

more than 32. **Census:** Red-eyed Vireo, 8 (32); Am. Redstart, 8 (32); Veery, 7 (28); Ovenbird, 7 (28); Rufous-sided Towhee, 6 (24); Catbird, 3.5 (14); Brown Creeper, 3 (12); House Wren, 3 (12); Brown-headed Cowbird, 3 (12); Blue Jay, 2.5; Black-capped Chickadee, 2.5; Chestnut-sided Warbler, 2.5; Yellowthroat, 2.5; Downy Woodpecker, 2; Robin, 2; Black-and-white Warbler, 2; Blue-winged Warbler, 2; Scarlet Tanager, 2; Com. Crow, 1.5; Wood Thrush, 1.5; Ruffed Grouse, 1; Barred Owl, 1; Yellow-shafted Flicker, 1; E. Wood Pewee, 1; White-breasted Nuthatch, 1; Canada Warbler, 1; Indigo Bunting, 1; White-throated Sparrow, 1; Black-billed Cuckoo, 0.5; E. Phoebe, 0.5; Cedar Waxwing, 0.5; Cardinal, 0.5; Rose-breasted Grosbeak, 0.5; Am. Goldfinch, 0.5; Broad-winged Hawk, +; Great Horned Owl, +; Pileated Woodpecker, +; Hairy Woodpecker, +; Least Flycatcher, +; Tufted Titmouse, +; Red-breasted Nuthatch, +; Yellow-throated Vireo, +; Magnolia Warbler, +; Baltimore Oriole, +; Chipping Sparrow, +; Song Sparrow, +. **Total:** 46 species; 82.5 territorial males (330 per 100 acres). **Visitors:** (Average number of individuals per 100 acres): Red-winged Blackbird, 5; Com. Grackle, 4; Wood Duck, +; Hermit Thrush, +; Starling, +; Solitary Vireo, +; Louisiana Waterthrush, +. **Remarks:** This area has been censused each year since 1965 except 1970. General stability of habitat and density continues, except that this year extensive defoliation, especially of the oaks by large span worms (and to a much lesser extent by no more than 10 per cent Gypsy Moth caterpillars), occurred. Density this year is about 15 per cent higher than in 1969, though only about 7 per cent higher than in 1966-1968. Barred Owls (young and adults) were seen and heard in the area. Broad-winged Hawks, which bred on or near the area in 1965, 1966, and 1968, were less in evidence than in any previous year. There were four new species; the Red-breasted Nuthatch and Chipping Sparrow came in from the east edge which borders a planted Norway Spruce-Red Pine grove; the Indigo Bunting and White-throated Sparrow were along the north border, an open road edge where some leveling of bushes and saplings was done this spring. A pair of Wood Ducks was flushed from a likely nesting area of several large knot-holed trees on June 3, but not seen again. Solitary Vireos were often present in the latter half of the census period. The visiting Louisiana Waterthrushes, present twice in past years, present an enigma. No good breeding habitat exists on or near the area, yet one or more singers arrive in mid-June and stay for a few days. This year 3 males arrived on June 14 and sang counter to each other amidst great excitement and chasing back and forth. On June 17 only one singer remained; it left on the 18th. Can this be evidence of a "floating" surplus population resulting from the very limited number of preferred breeding sites in the general local area? For on this census area, two facts were obvious: Their intense singing and aggressive behavior towards one another indicated territorial drive; yet, its short duration did not, obviously, indicate the stability of real territories. — ANDREW MAGEE, 34 Hobson Street, Springfield, Mass. 01109, under the direction of the White Memorial Foundation, Inc., Litchfield, Conn.

**9. UPLAND BEECH-MAPLE FOREST.** — **Location:** Connecticut; in the northwestern part of the town of Greenwich, and in the northern portion of the 280-acre Audubon Center. **Size:** 20 acres (rectangular, about 835 x 1040 feet), delineated by steel stakes at each acre-corner; numbers 208 to 212 marking the south boundary and 279 to 283 the north boundary. **Description of Area:** Forest canopy entire, with few shrubs in the substratum. Trees average 70 feet in height and from 1½ to 2½ feet DBH-34% Oak; Red (*Quercus rubra*), Black (*Q. velutina*), White (*Q. alba*), and Scarlet (*Q. coccinea*); 24% Maple: Sugar (*Acer saccharum*) and Red (*A. rubrum*); 12% Am. Beech (*Fagus grandifolia*); 8% Shagbark Hickory (*Carya ovata*); 8% Black Birch (*Betula lenta*); 5% Tulip-tree (*Liriodendron tulipifera*); 9% miscellaneous. Medium understory mostly of Maple-leaved Viburnum (*Viburnum acerifolium*); Flowering Dogwood (*Cornus florida*); Silky Dogwood (*C. amomum*); Witch Hazel (*Hamamelis virginiana*) and Sweet Pepperbush (*Clethra alnifolia*). **Edge:** Tract is surrounded by similar forest of the Audubon Center. **Topography:** A series of rocky ridges running SSW to NNE, varying from 340 to 480 feet elevation. The Byram River touches the southernmost 500 feet of the eastern boundary. It is a fast flowing stream about 5 feet wide and is shallow over rocks. Two shallow vernal pools, one of which was dry by the middle of the census period, covered less than ½ acre in all. **Coverage:** May 29, 31; June 2, 5, 6, 8, 9, 15, 17 (twice), 19 (twice), 21, 27; July 3, 5. Hours varied from 7:00 to 8:15 p.m. Total 34 man-hours. **Census:** Ovenbird, 7 (35); Rufous-sided Towhee, 5 (25); Worm-eating Warbler, 4.5 (22); Downy Woodpecker, 2; Blue Jay, 2; Black-capped Chickadee, 2; Tufted Titmouse, 2; Black-and-white Warbler, 2; Baltimore Oriole, 2; Great Crested Flycatcher, 1.5; Robin, 1.5; Wood Thrush, 1.5; Veery, 1.5; Red-eyed Vireo, 1.5; Rose-breasted Grosbeak, 1.5; Ruffed Grouse, 1; Yellow-shafted Flicker, 1; Pileated Woodpecker, 1; White-breasted Nuthatch, 1; Am. Redstart, 1; Scarlet Tanager, 1; House Wren, 0.5; Yellowthroat, 0.5; Cardinal, 0.5; Yellow-billed Cuckoo, +; Black-billed Cuckoo, +; Hairy Woodpecker, +; E. Wood Pewee, +. **Total:** 28 species; 45 territorial males (225 per 100 acres). **Visitors** (average number seen/number of censuses seen): Green Heron, 1/2; Canada Goose, 4/2 (overhead); Mallard, 1/1; Wood Duck, 2/2; Broad-winged Hawk, 1/1 (overhead); Am. Woodcock, 1/1; Herring Gull, 2/5 (overhead); Chimney Swift, 4/1 (overhead); Barn Swallow, 3/1 (overhead); Com. Crow, 6/9; Brown Creeper, 1/1; Catbird, 1/1; Starling, 3/2; Yellow-throated Vireo, 1/1; Black-throated Green Warbler, 1/1; Louisiana Waterthrush, 2/1; Canada Warbler, 1/2; Red-winged Blackbird, 2/6; Com. Grackle, 12/11; Brown-headed Cowbird (male), 1/3; Purple Finch, 1/1; Am. Goldfinch, 1/1; Song Sparrow, 1/3. **Remarks:** Nests found: Pileated Woodpecker, 1 Ovenbird, 1. The habitat has undergone little change since the last census taken in 1961, with the forest cover basically the same except older. The number of breeding birds increased slightly from 42.5 to 45 but many changes occurred in nesting species. Significant increases were Rufous-sided Towhee (+4), Worm-eating Warbler (+2.5), Blue

Jay (+2), Tufted Titmouse (+2), Baltimore Oriole (+2), Rose-breasted Grosbeak (+1.5), Ruffed Grouse (+1), Black-and-white Warbler (+1), and Am. Redstart (+1). Those species with the largest declines were: Red-eyed Vireo (-6.5); Ovenbird (-3); White-breasted Nuthatch (-1.5) and E. Phoebe, E. Wood Pewee, Catbird, Louisiana Waterthrush, Hooded Warbler and Canada Warbler each - 1. The Red-eyed Vireo showed the most serious decline and this also seems to have been happening in the surrounding areas in recent years. The Tufted Titmouse has expanded its range northward so the increase of 2 is understandable. Rufous-sided Towhees have also increased in nearby areas; see *Audubon Field Notes*, 24: 761-762 (1970). The Ruffed Grouse was seen with at least 6 young on 3 trips and the Pileated Woodpecker successfully raised 2 young that left the nest between June 19 and June 27. The remains of a freshly killed Yellow-shafted Flicker, Mallard, Ruffed Grouse, 2 Blue Jays and a Muskrat were found near the larger vernal pool. A Red Fox was seen and heard there on two trips and is assumed to be responsible for this. The Ovenbird nest was found on May 31 and contained 6 eggs. The remains of the Muskrat was found only two feet from this nest on June 5; it was apparently abandoned at that time and on July 5 still contained the unhatched eggs. Renesting likely took place shortly after as a new territory seemed to be established about 50-75 feet away after June 5. The Com. Grackles were numerous and seen on most trips, mainly frequenting the vernal pools, but no positive evidence of nesting was found. W. BOLTON COOK, P. C. SPOFFORD and GARY E. PALMER (compiler), 264 Davis Avenue, Greenwich, Conn. 06830.

**10. UPLAND TULIP-TREE - MAPLE-OAK FOREST.** Location: Maryland; west edge of Middle Patuxent River Valley, southwest of the Hobbits Gleg Golf Course at Columbia, Howard County; 39° 12'55"N, 76° 54'40"W, Clarksville Quadrangle, U.S.G.S. Size: 12 ha = 29.7 acres (basically rectangular, 1125 feet north-south by 1000 feet east-west, but irregularly extending farther in each direction where uniformity of habitat permitted). Surveyed and plotted on 1-foot contour map provided by Howard Research Development Corporation. Description of Area: A quantitative survey of the vegetation based on the method proposed by James and Shugart (*Audubon Field Notes* 24: 727-736) is as follows: Trees, 3-in. diameter and over, based on six 0.1-acre circular samples, 258/acre; total basal area 188.8 square feet/acre. Species comprising 90% of the total number of trees [figures after each give number of trees/acre, relative density (%), relative dominance, frequency, in that sequence]: Tulip-tree (*Liriodendron tulipifera*), 126, 31, 35, 100; dead trees, 40, 9, 12, 80; Red Maple (*Acer rubrum*), 37, 9, 6, 80; White Oak (*Quercus alba*), 14, 4, 15, 65; Red Oak (*Q. rubra*), 11, 3, 6, 30; Flowering Dogwood (*Cornus florida*), 98, 23, 6, 100; Shagbark Hickory (*Carya ovata*), 22, 5, 3, 30; Black Locust (*Robinia pseudo-acacia*), 16, 4, 9, 20; Black Gum (*Nyssa sylvatica*), 11, 3, 2, 30. Trees by diameter size class [figures after each class give number of trees/

acre, relative density (%), basal area in square feet/acre, relative dominance]: A (3-6 in.) 24, 54, 22.4, 12; B (6-9 in.) 85, 21, 25.4, 13; C (9-15 in.) 77, 19, 61.4, 33; D (15-21 in.) 19, 5, 34.6, 18; E (21-27 in.) 6, 2, 19.8, 11; H (greater than 40 in.) 2, 0.5, 25.1, 13. Shrub stems/acre, 16,700; ground cover 63%; canopy cover 67%; average canopy height 49 feet (range 36-72). The soils are well drained and moderately to severely erodible. Nearly the whole area is covered with various Manor loams, and almost half of it is of the more highly erodible types. Plant names are from M. L. Fernald, *Gray's Manual of Botany*, 8th Ed., 1950. Edge: The plot is bordered on the north by the hickory-oak-ash floodplain forest census area (number 1); on the east and most of the south by a continuation of the upland tulip-tree-maple-oak forest; on the southwest by a mature pine woods; and on the west by an old field. Edge effect was essentially eliminated by keeping the boundary of the plot 50 to 100 feet within the deciduous forest edge. Topography: A hill-top with a relief of less than 3 feet in one-half acre is centrally located 250 feet within the southern boundary. From the summit a gradual slope to the northeast falls 25 feet in a horizontal distance of 500 feet. Elsewhere the elevation drops sharply, especially along the east and northeast, where it drops 30-35 feet per 100 feet. Most of the plot slopes toward the north, with an average fall of 140 feet per 1000 feet. Elevation: 310 to 412 feet. Coverage: June 30; July 1, 2, 5, 6, 7, 8, 10 (2 trips), 12. Each survey started at dawn and lasted about 2 hours. Total man-hours, 20.5. Census (territorial males, followed in parentheses by males per square kilometer and males per 100 acres): Red-eyed Vireo, 14 (116, 47); Cardinal, 13 (108, 44); Acadian Flycatcher, 9.5 (79, 32); Rufous-sided Towhee, 8 (67, 27); Wood Thrush, 7.5 (62, 25); Hooded Warbler, 6.5 (54, 22); Kentucky Warbler, 4.5 (37, 15); Tufted Titmouse, 4 (33, 13); E. Wood Pewee, 3 (25, 10); Mourning Dove, 2.5; Downy Woodpecker, 2.5; Cerulean Warbler, 2.5; Red-bellied Woodpecker, 2; Carolina Wren, 2; White-eyed Vireo, 2; Parula Warbler, 2; Ovenbird, 2; Scarlet Tanager, 2; Carolina Chickadee, 1.5; Hairy Woodpecker, 1; Catbird, 1; Yellow-throated Vireo, 1; Worm-eating Warbler, 1; Red-shouldered Hawk, +; Bobwhite, +; Yellow-billed Cuckoo, +; Yellow-shafted Flicker, +; Great Crested Flycatcher, +; Blue Jay, +; Com. Crow, +; Fish Crow, +; Brown Thrasher, +; Blue-gray Gnatcatcher, +; Yellow-breasted Chat, +; Brown-headed Cowbird, +; Am. Goldfinch, +. Total: 36 species; 95 territorial males (790 per square kilometer, 320 per 100 acres). Visitors: Barn Swallow, Purple Martin, Mockingbird, Red-winged Blackbird, Com. Grackle. Remarks: Although this census was begun very late in the season, the beginning of the nesting season had been delayed enough by cool weather and late arrivals so that most species were still in full song in the early morning hours in the first week of July. Studies earlier in the year in subsequent breeding seasons will determine whether some of the early nesting species were missed in 1971. — EDWARD F. CONNOR, DEDRA BUCHWALD, PAUL WAGNER, AELRED GEIS and CHANDLER S. ROBBINS (compiler), Antioch College, Columbia, Md.; and Migratory Bird Populations Station, Laurel, Md. 20810.

**11. MIXED HARDWOOD FOREST.** — Location: Maryland; Calvert County, northwest of Plum Point and one mile inland from Chesapeake Bay between Routes 263 and 261. Size: 28 acres. Description of Area: See *Audubon Field Notes* 13: 333 (1959). This is the eleventh\* (and tenth successive) breeding-bird census on this study plot. Winter bird-population studies were made in the plot the previous twelve winters. Weather: Fifteen trips were in clear weather; one was in rain. The high temperatures on census days varied between 62° and 90° F. The bog area remained wet or soft, and the creek flowed except for a one-week period in mid-August. Coverage: April 10, 11, 17, 24; May 1, 8, 9 (evening), 12, 15, 23 (p.m.), 31; June 6, 12, 19, 26; July 3 (evening), 4, 11, 17, 25; August 1, 8, 15, 22, 29, 31; Sept. 6. There were six partial trips and several night visits. Total: 21 full daylight trips, averaging one-hour and 44 minutes, started between 6:28 and 10:30 a.m., E.S.T. Census: Red-eyed Vireo, 33 (118); Wood Thrush, 23 (82); Cardinal, 23 (82); Acadian Flycatcher, 21 (75); Carolina Wren, 13 (46); Parula Warbler, 12.5 (45); Tufted Titmouse, 12 (43); Carolina Chickadee, 9.5 (34); Kentucky Warbler, 9.5 (34); Ovenbird, 9 (32); Downy Woodpecker, 8 (29); Rufous-sided Towhee, 8 (29); E. Wood Pewee, 7 (25); Blue-gray Gnatcatcher, 6.5 (23); Yellow-throated Vireo, 6 (21); Hooded Warbler, 6 (21); Mourning Dove, 5 (18); Red-bellied Woodpecker, 5 (18); Scarlet Tanager, 5 (18); Yellow-billed Cuckoo, 4 (14); Ruby-throated Hummingbird, 4 (14); Yellow-throated Warbler, 4 (14); Louisiana Waterthrush, 4 (14); Am. Redstart, 3 (11); Am. Goldfinch, 3 (11); Hairy Woodpecker, 2; Great Crested Flycatcher, 2; Com. Grackle, 2; Brown-headed Cowbird, 2; Indigo Bunting, 2; Am. Woodcock, 1; Yellow-shafted Flicker, 1; Pileated Woodpecker, 1; Worm-eating Warbler, 1; Summer Tanager, 1. Total: 35 species; 258.5 territorial males (923 per 100 acres). Visitors: (Average number of individuals per 100 acres): Red-tailed Hawk, +; Broad-winged Hawk, +; Bobwhite, +; Barred Owl, +; Blue Jay, +; Com. Crow, +; Fish Crow, +; Mockingbird, +; Catbird, +; Robin, +; White-eyed Vireo, +; Black-and-white Warbler, +; Pine Warbler, +; Yellowthroat, +; White-throated Sparrow, +. Remarks: The 35 species judged to be on territory were one more than last year and equalled that for 1969. The 10-year average is 36. The total of 258.5 territorial males closely matched last year's 256, which was the second highest in 10 years. The 10-year average is 223. The Red-eyed Vireo again had the most territories (33), only three less than in 1970. The Cardinal (26 last year) remained second (23) and was equalled by the Wood Thrush, which increased from last year's 21 (its 10-year average was 15). Recovering from last year's lows were Blue-gray Gnatcatcher (4 to 6.5), Yellow-throated Vireo (2 to 6) and Ovenbird (4 to 9). The Carolina Wren showed a marked increase (8 to 13), the highest total yet for this species, the 10-year average being 6. The Ruby-throated Hummingbird and Com. Grackle also increased, 2 to 4 and 1 to 2, respectively. The

Acadian Flycatcher decreased from 26 to 21 and the E. Wood Pewee from 9 to 7. The Hooded Warbler, which fell off last year from 12 to 8, was even lower this year (6). It appears that this species has suffered the most in the two years following the opening of a major highway through the plot. The Barred Owl was considered a visitor the last two years, and the Whippoorwill has not been recorded for three years. The Red-tailed Hawk and Mockingbird were visitors for the first time. Of all the records in the breeding-bird studies in this plot in eleven years, none surpasses the occurrence this year of the White-throated Sparrow in full song on July 11 and August 15 (notes were heard at the same location on August 22). This species was considered a visitor. Regardless of whether or not there was a breeding pair the fact that this species occurred in southern Maryland in summer is singularly important in itself. — JOHN H. FALES, *Ridge Road, Neeld Estate, Huntingtown, Md. 20639.*

**12. MATURE NORTHERN HARDWOODS.** — Location: West Virginia; Weimer Nature Trails of Bethany College, Bethany, Brooke Co., at 40°12'45" N; 80°33'55" to 80°33'45" W; Bethany Quadrangle, U.S.G.S. Size: About 30 acres (square). Topography: A ravine with a stream bisecting it in the approximate center from north to south. Elevation varies from 950 to 1120 feet. Edge: The southern boundary is similar habitat except for an area of 30-year old pine and spruce woods, near the southeastern corner. The eastern border is a narrow dirt road through similar habitat. The northern boundary is through similar habitat. The western edge borders on an old field. Description of Area: Except for some White Oaks (*Quercus alba*) selectively cut during World War II, the area under study is virgin hardwoods. Many very old trees can be observed. Trees were analyzed by James J. Sawtell, Biology Department, Bethany College using the point-quarter technique. Dominancy in relative space taken (relative dominance) is reported as per cent of total area: Sugar Maple (*Acer saccharum*), 24.1%; White Oak, 14.2%; Beech (*Fagus grandifolia*), 9.3%; Am. Elm (*Ulmus americana*), 7.6%; Tulip-tree (*Liriodendron tulipifera*), 7.5%; Slippery Elm (*U. rubra*), 6.8%; White Ash (*Fraxinus americana*), 5.7%; Tree-of-Heaven (*Ailanthus altissima*), 5.5%; Am. Sycamore (*Platanus occidentalis*), 4.1%; Black Cherry (*Prunus serotina*), 3.5%; Red Maple (*A. rubrum*), 2.6%; Honey Locust (*Gleditsia triacanthos*), 2.3%; Red Oak (*Q. rubrum*), 1.5%; Black Birch (*Betula lenta*), 1.0%; Hackberry (*Celtis occidentalis*), 0.9%; Ironwood (*Ostrya virginiana*), 0.8%; Flowering Dogwood (*Cornus florida*), 0.7%; Basswood (*Tilia americana*), 0.3%; Bitternut Hickory (*Carya cordiformis*), 0.2%; Box-elder (*Acer negundo*), 0.2%; Am. Hornbeam (*Carpinus caroliniana*), 0.2%; White Sassafras (*Sassafras albidum*), 0.1%. Understory is open with some wild grape (*Vitis* sp.), Spicebush (*Lindera benzoin*), blackberry (*Rubus* sp.), and Japanese Barberry (*Berberis thunbergii*), along with seedlings of the canopy. Plants on the forest floor include at least 15 species of moss, Spinulose Shield Fern (*Dryopteris spinulosa*), Christmas Fern (*Polystichum acrostichoides*), Interrupted

\*The 1970 report for this study was published in *Maryland Birdlife* 27: 79-80 (1971). -Ed.]

Fern (*Osmunda claytoniana*), New York Fern (*D. noveboracensis*), Sensitive Fern (*Onoclea sensibilis*), Rattlesnake Fern (*Botrychium virginianum*), Spring Beauty Fern (*Claytonia virginica*), Cut-leaf Toothwort (*Dentaria laciniata*), Stone Crop (*Sedum ternatum*), May Apple (*Podophyllum peltatum*), Pale Violet (*Viola striata*), Yellow Violet (*V. eriocarpa*), Sweet White Violet (*V. blanda*), Com. Blue Violet (*V. papilionaceae*), Early Saxifrage (*Saxifraga virginensis*), Dutchman's Breeches (*Dicentra cucullaria*), Rue Anemone (*Anemone thalictroides*), Wild Ginger (*Asarum canadense*), Henbit (*Lamium amplexicaule*), Ground Ivy (*Glechoma hederacea*), Appendaged Waterleaf (*Hydrophyllum appendiculatum*), Swamp Buttercup (*Ranunculus septentrionalis*), Dandelion (*Taraxacum officinale*), Dwarf Larkspur (*Delphinium tricorne*), Small Solomon's Seal (*Polygonatum biflorum*), Anise-root (*Osmorhiza longistylis*), Jack-in-the-pulpit (*Arisaema triphyllum*), Large-flowered Trillium (*Trillium grandiflorum*), Bedstraw (*Galium aparine*), Winter-cress (*Barbarea vulgaris*), Com. Chickweed (*Stellaria media*), Fire Pink (*Silene virginica*), Wood Nettle (*Laportea canadensis*), Jewelweed (*Impatiens pallida*). **Coverage:** May 31-June 4. Eleven trips were made between 5:30 a.m. and 9:00 p.m., E.S.T. Total 20.8 party-hours. **Census:** Acadian Flycatcher, 12.5 (103, 42); Red-eyed Vireo, 7.5 (62, 25); Blue-gray Gnatcatcher, 7 (58, 23); Cerulean Warbler, 7 (58, 23); Rufous-sided Towhee, 7 (58, 23); Cardinal, 5 (41, 17); E. Wood Pewee, 3.5 (29, 12); Carolina Chickadee, 3 (25, 10); Wood Thrush, 3 (25, 10); Brown-headed Cowbird, 3 (25, 10) females; Yellow-shafted Flicker, 2; Downy Woodpecker, 2; Tufted Titmouse, 2; Kentucky Warbler, 2; Great Crested Flycatcher, 1.5; Scarlet Tanager, 1.5; Indigo Bunting, 1.5; Pileated Woodpecker, 1; Hairy Woodpecker, 1; White-breasted Nuthatch, 1; Robin, 1; Louisiana Waterthrush, 1; Carolina Wren, 0.5; Yellow-breasted Chat, 0.5; Com. Grackle, 0.5; Ruffed Grouse, +; Barred Owl, +; Chimney Swift, +; Red-bellied Woodpecker, +; E. Phoebe, +; Com. Crow, +; Am. Goldfinch, +. **Total:** 32 species; 77.5 territorial males (or females)(638 per square kilometer, 258 per 100 acres). **Visitors:** Hermit Thrush, Cedar Waxwing, Yellow-throated Vireo, Worm-eating Warbler, Blue-winged Warbler, Black-throated Green Warbler, Baltimore Oriole, Field Sparrow. **Remarks:** Five nests were found: Yellow-shafted Flicker (brooding female); E. Phoebe (empty); Acadian Flycatcher (under construction); Wood Thrush (brooding female); Louisiana Waterthrush (4 young); Rufous-sided Towhee (eggs). A Hairy Woodpecker and a Tufted Titmouse were observed feeding young out of the nest. A Yellow-throated Warbler was regularly observed singing in a spruce close to the southeastern corner of the study area. — GLEN PHILLIPS, MRS. LOWELL YOUNGREN and A. R. BUCKELEW, JR. (compiler), *Brooks Bird Club, 707 Warwood Ave., Wheeling, W. Va. 26003.*

### 13. MATURING OAK-HICKORY FOREST. —

**Location:** West Virginia; on the Peach Orchard Trail just east of its junction with National Forest Route 296 in the Monongahela National Forest, Greenbrier County, 3 miles northeast of Anthony; 37°56'N,

80°17'W. **Size:** 15 acres (rectangular, 110 x 660 yards, measured). **Description of Area:** Fairly mature oak-hickory forest with trees averaging about 65 feet in height and 12-24 inches DBH. The canopy is closed except for the trail which marked the center line of the tract. Approximately 65% Red Oak (*Quercus rubra*), 5% White Oak (*Q. alba*), the remainder consisting of Scarlet Oak (*Q. coccinea*), Chestnut Oak (*Q. prinus*), Shagbark Hickory (*Carya ovata*), Pignut Hickory (*C. glabra*), Black Locust (*Robinia pseudo-acacia*), Black Walnut (*Juglans nigra*), and Cucumber Magnolia (*Magnolia acuminata*). The understory consists of Flowering Dogwood (*Cornus florida*), Maple-leaved Viburnum (*Viburnum acerifolium*), Sassafras (*Sassafras albidum*), and Witch Hazel (*Hamamelis virginiana*). The ground cover is composed of seedlings of the overstory trees, small woody shrubs, and herbaceous plants of which the following are representative: Wild Sarsaparilla (*Aralia nudicaulis*), Large-leaved Aster (*Aster macrophyllus*), Black Snakeroot (*Cimicifuga racemosa*), Allegheny menziesia (*Menziesia pilosa*), and Bracken (*Pteridium aquilinum*). Scientific names of plants from M. L. Fernald, *Gray's Manual of Botany*, 8th Ed., 1950. **Edge:** Tract bounded on all sides by similar habitat. **Topography:** The center line follows a ridge crest in a northeasterly direction; both sides of the plot slope downward. The elevation at both ends is about 2700 feet and descends gently about 50 feet to a low point in the center. **Coverage:** June 7-11. Sixteen trips from 5:45 a.m. to 8:45 p.m.; 10 early morning, 2 mid-day, and 4 late evening. Total party-hours, about 8. **Census:** Cerulean Warbler, 7 (47); Ovenbird, 6 (40); Red-eyed Vireo, 5.5 (37); Blue-gray Gnatcatcher, 4 (27); Wood Thrush, 3 (20); Yellow-throated Vireo, 2.5; Rufous-sided Towhee, 1.5; Red-bellied Woodpecker, 1; Great Crested Flycatcher, 1; E. Wood Pewee, 1; Tufted Titmouse, 1; Black-and-white Warbler, 1; Parula Warbler, 1; Hooded Warbler, 1; Scarlet Tanager, 1; Downy Woodpecker, 0.5; Ruby-throated Hummingbird, +; Yellow-shafted Flicker, +; Hairy Woodpecker, +; Blue Jay, +; White-breasted Nuthatch, +; Worm-eating Warbler, +; Blackburnian Warbler, +; Brown-headed Cowbird, +; Rose-breasted Grosbeak, +. **Total:** 25 species; 38 territorial males (253 per 100 acres). **Visitors:** Chimney Swift, Starling, Chestnut-sided Warbler, Indigo Bunting, Am. Goldfinch. **Remarks:** Although not adjacent to the study area, there was a road on the north side of the ridge from which the Indigo Bunting and Chestnut-sided Warbler originated. Cerulean Warblers sang vigorously before sunrise and stopped abruptly at about 6:15 a.m., then resumed singing again at about 7:30 a.m. Owing to lack of singing activity, it was found that Ovenbirds could not be accurately censused on morning trips. They were very active in the evening, however, and frequently delivered their flight song as well. Cerulean Warblers preferred the highest elevations available on the ridge. They were concentrated on the higher ends, with only one pair nesting in the low center depression of the tract; they were not found on the sides of the ridge. Some species of birds restricted their territories to one side of the ridge only, seldom if ever crossing the crest. Among these were the Great Crested Flycatcher,

Wood Thrush, Tufted Titmouse, Black-and-white Warbler, Hooded Warbler, and Rufous-sided Towhee. All but the Tufted Titmouse were on the north-facing slope. — E. R. CHANDLER, MARY FORD, EUGENE HUTTON, CAROL RUDY (compiler), MARTIN RUDY, *Brooks Bird Club Inc., Wheeling, W. Va. 26003.*

**14. OAK-HICKORY FOREST.** — Location: West Virginia; Peach Orchard Study Area on Peach Orchard Ridge, Greenbrier County, 2.5 miles due northeast of Anthony, and 1.4 miles along Peach Orchard Road from its junction with Gunpowder Ridge Road. Size: 15 acres (rectangular, 110 x 660 yards, measured). **Topography:** The area extends southwest-northwest along a relatively narrow ridge of varying width. The elevation is 2700 feet dropping to about 2600 feet at the end. An old logging road served as the centerline. **Description of Area:** See *Audubon Field Notes* 20: 613-614 (1966). **Coverage:** June 5-9. Twelve trips between pre-dawn and daylight, and two in the evening. Total party-hours, about 10. **Census:** Cerulean Warbler, 8 (53); Red-eyed Vireo, 7 (47); Ovenbird, 4.5 (30); Solitary Vireo, 3 (20); Wood Thrush, 2; Blue-gray Gnatcatcher, 2; Yellow-throated Vireo, 2; Scarlet Tanager, 1.5; Great Crested Flycatcher, 1.5; E. Wood Pewee, 1; Black-throated Green Warbler, 1; Black-and-white Warbler, 0.5; Worm-eating Warbler, 0.5; Pileated Woodpecker, +; Red-bellied Woodpecker, +; Downy Woodpecker, +; White-breasted Nuthatch, +; Brown-headed Cowbird, +. **Total:** 18 species; 33 territorial males (220 pairs per 100 acres). **Visitors:** Mourning Dove, Blue Jay, Tufted Titmouse, Am. Goldfinch. **Remarks:** Because of logging activity near the beginning of the area studied in 1966, the present area was begun about 850 feet farther down the old logging road that served as the center line. This preserved the nature of the original habitat and should not have materially affected the results. The number of species having territories on the area decreased from 23 to 18 and the number of individual territories decreased from 247 to 220 pairs per 100 acres. The greatest change was an increase in concentration of Cerulean Warblers from 17 to 53 pairs per 100 acres. The concentration of Blue-gray Gnatcatchers increased from 3 to 13. Decreased concentration was noted in the following species: Black-throated Green Warbler from 20 to 7, Wood Thrush from 27 to 13, and Black-and-white Warbler from 17 to 3. Missing from this particular area were Blackburnian Warblers, Black-throated Blue Warblers and Hooded Warblers, each of which was present in 1966. — KENNETH H. ANDERSON assisted by RICHARD H. ANDERSON, A. JOHN BUSH, GLEN PHILLIPS, PAUL HAGGARD, GEORGE A. HALL, ESTHER REICHELDERFER, GREGG EDDY, ANN EDDY, DOROTHY BROEMSEN, STUART ROBBINS, EUGENE E. HUTTON, JR. and GEORGE KOCH, *Brooks Bird Club, Inc., Wheeling, W. Va. 26003.*

**15. POLE-SIZED OAK WOODS.** — Location: West Virginia; starts 1.2 miles south from the Anthony-Alvon road and 300 yards southeast from the present Big Draft road. Follows the trace of the

old county road and a stream bed west from 37°53'54"N, 80°15'13"W. White Sulphur Springs Quadrangle, U.S.G.S. Size: 15 acres (rectangular, 110 x 660 yards, measured) **Description of Area:** See *Audubon Field Notes* 20: 614 (1966). Clearcut logging where we began the original plot caused us to move the starting point 250 yards south in order to be in the same habitat as in 1966. We followed the original centerline from elevation 2330 and continued downstream to elevation 2180. **Coverage:** June 6-10. Ten trips between daylight and 8 a.m., two in the late morning and one in the evening. Total party-hours, 12. **Census:** Ovenbird, 7 (47); Red-eyed Vireo, 4 (27); Wood Thrush, 3 (20); Black-and-white Warbler, 3 (20); Worm-eating Warbler, 3 (20); Tufted Titmouse, 2; Hooded Warbler, 1; Rufous-sided Towhee, 1; Parula Warbler, 0.5; Scarlet Tanager, 0.5; Downy Woodpecker, +; Great Crested Flycatcher, +; Acadian Flycatcher, +; Blue Jay, +; Black-capped Chickadee, +; Solitary Vireo, +; Brown-headed Cowbird, +. **Total:** 17 species; 25 territorial males (167 per 100 acres). **Visitors:** Pileated Woodpecker, Com. Crow, Com. Grackle, Am. Goldfinch. **Remarks:** Shifting the plot downstream increased the number of the larger (10-inch DBH) trees and may account for the increase in Worm-eating Warblers. Otherwise we see little difference from 1966. — EUGENE HUTTON, WILLIAM SMITH, KYLE BUSH, MARY DAVENPORT, DAVID DAVENPORT, LAURA KOCH, GEORGE KOCH, (compiler), *Brooks Bird Club., Wheeling, W. Va. 26003.*

**16. RIDGE AND VALLEY HARDWOOD FOREST.** — Location: Tennessee; University of Tennessee Cherokee Farm Woodlot, 2.5 miles south-southwest of Knoxville (City Hall), Knoxville Quadrangle, U.S.G.S. Size: 60 acres. **Description of Area:** See *Audubon Field Notes* 19: 593-594 (1965). **Coverage:** April 14, 27; May 4, 11, 18, 26; June 15, 29. Hours varied from 5:30 to 10:35 a.m., E.S.T., and totaled 35 man-hours. **Census:** Cardinal, 34 (57); Red-eyed Vireo, 21 (35); Carolina Wren, 14 (23); Blue Jay, 9 (15); Carolina Chickadee, 9 (15); Tufted Titmouse, 9 (15); Brown-headed Cowbird, 5 (8); Blue-gray Gnatcatcher, 3 (5); Kentucky Warbler, 3 (5); Rufous-sided Towhee, 3 (5); Yellow-billed Cuckoo, 2; Downy Woodpecker, 2; Red-bellied Woodpecker, 1.5; Indigo Bunting, 1.5; Pileated Woodpecker, 1; Acadian Flycatcher, 1. **Total:** 16 species; 119 territorial males (198 per 100 acres). **Visitors:** (Estimated average per 100 acres): Com. Grackle, 7; Robin, 3; Summer Tanager, 3; Bobwhite, 2; Com. Crow, 2; Red-tailed Hawk (immature, a wanderer?), 1; Mourning Dove, 1; Chimney Swift, 1; Yellow-shafted Flicker, 1; Hairy Woodpecker, 1; Great Crested Flycatcher, 1; Purple Martin, 1. **Remarks:** This is the seventh consecutive census. From the beginning the total for all species has decreased each year until this year when it rose from the 176 of 1970. The Cardinal population was unchanged from 1970, the Red-eyed Vireo increased by seven (males per 100 acres), the Carolina Wren was unchanged, the Tufted Titmouse decreased by two and the Carolina Chickadee increased by three. This is the first time the chickadee population has increased and an additional

species, the Blue Jay, has attained a population (9) equal to that of any of the above five previously dominant species. Rainfall for January through May totaled 21.82 inches which is close to normal (22.24). This rainfall is more than 4 inches greater than fell in any comparable period since 1965. Temperatures averaged almost 3° F. below the mean for this period. Two Pileated Woodpecker nests were located within 200 feet of a boundary of the area, one to the east and the other to the west. A nest of a Carolina Chickadee containing one egg was found on April 14. A Cardinal nest with one egg and two recently hatched young was examined on May 11. — J. C. HOWELL, *Department of Zoology and Entomology, University of Tennessee, Knoxville, Tenn. 37916.*

**17. UPLAND MIXED FOREST.** — **Location:** North Carolina; one-quarter mile from North Wilkesboro, just west of Finley Park. **Size:** 37 acres (formerly 40 acres, then 38, but reduced by further building along two borders). **Description of Area:** See *Audubon Field Notes* 8: 367 (1954). **Topography:** A ravine, through which a small brook flows, occupies the center of the tract. On each side the slopes are steep, rising 50 to 100 feet. **Coverage:** May 14, 19, 27; June 1, 8, 11, 14, 22, 24; with additional observations during the season. Hours varied from 9 a.m. to 6 p.m. and totaled 20 man-hours. **Census:** Wood Thrush, 8 (22); Rufous-sided Towhee, 7 (19); Carolina Wren, 6 (16); Cardinal, 6 (16); Acadian Flycatcher, 4 (11); Bobwhite, 3 (8); Red-bellied Woodpecker, 3 (8); Blue Jay, 3 (8); Carolina Chickadee, 3 (8); Red-eyed Vireo, 3 (8); Ovenbird, 3 (8); Scarlet Tanager, 3 (8); Com. Grackle, 3 (8); Mourning Dove, 2; Yellow-shafted Flicker, 2; Great Crested Flycatcher, 2; E. Wood Pewee, 2; Tufted Titmouse, 2; White-breasted Nuthatch, 2; Catbird, 2; Yellow-billed Cuckoo, 1; Screech Owl, 1; Barred Owl, 1; Downy Woodpecker, 1; Brown Thrasher, 1; Robin, 1; Hooded Warbler, 1; Song Sparrow, 1. **Total:** 28 species; 77 territorial males (208 per 100 acres). **Visitors:** Great Horned Owl, Mourning Dove, Pileated Woodpecker, Tufted Titmouse, Wood Thrush. **Remarks:** Except for forest growth there has been no change in the tract. Ice storms during the preceding winter broke or uprooted trees but they were scattered, producing no "edge effect." A decline in species and in numbers of warblers over the past several years is noticeable; Black-and-white, Worm-eating, Parula, Yellow-throated, Pine, Kentucky and Am. Redstart were not listed this year. Ovenbirds and Hooded Warblers have been present in much larger numbers. Some of these species have been represented by only one pair so their absence may not be significant, but a gradual reduction of the Black-and-white Warbler from 4 pairs 10 years ago to none for at least 4 years seems strange. — WENDELL P. SMITH, *North Wilkesboro, N.C. 28659.*

**18. MOUNTAIN RAVINE MIXED FOREST.** — **Location:** Georgia; headwaters of Cuttingbone Creek in the Chattahoochee National Forest, 4 miles south-southeast of Clayton, Rabun County. **Size:** 5.9 ha = 14.7 acres (rectangular, 400 x 1600 feet, measured). **Description of Area:** See *Audubon Field Notes* 23:

710-711 (1969). Changes in vegetation are not perceptible from year to year in this mature forest. **Edge:** Bounded on all sides by similar forest. **Topography:** A small stream runs length-wise of the tract. The north and south slopes rise steeply from the floor of the ravine. Elevations vary between 1760 and 1840 feet. **Coverage:** April 10, 17, 19, 25, 27; May 4, 6, 9, 10, 12, 14, 16, 18, 20, 23, 25, 27, 30; June 1, 2, 3, 4, 5, 6, 9, 10, 13, 15, 20, 23, 26; July 1, 4. Of the 33 census trips, one was all night, several in the afternoon and evening, but most were between 6 and 10 a.m., E.D.T. Two hours were spent on most trips; the total census time was 81 hours. **Census:** Red-eyed Vireo, 13 (219, 88); Acadian Flycatcher, 9 (151, 61); Hooded Warbler, 9 (151, 61); Worm-eating Warbler, 6 (101, 41); Carolina Chickadee, 5 (84, 34); Cardinal, 5 (84, 34); Tufted Titmouse, 4 (67, 27); Black-and-white Warbler, 4 (67, 27); Black-throated Green Warbler, 4 (67, 27); Yellow-throated Vireo, 3 (50, 20); Scarlet Tanager, 3 (50, 20); Wood Thrush, 2; Swainson's Warbler, 2; Pileated Woodpecker, 1; Downy Woodpecker, 1; Blue Jay, 1; White-breasted Nuthatch, 1. **Total:** 17 species, 73 territorial males (1,227 per square kilometer, 497 per 100 acres). **Visitors:** Broad-winged Hawk, Screech Owl, Whip-poor-will, Chimney Swift, Yellow-shafted Flicker, Great Crested Flycatcher, E. Wood Pewee, Purple Martin, Carolina Wren, E. Bluebird, Louisiana Waterthrush, Am. Goldfinch. **Remarks:** Ruffed Grouse were not seen in the area, but were heard drumming near the south boundary during April and May. The Yellow-billed Cuckoo, Yellow-throated Warbler, Pine Warbler and Ovenbird held territories just above the north boundary. Mrs. W. L. Gibbs assisted in 3 census trips, and Paul and Esther Stewart, Caroline G. Newhall and Marie B. Mellinger in one census each. — E. O. MELLINGER, *Tiger, Ga. 30576.*

**19. SOUTHERN MIXED HARDWOOD FOREST.** — **Location:** Georgia; Wormsloe Plantation, Isle of Hope, Chatham County, approximately 9 miles south of the civic center of Savannah; 31°57'35"N, 81°04'25"W. **Size:** 25 acres (rectangular, 300 x 400 yards, measured). **Description of Area:** See *Audubon Field Notes* 17: 502-503 (1963) and 18: 555 (1964). **Coverage:** April 17, 24; May 8, 16, 21, 22, 29, 30; June 6. Hours varied from 6:30 a.m. to 8:30 p.m., E.S.T. and totaled 31 man-hours. At least two hours were spent censusing before 11 a.m. on the dates indicated. **Census:** Carolina Wren, 7 (28); Cardinal, 7 (28); Parula Warbler, 6.5 (26); Rufous-sided Towhee, 4.5 (18); Blue Jay, 4 (16); Tufted Titmouse, 4 (16); Pine Warbler, 4 (16); Red-eyed Vireo, 2.5; Acadian Flycatcher, 2; Carolina Chickadee, 2; Blue-gray Gnatcatcher, 2; Summer Tanager, 2; Yellow-billed Cuckoo, 1.5; Red-bellied Woodpecker, 1.5; Pileated Woodpecker, 1; Downy Woodpecker, 1; Yellow-throated Warbler, 1; Great Crested Flycatcher, 0.5. **Total:** 18 species; 54 territorial males (216 per 100 acres). **Visitors:** Red-tailed Hawk, Screech Owl, Great Horned Owl, Fish Crow, White-eyed Vireo, Yellow-throated Vireo, Hooded Warbler. **Remarks:** Total species are three (20%) more than last year's 15 and the total number of territorial males is 57.4% more than last year's 31. The count this year is very close to 1969's

and hopefully indicates a reversal of several years' downward trend in the breeding-bird population of this census area. — L. B. DAVENPORT, JR., *Biology Department, Armstrong State College, Savannah, Ga. 31406.*

**20. ASPEN FOREST. — LOCATION:** Ontario; in the "Natural Area" of Lake of the Woods Provincial Park, on the southeastern shore of Lake of the Woods, in the north-central portion of McCrosson Township, Rainy River District; 48° 59'N, 94° 28'W. **Size:** 10 ha = 25 acres. Staked in a 2-chain (132 ft.) grid (15 man-hours). **Description of Area:** The bedrock of Precambrian granite is exposed in several outcrops in the central part of the plot. On both sides of the outcrops and to some extent between them are deposits of black muck soil. Jack Pine is the characteristic tree of the outcrops, with a few small Bur Oaks, juneberries, Pin Cherries and scattered Junipers and Smooth Sumacs. Characteristic trees of the muck soil are Red Ash, White Cedar and Balsam Poplar with Mountain Maple and Round-leaved Dogwood the chief understory components. Quaking Aspen was by far the most important tree on the plot with White Birch more numerous but much smaller on the average, while Beaked Hazelnut is the dominant shrub over the whole plot. We found that in our 8% sample of the trees on the plot, Quaking Aspen (*Populus tremuloides*) made up 57% of the total basal area; White Birch (*Betula papyrifera*), 17.5%; Balsam Fir (*Abies balsamea*) 6%; Beaked Willow (*Salix bebbiana*), 5%; Jack Pine (*Pinus banksiana*), 4.5%; Balsam Poplar (*Populus balsamifera*), 3%; Red Ash (*Fraxinus pennsylvanica*) 3%; White Cedar (*Thuja occidentalis*) 2%. The remaining 2% was made up of 25 species, listed in decreasing order of importance: Mountain Maple (*Acer spicatum*), Beaked Hazelnut (*Corylus cornutus*), Juneberries (*Amelanchier humilis* and *A. intermedia*), Round-leaved Dogwood (*Cornus rugosa*), White Spruce (*Picea glauca*), Bur Oak (*Quercus macrocarpa*), Pin Cherry (*Prunus pennsylvanica*), Choke Cherry (*P. virginiana*), Downy Arrow-wood (*Viburnum rafinesquianum*), Alternate-leaved Dogwood (*C. alternifolia*), Canada Honeysuckle (*Lonicera canadensis*), Am. Elm (*Ulmus americana*), Red-osier Dogwood (*C. stolonifera*), Rose (*Rosa acicularis*), raspberry (*Rubus strigosus*), honeysuckle vines (*Lonicera dioica* and *L. hirsuta*), Com. Juniper (*Juniperus communis*), Black Spruce (*Picea mariana*), currants (*Ribes* sp.), Virginia Creeper (*Parthenocissus vitacea*), Smooth Sumac (*Rhus glabra*), Guelder-rose (*Viburnum opulus*), and Bush Honeysuckle (*Diervilla lonicera*). From a numerical point-of-view Beaked Hazelnut made up 21% of the woody vegetation (more than knee high) on the plot, White Birch, 17%; Quaking Aspen, 13.5%; Round-leaved Dogwood, 7%; willow, 7%; Mountain Maple, 7%; Balsam Fir, 6%; juneberries, 5%; Red Ash, 4%; Downy Arrow-wood, 2%; Choke Cherry, 2%; Balsam Poplar, 1.5%; Jack Pine, 1.5%; Pin Cherry, 1%; Canada Honeysuckle, 1%; with the remainder made up of 17 species with less than 1% each. Quaking Aspen and White Birch occurred on all 40 of the 1/20 acre subplots, Balsam Fir on 39, and Beaked Hazelnut on 38. Quaking Aspen was the tree with the greatest basal

area on 30 of the 40 subplots; White Birch on 3; Balsam Fir, 3; Jack Pine, 2; Red Ash and willow 1. Beaked Hazelnut was the most numerous species on 13 subplots; Quaking Aspen on 7; White Birch, 6; willow and Mountain Maple, 4 each; Red Ash, 2; Balsam Fir, Jack Pine, juneberry and Round-leaved Dogwood, 1 each. We did not sample the vegetation less than knee high, nor the non-woody vegetation. I am indebted to Shan Walshe for a list of this ground vegetation. He found six kinds of mosses on the plot: *Leucobryum glaucum*, *Sphagnum* sp., *Polytrichum commune*, *P. juniperum*, *Hypnum crista-castrensis* and *Rhytidiadelphus triquetrus*. There were a dozen ferns and fern-allies: Ground-Pine (*Lycopodium obscurum*), Running-Pine (*L. clavatum*), Ground-Cedar (*L. complanatum*), Rock Spikemoss (*Selaginella rupestris*), Com. Horsetail (*Equisetum arvense*), Wood Horsetail (*E. sylvaticum*), Rattlesnake Fern (*Botrychium virginianum*), Bracken (*Pteridium aquilinum*), Rock Polypody (*Polypodium vulgare*), Lady Fern (*Athyrium filix-femina*), Oak Fern (*Gymnocarpium dryopteris*) and Com. Wood fern (*Dryopteris austriaca*). The nine grasses were: Fringed Brome Grass (*Bromus ciliatus*), Kentucky Blue Grass (*Poa pratensis*), Fowl Meadow Grass (*P. palustris*), Reed (*Phragmites communis*), Wild Oat Grass (*Danthonia spicata*), Bluejoint (*Calamagrostis canadensis*), Timothy (*Phleum pratense*), Rough Rice Grass (*Oryzopsis asperifolia*), Pungent Rice Grass (*O. pungens*). Three sedges were identified: *Carex scoparia*, *C. arctata* and *C. lupulina*. Four lilies were: Clintonia (*Clintonia borealis*), Canada Mayflower (*Maianthemum canadensis*), Purple Twisted-stalk (*Streptopus roseus*) and Nodding Trillium (*Trillium cernuum*). The following dicotyledons were noted: Wild Ginger (*Asarum canadense*), Bindweed (*Polygonum cilinode*), Lamb's Quarters (*Chenopodium* sp.), Long-leaved Stitchwort (*Stellaria longifolia*), Mouse-ear Chickweed (*Cerastium nutans*), Sleepy Catchfly (*Silene antirrhina*), Red Baneberry (*Actaea rubra*), Wild Columbine (*Aquilegia canadensis*), Small-flowered Crowfoot (*Ranunculus abortivus*), Riverbank Anemone (*Anemone virginiana*), Wood Anemone (*A. quinquefolia*), Pale Corydalis (*Corydalis sempervirens*), Naked Mitrewort (*Mitella nuda*), Smooth Gooseberry (*Ribes oxycanthoides*), Hairy Gooseberry (*R. hirtellum*), Black Currant (*R. hudsonianum*), Swamp Red Currant (*R. triste*). American Strawberry (*Fragaria vesca*), Wood Strawberry (*F. virginiana*), Rough Cinquefoil (*Potentilla norvegica*), Three-toothed Cinquefoil (*P. tridentata*), Avens (*Geum aleppicum*), Dwarf Blackberry (*Rubus pubescens*), Red Clover (*Trifolium pratense*), Alsike Clover (*T. hybridum*), Vetch (*Vicia americana*), Creamy Peavine (*Lathyrus ochroleucus*), Hog Peanut (*Amphicarpa bracteata*), Bicknell's Cranesbill (*Geranium bicknellii*), Poison Ivy (*Rhus radicans*), Jewelweed (*Impatiens biflora*), Downy Yellow Violet (*Viola pubescens*), Fireweed (*Epilobium angustifolium*), Smaller Enchanter's Nightshade (*Circaea alpina*), Wild Sarsaparilla (*Aralia nudicaulis*), Bristly Sarsaparilla (*A. hispida*), Spikenard (*A. racemosa*), Black Snakeroot (*Sanicula marilandica*), Hairy Sweet Cicely (*Osmorhiza claytoni*), Bunchberry (*Cornus canadensis*), Shinleaf (*Pyrola*

*elliptica*), Liverleaf Pyrola (*Pyrola asarifolia*), Small Pyrola (*P. secunda*), Bearberry (*Arctostaphylos uva-ursi*), Dwarf Blueberry (*Vaccinium myrtilloides*), Loosestripe (*Lysimachia ciliata*), Starflower (*Trientalis borealis*), Spreading Dogbane (*Apocynum androsaemifolium*), Dodder (*Cuscuta gronovii*), Dragonhead (*Dracocephalum parviflorum*), Heal-all (*Prunella vulgaris*), Marsh Hedge Nettle (*Stachys palustris*), Horehound (*Lycopus americanus*), Mint (*Mentha arvensis*), Cow Wheat (*Melampyrum lineare*), Northern Bedstraw (*Galium boreale*), Sweet-scented Bedstraw (*G. triflorum*), Snowberry (*Symphoricarpos albus*), Twinflower (*Linnaea borealis*), Harebell (*Campanula rotundifolia*). Fourteen composites were found on the plot: Yarrow (*Achillea millefolium*), Sweet Coltsfoot (*Petasites palmatus*), Dwarf Goldenrod (*Solidago nemoralis*), Canada Goldenrod (*S. canadensis*), Large-leaved Aster (*Aster macrophyllus*), Lindley's Aster (*A. ciliolatus*), Calico Aster (*A. lateriflorus*), Common Fleabane (*Erigeron philadelphicus*), Pearly Everlasting (*Anaphalis margaritacea*), Bull Thistle (*Cirsium vulgare*), Canada Thistle (*C. arvense*), Canada Hawkweed (*Hieracium canadense*), Dandelion (*Taraxacum officinale*), and Wild Lettuce (*Lactuca canadensis*). The scientific nomenclature is from Gleason and Cronquist's *Manual of vascular plants of northeastern United States and Adjacent Canada*: common names from a variety of sources. All but two of the species listed above (yarrow and dandelion) were found by Shan Walshe on the plot; these were noted earlier in the season by the authors. **Coverage:** June 2, 3, 4, 16, 17, 18 (32 man-hours). Most counts were between 6 and 8 a.m. and 6 and 8 p.m. (two evening and four morning counts were made). A sample of the trees and shrubs was made on July 1, 2 and 3 along five of the grid lines covering 8% of the area of the plot. This required about 22 man-hours on the plot. **Census:** Least Flycatcher, 19 (76); Red-eyed Vireo, 15 (60); Ovenbird, 14 (56); Veery, 8 (32); Brown-headed Cowbird, 3.5 (14); Great Crested Flycatcher, 3 (12); Black-and-white Warbler, 3 (12); Blackburnian Warbler, 3 (12); Nashville Warbler, 2.5 (10); Mourning Warbler, 2.5 (10); Blue Jay, 2 (8); Black-capped Chickadee, 2 (8); Baltimore Oriole, 2 (8); Rose-breasted Grosbeak, 2 (8); Black-throated Green Warbler, 1.5; Ruffed Grouse, 1; Brown Creeper, 1; Hermit Thrush, 1; Cedar Waxwing 1; Canada Warbler, 1; Purple Finch, 1; Whip-poor-will, 0.5; Robin, 0.5; Swainson's Thrush, 0.5; Connecticut Warbler, 0.5; Scarlet Tanager, 0.5. **Total:** 26 species; 91.5 territorial males (366 per 100 acres). **Remarks:** The plot was used extensively by White-tailed Deer (*Odocoileus virginianus*) as evidenced by fresh droppings, tracks and browsing of shrubs; one was flushed just outside the plot. The only other mammal noted on the plot was a Varying Hare (*Lepus americanus*). The absence of squirrels may have contributed to the high bird population on the plot. The only amphibians noted on the plot were Gray Treefrogs (*Hyla versicolor*). A Veery nest with 4 eggs was found on June 17; it still contained 4 eggs on June 18 but was empty on July 1. Two species were definitely confined to the rocky outcrops with Jack Pines: the Hermit Thrush and the Nashville Warbler, while the Least Flycatcher avoided this part of the plot. Three

species were found only in parts of the plot with tall, old Balsam Firs: Black-throated Green Warbler, Blackburnian Warbler and Purple Finch. The Red-eyed Vireo, Ovenbird and Veery showed some preference for the black muck parts of the plot with associated big aspens but their avoidance of the rocky outcrop areas was not so marked as with the Least Flycatchers. We wish to thank Paul Catling and the Department of Botany Herbarium at the University of Toronto for assistance in the preparation of the plant list and the Department of Lands and Forests for assistance in locating a suitable aspen forest. We wish to acknowledge the financial support of the Canadian National Sportsmen's Show. — DONALD PRICE and J. MURRAY SPEIRS (Compiler), *Department of Zoology, University of Toronto, Ont., Canada.*

**21. MATURE POPLAR FOREST.** — **Location:** Ontario; 26 miles east of Matheson, Cochrane District, and one-half mile east of Garrison Creek, on the south side of Highway 101; southeast corner of plot is near 48° 31' N, 79° 56' W, on map sheet 32 D/12 West, Lightning River, National Topographic Series. **Size:** 20 ha = 49.4 acres (rectangular, 600 x 350 metres, with the southwest corner adjoining the creek omitted; laid out in 50-metre squares with compass and measured rope). **Description of Area:** See *Audubon Field Notes* 24: 742-743 (1970). **Coverage:** May 29; June 1, 4, 8, 12, 16, 19, 26; July 3. All surveys were made between 5:05 a.m. and 12:48 p.m., and totaled 29.5 hours. **Census:** Least Flycatcher, 16.5 (82, 33); Philadelphia Vireo, 12.5 (62, 25); Ovenbird, 10 (50, 20); Red-eyed Vireo, 5 (25, 10); Mourning Warbler, 5 (25, 10); White-throated Sparrow, 4 (20, 8); Robin, 3.5 (18, 7); Swainson's Thrush, 3 (15, 6); Winter Wren, 2; Veery, 2; Chestnut-sided Warbler, 2; Ruffed Grouse, 1; Black-capped Chickadee, 1; Bay-breasted Warbler, 1; Am. Redstart, 1; Am. Woodcock, 0.5; Black-and-white Warbler, 0.5; Magnolia Warbler, 0.5; Black-throated Blue Warbler, 0.5; Broad-winged Hawk, +; Yellow-bellied Sapsucker, +; Downy Woodpecker, +; Hermit Thrush, +. **Total:** 23 species; 71.5 territorial males (358 per square kilometer, 145 per 100 acres). **Visitors** (total number seen): Com. Raven, 1; Com. Crow, 1; Red-breasted Nuthatch, 3; Ruby-crowned Kinglet, 2; Tennessee Warbler, 1; Nashville Warbler, 2; Myrtle Warbler, 2; N. Waterthrush, 1; Rose-breasted Grosbeak, 1; Evening Grosbeak, 5; Purple Finch, 2; Pine Grosbeak, 1; Pine Siskin, 1; Am. Goldfinch, 2. **Remarks:** Nests found: Robin, 2; White-throated Sparrow, 2. Brood seen: Ruffed Grouse, 1. Although the similar poplar forest to the north of Highway 101 was badly mutilated by lumbering since last summer, this area remained undisturbed. Most species showed very similar densities, often using the same territories, in both years. While most of the larger changes (Philadelphia Vireo, Ovenbird, Black-and-white Warbler) were well documented, the drop in Swainson's Thrushes (from 5 to 3) may be spurious, resulting from infrequent song. No territory was represented by more than 4 song registrations on 9 surveys, and most by only 2 or 3; consequently the number of territories may be greater than shown. Of the species not breed-

ing on the plot last year, Yellow-bellied Sapsucker, Hermit Thrush, and Black-throated Blue Warbler were all heard from the plot then, so their territories were only moved slightly. Downy Woodpecker was noted on six surveys, but these registrations were scattered all over the plot and showed no cluster; even though woodpeckers range widely, 50 acres seems improbably large for a single territory! The one Black-capped Chickadee territory was also quite large and diffuse. — ANTHONY J. ERSKINE, *Migratory Bird Populations, Canadian Wildlife Service, Ottawa, Ont., Canada.*



Census 21. Balsam - poplar forest with willow and alder understory. June 19, 1971.

**22. MIXED HARDWOOD FOREST.** — Location: Michigan; 3 miles south of Ann Arbor, on the north side of Morgan Road, ¼ mile west of the intersection of Morgan and Stone School Roads. Size: 17.8 acres (rectangular, 430, 200 yards, paced). Description of Area: See *Audubon Field Notes* 20: 612 (1966). Coverage: March 4, 14; April 4, 24; May 1, 8, 13, 16, 22, 23, 31; June 25; July 3, 11. Hours varied from 4 a.m. to 4 p.m., totaling about 36 party-hours. Census: Red-eyed Vireo, 6 (34); E. Wood Pewee, 4.5 (25); Tufted Titmouse, 3.5 (20); Yellow-shafted Flicker, 3 (17); Red-headed Woodpecker, 3 (17); Downy Woodpecker, 3 (17); Wood Thrush, 3 (17); Ovenbird, 3 (17); Blue Jay, 2; White-breasted Nuthatch, 2; Cardinal, 2; Robin, 1.5; Rufous-sided Towhee, 1.5; Red-tailed Hawk, 1; Red-bellied Woodpecker, 1; Great Crested Flycatcher, 1; Acadian Flycatcher, 1; Indigo Bunting, 0.5; Song Sparrow, 0.5. Total: 19 species; 43 territorial males (242 per 100 acres). Visitors: Wood

Duck, Turkey Vulture, Mourning Dove, Hairy Woodpecker, Com. Crow, Black-capped Chickadee, Brown Creeper, Catbird, Brown Thrasher, Starling, Red-winged Blackbird, Com. Grackle, Brown-headed Cowbird, Rose-breasted Grosbeak, Am. Goldfinch. Remarks: The number of breeding species is down one from last year. There is some variation in the make-up of the breeding population but, except for the addition of Acadian Flycatcher and the apparent loss of the Great Horned Owl, the differences are all exchanges between the visiting and the breeding populations. The drop in absolute numbers of Great Crested Flycatcher (from 3 to 1) might be a function of lack of coverage of the area in June. Seven nests were located including Red-tailed Hawk, Yellow-shafted Flicker (2 nest holes), Red-headed Woodpecker (2 nest holes), White-breasted Nuthatch, and Wood Thrush. The Red-tailed Hawks nested outside of the grid last year when the owls nested just outside the southeast edge; this year the hawks moved back into the grid (northwest corner). The Wood Thrush nest was on a fork of the lowest limb of a double-trunked Beech tree, about 12 feet up. One fledgling was perched on the nest and at least two others were in the immediate area. Both Red-headed Woodpecker nest holes were in dead elms, one on the edge, and one in the middle, of low places in the woods that normally hold water throughout the spring. There was a fair amount of windfall in the woods last winter, especially in the southwest corner. The spring and summer were exceptionally dry, with the low places drying out by the end of April instead of late May. A road was put through just to the west of the woods, along the railroad track, but it seemed to be little used and probably had no effect on the census area. There is a continuing problem of high edge effect, owing to the non-uniformity of the census area. — PETER BONO, ETHEL KAWAMURA, SUE SODERSTROM, BILL SPENCER, MARY STEERE, and JANICE JOHNSON (compiler), *Washtenaw Audubon Society, Inc., Ann Arbor, Mich. 48104.*

**23. BEECH-MAPLE FOREST.** — Location: Indiana; Jackson's Woods. One mile SE of Versailles; NW ¼ of Sect. 18, T 7 N, R 12 E, Milan Quadrangle, U.S.G.S. Size: 15.3 acres (pentagonal, 150 x 900 x 500 x 1000 ft, with a square of 200 x 200 ft. and a rectangle of 200 x 150 ft. attached), measured with steel tape and compass. Description of Area: Forest crown is irregularly open owing to 8 recent windfallen large Beech. The understory of shrubs is about 6 to 8 feet high. The herbaceous ground cover varies from sparse to dense in certain areas and the average height of the trees is 115 to 120 ft. The following plant description is from Jackson and Allen, *Proc. Indiana Acad. Sci.* 78: 210-230, 1969, and A. A. Lindsey, D. V. Schmelz, and S. A. Nichols, *Natural Areas in Indiana and Their Preservation*, Purdue Univ., Lafayette, 1969. Stratum ranking of shrubs: Spicebush (*Lindera benzoin*), 8; Sugar Maple (*Acer saccharum*) and Com. Pawpaw (*Asimina triloba*), 5; Flowering Dogwood (*Cornus florida*), White Ash (*Fraxinus americana*), Poison Ivy (*Rhus radicans*), and Com. Greenbriar (*Smilax rotundifolia*), 4; Red Elm (*Ulmus*

Table 1.  
Vegetational Attributes of Trees Over 4 Inches  
DBH in Jackson's Woods, from Jackson and Allen, 1969

Species	(Basal Area B <sub>2</sub> per acre in sq. ft.)	(Density D <sub>2</sub> per acre)	V <sub>3</sub> (Importance)
Beech ( <i>Fagus grandifolia</i> )	57.7	14.3	32.4
Tulip-tree ( <i>Liriodendron tulipifera</i> )	19.5	11.7	14.1
Sugar Maple ( <i>Acer saccharum</i> )	12.7	42.3	25.1
Black Walnut ( <i>Juglans nigra</i> )	6.5	3.8	4.6
Red Elm ( <i>Ulmus rubra</i> )	2.7	8.3	5.0
White Ash ( <i>Fraxinus americana</i> )	2.6	4.0	3.0
Flowering Dogwood ( <i>Cornus florida</i> )	2.2	13.2	6.5
Black Gum ( <i>Nyssa sylvatica</i> )	1.6	1.7	1.5
Am. Elm ( <i>U. americana</i> )	1.3	1.4	1.2
Sassafras ( <i>Sassafras albidum</i> )	.8	1.6	1.2
Other species	3.0	3.4	3.0
	112.0 (Stand basal area per acre)	109.0 (Stand density per acre)	

*rubra*, Am. Hornbeam (*Carpinus caroliniana*), Sassafras (*Sassafras albidum*), Beech (*Fagus grandifolia*), Virginia Creeper (*Parthenocissus quinquefolia*), and Com. Red Currant (*Ribes sativum*), 3; 11 other species less common. Stratum ranking of herb layer species: Sweet-scented Bedstraw (*Galium triflorum*) and May-apple (*Podophyllum peltatum*), 7; Jack-in-the-pulpit (*Arisaema triphyllum*) and Wild Licorice (*Galium lanceolatum*), 5; White Baneberry (*Actaea alba*), Enchanter's Nightshade (*Circaea latifolia*), Wood Violet (*Viola palmata*), and False Nettle (*Boehmeria cylindrica*), 4; 13 others species less common. **Edge:** The 150 and 900 foot sides are bounded by an old field, the 1000 foot side by a ravine, and the two 500 foot sides by similar forest with considerably more windfalls. **Topography:** Karst region with elevation ranging from 920 feet in the lowest sinkhole to 970 feet on the highest knoll of the census area. Soil well drained Cincinnati silt loam. **Weather:** Six days were clear, one of which started with fog, and two were cloudy with one ending in rain. The wind factor was only a slight breeze on three days. The temperature ranged from 50° to 90° F. **Coverage:** May 29; June 5, 6, 8, 11 (evening), 13, 20, 28; a total of 7 morning counts and 1 evening count averaging 3 hours each, varying from 5:00 a.m. to 9:30 p.m. with a total of 31 man-hours. **Census:** Red-eyed Vireo, 5 (33); Acadian Flycatcher, 4 (26); Wood Thrush, 3.5 (23); Cerulean Warbler, 3.5 (23); Cardinal, 3.5 (23); Tufted Titmouse, 3 (20); E. Wood Pewee, 3 (20); Carolina Chickadee, 2.5; Carolina Wren, 2.5; Blue-gray Gnatcatcher, 2.5; Kentucky Warbler, 2.5; Downy Woodpecker, 1.5; White-breasted Nuthatch, 1.5; Yellow-throated Vireo, 1.5; Summer Tanager, 1.5; Black-billed Cuckoo, 1; Yellow-billed Cuckoo, 1; Red-bellied Woodpecker, 1;

Blue Jay, 1; Cedar Waxwing, 1; Great Crested Flycatcher, 1; Hooded Warbler, 1; Am. Redstart, 1; Brown-headed Cowbird, 1 (female); Indigo Bunting, 1; Rufous-sided Towhee, 1; Turkey Vulture, 0.5; Barred Owl, 0.5; Yellow-shafted Flicker, 0.5; Pileated Woodpecker, 0.5; Red-headed Woodpecker, 0.5; Hairy Woodpecker, 0.5; Com. Crow, 0.5. **Total:** 33 species; 56 territorial males (or females) (366 per 100 acres). **Visitors:** Chimney Swift. **Remarks:** Financial assistance was received from the Indiana Academy of Science. — DIANA L. ADAMS and J. DAN WEBSTER, *Hanover College, Hanover, Ind. 47243.*

**24. OLD GROWTH BEECH-TULIP-TREE-BLACK GUM FOREST.** — **Location:** Indiana; South Officer's Woods; 1 mile southeast of Volga, Jefferson County; 38°46'N, 85°30'W, Volga Quadrangle, U.S.G.S. **Size:** 24.9 acres (irregular rectangle, 690 x 205 yards, measured with steel tape and compass). **Description of Area:** An old, little-disturbed stand mostly on flat, deep, poorly drained Avonberg silt loam. The plant ecology, a summary of which follows, was by A. A. Lindsey, D. V. Schmelz, and S. A. Nichols, *Natural Areas in Indiana and Their Preservation*. Purdue Univ., Lafayette, 1969. — Nineteen species of trees were found. The understory gives evidence of disturbance by hogs formerly released to roam the woods. Stand attribute figures in Table 1 result from strip sampling for trees 4 inches DBH and over, using 0.4-acre samples that included 2 acres in the aggregate. The shrub-vine layer contained profuse tangled greenbrier (*Smilax* sp.), stratum rank 6, which