Report #731

THE BREEDING HABITS PROBLEM IN MAMMALS

by

Durward L. Allen

In the past five years we have observed numerous unexplained alterations in the rate of breeding in several species of mammals. In 1941 rabbits bred later in the summer than usual. That winter meadow mice were breeding during the coldest part of the season, as were a few prairie deer mice and wood mice that were caught. In 1942 two records were obtained of juvenile rabbits breeding in their natal year. Among fox squirrels there have been radical differences from one year to the next. These are explainable on the basis of food supply and population level. But whether this is the whole story is not certain. We have no explanation of the alterations in sex ratio which have appeared.

It has become increasingly apparent that fall populations of game animals are dependent upon the success of the breeding season. Within reasonable limits the size of the breeding stock is not the important thing. The fecundity of all species is such that a relatively small number of breeders can produce a bumper hunting season crop if conditions are favorable for the production and survival of young.

Since breeding and the factors which control it are of such vital importance, I propose to institute an intensive study of the phenomenon among most of our small mammals as soon as the war is over. One of the main difficulties of such a study among rabbits and squirrels is that the numbers of animals handled usually are not large enough to stand up statistically. We will do all things possible to remedy this situation and handle more animals. But one of the best hopes for uncovering principles common to all species lies in working with the smaller species such as mice, ground squirrels, etc. Within the past three years some of these animals have fluctuated violently at Rose Lake.

Such a study of breeding habits should probably be organized in three primary phases: (1) A study of breeding in wild live-trapped individuals which will be re-handled periodically. (2) Examination of dead animals which can be collected in

numbers away from any study area in which populations are being followed. (3) Study of breeding among captive populations. We have used the first two of these methods extensively; and with some refinements we can continue to do so. I think that we especially need to create facilities for working on the third. Small test populations of rabbits, and possibly squirrels, can be kept in open-range fenced enclosures where the cover pattern and other conditions can be closely controlled. Practically all such range pens will need to be built in pairs -- one to serve as a control over the other in experimental work. Smaller pens can be built in batteries where a number of experiments can be carried on at one time. A great deal of the small mammal work can be done indoors where such conditions as sunlight and temperature can be controlled. A piece of green sod is about all that meadow mice need to live on. Theoretically a piece of sod of a given size will support so many mice. I think that there is a field of study here that could be carried on the year (round in a properly constructed animal house such as we will have the opportunity to build in connection with the laboratory at Rose Lake.

For a number of years Elton et al at Oxford have studied the relationship of parasite infections to small mammal populations and their habits. Much of their evidence seems to be negative. But there is no question that disease and epidemics are tied in closely with population dynamics and probably also with changes in fecundity, etc. Not to give a full share of attention to this aspect of the problem would be to ignore a potential influence of great importance. It seems evident to me that the Division pathologist and/or his assistants will need to have a greater share in planning and participating in the ecological work at Rose Lake and elsewhere.

The breeding habits problem is only one phase of the work; but it is of such significance that it is worthy of special planning. Independent studies of several species by different men have been very productive of usable results, but at a place like Rose Lake we can perhaps better afford at times to study a certain type of phenomenon as it applies to all species in a local area. This does not mean, of course, to ignore the other things which are our responsibility.

I think it is important to plan for a more highly specialized research personnel that we have heretofore had if we are to get the most out of our post-war studies. The research activities of the Division have been primarily a training routine into which we could frequently dip and pull out a game area manager. There is no reason why the program should not continue to function in this way within certain limits. But the research men at Rose Lake should not be rated according to their supervisory responsibility alone. Here and elsewhere we need some "two" jobs, at least in order to be able to hire men with graduate training in fields where we need expert performance.

It seems to me to be especially important to be thinking and making plans about things like this now. One of these days the war will be over and we will need to know where we are headed and what we are trying to accomplish.

8/11/43

(Copied in Game Division 1/11/44)