A SEVEN-YEAR DUCK CENSUS OF THE MIDDLE RIO GRANDE VALLEY

WITH THREE SETS OF GRAPHS

By ALDO LEOPOLD

SINCE December, 1917, I have kept an ocular estimate of the number and kinds of ducks seen per day during my hunting trips in the Middle Rio Grande Valley in the vicinity of Albuquerque, New Mexico. The record ends with 1923 because of my leaving the state. Inasmuch as the United States Biological Survey is now circulating a questionnaire as to increase or decrease of the duck supply, it may be of interest to publish my record.

As to the accuracy of ocular counts, I made it a practice, in first developing the method, to compare totals at the end of the day with Mr. Ward Shepard, with whom I frequently hunted. We found that we nearly always checked within ten per cent. One of the possible sources of error in my figures is the increased movement of a given number of birds due to the increasing number of hunters in recent years. With 1000 birds in a given territory, they would give a higher count if there were enough hunters to keep them moving all day than if there were only a few hunters and the birds settled down in some unhunted spot. The increase of hunters would tend to make the counts for recent years too high in comparison with the earlier years. This error would, however, tend to be offset by the system of refuges which were installed along the Rio Grande in recent years, and gave the birds a place to settle in spite of the increase in hunters. I believe that for averages through a period of years the two errors compensate each other.

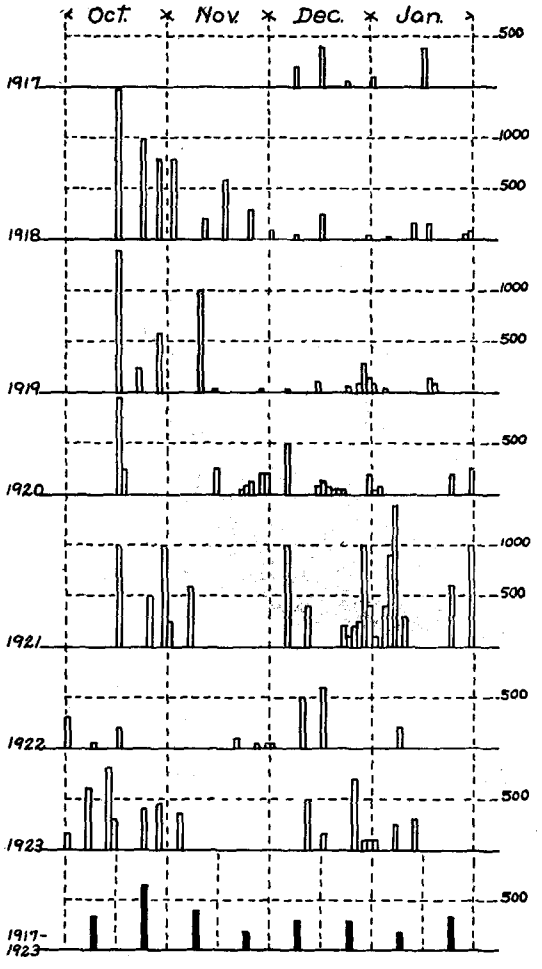

Fig. 4. TOTAL DUCKS SEEN BY DAYS, 1917-1923. EACH VERTICAL BAR REPRESENTS A DAY'S COUNT. THE BLACK BARS AT THE BOTTOM ARE THE AVERAGE PER DAY DURING EACH HALF-MONTH PERIOD, AND REPRESENT THE NORMAL SEASONAL FLUCTUATION IN ABUNDANCE.

All the other conditions favored accuracy. For the most part, the hunting days were at weekly intervals throughout the open season. Each month, and sometimes even each day, I hunted the various available types of territory, including sloughs, lakes, fields, river bars, and river points. Each year I covered the principal shooting grounds from Albuquerque to Socorro at

least once. When I was out for fractional days the count was converted at the time of writing the journal to a per day basis, using my best judgment as to what a full day would have counted under the particular conditions prevailing at the particular time and place. An experienced duck hunter can do this and strike a better average than the fractional results would have given.

Figure 4 gives the daily count, lumping all species. The blank spaces in early October, 1917-21, and late January, 1922-3, are due to shifting the open season fifteen days earlier in 1922. The other blank spaces are due to my absences from the region. It is significant to note that the sudden decrease of birds after opening day is less noticeable in recent years. This probably is due to the installation of refuges and their gradually improved observance by hunters. The refuges prevent the birds being "burned out of the country" by the opening day crowd.

The last graph in figure 4 shows the average per day for the seven years by half-month periods, and represents the seasonal fluctuation in abundance of birds. It coincides with my kill record in pointing out that during the average year we have a heavy October flight of mixed ducks, a November flight of Mallards, and then a sparse population of resident ducks during December, with the beginning of a return flight of Mallards and Pintail in January.

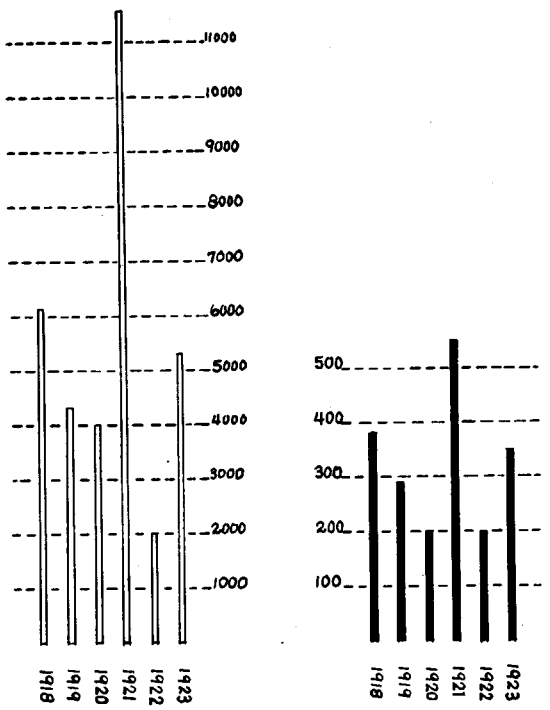

Fig. 5. LEFT: TOTAL DUCKS SEEN, BY YEARS. RIGHT: AVERAGE PER DAY, BY YEARS. THIS GRAPH IS THE BEST INDEX AS TO WHETHER DUCKS ARE INCREASING.

While the average count per day is a better indicator of changes in abundance than the total count per season, because of variations in the number and distribution of days, nevertheless I have shown the total count by years in the left hand graph of figure 5.

The right hand graph of figure 5 gives the final index to abundance in the average daily count by years. Violent fluctuations in both counts are of course to be expected, due to good and poor seasons. Thus the extreme drouth of 1922, when the Rio Grande went dry from Isleta down, shows in both graphs.

While it would take at least ten years (the climatic cycle is said to be eleven years) to justify any general conclusions as to whether ducks are increasing or decreasing in the Rio Grande Valley, I think it is safe to say that my figures, in so far as they go, do not support the claim frequently made in recent years that ducks are on the increase.

Up to this point all the graphs and discussions have dealt with the count of all ducks, without regard to species. Figure 6 shows the seven-year average count, by half-month periods, for each species. Geese are included in figure 6 but not in 4 and 5. Species of geese are not differentiated because of uncertainty of visual identification,

but they are mostly Canada and Hutchins, with a few Lesser Snow and possibly some Cackling geese, although I have never positively identified the last named species. Gadwall and Merganser are included in 4 and 5 but omitted from 6 because they are seldom abundant and would obscure the lower part of the graph. Canvas-back and Redhead are lumped because of the partial uncertainty of visual identification at a distance. Teal are lumped for the same reason but can be safely said to be nearly all Green-wing because Blue-wing are scarce and leave early, and Cinnamon do not occur in fall at all, making their appearance in February, on the spring migration only. From February till May they are abundant, and some stay to breed.

It must be said at the outset that the number of years covered was not sufficient to prevent exceptional "gatherings" of ducks, encountered on certain extra good days, from producing peaks on the graph. Thus the Teal peak in early January I am sure

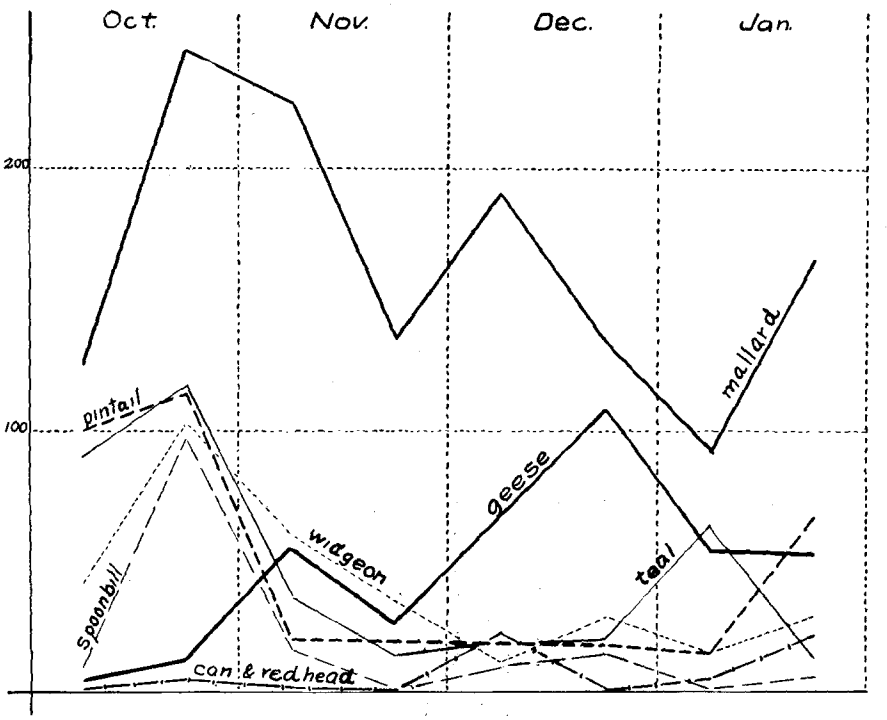

Fig. 6. AVERAGE PER DAY, DURING EACH HALF-MONTH PERIOD FOR SEVEN YEARS, BY SPECIES. THIS GRAPH IS THE BEST INDEX TO RELATIVE AND SEASONAL ABUNDANCE OF SPECIES.

does not represent a normal seasonal flight, but a huge gathering encountered January 3, 1922, on the Socorro Refuge. The early November peak for geese I rather suspect is caused by an accidental preponderance of poor days in late November, causing a depression which would disappear in a longer record. I also suspect the January decline of geese is too sharp; likewise the early December peak in mallards. On the other hand, I am convinced that the late January increase of mallards and pintail actually represents the spring migration and is not a bit too sharp. The late October peak on all species is I think correct, but the universal depression in early October is

too deep and was caused by only two years open season during that period, one a drouth year (1922) and the other containing some "hard luck" hunts in place of the usual fine shooting on opening day.

I refrained from smoothing off the curves because in spite of their defects they seem more valuable as they are,—an absolutely mathematical reflection of the daily count.

To my mind this census, however imperfect, is chiefly important in indicating how much pleasure and interest the average hunter loses in not keeping records, and how much valuable and authentic information could be gathered by hunters on practical problems of game conservation. If a hundred good hunters, well distributed, had each kept census on ducks for twenty years we should not have to be relying on questionnaires to answer the question of whether ducks are increasing.

Personally I do not believe they are, and that a nation-wide program of acquisition and improvement of breeding and feeding grounds, plus a moderate reduction in federal bag limits, should be undertaken at once.

Forest Products Laboratory, Madison, Wisconsin, August 30, 1924.