

PART 4
GRASSLAND BIRDS

BY O. A. STEVENS

THE species closely restricted to the grassland as a breeding ground include representatives of 10 or more diverse families and 5 orders: Marsh Hawk, Short-eared Owl, Burrowing Owl, Marbled Godwit, Upland Plover, Meadowlark, Bobolink, Brewer's Blackbird, Rock Wren, Sprague's Pipit, Nighthawk, Sandhill Crane, Horned Lark, and several sparrows.

There is some evidence of distribution corresponding to life zones. The grassland biome, extending from Mexico into Canada, may seem to be a vast natural area. Yet, though sharp lines cannot be drawn, it has definite variations. Sprague's Pipit and Baird's Sparrow nest only in the northern part; the Chestnut-collared Longspur extends a little farther south and the Lark Bunting still farther.

The return of certain individual birds to the same locality year after year shows that individuals are conditioned to definite latitudes. Plants are immobile, and although some grasses occur all over the biome, we are beginning to recognize that they, too, have races conditioned to certain localities. Much has been done by phytologists in defining physiologic races of fungi, but we know little of such races of birds and grasses.

Certain grassland birds are not limited to the biome, but choose areas with vegetation similar to the climax grassland. The Horned Lark is a characteristic prairie bird, but its range goes far beyond the grassland biome into all sorts of open spaces, especially those with short cover. It breeds in all parts of North America except the southeastern United States. It has been divided into a number of races, three of which breed in parts of the grassland biome.

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PART 5
CONIFEROUS FOREST BIRDS

BY ROGER TORY PETERSON

IN analyzing the most typical birds of the coniferous forest biome, we find that roughly one-third of them find their ranges within the great sweep of boreal forest stretching across Canada. Some examples are the Black-poll Warbler, Parula Warbler, Magnolia Warbler, Cape May Warbler, Bay-breasted Warbler, and Gray-cheeked Thrush. Roughly, another third are peculiar to the montane coniferous forests of the Western States. Some examples are the Steller's Jay, Clark's Nutcracker, Williamson's Sapsucker, and Townsend's Solitaire; the remaining third are birds that are common to the coniferous forest biome as a whole. Typical examples are the Red-breasted Nuthatch, Purple Finch, Pine Siskin, Hermit Thrush, and Olive-sided Flycatcher.

The ranges of many birds seem to conform to the outlines of the area occupied by their preferred vegetational "life form," while others occupy only parts of it and reach either their northern or their southern limits deep within it. This indicates that they are not entirely restricted in their distribution by dominant forms of vegetation. This, then, might leave room within the biotic concept for the application of something like Merriam's temperature concept, or some other modification. Thus it appears that the biome is not much more satisfactory than the life zone in describing bird distribution.

Birds which occupy the developmental stages of a biome are often found in other biomes as well. This is because the life forms of the vegetation that compose the developmental stages of one biome are often duplicated in other biomes. Birds which occupy the climax portion of a biome are most frequently restricted to that biome and are indicators of it. This is because the climax life forms are often peculiar to that one biome.

Birds appear to fit the life zone concept best in climax forest in those areas where temperature agrees with the vegetation, as, for example, in the Canadian and Hudsonian zones.

Briefly, the physical aspects, or "life form," of the vegetation seems to be the most important factor influencing land bird distribution, but this is further modified variously by climatic influences, physical barriers or other geographical factors, interspecific competition, population pressures, and probably also by other less tangible factors.

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PART 6

THE RELATIVE MERITS OF THE LIFE ZONE AND BIOME CONCEPTS

BY V. E. SHELFORD

A KNOWLEDGE of the greatest extent of the biomes, or biotic communities, is a fundamental step in making any comparison of the biome system with the life zone system. Figure 1 is a map of the principal North American biomes with the life zones superimposed. It is similar to the map by Weaver and Clements (1929: frontispiece) of which an earlier modification was published in 1932 (*Wils. Bull.*, 44: 154), but increased knowledge has made further modifications necessary.

To understand the basis for these modifications, the variations within biomes or climax areas* must be taken into account. We are

* In the legends of some maps (for example, the Weaver and Clements map mentioned here) the largest biotic communities are referred to as the "climaxes." "Climax area" would be a better term; thus the *climax area* is the area which it can be predicted will be covered by the *climax community* as shown by studies of succession.