Daryl Tessen

The spring migration (1978), while generating some excitement, had generally been disappointing. The unseasonably cool weather persisted into May, holding the main passerine wave to the south in Kentucky. A sudden warming trend in mid-May brought the birds through in impressive but rapidly moving numbers. It was therefore with a degree of uncertainty that I formulated plans for a trip to cover the western and northern portions of the state during the Memorial Day weekend. Anything but reassuring was a quick trip to Milwaukee on the 26th which failed to produce the Cinnamon Teal that had been discovered the previous day. My tentative plans included covering Wyalusing State park, Trempealeau N.W.R., various lakes in Dunn and St. Croix counties, Fish Lake and Crex Meadows Wildlife Areas, Solon Springs, the Brule River, Wisconsin Point at Superior, Ashland and the Clam Lake area. A previous May trip (1977) with fellow birders (Jim Frank, Craig and Ruth Faanes, Bob Ake) had produced a highly interesting group of birds, especially at Crex Meadows, W.A. and Wisconsin Point. As a result I planned to spend the majority of time at these two places.

The day and a half drive to Crex Meadows was noteworthy on two counts, meteorological and ornithological. The 27th quickly developed into a hot (mid-90s F) and humid day, with severe storms accompanied by torrential rains raking the western and northern portions of the state by evening. The 28th dawned foggy, with it lifting by mid-morning, but the air remained heavy with the indication of impending storms and additional heavy rains.

The ride to Wyalusing State Park was highlighted by Dickcissels singing their "dick-ciss-ciss" from many fenceposts and tall weeds. Often they were accompanied by the buzzing of the Grasshopper Sparrow. Two brilliantly colored Prothonotary Warblers were "pished" into fine viewing position at the Bagley Bottoms. Wyalusing S.P. produced its usual compliment of birds. This included two Henslow's Sparrows practicing their "hic-cup" song along with the "nasal" song of three Bell's Vireos along the entrance road to the park. The Long Valley Road yielded Cerulean Warblers, Blue-gray Gnatcatchers, plus three southern treats: several Tufted Titmice, six Acadian Flycatchers and four Kentucky Warblers. It was while trying to draw one of the Kentuckies into closer viewing range that I was pleasantly surprised to hear the chippy-like call of the Worm-eating Warbler. A closer check revealed this drab warbler in dense undergrowth in the same locale as last spring. At Oakridge Lake (St. Croix County) a pair of Red-necked Grebes were observed building their nest in a cattail island. Fish Lake W.A. revealed a surprisingly high water level, which diminished birding productivity. However, nesting Double-crested Cormorants and Ospreys provided a nice picture on the Grettum Flowage.

Crex Meadows

The entire afternoon (28th) and evening was spent covering Crex Meadows. Unfortunately, a similar high water problem existed here, curtailing the productivity of certain parts of the marsh. In particular was the Reed Lake pump station area, which last May (1977) had attracted Yellow Rails, Sharp-tailed and LeConte's Sparrows. Of interest during the afternoon were 21 Canada Goose families, a nesting pair of Osprey, five Common

Loons, six Bonaparte's Gulls and 54 cormorants. Returning to the marsh in the early evening I was rewarded with a raven, always a treat to a "southern" birder, and one singing LeConte's Sparrow. A light rain that began as I arrived at Reed Lake soon gave signs of increasing to a downpour. A strong storm that earlier had passed southeast of the marsh was suddenly doubling back. As I exited via the East Refuge Road, I casually noticed a gull-sized bird approaching from the southwest, a bird that was to prove one of the highlights for the weekend. What caused me to forget the pending storm was the observation of a distinct bend in the joint of the bird's wings. Slamming on the brakes and jumping from the car I had the pleasure of watching an adult Parasitic Jaeger leisurely pass overhead. A passing car of non-birders paused briefly, apparently frozen by my excited look and a series of comments. The bird headed northeast into the descending storm. A quick attempt to relocate it proved fruitless, as the storm broke almost immediately.

After a night punctuated by storms and a quick dawn (29th) excursion onto the marsh that revealed nothing new, I headed towards Superior. A short check of the Brule River near Solon Springs revealed an assortment of warblers and one Olive-sided Flycatcher searching for insects. However, it was while listening to the "drink-three-beers" of the Olive-sided that an alarmed "peek-peek" came from a nearby spruce tree. Suddenly a dark, medium sized woodpecker flew across the road to a nearby dead spruce. For the next five minutes I was afforded a memorable view of a female Black-backed Three-toed Woodpecker who proceeded to tell me her thoughts on my intrusion into her territory.

Wisconsin Point

As I arrived at this unique migratory haunt, a moderate rain was falling. A "waterlogged" Osprey was perched on the dead tree overlooking the eastern edge of Allouez Bay as I searched for an unflooded parking spot. After locating one and donning rain gear, I ventured into a thoroughly soggy but most surprising area. Almost immediately it became apparent that I was standing in the midst of an **immense** number of grounded birds. The Superior area had had several consecutive days of storms, heavy rain and dense fog. Undoubtedly this forced numerous migrating birds, upon reaching Lake Superior, to follow its shoreline. Upon reaching Wisconsin Point, they could migrate no further, resulting in the build-up that I was currently witnessing. It was impossible to take a step without having from five to 50 birds move ahead of me. This proved true not only for the wooded area, but also the grassy section of the beach and the beach itself. **Birds were everywhere!** In the woods there were warblers, vireos, thrushes and flycatchers. Even the grassy area had a seemingly endless stream of similar bird groups darting back and forth. It was surprising to be able to see Magnolias, Palms, Wilson's and Redstarts, accompanied by Least and Yellow-bellied Flycatchers flush as I made my way to the open beach. This yielded an impressive collection of shorebirds, surprisingly interspersed with an amazing number of flycatchers, primarily Eastern Kingbirds. Added to this gathering were Brewer's Blackbirds, a lesser number of different sparrows, a few warblers, plus one Lapland Longspur.

Conservatively, I estimated that 2500 individuals were concentrated on this tiny spit of land. During the four hours that I initially spent on the Point (10:00 a.m. to 2:00 p.m.) many passerines were noted moving back and

forth along the two mile length of the peninsula. However, they seemed reluctant to leave it for the adjacent mainland. An interesting feature of this event was the number of certain species observed. Shorebird numbers included 400+ Ruddy Turnstones, 300+ Sanderlings, 250+ each of Semipalmated Sandpipers and Dunlins, 15+ Semipalmated Plovers and 10+ Baird's Sandpipers. The flycatchers included 100+ Eastern Kingbirds, 50+ Yellow-bellied Flycatchers, 35+ Least Flycatchers and 30+ Eastern Wood Pewees. The thrushes were dominated by the Swainson's and the Veery, both 35+. Vireos were primarily represented by the Red-eyed (35+) and Philadelphia (15+). The warbler list was headed by the American Redstart (45+), followed by the Wilson's and Yellowthroat (25+ each) and then the Yellow, Magnolia, Chestnut-sided and Canada (15+ each).

Equally impressive were the unusual birds found here. Headlining the finds were the two Cassin's Kingbirds. The first was originally discovered perched on a large drift stump on the beach among 15-20 Eastern Kingbirds, a multitude of shorebirds and the one longspur. During the many minutes that I followed it in its westerly movement along the beach, two Red Knots and one Western Sandpiper were discovered among the shorebirds. Eventually the original Cassin's landed next to a second individual. Other interesting, though less heart-stopping sightings included a male Common Goldeneye, a female Bufflehead and an Olive-sided Flycatcher.

After briefly birding the Sewage Treatment Plant in the late afternoon, where a Piping Plover and a tardy Lesser Yellowlegs were enjoyed, I returned to the Point for the evening. Here I met Don Follen and Ken and Jan Luepke. We birded the area until a fog bank rolled in from the lake. Prior to its arrival we were fortunate enough to discover a Whimbrel along the beach and move close enough for an excellent view. Unfortunately, the fog bank hindered our efforts to relocate the Cassin's Kingbirds. As I left the Point later that evening, the passerines could be heard in the trees and grass, while the shorebirds called as they scurried around the beach. It provided a dream-like quality to a day during which I had been fortunate enough to witness a birding phenomenon that few get to see. Later that evening a tabulation of the day's list revealed 153 species, including 115 on Wisconsin Point alone. The latter included 14 shorebird, 9 flycatcher, 5 thrush, 3 vireo and 23 warbler species.

The 30th dawned exceptionally foggy. As I had to return to Illinois this day I decided all I had time for was a quick recheck of the Point. It was obvious after only a few minutes of birding that the passerine numbers were considerably reduced from the previous day. Likewise there were many fewer shorebirds scattered along the beach. However, it was while checking one of the first beach areas that the birding surprises resumed. When the fog bank briefly retreated, a group of ducks was revealed swimming towards the shore. This group consisted of both dabblers and divers, and totaled 13 species. The divers generated the excitement. Swimming near a male goldeneye was a male Surf Scoter, and next to it, an immature male Harlequin Duck. After I watched this unique group for several minutes, the fog began to envelop them again. As I returned to my car, I became aware of gulls calling overhead. The first were lost in the fog, but the next group, consisting of five birds, flew low enough to reveal themselves as Franklin's. Simultaneously eight Red Crossbills passed by in the opposite direction. Before the fog totally enveloped the peninsula, I decided to quickly recheck

the original sighting place for the Cassin's Kingbird. Surprisingly one bird was only a few feet from where it had been originally discovered. A quick recheck of the original identification points was made, again verifying the species. It shortly took flight and soon afterwards, so did I.

The drive towards Illinois was broken with an all-too-brief stop at the Brule River near the community of its name. There Evening Grosbeaks added to the gathering of warblers and flycatchers. The Ashland area had several Mute Swans plus a totally unexpected White-fronted Goose at Chequamegon Bay and two Franklin's Gulls on a pier in the city itself. From Ashland, the drive southward was punctuated by a Gray Jay and a singing Winter Wren near Clam Lake. However, as I headed homeward, I realized that anything now would seem anticlimactic after these past four phenomenal days. Certainly I was most fortunate to have witnessed such a bird variety, highlighted by the Wisconsin Point collection. It was not until the next evening, after some much needed sleep, that a tabulation of the trip list revealed a total of 208 species. The events of these past four days will certainly provide me with a most pleasant memory for many future years, especially on those cold, snowy winter nights.

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HABITAT FOR WILDLIFE

Mary and Charlie Nelson

Status of the Black Tern in Western Wisconsin

By Craig A. Faanes

The Black Tern (*Chlidonias niger*) is a fairly common migrant and nesting species in western Wisconsin (Faanes and Goddard 1976). Though considered a species characteristic of prairie wetlands, Black Terns are well distributed in Wisconsin, with nesting reported from most regions of the state. Recent data summarized by Robbins (1977) suggests that a statewide decline in Black Tern breeding populations is occurring. On Breeding Bird Survey transects (Robbins and Van Velzen 1967) conducted in Wisconsin, the average number of Black Terns recorded per route declined from 2.3 in 1968 to 0.4 in 1975. These data indicate a yearly statewide population decrease of 14 percent.

Elsewhere, in the central regions of the Canadian prairie provinces, Erskine (1978) observed a decline in the Black Tern breeding population; data from the southern regions indicated a stable population. However, Erskine noted year-to-year population fluctuations.

Concern for other tern species in Wisconsin has recently been expressed. Breeding populations of both Forster's Tern (*Sterna forsteri*) and Common Tern (*S. hirundo*) have declined dramatically within the state. These terns have been given "watch status" by Wisconsin Department of Natural Resources personnel, and may soon be designated endangered in the state (R. Hine, pers. comm.).

To document possible changes in Black Tern breeding populations in western Wisconsin, I monitored tern colonies on several wetlands in St. Croix and southern Polk Counties from 1975 to 1977.

Study Area and Methods

The topography of central St. Croix and southern Polk Counties, Wisconsin consists of gently rolling hills and broad glacial outwash plains. Fertile prairie wetlands occur throughout the landscape. Highly productive loam and silt-loam soils, overlying Wisconsin age glacial till, are the predominate soil associations. (Martin 1932).

Curtis (1959) described the original vegetation of this area as a continuum between forest and prairie. At the time of settlement, large expanses of tallgrass prairie dominated by big bluestem (*Andropogon gerardi*) were common. Intermixed with the prairie were small stands of various oaks (*Quercus* sp.) giving the entire area the aspect of a savannah (Kuchler 1964). Currently, most of the uplands are in agricultural production and nearly all of the native vegetation has been destroyed.

The proximity of the Twin Cities metropolitan area (30 miles W) makes this area a prime location for rural residential development. Hundreds of acres of land are being altered annually to accommodate these developments. In 1977, St. Croix County had one of the highest growth rates of any Wisconsin county (T. Nelson, pers. comm.).

The seven ponds I studied ranged from 7.9 to 71.4 ha. According to Fish and Wildlife Service wetland classification schemes (Shaw and Fredine 1956) five ponds were Type V, permanent fresh wetland; and two were Type IV, semi-permanent fresh wetlands. Dominant emergent plants in the deep marsh zone included river bulrush (*Scirpus fluviatilis*), roundstem bulrush

(*S. acutus*), cattails (*Typha latifolia*, *T. angustifolia*), and duck potato (*Sagittaria* sp.). Common submerged aquatic plants included water milfoil (*Myriophyllum* sp.), coontail (*Ceratophyllum* sp.), duck week (*Lemna* sp.), and various algae.

Black Terns were censused during surveys of breeding waterfowl and other marsh birds. Breeding pairs of Black Terns were observed on other wetlands in the area; however, the main population was in my waterfowl study area and I kept records only on those birds. Breeding pairs or inferred pairs were determined on the basis of territorial defense or upon finding an active nest. Pair populations on Oakridge Lake and Goose Pond were considered exact, since I found the same number of nests as there were inferred territorial pairs.

I made observations from a canoe or on foot, using 8 x 40 binoculars. The territory or nest of each pair was mapped on rough-scale field maps of each pond. Each wetland was visited from 5 to 7 times during each breeding season. Thus, population figures probably reflect the maximum number of breeding pairs utilizing the wetlands each year. General changes in water levels throughout the breeding season were estimated for each pond. General observations were made on the relative abundance of potential food items.

Results and Discussion

During the study, 90 Black Tern pairs were observed. Yearly populations were: 1975, 42 pairs; 1976, 30 pairs; 1977, 18 pairs (Table 1). These figures represent a 57.2% decrease in the population over the 3-year period. Populations on two wetlands, Lundy Pond and Goose Pond, were extirpated by 1977. The two populations showing the smallest fluctuation were Oakridge Lake (-36%) and Flater Waterfowl Production Area (WPA) (-34%).

Possible factors contributing to this decline were changes in water levels and a corresponding change in aquatic vegetation growth. This region of Wisconsin experienced a severe drought during 1976 and 1977. Water levels on many wetlands were substantially below 1975 levels. However, estimation of water level changes on these seven ponds indicated this probably was not a contributing factor. During 1977, water levels on Goose Pond were below 1975, and the northern end of the pond became dry. Breeding terns utilized the western and southern ends of the pond, and were probably not adversely affected by low water levels. Water levels on the larger ponds were not significantly lower, and the levels of Oakridge Lake apparently increased during mid-1977.

Breeding pairs invariably utilized the deep-marsh zone of each wetland. All but 1 of 52 tern nests were found on mats of floating vegetation (Table 2). The three vegetation types most commonly used for nest placement were cattail, river bulrush, and round-stem bulrush. Six nests were found on mats of submerged aquatic plants. In 1975, one pair deviated from the usual habit of nesting on floating vegetation and was found on a muskrat (*Onдатra zibethicus*) house. In Iowa, Bergman et al. (1970) found cattail rootstocks were the most frequently used nest substrate (53%). However, they found 25% of the Black Tern nests on muskrat lodges.

An abundance of both emergent and submerged aquatic vegetation was available on each wetland and therefore was probably not a factor in the

Wetland	Location		Size (in ha)	Breeding pairs			% Change 1975-1977
	County	Legal description		1975	1976	1977	
East Twin Lake	St. Croix	T. 29N., R. 18W., Sec 28	34.4	12	10	5	-54
Lundy Pond	St. Croix	T. 30N., R. 18W., Sec 27	17.1	4	0	0	-100
Hatfield Lake	St. Croix	T. 31N., R. 18W., Sec 25	40.9	5	3	3	-40
Oakridge Lake	St. Croix	T. 31N., R. 17W., Sec 9	71.4	11	10	7	-36
Goose Pond	St. Croix	T. 31N., R. 17W., Sec 33	7.9	5	3	0	-100
Gust WPA	St. Croix	T. 31N., R. 16W., Sec 7	8.3	2	2	1	-50
Flater WPA	Polk	T. 32N., R. 17W., Sec 33	23.6	3	2	2	-34
Total				42	30	18	-57.2 (avg.)

Table 1. Trends in Black Tern Breeding Populations in St. Croix and Polk Counties, Wisconsin, 1975-1977.

population decline. This observation is further substantiated by the variety of vegetation types used for nest platforms.

I did not quantitatively examine food supply at any of the wetlands, although casual observations indicated an abundance of aquatic and terrestrial invertebrates were available and were being utilized. Also, I did not gather data on concentrations of chlorocarbon insecticides in food, water, or the terns. Population changes in other tern species have been attributed, in part, to these contaminants (Morris and Hunter 1976).

Along the Wisconsin shore of Lake Superior, Harris and Matteson (1975) attributed nest failure among Common Terns to human disturbance and habitat disruption. Morris and Hunter (1976) examined several factors contributing to colony desertion by Common Terns in Canada. They concluded that loss of habitat and possible chemical residues contributed to desertion of one colony site.

Although habitat losses did not outwardly contribute to the lower breeding populations I observed, this may be a factor in statewide population declines. Future events will undoubtedly contribute additional stresses to breeding Black Terns in western Wisconsin. Human disturbance has been shown to affect breeding Common Terns in Canada and Wisconsin. Expanding residential development of St. Croix and Polk Counties will probably create additional human disturbances which may affect breeding populations of Black Terns.

Recommendations

1. Breeding populations of Black Terns should continue to be monitored to determine the nature of the population decline.
2. In view of data presented by Robbins (1977), a statewide Black Tern population status survey should be initiated. The objectives of this survey would be threefold: (a) to identify those areas of the state where Black Tern breeding populations exist, (b) to assess short-term and long-term population trends on intensively studied areas, and (c) to evaluate the importance of marshes for the continued survival of this species.

(Editor's Note: *Such a survey has been undertaken in 1979 by volunteers coordinated by Nancy Tilghman of the Department of Natural Resources.)*

3. A research study should be initiated to assess possible effects of pesticide residues on breeding colonies of Black Terns.
4. Steps should be taken for the protection of Black Tern colonies on wetlands currently in public ownership; protective agreements or land purchase should be considered for important colonies on private lands.

Acknowledgement

I thank H.A. Kantrud for providing constructive criticisms on earlier drafts of the manuscript.

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**U.S. Fish and Wildlife Service
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Substrate	No. nests	% Total
Cattail	17	32.7
River bulrush	16	30.8
Round-stem bulrush	12	23.0
Submerged aquatic vegetation	6	11.5
Muskrat house	<u>1</u>	<u>2.0</u>
Total	52	100.0

Table 2. Nest Substrate Utilized by Breeding Black Terns in St. Croix and Polk Counties, Wisconsin.



Wisconsin's Forgotten Ornithologist:

Leon J. Cole

By Robert A. McCabe

To claim that an ornithologist has been forgotten requires that he be established as an ornithologist and that it be shown that he was and is forgotten. I will try to do both.

Leon J. Cole was born in Allegany, New York on June 1, 1877, and died in Madison, Wisconsin, on February 17, 1948. He entered the Michigan Agricultural College and then the University of Michigan from which he graduated in 1901. He earned a Ph.D. from Harvard University in 1906. From 1906 to 1910 he headed the Division of Animal Breeding and Pathology at the Rhode Island Experiment Station and was an instructor in Zoology at Yale University. In 1910, he came to the University of Wisconsin to initiate a Department of Experimental



Breeding for plant and animal improvement, the forerunner of our current Department of Genetics. He and his students cut a wide swath in the fields of plant and animal genetics in the years that followed. Those students who survived him became the teachers of many of this generation's geneticists.

In spite of his considerable accomplishments in the field of genetics, Cole harbored an early love of birds. A scientist at heart and by training, he saw the potential in the use of leg bands in birds in studying what was then regarded as the "mysteries" of bird migration, movement and behavior. In 1901, he wrote his classic article, "Suggestions for a Method of Studying the Migration of Birds" (Mich. Acad.Sci. 1901, pp 67-70). In that paper he said, "As I say, it is possible such a plan (to tag birds individually) might be used in following the movement of individual birds, if some way could be devised of numbering them which would not interfere with the bird in any way and would still be conspicuous enough to attract attention of any person who might chance to shoot or capture it."

These were the first words to be written (or spoken) for a comprehensive bird banding program. It was the leg band that provided the "way" to tag birds.

Dr. Fredrich C. Lincoln, in writing an historical account of bird banding to 1928 (Smithsonian Rpt. 1928, pp. 331-354), wrote, "To Dr. Leon J. Cole

must go the credit however for bringing the advantages of the method (i.e., bird banding) to attention of American ornithologists...."

Dr. Cole's own assessment in a paper published in 1922, (Wilson Bull. 34 (2): 108-115) was, "My own interest in bird banding grew independently out of my lifelong interest in birds and in the problems of migration." And further, "In 1902, in connection with a study of the German carp which I was making for the United States Fish Commission, I tagged a small number of these fish in order to determine their movements and distribution, but the work was not continued and was on too small a scale to produce results. I became determined, however, to try the method out on birds at the first opportunity.

Between 1902 and 1922, he wrote seven papers on bird banding alone. When bird banding gained stature in the field of scientific ornithology and its adherents formed an organization of devotees, Leon J. Cole became the president of the American Bird Banding Association.

Thus, Dr. Cole is rightly regarded as the father of American bird banding. His academic life at Wisconsin forced him away from serious bird banding but not from his interest in birds. Through penetrating research he and his students produced an unparalleled insight into the genetics of the **Columbidae**. Hybridization of pigeons and ring doves was of particular importance.

Dr. Cole was never parochial in his research interests and these interests led him far afield. He was a member of the Harriman Alaskan Expedition in 1899 (at age 23), during which time he cultivated the friendship of Louis Agassiz Fuertes, America's premier bird artist. He often displayed with pride a hand-painted deck of playing cards created by Fuertes and used by the members of the party in the absence of a commercial deck. Fuertes also painted two of Dr. Cole's experimental ring doves. The reason for painting these particular birds cannot be detected from the research paper (American Nat., 1950, 84: 275-308) in which they are listed. The paintings were made, I suspect, between 1945 and 1955, about 51 years after Cole met Fuertes. To my knowledge, these paintings were never used in a publication nor were they framed or displayed.

He also participated in an expedition to Yucatan in 1904, and aided in compiling a list of 128 species of birds for Yucatan as reported in the Bulletin of the Museum of Comparative Zoology, Harvard University (1906).

The Woods Hole Marine Laboratory in Massachusetts claimed several summers in his young professional career during which he studied fish and aquatic hatibats. His intellectual appetite was omnivorous.

On two occasions our professional paths crossed lightly. During a research program I carried out on Ring-necked Pheasants at the University of Wisconsin Arboretum in the early 1940's, I had this experience: One evening one of my traps in the center of the Aboretum caught four birds. All were previously banded. In a routine recording of numbers prior to releasing the captives, I checked a band number that was not one I had used. On closer inspection, I found beside the strange number an inscription on the band that read: "Notify A.M. (American Museum) N.Y." In the cold darkness of that January evening a very puzzled biologist read and reread the inscription: surely a pheasant could not have walked or flown in from

the east. In the weeks that followed I tried to learn by correspondence where the band had come from. The museum staff in New York said that such a band had not been issued in the past 25 years. Did I have an ancient and a well-traveled hen pheasant? The museum reported further that the records were in an archive somewhere in Washington, D.C., but that they would investigate. In due course, a second letter arrived to say that the band in question was issued to none other than Leon J. Cole about 1910. With great haste, I confronted Dr. Cole with my story. His reply: Yes, he banded the bird last spring in his apartment backyard adjacent to the University Arboretum. It had forced its way into a government sparrow trap that was set for White-throated Sparrows.

In an old desk drawer he had found this aged leg band and put it on the very young hen pheasant. He could not resist the urge to band even this one local hen pheasant with an exotic band where the likelihood of recapture was very slim. The slim chance however, paid off in excitement from Aboretum to the American Museum in New York and back again to its perpetrator, Dr. Cole, in Madison, Wisconsin.

On another occasion, I consulted him concerning what I regarded naively as a discovery. During a research program with House Wrens, I noticed that the last egg of a clutch was always much lighter in its speckley brown molting. When that egg was laid it was the clue that the clutch was complete. I had taken notes on this character and explained my results in great detail. I waited on his reply, although his face registered no response. He was aware of the phenomenon and had also taken notes. In fact he had turned these data over to Frances Hamerstrom who was later to coauthor a paper on the subject (AUK, 1956, 173(1): 42-65). His manner of letting me know that others were aware of my "discovery" was skillfully managed. I did not feel put down or made a fool of. He made me feel I was one of a group of ornithologists who were privy to special information, thus setting aside any embarrassment or disappointment. I was grateful and it gave me a measure of the man.

To say that few in WSO remember him would be an understatement. As mentioned earlier, to be forgotten also implies that one be generally recognized in the first instance. L.J. Cole had become an Associate Member of the American Ornithologists Union in 1908, and a member in 1934. At one point, in the years we knew each other, he told me that he hoped some day to be elected a Fellow of the A.O.U. So fervent and deep-seated was this desire of a dear friend that, as an Associate Member of that organization, I put together the necessary documents in 1946, and turned them over to other ornithologists who were members and fellows and who could better follow through. What happened, I never knew, but the A.O.U. turned him down--forgotten even by the enlightened and those who should have remembered. The disappointment was obvious, but never discussed between us.

Fate and forgetfulness denied Dr. Cole the recognition as an ornithologist that was his due. My brief statement in no way compensates, but I hope it lets some of today's young ornithologists know that the exciting work coming from computer analysis of banded birds currently had its origin in 1901 by the father of American Bird Banding, Leon J. Cole.

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By the Wayside...



Due to circumstances beyond our control, the Fall Seasonal Summary has been delayed. Hopefully, it will be published in the following issue.

An Unusual Red-Tail Hawk Nestling Companion

On 24 May 1979, while preparing to lower two Red-tail Hawk young to the ground to be banded, I noticed a movement in the bottom of the nest. Lying partially buried in nest material under one of the young hawks was a live American Toad. The toad seemed to be in good condition, lacking any signs of being in such a predicament. Also found in the nest was a dead, intact Killdeer nestling. The circumstances leading to the presence and survival of a toad 30 feet up in a Red-tail nest are puzzling. The idea that the toad jumped or climbed to the nest was immediately rejected. The toad could have been brought to the nest as food for the young, but refused because of the bad tasting secretions of the toad. However, toads being eaten by hawks has occasionally been reported. Or, the toad could have been carried along after a strike and capture of some other food item, brought to the nest, and then not noticed by the parents and young. Paul Matray (Matray, Paul F. Auk 91:307-324, 1979) noted on four occasions American Toads were brought to the rim of Broad-winged Hawk nests by the male and jumped out before the female could return to feed them to the young. Whatever the reason for its presence and survival, I was dismayed to discover that the toad had disappeared while the young were being banded. I checked the nest very carefully and can only assume it fell or jumped out during the commotion. My companion on the ground disclaimed seeing any Kamikazi toads.

Joe Buday

Ground Nesting Mourning Doves

On 2 June 1979, while snake hunting in Dane County, I discovered a Mourning Dove in an unusual situation. A pair of doves had built a grass nest under a raspberry bush on the side of a rocky ravine. The nest contained two white eggs. Ground nesting in Mourning Doves has been documented, though it is uncommon. What makes this situation interesting is that the doves had decided to build their nest in the middle of a snake den. Snakes that I have collected at this site are Fox Snakes, Milk Snakes, Brown Snakes, Garter Snakes and Red-bellied Snakes. This nest seems to be in a perilous state, since Fox Snakes and Milk Snakes commonly feed on birds eggs. That day I collected, within a few feet of the nest, four Fox Snakes and a Milk Snake, all of which were large enough to eat the eggs. I was not able to return later to check on the success of the nest.

Joe Buday

A Black-headed Gull in Milwaukee

On October 14 the strong westerly winds made me decide to bird along Lake Michigan. I met Daryl Tessen at the Jones Island Impoundment Project and we spent time watching shorebirds. Before leaving, we decided to check the Bonaparte's Gull flocks once more. After a minute or two, I noticed a gull which looked like a Bonaparte's but seemed noticeably larger. I hesitated a few seconds before voicing my suspicions to Daryl, but he had already noticed the same bird at the same time. He noticed the slaty-gray underwings and we both called out at the same time. The bird was observed several times during the next half hour. In addition to the larger size than the Bonaparte's and the dark under wings, we later observed its dark red, noticeably heavier bill than the Bonaparte's. The bill was not straight as the Boni's but longer with a slightly drooped appearance near the tip, similar to the larger gulls. All other field marks were similar to the Boni's. I observed the bird on Oct. 21 and on Nov. 1 when its darker red legs were also seen.

Dennis Gustafvson

At a distance of 100 feet when the bird was on the ground to a distance of 50 feet in flight using 7X-15X 35 binoculars and a 48X spotting scope, I could see that the bird was slightly larger than the many surrounding Bonaparte's Gulls. In the excellent afternoon light, I could see the darker, almost blood red legs of the Black-headed in comparison to the Bonaparte's. The mantle was a light gray, lighter than the Bonaparte's. The head was all white except for a small blackish ear spot and a small black spot in front of the eye. The bill was larger than the Bonaparte's and red with a dark tip. In flight the dark underwing extended from the secondaries through the primaries and was easily picked out from the much lighter Bonaparte's Gulls.

Randy Hoffman

The dark under the wing of the Milwaukee Black-headed Gull was a useless character in flight contrary to what the field guides indicate. When flying this bird would quickly disappear in the mass of Bonaparte's Gulls, but once it landed again one could easily find it again by using the head characters, especially the large red bill and head markings.

Eric Epstein

(Ed. Note: This bird was very difficult to follow once it was flying; it was not as obvious as the Little Gulls that are present here earlier in the season. The very dark underwing linings in these individuals that are easily seen in flight.)

After an hour of studying the large group of Bonaparte's Gulls a man walking on the breakwater flushed the entire flock, but I was unable to see the bird. After another half hour I found the Black-headed Gull.

Steve Thiessen

(Ed. Note: This illustrates how difficult it was to locate this bird in the large flock of Bonaparte's Gulls. This observer's description was very similar to others included here.)

The Black-headed Gull was photographed by me in late October several times using a 800mm lens. The bird would not come closer than about 75 yards so less than desirable photos were obtained. This caused a split decision among the Records Committee in accepting the slides as a documentary piece of evidence. The record of this species for the state was accepted by the Committee due to the many reporting observers who provided documentation. Not all the descriptions of all reporting observers are included in these notes save the two of the original observers and excerpts from others. The field marks mentioned by the two included reports were the same in all documentations received.

John Idzikowski

**Black-headed Gull -- Milwaukee County, October 14, 1978,
around 8:00 a.m.**

Near the completion of birding the Coast Guard impoundment, Dennis Gustafson and I were standing along the water's edge checking the numerous gulls in the vicinity. Simultaneously, both of us noticed a different appearing gull amongst the circling Bonaparte's (although neither would comment immediately to the other -- disbelief of what we were seeing). I was noticing the darker underwings with a white edge at the end of the primaries while Dennis was noting the larger size -- both in comparison to the Bonaparte's. When we voiced our sighting to the other we followed the bird in flight for an additional 1-2 minutes, verifying each other's identification point. The bird landed in the water apart from the Bonaparte's where we watched it for an additional 10+ minutes, both using zoom scopes (15-60x). During this time it drifted over into the Bonaparte's, affording excellent comparison to them. The larger size -- slightly -- could be seen but not as readily as when in flight. However, most distinct was the thicker, larger bill which had a clear red coloration. This is in contrast to the shorter, black bill of the Bonaparte's, clinching the identification as a Black-headed Gull. The remainder of the bird was white-gray, with a black spot in back of the eye. After about 10 minutes it took flight with the Bonaparte's. It was seen briefly once later. I returned late in the afternoon from birding north along the lake but in the fading afternoon light, I was unable to relocate the bird amongst the 350+ Bonaparte's.

Additional sightings of the gull occurred on Nov. 4 when I had a leisurely hour study of the bird resting amongst the Bonaparte's on the Coast Guard Impoundment mudflats. All identifying marks were again noted, minus the grayer underwings, with both 10x binoculars and 15-40x scope. Time was approximately 7:30 - 8:30 a.m. I also saw it briefly in the same area on Nov. 18.

Daryl D. Tessen

Great Gray Owl

Subject: Great Gray Owl - (*Strix nebulos*)

Date: August 19, 1978 at dusk

Observers: Ken and Jan Luepke - Don and Mary Follen

Location: One mile north of Moose Junction, which is at the Junction of County M and US 35.

Habitat: Mixed, mostly aspen woods with heavy underbrush where the birds were seen. They were also seen later near the edge of a fairly large dry grassy marsh with large areas of alders. In very close proximity to this area, are very extensive spruce and tamarack bogs of both open and closed types. These areas are known as the Empire and Belding Swamps and total at least 10,000 acres.

The birds were first seen by Art Clarke of the DNR who informed Bernard Klugow who in turn notified us of the location. The Follens went to the area on August 18 and heard several young calling and Don saw an adult at close range after dark. When Jan and I arrived on the evening of the 19th, the young owls started calling about sundown. They were identical to tape recorded calls of young Great Grays made by Bob Nero in Manitoba. Our tapes were played at the same time the young were calling in order to verify the calls. Also a single call note of the same type is present on Peterson's "Field Guide to Bird Songs".

After listening to the calls for an hour to pinpoint the various locations of the different young, we entered the woods from two directions in an attempt to positively identify the owls. I obtained a clear look at a young bird 30 yards away for about 30 seconds. Field marks were the large size, gray coloration, with belly and breast streaked lengthways, yellow eyes, very large facial disc with black concentric circles, making the head appear very large. The facial disc in fact when viewed from the rear of the head was larger than the head itself. This bird was joined by another young and an adult. Instead of staying in one place, all of the birds moved about quite frequently with at least one young begging for food almost constantly. The birds then moved across a small marsh to some large dead trees about ¼ mile distant. The adults were seen feeding the young in the tops of those trees until dark. In all there were two adults and at least three begging young in this group. The young called less frequently as it grew darker and were last heard about midnight. I heard no sound from any of the adults and no birds were seen nor heard the next morning. Attempts to trap the birds for banding failed and in the several trips made to the area later the owls were not seen again.

Kenneth J. Luepke
Janice Luepke
Don Follen, Sr.
Mary Follen

Lark Buntings and a Smith's Longspur in Columbia County

Date: Sept. 29, 1978

Location: NW quarter of the NW quarter, Sec. 24, Lowville Township, Columbia County at the junction of King and Hagen Roads.

Species: Smith's Longspur

This species was observed in a plowed field at 50 meters with a 48X spotting scope for about 10 minutes.

Among the many Vesper and Savannah Sparrows flying by as a farmer was dragging his field, I noticed through my binoculars what I thought were some Lapland Longspurs. Through my scope, I found that they were indeed Laplands. Again, looking through my binoculars at the birds flying south in advance of the farmer, I noticed a brown bird land beside the Laplands. With my scope, I could see that the bird was slightly smaller than the

Laplands and as it moved, white outer tail feathers could be seen. The bird did not look like a Vesper Sparrow so I began looking at details. Notes taken in the field: *was slightly smaller than the Laplands; buffy all the way to the tail, bill same shape as the Laplands; and the breast was buffy with very light streaking. The cheek patch was similar to the Laplands but much less distinct with buffy on the eyeline above the buffy behind the cheek patch, back streaked, tail black with outer two primaries white; tail slightly forked. The crown was slightly streaked and the legs were light, but I was not sure of the color. The wing was brown and the shoulder was almost black with white edgings.* I eliminated pipits because of the bill shape; it was not a Vesper Sparrow because the streaking was light, the body buffy and the shoulder was black with white and not brown. Through elimination, the bird was a longspur; It was not a Lapland because of the direct comparison, not a McCown's because the tail did not have a black terminal band; Chestnut-collared was eliminated because the two outer tail feathers were the only ones that were white. By process of elimination I deduced this was a Smith's Longspur.

Species: Lark Buntings

After viewing the Smith's Longspur, I noticed a number of birds feeding in an area of the same plowed field that had scattered weeds. Among these were two birds that were larger than the sparrows feeding there. At about fifty feet using my 7x15x 35 binoculars, I observed these birds for two minutes before they flew off. From behind I noticed a long and rounded tail. From the side many marks were seen. They seemed to be Purple Finch-like in size and build. The breast and sides were heavily streaked, the cheek was large and brown grayish in color with one stripe over the eye and one stripe from the bottom of the bill to the neck. The head and back were brown and gray. The most noticeable mark was the broad white stripe on the wing; one bird had a tinge of buff in the stripe. When they flew, the white shoulder could easily be seen.

Randy Hoffman

A Red Phalarope in Milwaukee

Ray Glassel, a birding friend of mine from Minneapolis was in Milwaukee during the Thanksgiving weekend and informed me of this observation. On the afternoon of Nov. 24, a shorebird was seen swimming near some algae covered rocks south of the Milwaukee Gun Club, together with many Bonaparte's Gulls. The bird was very white underneath and on the breast, with black markings on a white head, typical of Phalaropes in winter plumage. The back was unmarked gray with the gray scapulars showing a scaly pattern. The wings were dark with a white wing stripe noted in flight. It was more stocky than the Northern Phalarope and had a much heavier bill which was all dark. A similar appearing Red Phalarope was seen by Ray in Minnesota within the last few years and it has been found that not all Reds show yellow in the bill in fall plumage. The bird was swimming in typical phalarope fashion. These notes were written by me after an oral description was given by Ray. The bird could not be located on the following day.

Dennis Gustafson

(Ed. Note: Another Red Phalarope showed up in the Waukegan, Ill. area a few days after this bird was seen).

A Parasitic Jaeger at Superior Plus Two Unidentifieds

On September 4 while walking on Wisconsin Point near Superior, I was able to see little more than large numbers of gulls resting out in the Lake. Then I noticed three different birds partially sailing and partially flying south over the beach. As they flew overhead at least one was an unmistakable Parasitic Jaeger, an adult bird. From underneath the following field marks were noticed: the wings were dark with white flashes in the primaries; the belly was off-white; a grayish band covered the breast; white throat merging into a yellow cheek and a black crown. The tail was gull-like except for the two central tail feathers which were pointed and exceeded the rest of the tail by two to three inches. The other two birds were basic brown with a mottled effect with white flashes in the primaries and no tail feather extensions. They appeared to be the same size as the adult, but a positive identification on these birds could not be made. The observation lasted 15 minutes at a distance as close as 200 feet over open beach habitat.

Randy Hoffman

A Yellow Rail at the Mazomanie Wildlife Area

While walking to the north end of the small pond to get a closer look at the many Soras present, I arrived at the end of a "grassy point" where I began to watch for rail movement. After about 2 minutes a bird flushed no more than about 8 inches from my foot; it flew for about 5 or 6 feet and then landed on the mud and ran into the grass. The bird in flight was definitely a rail with dangling legs, narrow back, and weak flight. The back was brownish to buffy as were the wings with black markings extending onto the back. There were white patches in each wing. This was the first time that I had ever "seen" a Yellow Rail.

Randy Hoffman

A Summer Tanager at Harrington Beach State Park and a Swainson's Hawk

While birding the southern boundary of the Park, a flock of chickadees and warblers came to my attention. I was startled by a bird that came out of the cedars and lit in a leafless tree. The bird was a fall-plumaged tanager with a very yellow breast, greenish head and back. What surprised me was the lack of gray-black wings and tail. The bird was observed for one minute with 10x binoculars before being chased back into the cedars by a Yellow-rumped Warbler.

Upon leaving Harrington Beach, I noticed a hawk circling high above CTH "LS" drifting leisurely to the south. The bird was dark on the wings and breast with a banded tail. It was observed for several minutes. Both birds were seen October 14.

Daryl Tessen

A Yellow-throated Warbler in Cedarburg

On September 9 during an excellent movement of warblers through the area along Cedar Creek I was able to watch a Yellow-throated Warbler for about

a half hour often in excellent light and at close range (15 to 20 feet). All the significant field marks were recognized: the solid gray back; gray wings with white wing bars; lemon-yellow bib bordered in the head and upper throat by black; black streakings on the side; broad white mark extending from the bill over the eye and another extending from the face along the neck. The only thing missing was the song! I have seen this species before around St. Louis and along the middle Atlantic Coast.

Roger Sundell

(Ed. Note: This is one of the few fall records for this species in Wisconsin to my knowledge.)

A Plegadis Ibis at Horicon

On November 12, while picking up crippled geese north of Highway 49 in Fond du Lac County, two staff members and myself flushed an ibis-shaped bird fifty feet in front of us. I noticed the strongly down-curved beak and purplish color of its plumage. I studied it on the ground and flushed it twice more. Light was good and observations were made with 7x35 binoculars.

Bob Drieslein

(Ed. Note: This bird was presumed to be a Glossy Ibis. Due to the season and to the changing distribution of this genus, no specific identification could be made.)

Third Record of a Sabine's Gull for Wisconsin

This bird was first seen on Oct. 6 on the Breezy Point Rd. just west of Highway 151 in Dodge County. While scanning gulls at the pond at about 200 feet with binoculars, I noticed a bird that appeared brown and tern-like next to some larger Bonaparte's Gulls. I got my scope on the bird and noticed the at rest the bird's bill and legs were black; the forehead was white; the crown and neck were brown. There was a brown patch extending down in front of the wings which were brown with black primaries showing through. The most impressive characteristic was the brown back that had a scaly character to it with white shoulder patches. After an hour of waiting, the bird flew and the triangular black and white wing pattern could be seen. The slightly forked tail was noticed with a black terminal band. The bird would pick its feet straight when walking in the very shallow water and then proceed to feed on what it stirred up making it look like a tern feeding like a phalarope. The bird was seen again by myself on October 7 and the 9th for a total of 4 hours of observation in the muddy cornfields around the Breezy Point Road.

Randy Hoffman

(Ed. Note: Randy promptly called many birders and at least 10 were present there shortly after dawn on the 7th, all getting excellent looks.

A Spruce Grouse in Burnett County

On Sept. 4, 1978, I stopped at the wayside where Highway 35 crosses the St. Croix River. In late May I had heard and seen a Spruce Grouse. Upon driving into the parking area, I saw a grouse standing near the road. It was about fifty feet away when I stopped the car. As I lifted my binoculars it began to fly, but I was still able to observe in 3 or 4 seconds the grayish back and the black tail with a brown terminal band identifying this bird as Spruce Grouse. The habitat around the area is boggy with spruce, cedar and alder and is bounded by Red Pine and maples along the river and higher areas.

Randy Hoffman

A Ferruginous Hawk in Western Wisconsin

On Sept. 24, 1978, on the Oakridge Waterfowl Production Area in St. Croix County, I observed a typical **Buteo** soaring over a plowed field. Expecting to find a Red-tailed Hawk I immediately noticed that this bird was larger with a much lighter head and less buffiness on the breast and lower throat. The stomach was also much lighter colored. The legs showed a russet-reddish color but did not form a "V" as mentioned in Robbins, et al. The wings were light colored underneath and a distinct "window" was noted. The underside of the tail was also more pale than in the Red-tail. I watched the bird for five minutes using 8X40 binoculars. In May-July, 1978 hardly a day went by when I did not observe this species in the North Great Plains states. I have also seen juvenile plumages on several occasions. Using this background, I eliminated Red-tail and also immature Ferruginous.

Craig Faanes

A Late Blue-winged Warbler

This bird was observed on November 10, 1978, at Blue Mound State Park in Dane County in a small patch of hawthorne with dry goldenrod stalks comprising most of the understory. I watched the bird for ten minutes as close as thirty feet away as it foraged among the branches, the goldenrod and on the ground. Description: warbler size with yellow forehead, throat, breast and belly; black line through a dark eye; gray wings with two white wing bars; yellowish-green upper back and rump and large white spots on the outer tail feathers. It foraged in company with a Dark-eyed Junco. The weather was clear, temperature sixty degrees and no wind.

Philip Ashman

A Townsend's Solitaire in Billings Park, Superior

On October 9, 1978, at the entrance to Billings Park in Superior, a bird somewhat resembling a Bluebird was spotted. It was longer than a Bluebird primarily because of the tail. Plumage characteristics included a uniform gray-brown color with slightly darker wings. A small amount of white flecking was seen on the breast indicating a molt or an immature bird. The crown and nape were darker than the sides of the head and a conspicuous eye-ring was noticed. The tail appeared to be about the same length as the bird's body.

and was a dark gray color with conspicuous white outer tail feathers. I had an unobstructed view with binoculars from a distance of about 20 yards. I have seen this bird on its breeding grounds in the Rockies.

Craig Faanes

Arctic Loon -- Ozaukee County, November 1, 1978, 3:45 - 4:15 p.m.

While returning to Elgin from Appleton I decided to bird along Lake Michigan. The Cleveland area produced a fine Red-throated Loon in classic fall plumage. After checking out several additional spots, I stopped at what is left of Loon Bluff. 10 minutes of birding yielded nothing out of the ordinary. While making one last scan with the scope, I was surprised to find three loons and a lone gull swimming leisurely out from the shore area into the lake. Certain field marks caused me to become very excited as I hurriedly made the following notes in the field:

1. Originally noted with 15x scope
2. Immediately impressed with small size
3. Also impressed with very dark head, back of neck and back
4. Throat and belly were white
5. Bill seemed small

I zoomed to 30x, and eventually 40x to further verify the aforementioned points plus the following additions:

6. Small, thin, gray bill, not upturned
7. Somewhat smaller than the adjacent Herring Gull

During the ensuing half hour the loons dove, bathed, chased each other and leisurely swam further out into the lake, always in company with the Herring gull. One bird always remained on the surface, while the other two dove at varying intervals. I felt almost immediately I had three Arctic Loons. The contrast to the Red-throated Loon seen earlier in the day was distinct. It had a soft gray, almost whitish head, neck and back, with a distinct thin, upturned bill. The Common Loons I have seen in the fall are not as distinctly black, the bill is always much thicker and the size is greater than that of these three. Returning to the car, I checked both Robbins' "Birds of America" and Peterson's eastern guide and upon arriving home Godfrey's "Birds of Canada". Everything I saw and read further verified my identification. The weather was clear with the sun behind me and the temperature in the mid-upper 50's.

Daryl D. Tessen

Fork-tailed Flycatcher in Columbia County

Species: Fork-tailed Flycatcher - *Muscivora tyrannus*

Number: One

Location: NE ¼ of SW ¼ of Section 20, T11N, R11E, Town of Otsego, Columbia County, Wisconsin

Dates and Times: All 1978 - November 13, 11:30 a.m.; November 15, 2:00 - 2:05 p.m., 2:20 - 2:25 p.m.; November 16, 2:55 - 3:30 p.m.

Description: Top and sides of head black. Small yellow stripe in center of crown, visible only when seen from directly in front or behind the bird. Bill straight and black. Throat, breast, sides, belly and ventral area white. Nape and back light gray. Wings dark gray with very faint brownish tinge. Tail black and distinctly forked. The right fork had a long slender black feather which I estimated to be about 11 inches in length. The left fork had what appeared to be the shaft of a long feather that had broken off near the tip of the fork. There appeared to be a narrow white line at the outer edge of the tail towards the base. When the bird was at rest the tail appeared fairly straight but deeply notched. On short flights the main portion of the tail frequently flaired out and had a "swallow-tail" appearance.

Voice: Not heard.

Behavior: The bird perched in flycatcher fashion at heights of 2 to 8 feet in willow brush and other small trees and bushes in and adjacent to an open marsh area. Although the temperature was about 35° F, the bird made several short "flycatching" sorties. It also went down into the long grasses and sedges a few times where it seemed to be looking for food. It was seen three times perched on tree branches about 35 feet from the ground. When not bush hopping or flycatching, the flight of the bird was level and not very rapid, with the long tail feather conspicuously streaming behind.

Habitat: Marsh with clumps of willow. Adjacent to oak-hickory-black cherry forest. Bird was seen in the marsh area and up to 75 yards inside the forest.

Identification: The long forked tail, bright white front, and black crown with inconspicuous yellow crown patch make this flycatcher hard to confuse with any other American species. the scissor-tail flycatcher (*Muscivora forficata*) is lighter gray with a pinkish caste and has no black crown. The Eastern Kingbird (*Tyrannus tyrannus*) is darker gray on the back, and has a shorter unforked tail with a white terminal band.

Distance: 20-60 feet. Distance measured by camera range-finder.

Optical Equipment: 8 x 40 Fuji binoculars.

Light: Bright sunlight on November 13 and 15. Overcast on November 16.

Previous Experience: In January 1978, I saw several fork-tailed flycatchers in the vicinity of Waspam, Nicaragua. I have seen hundreds of scissor-tailed flycatchers in the south and southwest.

Sources: Identification and notes were made prior to checking descriptions given in *A Field Guide to Mexican Birds* by Peterson and Chalif, *A Guide to the Birds of Panama* by Ridgely, and *A Guide to the Birds of Venezuela* by de Schauensee and Phelps.

Photography: Despite poor photographic conditions, several exposures were made using a Canon FTb with a 200mm Canon FD lens plus Vivitar 2X Tele Converter. Film was Kodachrome 64 and settings were f4 at 1/60 second. Ranges were 20 to 35 feet.

Other Observers: None.

Remarks: This species has been infrequently seen and/or collected in several states including Maine, Massachusetts, New York, Pennsylvania, New Jersey, Kentucky, Mississippi and Michigan. I am unaware of any reports of it in Wisconsin.

Frank Freese has loaned me 20 slides taken on November 20, 1978 in support of his sight identification of the Fork-tailed Flycatcher. These slides were reviewed carefully by William Hilsenhoff, Stan Temple and myself. The clear breast is very evident, as are the black contrasting crown, the flycatcher bill and wings, the grayish back and the long (partly broken) tail feathers. We were pleased to see a faint suggestion of some yellow in the crown and the clear-cut white outer tail feathers at the base of the tail. We have no doubt that Mr. Freese saw a Fork-tailed Flycatcher on the dates he reports and we recommend that his record be accepted for the Wisconsin State list.

Sincerely,
Joseph J. Hickey

(Taken from a letter sent to Sam Robbins as the official decision of the WSO Records Committee)

Great Gray Owl in Taylor County

A Great Gray Owl (*Strix nebulosa*) was sighted in Taylor County on 10 November, 1978. It was approximately 4:45 p.m. and the day was just getting dark when the bird was noticed by Myron Strengberg and Robert Knapp. The bird was sighted from a gravel road as the two observers were driving north on the road. The area was in the Township of Maplehurst, 13 miles west of Medford: T30N, R2W, Section 10, SE $\frac{1}{4}$ NE $\frac{1}{4}$.

The bird was perched in a small aspen about twelve feet up, on the edge of the woods next to the road. It did not exhibit any uneasiness while the observers sat in the car. As they looked the bird over for several minutes, the bird calmly stared right back at them. The owl turned its head several times during this period. The bird appeared to be about the size of a Great Horned Owl, charcoal-gray in general coloration. The observers noticed the large round facial disc appearance of the head, a distinct white upper breast area, and longitudinal brown striping over the rest of the breast. One of the observers got out of the vehicle and took several steps toward the owl, which was about thirty feet away. It flew back into the woods about sixty feet, alighting in another tree 10-12 feet up. Noticeable was the large wing span about the same dimensions as a Great Horned Owl.

Robert Knapp

I visited the same area on the afternoon of 16 November, and found this bird around 4:30 p.m. about 1/4 mile north of its previous sighting. The bird was first seen in flight, showing massive owl size and gray coloration. The owl had evidently been perched in an aspen scarcely fifty feet away, but escaped notice until it flew. When the bird landed in a birch 100-feet distance, it was clearly visible through 10x binoculars. Because the bird was facing me, I had ample opportunity to note the large facial discs surrounding a pair of distinctly yellowish eyes. A whitish area below the throat made me think of a white baby's bib. There was none of the horizontal brown

streaking below the bill which one would expect to see in the similar-sized barred owl. The heavy breast streaking was all vertical, starting just below the white bib. This bird looked and acted just like the Gray Gray Owls I saw in northeast Minnesota last winter.

Sam Robbins

Letters to the Editor

Dear Dr. Kemper:

Over the years I have seen several published records of "cannibalism" in the bird world. I believe most of them should not be called "cannibalism".

By definition, cannibalism means "a human being that eats human flesh; hence, any animal that devours its own kind" (Webster's New Collegiate Dictionary, 2nd Edition).

Thus "owls being eaten by other species of owls and diurnal raptors" and **Broad-winged Hawk Preys on Saw-whet Owl** (see **Passenger Pigeon** Vol. 41, No. 2, page 60) should not be referred to as cannibalism.

I think Rosenfield used an accurate title for his article but in the text his observation should not have been referred to as cannibalism as the "eater" and "eatee" were different species -- just as a human being cannot be referred to as a cannibal for eating the flesh of a cow or pig (or a hawk or owl).

Sincerely,
Charles R. Sindelar
456 Baird St.
Waukesha, WI 53186

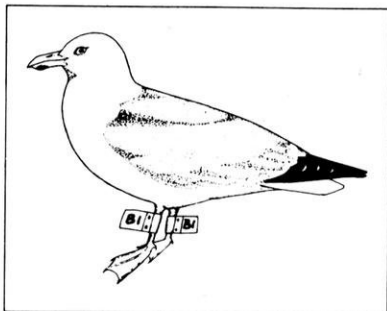
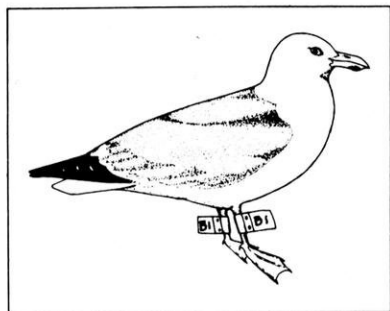
Dear Sir:

I would appreciate it if you would include the enclosed notice in the next issue of your newsletter, as well as bring it to the attention of your members at your next scheduled meeting.

The notice is printed and sized so that you should be able to tape it securely to a page of copy and have it duplicated with the rest of the newsletter. It should only take up a half a page.

Thank you very much for your cooperation.

Yours sincerely,
D.V. Weseloh, Ph.D.
Wildlife Biologist and
Editor, Pickering Naturalist
Pickering, Ontario



Great Lakes Herring Gulls have been marked with numbered and lettered green, orange, blue or pink leg ribbon - one on each leg. If you see any Herring Gulls so marked, please note number, letter and colour of each ribbon and date and place of sighting. Contact Dr. D.V. Chip Weseloh or Mr. Pierre Mineau, Canadian Wildlife Service, Box 5050, Burlington, Ontario, Canada, L7R 4A6. Telephone (416) 637-4264.



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