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REPORT ON THE ARNETT, OKLAHOMA, EXPERIMENTAL QUAIL AND
PRAIRIE CHICKEN MANAGEMENT PROJECT

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INTRODUCTION

The Arnett project, in official progress during 1932-34, was one of a series of demonstrations arranged between sponsors, the American Game Association, and the Bureau of Biological Survey. The sponsor in this particular case was the Oklahoma State Game and Fish Commission. The site was the Davison Ranch of about 100,000 acres in Ellis County, and the superintendent, Verne Davison.

While the project started with great hopes and had local management of the highest type, frequent changes in the personnel and policies of the sponsoring organization handicapped operations so that the cooperative work came to an untimely and disappointing end. Nevertheless, many things of interest were learned and they are briefly summarized here from a report extending to about 100 ordinary typewritten manuscript pages, prepared by Verne Davison, now associate biologist in the Soil Conservation Service, at Huron, S. Dak. Readers will be glad to learn that Mr. Davison plans to carry on the work so far as practicable, through the agency of an experienced local assistant, as a personal contribution to wildlife management studies. It was his initiative, intelligence, and self-sacrificing activity that brought the original investigation to its present degree of achievement, and he deserves the greatest success in its continuation.--W.L.M.

The Davison Ranch is chiefly sandhill country with an abundant growth of scrub or shin oak. With mistaken enthusiasm the land was homesteaded in the period 1907-20. After the homesteaders starved out, their "farms" were recombined into a large cattle ranch and game refuge. Where cultivation was attempted the shin oak has not yet reestablished itself, and many of the old fields have become blowouts. Intermixed with the low oaks is a good growth of grass and herbs, and the tract affords ample grazing for cattle as well as cover and food for upland game. The species with which the investigation was particularly concerned are the lesser prairie chicken (Tympanuchus pallidicinctus) and the bobwhite quail (Colinus virginianus).

LIFE HISTORY FINDINGS

Lesser prairie chicken.--The best of the summer range of the prairie chicken is in the higher and "sandyest" parts of the sandhills. In fall and winter the birds move to some of the old fields, bordering clay lands, and occasionally to creek valleys; late in February they return to the breeding area. The cocks then gather on "gobbling" grounds, apparently selected as affording a good view over surrounding territory. On the 16 sections studied and during a period of 4 years, the number of "gobbling" grounds varied from 28 to 40, and they accommodated from 1 to 38 birds each. The cocks maintain individual positions and do a good deal of fighting without serious consequences. The females come to the "gobbling" grounds and mating occurs there.

The earliest nesting is about April 15; the average number of eggs to a nest is 15; and the incubation period 22 or 23 days. The hatch is high (11 to a clutch) and the bulk of the annual crop of young is hatched from May 20 to June 15. Later attempts at nesting are made by pairs whose nests have been destroyed, but the species is single brooded. The average young per covey was 7.5 in 1932, 6.46 in 1933, 5.46 in 1934, and 5.1 in 1935. There is a 50 percent loss from hatching to the end of the growth period. The birds are full-grown at about 14 weeks. The male takes no part in care of the young.

The sex ratio of young birds trapped for banding at 5 to 14 weeks of age was 140 males to 100 females. Capture of banded birds usually revealed moderate but continued movement from the original locality within a radius ordinarily of 1 to 1-1/2 miles. One bird was shot at a point 80 miles from the ranch. A female and her brood may move a mile in three weeks but they are likely to remain on an area of about 160 acres most of the summer. When fully adult (October-November) the birds begin to assemble in flocks of 25 to 50, and in midwinter as many as 200 or 300 may be seen in a single field. The composite flocks form from coveys of 10 to 25, however, and if undisturbed, separate and go their own way in the original groups.

The food of the prairie chickens in summer consists chiefly of insects, of which possibly 90 percent are grasshoppers. A full-grown bird will consume morning and evening about 30 adult grasshoppers, each about 1-1/2 to 2 inches long. From August on, the new crop of acorns is available, and as the seasons advance is more and more heavily utilized. In spring oak flowers are an important food. Greens are eaten at all seasons, when available; the most important sources seem to be wild sweet pea (Cracca), hairy puccoon (Lithospermum), ragwort (Senecio), prairie marigold (Thelesperma), beardtongue (Pentstemon),

umbrellawort (Allionia), and evening primrose (Oenothera). Seed producers most frequently patronized include ragweed (Ambrosia), queen's-delight (Stillingia), hairy puccoon (Lithospermum), wild sweet pea (Cracca), and dayflower (Commelina).

Bobwhite.--The outstanding finding was that while bobwhite quail are relatively sedentary (ranging over 5 to 40 acres) both in summer and in winter, their ranges for these seasons may be widely separated. Thus under existing conditions restricted areas are not adapted to management, as the birds may entirely depart in winter from the tract upon which they were produced in summer. Continued research may show, however, that environment may be modified so as to check or perhaps entirely eliminate this winter migration. Individual banded birds were recovered at distances varying up to 26 miles from the original station. The average number of young in coveys trapped varied considerably, being 10 in 1932, 4 to 5 in 1933, and 8 in 1934. Total production on 16 sections was estimated for 1932 at 750 (1 bird to 13.6 acres); 1933, 300 (1:34); 1934, 350 (1:29.2); and 1935, 450 (1:22.7). In this period, one of drought, the country was not highly productive for quail, but continued investigation is urged in the hope that management practices may be developed that will materially increase the yield as well as hold the birds for the winter on their rearing grounds.

The birds are strictly single brooded. The popular belief in plural rearings seems to result from hunters seeing different-sized young together with older birds. The readiness, however, with which quail families associate within the limits of normal covey size sufficiently explains all the unusual combinations observed. Separate successive rearings are impossible through lack of time.

Important food items of the bobwhite include seeds of wild sweet pea (Cracca), beggarweed (Meibomia), prairie clover (Psoralea), pencilflower (Stylosanthes), black locust (Robinia), ragweed (Ambrosia), marsh elder (Iva), dayflower (Commelina), puccoons (Lithospermum), sumacs (Rhus), sporges (Croton, Stillingia, Dichrophyllum, Tragia), amaranth (Amaranthus), sunflower (Helianthus), and bull grass (Paspalum).

MANAGEMENT STUDIES

Observation from closed automobiles was found less disturbing to the birds than any other method, as well as having advantages in the way of insuring comfort and keeping equipment readily available.

Trapping.--Such cars were used in connection with trapping; the prairie chickens were caught in the oak motts or thickets where they seek shelter in the heat of the day by driving them into nets of fyke design, spread around and over the mott. The best hours for netting are from 11:00 a.m. to 3:00 p.m. The nets are of one-inch mesh and should be 8 to 10 feet high and 40 to 60 feet wide. The fyke is some 30 inches in diameter and 8 feet long and is quickly removable. The net has ropes along the margins, quarter-inch at the top and half-inch at the bottom. Firmly attached stout iron stakes serve to hold the lower edge close to the ground. The wings are extended taut at right angles, preferably with a clear runway paralleling the inner side, and the whole net is set close to the dusting holes of the birds at the edge of the mott. The birds retreat only to the other side and readily return to their loafing place. They are slowly urged toward the net and when all are under the overhanging margin, they are driven into the fyke by one man at each end and one in the middle. The

fyke is then quickly detached and carried to shade where the birds are promptly banded and released or placed in a crate if for transportation. Crates with smooth slats and a burlap buffer top are satisfactory - 2 feet high for prairie chickens and 1 foot high for quail.

The net for quail is used in much the same way and is of the same general construction. The wings, however, need be only 8 inches high, but a hood about 4 feet high and extending 6 feet each side of the fyke is added to provide the overhang needed to catch flushing birds. The fyke is 15 feet long, tapering from 12 inches in diameter at the entrance to about 7 inches at the end, and is held in shape by wire hoops about 30 inches apart. Quail are caught equally well outside the motts or within them, and at any time of day.

Rabbits are a nuisance in connection with trapping operations, as they cut their way out, making holes through which the birds can escape. It is desirable to take whatever precautions are possible to avoid getting these animals in the nets.

Feed patches.--Areas averaging 5-1/2 acres in size were fenced and in part cultivated for feed patches. Three-wire fences found not sufficient to exclude stock, cost on the average \$22.77 per acre for labor and materials, and four-wire fences that did exclude cattle, \$33.35. Drought kept down production, in the 25 feed patches established. It was found, however, that 2 acres of feed to each section was inadequate for the wildlife that resorted to it, being entirely consumed prior to the period of greatest need late in winter. Rabbits devoured a great deal of the feed patch vegetation and damaged plantings of trees and shrubs. It became apparent that plantations intended to benefit the prairie chicken and bobwhite must be protected from rabbits.

Use of fire.--Burning is necessary in this shin-oak country to keep down the growth of oaks that, uncontrolled, would suppress the grass, and to clear away the uneaten residue of old grass stands so that a clear growth of new and palatable herbage of superior fattening qualities becomes available. Burning between April 1 and 10 is compatible with the welfare of both grazing and game-bird production. To control intensity, burning should be done following rain or heavy dew, and numerous patches of from a fraction of an acre to several acres in extent should be left unburned. Burning appears to stimulate immediate growth of native legumes and to be followed about the third year by a heavy crop of acorns. To assure the presence of some acorns, good cover, and summer shade, burning of the same area should be done not oftener than once in 3 years.

Water requirements.--Water has no place in the daily routine of the quail, though the birds will drink if water is available near heavy cover. Frequenting the vicinity of water in some cases seems for the purpose of catching insects that are more numerous there. The lesser prairie chicken, while at times observed to drink freely, at others demonstrates its independence of a water supply. Water may have attraction for both species, but is probably no necessity, even in the hottest part of the summer.

Predators.--Thirty-one stomachs of crows and white-necked ravens were collected and examined. The principal foods were insects, grains, carrion, and lizards. Eggs of prairie chickens were detected in the stomachs of 3 nestlings. The destruction of nests of the game birds by crows and ravens seems not serious. In 1935 cover being very deficient because of drought, more eggs were destroyed by

these birds, but it was noted also that a higher percentage of their own clutches were devoured by other birds. No special study of other predators was carried on, but the suggestion is made that the provision of abundant cover is the best method of coping with the predator problem.

MISCELLANEOUS COMMENT

Introduction of Mexican quail.--Large numbers of Mexican quail have been transplanted to areas in Oklahoma that have been so depleted of food and cover that the native bobwhite has been extirpated there. This obviously futile activity has been closely paralleled by trapping and release of both native quail and prairie chickens within the State. Such plantings are a deplorable waste of valuable material, especially in the case of a species existing in such restricted range and numbers as the lesser prairie chicken. The changes required to make a depleted environment capable of year-round support of transplanted game birds go far beyond the usual brief artificial feeding or even the unusual planting of small feed patches. Rather the process of bringing a seriously damaged environment up to a satisfactory standard as to food and cover facilities may be the work of years. Such work, however, should be done, and thoroughly done, before precious stocks of living game birds are transplanted. Not only economic, but also humane, considerations dictate thorough preparation before introduction as the only correct procedure.

Misconceptions of hunters.--Hunters seem prone to overestimate both the numbers and the recuperative capacity of upland game birds. For example, the prairie chicken population of the Davison Ranch was popularly estimated at 10,000 to 100,000 birds, with the estimate of 25,000 being generally held conservative. Through counting by methods developed during the investigation and regarded as not subject to more than 5 percent of error, it was determined that 3,000 is a liberal outside figure for the prairie chicken population.

Yet the grossly erroneous estimates cited were used as the basis for trapping operations to get birds for restocking purposes, and similar wild guesses are often the basis for regulation of bag limits and open seasons. They naturally result in excessive kills, and disappointing experience in the way of maintenance of game stocks, and in many a false step in game administration.

Estimates as to annual increase also are startlingly wide of the mark. In the case of the lesser prairie chicken it was assumed that the sexes are equally divided, so that all would be paired, when in fact there is a preponderance of males. It was further assumed that each hen would raise a brood of 15, resulting in 1,500 birds the first year from 100 pairs, 11,250 the second, and 84,375 the third - annual increases of 750 percent. Such imaginings are, of course, grotesque, as even under management an actual increase of 100 percent is exceptionally good, and 50 percent is not disappointing. Those indulging in such speculations should reflect that under natural conditions and in the long run there is no increase. A pair is succeeded by a pair in a generation of the species concerned, not in a year. If prairie chickens live 5 years, on the average, the birds need to rear to breeding age only two birds to a pair in five years to maintain their numbers. Hunting to date in this country has consisted largely in man taking a moderate share of the annual generation before natural elimination is completed, in which case survival may not be materially affected. When the share became too large, populations went down,

and it is only by management practices that improve environment and life expectancy that more than a minor share can be harvested by hunters without imperiling maintenance of the stock.

The idea is rather widely held that game birds, particularly quail, produce more than one brood per year, but every scientific study of the subject has demonstrated that this is not true. This fancy, like all others that give an exaggerated view of reproductive capacity, should be refuted on all appropriate occasions so that belief in them will eventually be destroyed. Such ideas hamper management and administration of game because they prevent the sportsmen from appreciating the basic facts upon which these arts, to succeed, must be based.

Free hunting.--This term, dear to the heart of American hunters, is a misnomer for game is not, and cannot be, produced for nothing. Unless the sportsman pays an equivalent of the cost of production of game he is sponging on someone. If on privately owned land, probably a farmer; and if on State or Federal land, it is the public that is paying for the production of the game the hunter takes, usually without any other thought than that he has a right to it. There is no such right, however, and until the policy is universally adopted of the sportsman paying adequately for what he takes, game production to some degree will be a form of charity. On lands the ownership of which does not permit charity, game production, in the absence of satisfactory recompense, is certain to be meager, and the hunting privilege of little value.