

On the basis solely of the critical characters of size and concealed streaking, the type would be considered a migrant *frontalis* from the northern part of Sonora, along with three other specimens of slightly smaller size which are marked *frontalis* in the Dickey Collection. To sum this up, in view (1) of identity with specimens of *ruberrimus* in color, (2) identity with *frontalis* of northern Sonora in size, and (3) the fact that the bird was taken in December when the expansion of red reaches its maximum, it would seem wise to consider this type an expansively red migrant *frontalis* from northern Sonora.

This leaves the bird of southern Sonora without a name. I can perceive no advantage in coining one. The critical birds in the *mexicanus* group for taxonomic purposes are the breeding birds and the long series from southern Sonora are not only not distinguishable from breeding *ruberrimus* in size or color, but are exactly intermediate between *frontalis* of northern Sonora and *rhodopus* of Sinaloa. On the other hand, in view of the present isolation of *ruberrimus* in Lower California, I can raise no objection to recognizing that race, nor would I protest the use of the name *ruberrimus* for the birds of southern Sonora, if anyone desires a handle for these intergrades. Certainly there are many true intergrades in other species, whose subspecific names are still recognized. If this is deemed an illogical suggestion, it may not be impertinent to ask if Nature herself was illogical in creating two similar forms under nearly parallel conditions, one of them an intergrade and the other a true race.

*California Institute of Technology, Pasadena, California, June 18, 1936.*

## EAGLE "CONTROL" IN NORTHERN CALIFORNIA

By FREDERICK H. DALE

The use of the airplane in hunting predators, affording as it does a highly efficient means for destroying large birds, particularly eagles, should arouse the keen interest of all conservationists. Between February 1 and March 31 of this year, I had the opportunity of studying first-hand the conditions under which this type of hunting was being carried on in the country east of Red Bluff, Tehama County, California. It was apparent that several important phases of this rigorous campaign of predator control were being overlooked by the persons engaged in the activity.

During the period mentioned I did not have the privilege of observing the actual killing of an eagle, but I did see five eagles that local herders stated had been killed or crippled from an airplane, and I saw the airplane hunting for the birds on one occasion. The facts reported here have been gleaned from newspaper accounts and from interviews with two persons who have actually taken part in the hunting, as well as from interviews with other persons connected in some way with sheep raising in the Sacramento Valley.

The method used in hunting eagles is related by Mr. Ben Torrey of Corning, California, in a letter published in the sporting page of the San Francisco Chronicle. This evidently was written for the purpose of interesting hunters in this new sport. In his letter Torrey says, "I use my airplane, which is a three-place biplane. I removed the left door so the gunner can shoot out to the left. I have ribbons taped on the wires so they will not shoot into the propeller. The ribbons are simply indicators so as not to get [the] muzzle in that area. I recommend a shot gun with about No. 2 shot. At times I am able to fly within 50 feet of the bird by getting behind and slightly over it. We are permitted to kill golden eagles, but not the bald variety . . . ."

"This is something new and I am in the business of taking passenger-hunters out. In an hour's time I usually cover over 70 or 80 miles of territory . . . ."

In the same article in which the above letter is quoted there is mention of a former article concerning the skill of one "Lefty" O'Doul in shooting eagles from an airplane "in the upper California country."

A few days later, April 8, 1936, an article appeared in the Red Bluff Daily News, from which the following is quoted: "When friends of Floyd Nolta, Willows flier, heard today that Ben Torrey, the Corning aerial wild game hunter, had killed 38 eagles by plane, they said that was pretty good but that Nolta had killed 160 . . . ."

From information contained in this latter item, and from the statements of persons engaged in eagle hunting, it is evident that the total number killed during the past winter and spring was over 200. I was told by a reliable person that 13 eagles were killed in one day by hunters from an airplane. I saw this airplane hunting for eagles east of Red Bluff on that day, but did not learn the extent of the area covered in the day's hunting.

Although the Golden Eagle, *Aquila chrysaetos*, is a permanent resident of the Sacramento Valley, the Bald Eagle, *Haliaeetus leucocephalus*, which migrates into that region in winter, is more abundant during that season than the Golden Eagle, at least in the country east of Red Bluff. The five eagles seen by me, and said to have been killed or crippled from an airplane, were all Bald Eagles. If the same conditions with regard to the relative abundance of these two birds exists over the whole Sacramento Valley, it is probable that the greater part of the birds killed were Bald Eagles.

One sheepman explained his stand against eagles as follows: "We have lost lambs from our corral. We feel certain that they were taken by eagles. We do not know what eagles killed them, so we kill all the eagles we can." There is the general belief that all eagles must be alike in habits, and since the Golden Eagle is known to kill lambs, it is assumed that the Bald Eagle has similar habits. Another thing held against the Bald Eagle is the fact that these birds migrate into sheep country shortly before the lambing period.

I was not successful in learning what loss the sheepmen estimated had been suffered from the eagles. One man saw a Golden Eagle strike into a band of lambs and wound five of them so badly that they died. The eagle was killed, and I later saw it as a mounted specimen. This was the only definite account I was able to unearth, although I questioned a great many persons on the subject. This same man stated that he believed the loss from eagles would be greater than the seven hundred dollars which was said to have been paid by his employer in the form of eagle bounties during the past winter and spring. In order for this belief to be correct it would be necessary for eagles to kill many more lambs than the evidence I have been able to collect would indicate. In spite of the large number of Bald Eagles in the area about Red Bluff, and although eagles do their hunting in broad daylight, I was not able to find anyone who had ever seen or heard of a Bald Eagle attempting to kill a lamb. Since the Golden Eagle is relatively uncommon in that area, it is not likely that the loss of lambs from this source would be extremely high.

In considering the economic status of eagles, the two kinds must be given separate treatment because of wide differences in habits. Several accounts of food-habits are available for both birds, and it is one purpose of this report to sum up the results of the most important of these in an attempt to interpret the status of both eagles in relation to the agriculturalist.

The Golden Eagle is recognized generally as having more predatory habits than the Bald Eagle, and investigations have largely substantiated this opinion. Stomach content analyses and studies about the nests of the Golden Eagle have indicated that this bird is primarily a hunter of live game, although it may on occasion stoop to scavenger habits. McAttee (U. S. Dept. Agr., Circ. No. 371, 1935, p. 24) found rabbits

to be the chief food of the Golden Eagle, as indicated by analyses of 26 stomachs, evidently taken from scattered localities. In his analysis, rabbits made up more than 50 per cent of the food, being found in 14 of the 26 stomachs examined. No other item was significantly abundant, carrion rating second with 3 occurrences, or about 12 per cent.

Oberholser (U. S. Dept. Agr., Biol. Surv. Bull. No. 27, 1906) shows that ground squirrels (*Citellus beecheyi*) are important items of food for Golden Eagles. He cites W. L. Finley's report upon a pair of nesting Golden Eagles near Oakland, California, in which Finley estimated that a single pair of birds would kill approximately 540 ground squirrels during the three months in which they had young in the nest. Oberholser also makes a general statement to the effect that Golden Eagles do much damage at times on sheep ranges, but does not cite definite instances or estimate the amount of damage a Golden Eagle might do.

Sumner (Auk., vol. 46, 1929, pp. 161-169) found that ground squirrels were the most important item of food brought to the nest by a pair of Golden Eagles in southern California. Ground squirrels were found in the nest whenever he visited it during the nest life of the young eagles. Grinnell and Dixon (Bull. State Comm. Hort., vol. 7, 1918, p. 622) cite an instance in which eleven freshly killed ground squirrels were found in and about an eagle's nest that contained two eaglets about a week old.

The benefits to the stock raiser derived from the activities of a pair of Golden Eagles operating on his range can be realized when the destructive nature of rabbits and ground squirrels is taken into consideration. In normal numbers these pests may be of minor importance, but with their natural checks removed they can, and often do, become problems of major significance to all phases of agriculture as well as to public health. Many of the natural enemies of these pests have been detrimental in some way to one or another interest and have been reduced in numbers until they no longer play any important part in the natural control of rodents and rabbits. It is unfortunately true that any predatory animal large enough to prey upon rabbits and ground squirrels may at some time be detrimental to human interests. However, to condemn a species because of occasional damage when the greater part of its activities is beneficial is as logical as condemnation of the rain because it may bring the flood. It would seem no more than just, therefore, to limit killing of eagles to those individuals known to be destructive. Persons engaged in branches of agriculture in which the ground squirrels or rabbits are serious pests should be entitled to consideration before large numbers of these controlling predators are slaughtered.

When the Bald Eagle is considered, an entirely different problem presents itself, for here we have a bird known almost universally as an eater of fish and carrion. McAtee (*loc. cit.*) found the carrion eating tendency so marked as to cause him to say that ". . . question arises in the case of almost everything found in the stomach of this bird as to whether it may not have been taken as carrion." His conclusion after analysis of 58 stomachs of the Bald Eagle is that the bird is "a vulture in the guise of a hawk." The strange condition arises, then, in the eagle slaughter, that the bird shown by food habits studies to be the least predatory of all the hawks, the bird selected as the national emblem of our country, is the chief victim.

To sum up the salient facts of the situation, Golden Eagles are highly beneficial to agriculture in the sum-total of their activities and should not be destroyed as a species, although occasional individuals may require destruction because of lamb-killing habits. Control should be limited to the areas where these birds are known to be killing lambs. Bald Eagles have not been found guilty as yet of killing lambs and their slaughter represents a poor investment by the sheep-owner.

*Red Bluff, California, June 12, 1936.*