

IV.

Extracts from "The Trend of Avian Population in California,"
by Dr. JOSEPH GRINNELL (printed 15/12/1922).

. . . It is a recognized, established principle that the presence in a region of any given bird species is absolutely dependent upon, first, proper food supply; second, the right kind of breeding-places; and third, appropriate cover or protection for individuals—each of these conditions as bound up with the inherent structural features of the bird under consideration. Mark that there are *three* of these factors, each and all of them essential; if any one of them in a given region becomes effaced, the bird in question can no longer exist there. There are, of course, other factors essential to avian existence, but they affect all the birds of a given fauna alike. We can deplore, wring our hands, and suffer agonies of regret, but to no avail—except active steps be taken to restore the critical condition. As a matter of cold circumstance, a bird's disappearance in a given locality may be irretrievable—as happens where man has densely settled a territory and incidentally or purposely destroyed certain of its natural features unnecessary or inimical to his own existence there. Chop down all the trees, and there can be no more Woodpeckers; drain the lakes, ponds, and swamps, and there can be no more water birds; remove the chaparral, and Wren-Tits, Bush-Tits, and Thrashers can no longer find proper food and shelter. Cement up all the holes in the campus oaks, and there will be no more Plain Titmouses—for the reason that roosting and brooding places essential to their existence are no longer to be found. . . . Rate of reproduction in any species has been established down through past time so as to supply the population needed to keep the appropriate niche filled. This rate varies with the natural prevalence of the niche, and with the hazards to which the niche occupant is exposed. Not only that, but a wide margin above the normal need is provided to meet that extreme emergency which may arise but once in a thousand generations; in other words, there is produced a great surplus—an apparent great waste—of individuals over and above what is needed to keep the appropriate territory fully populated, in order to save the species from extinction at some critical moment; for animal nature abhors a vacuum no less than does inanimate nature. A recent writer in "Science" (LV., May 12, 1922, pp. 497-505), Professor A. F. Shull, has, in another connection, called this fact of over-production the "factor of safety." He says:—

"The entire struggle for existence is based on the principle that security and advancement are best assured through wasteful overproduction." The employment of the factor of safety, I would say, is a manifest device on the part of Nature to ensure continuity of species, and hence also to make evolution possible. . . . Another biotic modification is brought about by deforestation. Close stands of coniferous trees are replaced by "slashes," by open young growths, or by mixed brush land and trees. Dense forests, it is well known, are sadly lacking in bird population. The removal of the forests has meant, of course, the disappearance of a few specialized avian tenants. But in their place, occupying the clearings and mixed growths, is a much greater population both as to individuals and species. Kinglets, Pileated Woodpeckers, and Hermit Thrushes may have disappeared; but Fox-Sparrows, Chipping-Sparrows, Spotted Towhees, and a host of other birds of like habitat preferences have come in. Certain little niches have been done away with; but the change in the nature of the territory at the hand of the lumberman has resulted in there being many more new niches, each of these evidently of greater amplitude, of greater supporting power. . . . In general, then, my contention is that there has been, on the average, as a result of the settlement of California, a marked increase in our bird population. Bird life at large has benefited—and this in spite of various adverse features which also have been imposed. My message should be, therefore, one of optimism to the bird-lover. It is to be understood that I refer to birds of all groups together, not to any particular group. There are vastly more of the so-called "song birds" numerically than there are of the "game birds" and "birds of prey." The latter two groups have been seriously depleted, unquestionably, from various causes associated with man; but probably not more than 10 per cent, of our original bird population consisted of game birds and birds of prey combined. Permit me now to link up with current notions and beliefs in regard to the status of bird life some of the ideas that I have been endeavouring to express. In a large proportion of cases the reduction or disappearance of a cherished species of bird locally, such as may have been laid to other entirely different causes, has really been due simply and inevitably to the reduction or complete effacement of the kind of habitat the bird must have for its existence; in other words, its ecologic niche has been reduced in volume, or destroyed. No one could help it; nor can anyone now stay the process, except by restituting the lost factor; for example, when land is bought

or otherwise preserved from human use and devoted to the use of birds, as in National or State bird or game reserves. Of course, in certain areas, such as National parks and forest reserves, the environments and the birds occupying them are being preserved anyway, incidental to other interests. The tendency among sentimentalists has usually been to seek out a cause for the disappearance of birds that is directly concerned with their fellow-men. The hunter, or the boy with the sling shot, the collector, any one of them, or all, loom up as *the* "exterminators of birds"; whereas, in truth, I believe, it is only in rare cases, and then only very locally, that *these* agencies have had any effect at all. In other words, if my line of reasoning has been correct, legal protection with 90 per cent. of our bird species is absolutely unnecessary save as it applies, and then properly so, to parks, the suburbs of cities, and to logically-constituted game and wild-life preserves, where shooting for any purpose is out of order. Recall the geometrical ratio of reproduction, and the consequent powerful potentiality for recovery on the part of bird species. Let me cite here the case of the Eastern Bluebird, as reviewed by Mr. P. A. Taverner in a recent number of the "Canadian Field-Naturalist" (XXXVI, April, 1922, pp. 71-2). In the winter of 1895-6 a cold wave swept the South Atlantic States, the sole wintering ground of the Eastern Bluebird. As a result, famine and death reduced the total Bluebird population almost, but not quite, to the vanishing point. But in five years the species had recovered "from almost nothing to practical normality." After reaching normal, a "saturation point of population" for the species, it ceased to increase, or, as I would express it, its ecologic niche, of fixed amplitude, was then full. The operation of the "factor of safety" not only saved, but very quickly brought back, the species. Another catastrophe, recorded by Dr. T. S. Roberts ("The Auk," XXIV, pp. 369-77), happened to a Sparrow-like species, the Lapland Longspur, in south-western Minnesota, the middle of March, 1904. It was migration time, and a peculiarly wet and thick snowstorm that occurred during the night of the 13th is thought to have overwhelmed the birds when in flight high overhead, soaking their plumage and dazing them. At any rate, great numbers hit the ground with fatal violence. In the morning dead and injured birds were to be seen over a wide stretch of country; on the frozen surfaces of two lakes 750,000 dead Longspurs were counted by the method of laying off sample units of area and checking the birds to be seen on these units. But in spite of this spectacular destruction of individuals, the

Lapland Longspur was not reported the following year in the winter range of the species (Kansas, etc.) as obviously less numerous than usual. Did not the ability of the species to recover from this extraordinary calamity rest in the "factor of safety"? There is good reason to believe that release of intra-specific pressure on the breeding-grounds of a species is accompanied by greater productivity on the part of the remaining population. The survival chances for the young are greater where the safest type of nesting-places is available to all the adults seeking to breed, and where congestion of population, and consequent drain on available food supply, has been relieved.

Let me centre attention now upon the significant fact that certain of our birds are, and always have been, totally unprotected by either law or sentiment—Jays, Crows, Linnets, Shrikes, and Blackbirds. The rate of annual increase in those species is no different, in so far as I am aware, than it is in the Vireos, Warblers, Mocking-Birds, Tanagers, and Purple Finches, which latter are looked upon as desirable song-birds. Yet the former are holding their own just as well as the latter, protected, species. . . . Bird population, in kind and quantity, is controlled primarily by conditions of habitat. It is a matter of food and shelter. The natural-history collector, as a factor against birds, is only an exceedingly minor influence, one which, like all the others, is allowed for by the "factor of safety." My readers will begin to suspect that I have become sensitive because of the inveighing that certain well-meaning but uninformed people have undertaken against the killing of birds for specimens. I admit the score.
