

BREEDING WOODCOCK POPULATIONS¹

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DURING the spring of 1939 a fairly heavy concentration of breeding American Woodcocks (*Philohela minor*) was observed in the scrub-oak and pitch-pine forest type of central Pennsylvania. This type constitutes about one-sixth of the forest area of the State, and the area in Centre County, known locally as the 'Barrens,' is quite similar to this type in other parts of the State. Cutting operations and repeated burning have produced dense growths of scrub oak and pitch pine that usually support high populations of various species of wild life.

In Centre County the part of this forest type utilized by singing woodcocks is covered by a low growth of scrub oaks (*Quercus prinoides* and *Q. ilicifolia*), paniced dogwood (*Cornus paniculata*), hazelnut (*Corylus americana*), prairie willow (*Salix humilis*), sweet fern (*Myrica asplenifolia*), and blueberries (*Vaccinium* spp.). The larger trees scattered throughout the area are mostly pitch pine (*Pinus rigida*), black cherry (*Prunus serotina*), aspens (*Populus tremuloides* and *P. grandidentata*), and shadbushes (*Amelanchier canadensis* and *A. oblongifolia*). Small openings that serve as singing grounds occur over most of the lower regions. These openings average 21 by 37 feet; the largest is 47 by 54 feet and the smallest, 5 by 12 feet. They are covered with wild-oat grass (*Danthonia spicata*), bluegrass (*Poa pratensis*), and numerous scrub-oak and paniced-dogwood stems, 6 to 12 inches high (Norris, Beule, and Studholme, 1940). These open areas are usually level and are surrounded by dense woody vegetation from two to four feet high.

Because this area was an unusual type of cover for breeding woodcocks, a population-density study was carried on during 1939 and 1940 to determine the importance of this forest type as woodcock cover in Pennsylvania. In addition, many interesting facts concerning the breeding habits of these birds were learned, and a technique by which the singing males could be trapped on the singing grounds was developed (Norris, Beule, and Studholme, 1940). This work was carried on under the supervision of Dr. Logan J. Bennett, Fish and Wildlife Service, U. S. Department of the Interior; Dr. P. F. English,

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In 1939, woodcocks were first heard in the Barrens near State College on March 26, and a few were flushed as early as March 16. The winter of 1939 was normal, however, and very little snow covered the ground during March. Discovery of the breeding concentration of these birds in the scrub oak and pitch pine forest type was accidental, and the writers believed that the birds had been singing for several days before the first record. Undoubtedly they arrived in Centre County during the early part of March in 1939.

The winter of 1939-40 was severe throughout eastern United States, but it was most injurious in the South. The Gulf States experienced one of the worst winters in history: temperatures were extremely low, and snow fell in many places for the first time in years. The severe weather throughout the main woodcock winter range was reported to have caused heavy mortality among the birds. Reports from Louisiana (McIlhenny, 1940) regarding woodcock suffering from cold during January caused much concern among game administrators, sportsmen, and ornithologists. Large numbers of birds were reported to have been found in emaciated condition on the feeding grounds of Louisiana, and early in the year it appeared that the woodcock population would experience a tremendous decrease. Because of these reports, the arrival of woodcocks in Pennsylvania was anxiously awaited and a close watch was kept on all likely woodcock coverts in the vicinity of State College.

The late winter in central Pennsylvania was also severe, however, and this undoubtedly caused a retardation of the spring woodcock flight. On February 13, the State experienced a heavy snowfall, about 18 inches falling in Centre County. This snow, together with several subsequent snowfalls, remained on the ground until the 1st of April and even later in some wooded regions. Dick Rauch (Langenbach, 1940) observed singing woodcocks in Harrisburg (only ninety miles southeast of State College) on March 7. There is, however, a great difference in the climate of these districts. At that time most of the snow had disappeared in the vicinity of Harrisburg, while about sixteen inches of snow still remained in the woods in Centre County.

Singing woodcocks were heard in Stone Valley, Huntingdon County, near Charter Oak (about nine miles south of State College) on March 29, 1940. On this date twelve birds were heard singing during the evening flight period. On the morning of March 30 the Barrens area (where the 1939 study was carried on) was searched and only

two birds were heard singing. These two areas were watched carefully, morning and evening, but no singing grounds were finally occupied by woodcocks until the 7th of April. Most of the birds seemed to move from one location to another, and territories were not definitely established until the second week in April. The writers believe that much of this movement and fluctuation may have been due to migrant birds.

The Stone Valley area resembles more closely the typical Pennsylvania woodcock breeding coverts. A small stream bordered by a mixed growth of hemlock and hardwoods runs through the valley. There are many dense stands of alder, and much of the land is wet. The principal tree species in the bottomlands bordering the stream are hemlock (*Tsuga canadensis*), beech (*Fagus grandifolia*), red maple (*Acer rubrum*), tulip poplar (*Liriodendron tulipifera*), black birch (*Betula lenta*), yellow birch (*Betula lutea*), white ash (*Fraxinus americana*), large-toothed aspen (*Populus grandidentata*), alder (*Alnus incana*), blue beech (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), hop hornbeam (*Ostrya virginiana*), and shadbush (*Amelanchier canadensis*). Virginia pine (*Pinus virginiana*), pitch pine (*Pinus rigida*), and table-mountain pine (*Pinus pungens*) are scattered throughout the old fields that lie on one side of these bottomland hardwoods. On the other side the lowland area is bordered by a series of ridges, on which the mixed oak-hickory forest type occurs.

Woodcocks utilized the old fields near the stream as singing grounds, and a few of the male birds selected openings in the wooded areas. The singing grounds were generally much larger than those of the Barrens area, and the woodcocks sang from one opening, not from two or more as was the case in the pitch pine and scrub oak type.

No intensive study was carried on in Stone Valley in 1939 or 1940, and no population figures are available for that area. That section supported a good population of breeding woodcocks in 1940, however, and coverts of that type undoubtedly produced many woodcocks throughout the State.

After the woodcocks had established their singing territories and all fluctuations in their numbers had ceased, a 1940 singing-ground census was carried on in the Barrens area. In 1939, this tract supported 45 singing males on the 950-acre study area. Twenty-seven singing males were counted in 1940, representing a 40 per cent decrease from the 1939 population. This fluctuation in singing males from 1939 to 1940, however, is known to have occurred only in this area. There is a possibility that the 1939 population was abnormally

high in this forest type. Also, numerous reports indicate that some breeding birds were present in all suitable environments throughout Pennsylvania in 1940.

It was hoped that the 1940 study might yield some information on the question of singing males returning to the same singing grounds used by them during the previous year. Sixteen of the twenty-seven singing males in the Barrens area in 1940 were utilizing almost exactly the same openings that woodcocks used in 1939. Seven of the 1940 male woodcocks were singing within fifty yards of 1939 singing grounds, and the remaining four birds occupied new singing territories.

In an attempt to determine if male birds returned to the same singing grounds from year to year, live-trapping operations were continued during the spring of 1940. The woodcock trap used in the spring of 1940 was patterned after the 1939 model (Norris, Beule, and Studholme, 1940), but a No. 4 jump-trap was used instead of the No. 3 trap and the gill netting was replaced by Gold Medal seine ($\frac{3}{8}$ -inch mesh). This new trap was faster, and the trapped birds did not entangle themselves in the netting. Early in the season two woodcocks got out of the revised traps because the jaws closed so rapidly that they sprang open and allowed the birds to escape, but this defect was easily remedied by shortening one of the wires enough to allow it to fit inside the other. No birds escaped after this change was made, and twice woodcocks standing beside the decoy were trapped.

From April 4 to May 12, ten male woodcocks were caught in this trap on their singing grounds. Two were trapped in the Stone Valley area, and eight were trapped on the Barrens tract. Three of these birds were taken on the same singing grounds where birds were banded in 1939, and another was caught seventy yards from a singing ground where a bird had been trapped in 1939. None of these birds had bands when they were trapped. In addition, two woodcocks without bands were observed with a strong spotlight and field-glasses on singing grounds where birds were trapped in 1939. Although none of the ten birds caught had previously been banded, a banded woodcock was observed singing from an opening on which no bird was trapped in 1939. Several attempts to trap this bird were unsuccessful, and it disappeared about May 1, long before the singing season was over.

In 1939, each male woodcock in the Barrens area usually sang from one or two openings within his singing territory, but in 1940 the birds were not so consistent. Instead, they generally sang from several openings within their territories and did not limit their flight

songs to one or two openings. This movement made it exceptionally difficult to catch the birds, as the traps were often misplaced. Attempts to call the woodcocks by 'peenting' met with little success as compared with that of 1939: only two birds were lured to the decoy in this manner during 1940. Perhaps the less dense population in 1940 gave the singing birds more space for selective movement over singing-ground areas.

The last singing bird was heard on the evening of June 3. The birds had been singing very irregularly during the preceding two weeks. Although most of the males sang regularly until the middle of May, six of them were not seen or heard after April 30. After they had been heard regularly for fourteen days, these birds (all at one end of the Barrens area) disappeared between April 17 and April 30. No predation of singing woodcocks was observed, but the fact that all the birds that vanished from the area were grouped at one end of the study tract seemed to indicate a possibility of predation or some other form of interference.

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