

OUR WILD LIFE AND THE CHANGING FOREST

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In the course of agitation for game conservation we hear much about the effects of shooting, vermin, and disease, and little about the ups and downs of the habitats, of the immense changes in the ratio between forest and field and in the kinds of trees and shrubs which were plentiful or scarce at different periods of our history. In twenty years' experience at the Harvard Forest, we have had an opportunity not only to see what happens on particular areas with gradual or complete change in the kind of forest, but also to piece together a pretty authentic picture of what has happened to the habitats of central New England in the two hundred years of the white man's occupation.

In this period there have been four dominant phases of cover or types of forest vegetation. The first settlers of the inland towns found eighty to ninety per cent of the region covered with virgin forest. By the end of the first century they had converted fifty or sixty per cent of this area into farm and pasture. The abandonment of farms from 1840 to 1880 brought back natural second growth, much of it pure white pine, which, with the remains of the original forest, restored nearly three quarters of the land to forest. Now in the last forty years lumbering and increasing fires have, without reducing its area, converted this woodland into a wilderness of small and ultimately inferior hardwood stands. Each of these four phases involved special conditions of cover and food supply.

The original forest was mixed hardwood and softwood, from large trees two to four hundred years old to small seedlings. It was rich in variety of species, - trees, shrubs, and small plants - and varied

with dead snags and down logs. It was the most stable and complex of all the four environments under consideration. Most significant of all, it was almost devoid of the smaller short-lived tree species that feature our landscape today, such as gray birch, aspen, fire cherry, scrub oak, hawthorn, and wild apple. Probably wood warblers, creepers, nuthatches, woodpeckers, - especially the pileated - owls, and some thrushes outnumbered the birds of the open and woodland margins. Both partridge and woodcock must have been much more localized than today and uncommon over immense areas. Converting old forest by the million acres (1730 to 1830) must have enormously increased the grass and ground birds - bobolinks, larks, buntings, some species of hawk, and probably quail and upland plover. Conversely, the birds of the big woods and the larger carnivores fell off greatly in range and abundance. When, with the decline of farming from 1840 on, the land reverted to second-growth pine, birch, and alder runs, berry and thorn-apple thickets, also on a vast scale, birds of the open decreased and some of the forest species, such as the hermit thrush, extended their range. From 1870 to 1900, before the advent of the motor car, there developed the greatest area of ideal cover and feed for partridge and woodcock known in our history, and both of these species probably reached greater numbers than before or since.

But as the second-growth pine became merchantable, it began to be lumbered to replace the vanishing old stands. Since 1895, from land formerly field and pasture, twelve billion feet of lumber with a value of \$400,000,000 have been cut in Massachusetts, New Hampshire, and southern Maine. On this gratuitous crop a great population has been supported; but pine timber is dwindling and a new forest environment of infinitely less economic value, and probably the least favorable to wild life that the region has known, is being created in immense areas. Logging, fires, and the absence of any effective

forestry have steadily depleted or enfeebled the better species of trees and have multiplied a thousandfold the forest weeds - gray birch, poplar, pin cherry, red maple, and so on. And although we now have sixty per cent of our area nominally in woodland, it is tending more and more to monotonous stands of small-sprout hardwood, unfavorable as to cover and abnormally susceptible to insects and disease.

The evolution of each of these two last types of cover, the pine and the subsequent hardwood, indicates that the transition has a bearing on the relative numbers of the partridge and the woodcock, to mention the most conspicuous of the many species affected. The pine wood developed on old fields and pastures, together with more or less hawthorn, running blackberry, viburnum, blueberry, apple trees, and birches. The process of change from shrubby field to forest was gradual, and during the first twenty to thirty years the combination of vegetation was ideal for the partridge - increasing shelter, varied food plants, and open dusting places. From then on the pine rapidly closed up and most of the food plants, even the old apple trees, were killed out. Since the bulk of the pine woodlands reached this condition twenty to thirty years ago, the favorable cover was reduced to the margins where the pine gave way to brushy openings or the birch thickets more characteristic of recently abandoned fields. Thus there was going on a progressive reduction in good cover even before the logging activities of the last generation.

But if the maturing and removal of the old field pine has deprived the partridge of more and more of his best habitat, the process has, in many cases, accomplished the opposite for the woodcock. It has been shown at the Harvard Forest that under certain conditions the change from pine to hardwood is accompanied by a remarkable alteration in soil. Under a pine wood there is progressive accumulation

of leaf litter, often to a depth of four or five inches, in which decay is very slow and acidity high. With the change to certain species of hardwood, if the situation is not too wet or too dry, the original bed of leaf litter disappears in from fifteen to twenty years, the current fall of hardwood leaves decays almost annually, and the resulting fine humus merges with the mineral soil, sometimes to a depth of ten inches or more. There results a rich brown loam in which earthworms are characteristically abundant. On all such areas at Petersham, once the new forest has begun to close up, breeding woodcock have appeared in numbers, so that in the season of 1928, for example, there were apparently four pairs on a total area of forty acres where a few years ago no woodcock were seen at any season. This transformation is not universal, but apparently confined to certain combinations of sites and tree species. In sum total, however, the change has taken place in favorable spots over wide areas. Thus, there would seem to be reason for the recent abundance of woodcock in northeastern covers.

It is a fair conclusion that such immense and successive disturbances of environment as man has wrought, involving indispensable factors of food and cover, bring about enormous fluctuations in wild life, regardless of shooting, vermin, or disease. If this is true, the corollary is that types of favorable cover must be recognized and maintained in sufficient areas. This, however, is not a simple matter. Practically all of our present woodland is in a state of transition, one type of vegetation giving way to another, often without much outward or visible alteration; and when fire or the usual cuttings occur, a tendency is started in a new and worse direction. A sanctuary or shooting area, for example, may lose the bulk of its food plants in a period of ten years merely with an increase in the size and density of the trees. Some areas like the present

impoverished hardwood sprout land are quite useless.

This is why forestry and game conservation must work together. For economic reasons the main objective of forestry in New England is to convert the present poor stands of forest weeds into good ones of valuable species; and though the trees and vegetation desirable for the needs of game may be different, the technique requires the same kind of knowledge and skill.