

led him to continue his studies almost alone. So, to the later generation, such as comprises so large a proportion of the attendance of Cooper Club meetings, he was personally all but unknown. Upon those of us who can appreciate the values in his researches is laid the responsibility of seeing that he receives the credit that is his due for the labors he accomplished.—H. S. S.

We recently saw the reproduction of a drawing in a popular bird magazine with legend: "The Prairie Falcons of Pyramid Lake". In the talons of one of the birds is depicted a Gambel Quail. But, as far as known to ornithology, the Gambel Quail does not exist, wild, anywhere nearly so far north in Nevada as Pyramid Lake. The association of locality, prey and captor as implied in the legend is thus contrary to fact. The artist who originally painted the really splendid portrait of the hawks had the highest regard for accuracy; and we happen to know that he never intended the mis-information now implied.—J. G.

The personnel of the recently instituted "Game Refuge and Public Shooting Grounds Advisory Committee of California" has been announced by Governor C. C. Young. Dr. Barton Warren Evermann, Director of the California Academy of Sciences, and Dr. K. F. Meyer, Director of Hooper Foundation for Medical Research of the University of California, become members, *ex officio*. The others, appointed by the Fish and Game Commissioners, with the approval of the Governor, are H. L. Betten, Alameda, Jacob Baum, Los Angeles, J. Dale Gentry, San Bernardino, and Manley S. Harris and Nathan Moran, both of San Francisco. The function of the committee is to make a survey of the state for the purpose of ascertaining the needs for game refuges and public shooting grounds, thus supplying data to be used by the Fish and Game Commission in the acquisition of desired areas.—H. S. S.

The latest announcements from the California Fish and Game Division, coming through the daily press, indicate the following activities seriously affecting the bird life of the state. (1) Where, within the state, quail have become overly numerous and a "menace" to the farmer, the birds are being trapped by deputies and transported, irrespective of subspecies

or species, to other sections of California where the native stock has diminished. (2) "Wild" Turkeys are again being brought in for liberation, this time from Arizona whence, we are informed, "most of the domestic stock" has been derived. (3) Ring-necked Pheasants and Hungarian Partridges are being reared at the State Game Farm, for liberation in "our wonderful mountains and our glorious valleys," where, we are assured, "there is plenty of feed and spacious breeding grounds for all forms of wild bird and animal life." (4) A shipment of South American Tinamous, of three different "sizes," has just been received, for planting in various parts of the state, thus "adding to our game resources." Apparently, the principle being followed, despite sound biological ground against such procedure, is as follows: The California Fish and Game administration receives its support from the sportsman; "practical" ways must be found of showing immediate returns; fertile-minded but biologically uninformed persons urge the above various lines of action and the sportsmen of the state are fully instructed as to these and the theoretically attractive results to be expected; the sportsman "demands" that the Fish and Game administration proceed on these lines; said administration does so. The circle is complete; and our unique native game birds are exposed unwittingly to the danger of supplantation by foreigners at a time when all sorts of hazards inevitably accompanying close settlement of the country by the white man are rapidly reducing the food and shelter necessary for their existence. Is it realized that our proposed State Bird, the beautiful California Valley Quail, is, in effect, likely to be driven to the wall by alien competition?—J. G.

#### COMMUNICATIONS

CORMORANTS IN RELATION TO FISHERIES  
Editor THE CONDOR:

There is an error in calculation in the third paragraph on page 184 of the current (1927) volume of THE CONDOR in the article by Mr. Arthur H. E. Mattingley on "Cormorants in Relation to Fisheries": While I have been reluctant to draw attention to it, yet, as it is being quoted approvingly in various quarters, and as the results that it provides may conceivably be adopted for use in various ways in the future, perhaps some action should be taken to prevent the

error from spreading farther. Perhaps you have noticed it already.

The author's premises are that, in a 30-day period, each crayfish eats 1000 fish ova per day and each cormorant eats 10 crayfish per day. He obtains as a result, that each cormorant saves 300,000 fish ova in the 30-day period.

If each cormorant eats 10 crayfish per day for 30 days, the total number of crayfish eaten is 300. The eating of the first crayfish, on the morning of the first day, saves 30,000 ova, as the crayfish if left uneaten would have consumed that many ova in the 30-day period immediately ensuing. The eating of the last crayfish, on the evening of the 30th day, saves no ova, as that crayfish has just finished eating his 30,000. The average number of ova saved per crayfish eaten is 30,000 plus 0, divided by 2, which is 15,000. If 300 crayfish are eaten, with an average saving of 15,000 ova per crayfish, the total number of ova saved per cormorant is 4,500,000, or 4,200,000 more than the number stated by Mr. Mattingley.

If Mr. Mattingley's premises were obtained, as is to be hoped, by examination of the stomach contents of cormorants and crayfish, it is to be regretted that he did not so state when giving his figures circulation.

HARRISON F. LEWIS, *Ottawa, Canada,*  
*December 6, 1927.*

Editor THE CONDOR:

I am glad that my article published in THE CONDOR entitled "Cormorants in Relation to Fisheries" has aroused such widespread interest. As an ornithologist and a field naturalist I wrote the paper couched in popular terms for the education of anglers and fishermen so that the contentions and statistics given could readily be followed and assimilated by them and by your readers generally. The subject matter was acquired from field observations made by me and was not the result of the application of standard scientific formulae or of the systematised methods adopted by laboratory biologists.

The figures quoted by me which your correspondent has suggested should be amended to read 4,500,000 are much more in favor of my contention, but these suggested figures have no safer basis to warrant their use than mine since so much depends upon what period of the day the crayfish were caught and what damage they had done up to that period. Even an actuary could not devise a cor-

rect mathematical formula to suit all factors governing the case. The figures given are as accurate as are necessary for the purpose for which they were intended. Absolute accuracy can never be established.

I have, however, laid the foundation upon which the edifice of further knowledge can gradually be erected with more mathematical precision. For instance, it cannot be definitely asserted that every cormorant eats exactly and regularly ten crayfish each day; but since I have ascertained from actual observations made at several nests in different rookeries that up to ten crayfish together with other forms of life were fed to the nestlings during one day I am satisfied that my deductions for the purpose of illustration are prudent even though some persons may consider them arithmetically understated.

It is within the bounds of possibility that they may be exceeded or even further reduced according to the diminution of the crayfish after the daily attacks of the cormorants at the end of the thirty-day period when spawn is available, or from other causes governed by the environment. This spawning period of thirty days is likewise a fair and reasonable approximation and is only used as a mutable factor in computation necessary to illustrate my remarks.

Bearing this in mind I prefer to use the figures given although the figures suggested by your correspondent may comply more closely with the requirements of mathematical progression. A closer approximation to absolute accuracy of figures in this direction will take many years of patient research by biologists especially appointed for this purpose.

My article being written in a popular vein required to be illustrated by figures given in reasonable approximations to illuminate the points of my field observations and to act psychologically, thereby causing a fixation of the point adduced, and no attempt to dogmatize was made by me knowing that dogmatic statements of fact have so frequently in the light of further investigations been superseded.

The quantity of ova eaten was obtained by the examination of the stomachs of the crayfish, but again allowances had to be visualized to arrive at a fair estimate of the quantity consumed owing to digestive processes having destroyed some of the spawn. Even though the figures be mutilated by those desirous of using

their own mathematical method of computation the main issue will not be affected thereby. After all, it is the issue or tenor of the article that is the chief desideratum.

I am pleased to know that the article has received such careful consideration by those interested in the question and feel indebted to them for analysing its contents and I welcome any form of criticism thereon whether constructive or destructive in its incident.

ARTHUR H. E. MATTINGLEY, "Koonawarra," 13 Turner St., South Camberwell, Victoria, Australia, January 10, 1928.

#### PUBLICATIONS REVIEWED

TAVERNER'S STUDY OF RED-TAILED HAWKS.<sup>1</sup>—As the result of protracted study of the several forms of *Buteo borealis* in a portion of the habitat of that species, Mr. Taverner has produced an excellent summary of the range of variation and the sort of variation that obtains among the several more northern of the currently recognized subspecies. His descriptive accounts of subspecies and individual birds, together with the helpful colored plates, form an important contribution toward an understanding of this difficult species and one that will be consulted many times by future students of the group. With ready acceptance of most of his descriptive matter and of most of his general statements, one may still, however, differ from him in conclusions reached. To summarize briefly, his study includes the subspecies *borealis*, *calurus*, *harlani*, *krideri*, and *alascensis*. His conclusions are that these names really cover but two forms, an eastern race, *borealis* (including *krideri*), and a western race to which he applies the name *harlani* (including *calurus* and *alascensis*). The facts he adduces, to my mind, may be interpreted to point just as clearly in other directions.

We are each of us, I suppose, influenced throughout our work by certain trends of thought that cause us to attack similar problems in similar ways, instinctively applying to new questions theories and formulae that we have tested out in the past—to our own satisfaction at least.

Mr. Taverner, in previous publications, has abundantly demonstrated his disinclination (I do not say refusal) to accept subspecies save on grounds that many of us believe to warrant full specific recognition. I, on my part, have become increasingly inclined to recognize by name geographic forms of different degrees of variability and of different kinds of variability. And I feel very keenly the desirability of using clear-cut subspecific names in cases where important facts can thereby be driven home, as is emphatically the case in some aspects of this *Buteo borealis* tangle.

In the first place, I can see no adequate ground for a primary division that lumps *krideri* with *borealis*, and *harlani* with *calurus*. It would be more reasonable, to my notion, to draw a relationship-expressing line which leaves *borealis*, *krideri*, and *harlani* on one side, *calurus* on the other—at least as expressing conditions at the northern limit of the range of the species *borealis*, to which region Taverner has restricted himself. Parenthetically, I may here express my acquiescence in the dropping of *alascensis*, as indistinguishable from *calurus*.

As it happens, the form *harlani* illustrates most of the points that I wish to make. It happens also that I have made some study of this bird, and have had some experience with it in life (see Swarth, Univ. Calif. Publ. Zool., vol 30, 1926, pp. 105-111).

Taverner in his conclusions regarding *harlani* and *krideri*, "views *harlani* . . . as a local chromatic form of *calurus*, whereas *krideri* represents a dichromatism limited to the western representative of *borealis*, but transmitted to *calurus* at the northern extension of the latter's range." Do this and similar statements explain anything? They leave me, personally, in a haze of confusion, from which I turn desperately to what appear to me to be certain basic facts. Some of these are as follows: In northwestern British Columbia (specifically in the Atlin region, where most of my observations on *harlani* were made) and in the adjoining interior of Alaska and Yukon Territory, all of the Red-tails there breeding are of one race. Young from any one nest may eventually pair with young from any other nest. Regardless of details of appearance they are all the same, and to use different names for different individuals can result in nothing but confusion. In the nearby coastal

<sup>1</sup> A STUDY OF BUTEO BOREALIS, THE RED-TAILED HAWK, AND ITS VARIETIES IN CANADA. By P. A. TAVERNER. Victoria Memorial Museum, Museum Bulletin no. 48, Biological Series, no. 13, November 11, 1927, pp. 1-20, 3 colored plates, 1 fig. (map).