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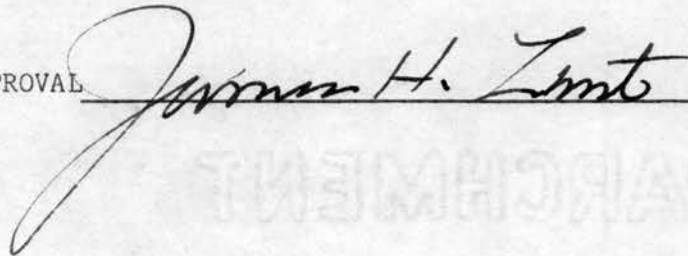
Candidate for Degree of Master of Science

Major Field: Natural Science

Scope of Study: The bobwhite quail is one of the United States' upland game birds which is hunted quite extensively by the sportsman and his dog. In some areas of the bobwhite's range, the bird is almost extinct due to improper range management, lack of sufficient cover and food, and, in some cases, excess killing of the bird by hunters. This report deals with three aspects of the bobwhite quail and the relationship of these aspects to the sportsman and his dog. These areas of study include the life history of the bird, the habitat of the bird, and the relationship between man and his dog to the quail in the field. This report was completed from books and journals dealing with the various aspects of this upland game bird.

Findings and Conclusions: The bobwhite quail can be preserved in rangeland that has adequate cover and feed. Cooperation between the land owner and the farmer will help insure an abundance of quail in most areas of the bobwhite's range. Knowledge of the facets of the bobwhite quail related in this report would help both the sportsman and the land owner gain insight into the problem of conserving this upland game bird.

ADVISOR'S APPROVAL



A SPORTSMAN'S VIEW OF THE BOBWHITE QUAIL

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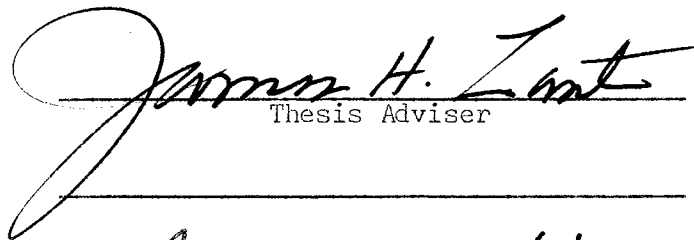
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A SPORTSMAN'S VIEW OF THE BOBWHITE QUAIL

Thesis Approved:

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PREFACE

On the following pages will be found a discussion of some of the many aspects of the Bobwhite Quail, (Colinus virginianus and its races), which occur over a vast area of Eastern, Mid-western, and Southern United States and southward through central America. This writing will concern itself only with the bobwhite of the U. S. as this is my primary interest.

During the pioneering period of the United States, this bird increased greatly and vastly extended its range due to the crude agriculture of the day. With the advent of farming machinery and the expansion of the livestock industry, the conditions which followed were very unfavorable to the development of the species. The bobwhite is one of this country's most prominent game birds as well as an ally to the farmer, and, therefore, knowledge of the life history of this bird has become increasingly important during the past years.

I have always been an avid outdoorsman and hunter. Until recently I have been unable to keep a sporting dog, but have one now. I can think of no greater challenge to man and dog than that which bobwhite quail offers. There is no greater thrill to a sportsman than the sight of dog on point or the flush of a covey of quail. This is one reason I am interested in this game bird, and, due to the fact of the decrease in natural habitat of this bird, there is great concern for the continued good sport this bird offers dog and man.

I wish to attack this problem from three broad angles consisting of

the following. First the life history of the bobwhite, second the natural habitat of the bird and its proper management, and lastly the relationship of man and dog to quail in the habitat of the quail. There are many different aspects of the bobwhite quail, but I feel the above three to be most interesting; and first hand knowledge of these would be most valuable to the true sportsman. A true sportsman would know the bird, that is to say, have some knowledge of its pairing, nesting, egg laying, incubation, rearing, brooding, feeding, and covey formation to name but some aspects of the quail's life cycle. In order to develop and preserve the quail, the sportsman should be aware of the habitats suitable for the bobwhite quail and also how one goes about developing these natural habitats. With the preceeding knowledge at hand, one can more readily appreciate and understand the world of the dogs in the field during the fall hunting season.

To go into great detail on any one of the three main aspects of the bobwhite would be quite out of proportion here, for there are volumes written about all three and even about various subtopics within each main topic. I intend to draw upon such volumes to create a resume of facts that would be beneficial to myself as a sportsman and also interesting to any one who might be concerned with a brief discussion of the life history, habitat and relation between man, dog, and bobwhite.

The writer wishes to express appreciation to Dr. F. M. Baumgartner and Dr. James H. Zant for their helpful suggestions and advice during the writing of this paper.

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CHAPTER I

LIFE HISTORY OF THE BOBWHITE QUAIL

The mating. In discussing the life history of the bobwhite, it is convenient to start with the covey in mid-winter. The birds are in good fellowship with one another as each covey consists of an assortment of birds from various coveys.

The male bobwhite's mating instincts are first aroused in February on the first warm, springlike days. From this time until April, the males court the females, but the covey still usually remains intact.

The cocks, which had been peaceable companions previously, become pugnacious to some extent as the warmth of spring begins to set in. They puff themselves up when feeding, continually bluffing each other with lowered heads. The cocks are now in their most attractive dress and are quite active during the period preceeding mating. However, the demure females appear to be in no way excited. According to Stoddard (1931), the time of pairing depends mainly upon the weather, and the starting of pairing is coincident with the first bobwhite call notes. This usually takes place from mid April to the last of April, but some have been noted as early as February.

The bobwhite is an extremely shy bird, and for this reason the study of this bird has proven quite difficult. Most of the information garnered about this bird has been from studies of birds in captivity in pens of sufficient nature and size to permit the birds to carry on a

normal range of activities. Many long tedious hours must be spent in a blind overlooking the birds in order to obtain a full insight of their life history.

During the height of the mating season in early May, the cocks have been known to fight when hens are introduced to the pen. These fights have not been known to be fatal in captivity, but in the wild, an occasional combat no doubt proves to be fatal because evidence of this nature has been found in the field. The fighting does not necessarily determine the mating of the birds, for it seems that cocks and hens alike have their own preferences much like human courting procedures. It has been noted in studies that a once defeated cock becomes a new man, so to speak, after mating and has been known to run off a cock which had previously done the same to him.

The courtship display of the cock and the hen is a frontal one carried off in somewhat the following manner. The hen walks along with tail stiffly spread, plumage ruffled, and wings slightly raised and quivering. The cock is alongside the hen with head lowered showing his snowy white head markings to the best advantage; the wings extend with tips touching the ground. The elbows are elevated over the back and thrown forward forming a stiff feathered wall. The bird is also puffed out to the utmost, much like the hen. The cock then would rush the hen and the hen runs. Soon the cock catches the hen and copulation takes place.

Even in the midst of the mating excitement, the birds have been known to periodically freeze and then just as quickly return to their mating activity. Birds failing to conform to this freezing instinct are easy prey to such natural enemies of the bobwhite as the blue darter

and other hawks.

Pairing. After mating takes place, the cocks are somewhat tyrannical for they chase others away from their particular area. In a few days they settle down and can be found living in close proximity with other birds.

Old birds which survive the winter months together remain mated and are first to leave the covey in the spring. According to the literature this has been hard to substantially demonstrate except for a few times. One such time shows two hand reared quail arbitrarily mated during experiments in 1926 who lived together during the summer and produced forty-nine eggs. As related by Stoddard (1931) they were released in the fall where quail were abundant and they had ample opportunity to mate with other birds the following spring. Stoddard (1931) states that they were trapped in April of 1927 as a mated pair and were kept confined for further experiments.

Between pairing and the beginning of nesting, two weeks to a month may elapse. During this time, the cock is very attentive to the hen and often catches grasshoppers for her to feed upon. The pair are quite inseparable at this time.

Nesting. The most important nesting months are May, June, July and August. Normally, the majority of the quail nest during these months. According to Stoddard (1931), authentic records from various parts of its range show that the bobwhite has been known to breed, at least occasionally, somewhere in its range, every month of the year except December. However, broods brought off earlier than April, or later than October, must be regarded as altogether exceptional.

Selection of nesting site. The bobwhite utilizes a wide variety of

nesting sites. Nests may be built around clearings or fields or near open woodland. Nests are frequently built in areas visited often by the quail during all seasons of the year. Bobwhites prefer to nest in areas that are sufficiently open for them to run about freely at the birds own level.

The birds seem to prefer to build their nests near paths, roads, and edges of fields and in other such areas that are often frequented by some of their natural enemies. This could indicate a preference of the bird for wanting to keep an eye upon some of his many predators during this time of year.

Construction of bobwhite nests. Nests are built of last year's vegetation with such things as various types of grasses, pine needles, mosses, and other suitable building material of the pre-season's growth. The building of nests by the quail has been studied and observed in large enclosures, under natural conditions artificially produced. The vegetation, which includes several kinds, is grown in the enclosure and then an observer can see the bobwhite in action in the construction of its nest.

The bobwhite is very secretive about the building of the nest. The literature states that one might spend a life in the field without witnessing this interesting operation. Some observers believe the nest building activities are carried on by the cock because of the nests built by cocks in enclosures during the nesting period of the season. However, the female often joins in the construction work which also has been observed.

In building the nests, the bird digs a hole much the same as one dug for use as a "dust bath". The cock uses both the beak and the claws

to make the dish shaped hole which has a lip like edge serving to keep water from the nest during wet weather. After the hole has been made, the bird pulls grass into the bowl-like structure and then pulls more grass over the nest to form a roofed nest. Sometimes nests are built with natural roofs which still require additional effort on the bird's part to shape it as need be.

Sometimes more than one nest may be built, and if the nest builders are disturbed during building operations another site is selected and construction begun again. As will be seen later, the hens are capable of laying more than once in a season. If the nest is destroyed, the pair of bobwhites simply begin again, and on the average, a pair of quail will bring off one clutch of eggs a year.

Quail nests are hard to find when one of the pair is incubating because of the great natural coloration of the bird. Once the nest is abandoned for some reason or other, the white of the eggs readily gives away the location of the nest. Most of the bobwhite nests are concealed from above, but when looking from an angle to the front of the nest, the eggs can be seen. Some nests also have natural concealment due to their location, and this adds to the difficulty of finding the nest. Due to the fact that the nesting time takes place when there is an abundant of green vegetation as well as the dead growth of the preceeding year, most nesting sites are well concealed to the casual observer.

Egg laying. Eggs are layed at a rate of one per day until the set is complete. The hen may fly in to lay her egg, or both cock and hen sometime advance toward the nest on foot and the hen then deposits her egg. Then the two birds depart together. Egg laying usually consumes two or three weeks; the number of eggs varies from seven or eight up to

thirty or more according to Edminister (1954). The average size of the clutch is about fourteen eggs. For the most part, eggs are not turned during the egg laying period and may get a yellowish stain due to wet weather or the nest itself.

When quail are abundant and nesting cover is secure, two or more bobwhites may sometimes use the same nest. There have been found as many as forty eggs of three different sizes and forms in a single nest which had come from three different hens.

Incubation. A few days to a week may elapse between the time of the laying of the last egg until the beginning of incubation. The incubation period usually lasts for about twenty-three days after which the eggs are hatched. The incubation duty may be performed by the cock or the hen, and in most cases it is done by the hen. In some instances, the incubation may be shared by both, but according to the literature, this is a rare happening. The cock bird is the more determined of the two mates to bring the nesting to a successful conclusion and will do this even if his mate has been killed close by. The hen often is reluctant to continue the activity of the incubation if she is left alone. The birds have a great affinity for one another during mating and after, and are found together at all times except for incubation in which only one bird is on the nest or near the nest and the joining of partners takes place away from the nesting site. The incubating quail will leave the nest for as long as two hours a day for feeding and recreation.

The cock quail, as was mentioned before, is the more determined bird during incubating and is prone to fight or defend the nest if challenged. The hen will do this also but seemingly gives up easier than her mate. The birds have an uncanny ability for sensing danger, for a cow may pass

rather closely to the nest and the bird ignores this, but a fox or a hawk will cause the birds to become greatly concerned. If the setting bird is drawn off her nest, she will make every effort to draw the intruders away from the nest. The bird may feign injury by fluttering its wings and dragging them along the ground while uttering a squealing note in an attempt to draw an enemy away from the nesting site.

While on nesting duty, the action of the bobwhite depends much upon the conditions of nature. Sometimes some of the natural enemies of the bird, such as the red "thief ants" may attack the nest in large numbers. The nesting bird may be kept quite busy eating these ants to keep them off the eggs. If an egg is cracked, the "thief ants" are capable of entering the egg and devouring the chick inside the egg. When the bird is off the nest during its recreation period and the nest is left vacant for some time, the nest is in great danger from nest robbers such as ants, snakes, crows, cotton rats, and opossums.

If not disturbed while on the nest, the bobwhite often dozes by the hour with partly closed eyes apparently oblivious of the usual noises of the vicinity. The quail has only one concern during incubation, and that is the nest and its deposit of eggs.

Most of the activity centered around the nest concerns itself with the eggs with respect to the turning and protecting thereof. The eggs are turned several times daily. The bird does this with the beak or a rapid scratching action of the feet while on the nest itself. Egg turning is of considerable importance in the proper incubation of the nest as was revealed in the literature by hatching abandoned eggs under Bantams. Stoddard (1931) says that chicks hatched by Bantams frequently lacked balance, or were otherwise defective, presumably because of lack

of proper turning of the eggs for the few days.

During rain or at night, the incubating bird rarely leaves the nest unless disturbed. During such prolonged periods of nesting, the bird is quite motionless and does not emit the scent of the natural bobwhite when moving about or feeding. This is one way provided by nature to protect these birds during this vulnerable time of their life cycle. A bird dog passing close by a nesting bobwhite will not pick up the scent if the bird has been on the nest for any period of time. The bobwhite has many habits which are beneficial to him during nesting period. Among these are extreme tidiness about the nest such as not excreting droppings in the immediate area, and slow deliberate movement about the nest.

The nesting instinct is very strong in the bobwhite. The bird will remain on the nest long after the normal incubation period has been completed. One hen quail that was incubating when her nest was discovered, sat on the eggs for fifty-six days relates Stoddard (1931). This shows a great devotion to duty by the bobwhite during incubation.

Hatching. Hatching time in the southern states usually takes place during the month of May and June, although a few, mostly renests, come off still later. In the northern quail range, hatching is on the average about three weeks later.

During the twenty-first day of incubation or around 48 hours before the eggs are to hatch, they are "pipped". That is to say, the beak of the chick will push up and crack the egg at the place where the opening in the egg will start. This is a very critical time in the life of the young brood because of the constant noise of the nest and the always dangerous thief ants which may enter the partly opened egg and kill the

baby chick before it gets out into the light of day. At the onset and during the twenty-third day, the chick that are going to hatch do so in about one hour. After this hour of pecking and violent heaving at the shell, the chick emerges with the natal down wet and plastered down. It immediately starts chirping, struggling around and soon dries off.

After hatching of the brood, the nest takes on a distinctively "quaily" odor and becomes an increasingly dangerous home for the bobwhite family. It is believed by some observers that the period immediately after hatching is the time that most young bobwhites are lost to predators. The chicks are moved soon after hatching, depending upon the time of day and weather conditions. These chicks become an increasingly large problem for the cock and hen as they are quite small and very active requiring constant supervision. They may become suddenly chilled or fall into holes which they cannot get out of and become lost. If it rains, the chicks run for the cover of the hen's outspread wings until the shower has passed. The cock also is busy moving the brood to other grounds and away from the nest. The time immediately following hatching is one of anxiety for both birds and they have many responsibilities to the brood to see that their safety is maintained.

If disturbed in the nest, the young chicks will leave the nest for concealment in neighboring vegetation. In the meantime, the parents are busy beating the ground with their wings trying to divert the attention of the intruder. This will create a sense or condition of confusion to the intruder, and the young will have time to hide in the vegetation. The birds are endowed with a wonderful protective coloration which helps in concealing them from their enemies. After the danger has passed, the young chicks will rally around the hen upon her call.

If the weather and other natural conditions, such as predators, are favorable or just average, better than 85% of the eggs of a clutch will hatch. If the eggs become chilled during incubation, or a prolonged drought causes eggs to hatch at different intervals, the chances of hatching 85% of the clutch is greatly reduced.

Rearing of the chicks. As has previously been pointed out, the chicks, after hatching, are very vulnerable to their natural enemies such as the weather and predators. The cock joins the family also at this time to assume his share of the job of raising the chicks. Once united in this manner, the family is together until the following spring barring misfortune to some of its members.

Brooding. The chicks are brooded a great deal for the first two weeks by either one of the parents. They have short periods of exercise and time when they feed, but interposed between these activities are the longer periods of brooding. Chicks at this age require protection from the heat of the sun as well as cold wet weather.

Chicks are brooded in the shade of trees during hot weather, and when the sky is overcast by cloud covering, they venture forth to feed as a group with the hen and cock in the middle of their brood. The chicks from the first day pick up grit to serve as grinding material for their gizzards as well as tiny insects, berries, seeds, and bits of tender green leaves to serve as their source of food. The quail receive their daily moisture requirement in the early morning by touching their beaks to the dew drops on the grass. This serves them the remainder of the day and therefore enables this upland game bird to survive in rather dry conditions. An indirect source of water during the day is obtained from the various berries and other vegetation eaten by the bird.

The tiny chicks are very active from the first and require very little coaxing to eat. They jump and chase small insects and help each other dismember ones which are caught. By the end of the first week, the chicks are able to take flights of a few feet or so, and gradually their wings strengthen and their flight feathers develop. The young move about quite rapidly, scratching much in the same manner as do the adults. Their close imitation of the adults gives them a sort of cocky deportment as they go about the business of feeding.

During this time of feeding and activity, the adult birds are constantly on guard for possible danger. Scarcely an hour passes without some form of danger threatening the brood. A drizzling rain, the shadow of a blue darter hawk, or a coach whip snake may cross their path, and any one of these three menaces might spell disaster for the brood of tiny chicks. It is almost impossible for the family to escape from a coach whip snake, for it hunts out each tiny chick which cannot fly and swallows it whole.

Alarms. The young chicks will scatter and hide when the alarm of danger is given by the adult quail. If the danger is one that can be dealt with by combat, such as a pheasant or a domestic fowl, the bobwhite will ruffle up its plumage and defend the brood. Most dangers are not of this type, however, and the chicks are prone to be eager to come out of hiding and move around. This in some cases is a dangerous mistake for the chicks are protected by their coloring, but movements when they are supposed to be freezing often catch the eye of the predator and disaster is ultimate for the chick.

Development. Quail chicks develop their flight feathers rapidly so that they begin to fly when between two and three weeks old states

Edminster (1954). The chicks' juvenile plumage begins to replace the natal down during this period, and thus the young bobwhite can shed the rain without the services of the mother hen. The young birds also start to roost in the characteristic circle by the seventh week. Quail roost in a circle with their heads pointing out which helps conserve body heat and affords the birds a quick flight in time of danger.

It is during this time when the young birds begin to fly that their true gregarious nature comes to bear. Many young birds wander off while feeding and fail to hear or respond to the "scatter call" which is the call used by the bobwhite when regrouping after the covey has broken its unity in the field. Many times, if young birds fail to assemble when the scatter call is given, the parent covey may then move on without these single strays. Therefore, these stray young birds are forced to unite with other coveys, if they survive, which is one way that coveys of quail become integrated among families.

Covey Formation. During late summer when the birds of the older quail are starting to expand their feeding grounds, it is very easy for one covey to meet another in a well stocked area frequently resulting in the formation of a large covey. Often the presence of birds of several different ages can be noted in these coveys. At one time, it was believed that bobwhites brought off more than one brood a summer because of the difference in age of some of the birds of a rather large covey. This is not the case, and the resulting conclusion is that smaller coveys of birds form larger ones of various age groups. Also found in most coveys are unmated cocks and hens that join the covey late in summer after several unsuccessful attempts at nesting.

At fifteen weeks, the young birds very much resemble their parents.

They frequent areas of the terrain suitable for protection, roosting, and feeding. If they have such an ideal environment, they do not move about to any great degree. Birds in this type of habitat seldom migrate more than a mile and will be found time after time in relatively the same locations.

Fall coveys. In early fall, life for the bobwhite is easy because the food is plentiful and cover is adequate. The birds gorge themselves with meaty seeds of longleaf pine, loblolly, and the blackpines through the months of October and November. They spend considerable time in the farm fields dust bathing, feeding, and roosting, especially if the field has ample natural cover.

The interchange of birds among coveys continues throughout the fall and winter months and is often accelerated due to loss of birds during hunting season. As hunting season progresses, the number of coveys declines but the size of each remaining covey remains nearly constant due to the interchange of birds. Hunters usually bag about 20% of the game population during season. This is not to any great excess though, for most areas have a static carrying capacity for the birds of this particular area. This is to say, that during the worst part of the year for the quail when food is low and weather is detrimental in their habitat, only a certain amount of birds will survive to repopulate the area for the coming year.

A true sportsman will understand the life history of the bobwhite and also the important carrying capacity of the area which is to be hunted. If during hunting season, dog and hunter when seeking out the bobwhite do not scatter every covey beyond regrouping, or single out and shoot all the birds in a given covey, then this covey will be available

for the next season. The blue darter hawk also makes heavy inroads on coveys and single stray birds during fall and winter.

After the passing of winter comes the spring, and the courting season is here again. The bobwhite is now ready to start life anew. There may be more or less birds in the spring depending upon the many factors related to the environment of the quail. If there is a decline in their numbers, we must look to the environment, the climate, soils, waters, plants, and animals with which the bobwhite lives in, on, and with. For if given proper environment, the bobwhite has proven it will populate to the fullest capacity.

CHAPTER II

THE HABITAT OF THE BOBWHITE AND ITS PROPER MANAGEMENT

Introduction. The fundamental requirements for the survival of bobwhite are the same for all types of habitat. These general requirements are food and cover in satisfactory quantities, and they are not dependent upon geological or climatic differences. Given proper food and cover, the quail will thrive in both woodland and open range. When agriculture areas are the primary environment, the birds thrive and produce if small weedy fields are allowed to materialize providing cover and food in the form of various weed seeds.

In the past, the bobwhite quail was hunted for its market value. Birds were abundant everywhere the conditions were favorable. This indicates that there is no preferable habitat for the bobwhite. This is one reason the bobwhite has become such a desired upland game bird and is found over such a wide range in the United States, extending from Massachusetts to Kansas and Minnesota to Texas.

The abundance of quail is largely controlled by nature. If quail are very abundant in one particular habitat, certain predators follow the law of nature and prey upon the easy food source which is in this case the bobwhite quail. There will be an influx of hawks, cotton rats, snakes, opossums, and many others. Man himself operates the same when in pursuit of the bird. If the word gets out that there is an abundance of birds in a particular area, the hunters will flock to this

place and proceed to get their limit.

Nature then is the truly regulating factor in the survival of the bobwhite. Even the breeding is stimulated to the utmost when the birds are scarce in a favorable environment. The reverse is true when an abundance of the birds prevails and food is adequate.

The key then to the maintenance of the bobwhite quail is the relation between food, cover, and existing birds in the area. Habitat is important because, without it, birds will not flourish.

Types of range. The bobwhite's range can be divided into four sections, the northern cold section which extends from Minnesota to Massachusetts, the western section from Nebraska south to Texas and the central and southeastern sections which are included in the states south and east of the afore mentioned northern and western sections. The western and northern portions of the bobwhites' range are referred to as the peripheral areas, and in these locals, the quail are somewhat insecure. When conditions are right, the birds flourish abundantly there; if the weather or food becomes a problem, the birds are scarce. In the other two sections, the climate is more stable and suits the bobwhite best so that most years are favorable for the abundance of this game bird.

Southeastern section. This section includes the coastal plains, piedmont plateau, the black belt of the southern states, and the famed plantation country. The weather is mild and somewhat humid. The land itself is a mixture of farm land good for raising cotton, peanuts, sugar cane, citrus fruits, and timberland of pine, loblolly, longleaf and other associated spruces.

Central section. The heart of the quails' range lies within this

section which includes the lower portions of the Mississippi River valley and eastern Texas. The climate is mild, soils are fertile and suited for intensified farming, and woodland is somewhat scarce in portions of this geographic range. The major crops of this area are various types of grains, cotton, and tobacco.

Northern section. This section is limited in its ability to produce abundant quail because of the disagreeable climate. It was mentioned in chapter I that young birds often do not survive if the weather changes too abruptly during brooding season. Often the quail do not bring off their clutch until late summer so that early cold spells in the fall may kill some of the younger birds. This area also has a cold winter which often proves fatal to the bobwhite because it creates a scarcity of food. The increase of farming and domestic livestock in this section of the range has also made the bobwhites normally precarious existence still more difficult.

Western section. This portion of the quail's range has an extremely dry climate which is the major characteristic of the section. There are very little woodland areas in this section and the quail tend to be scattered over wide areas inhabiting only areas of the best habitat such as streams and gullies which have abundant cover and food for the birds. The major crops are dry land grains and also livestock raising.

Types of cover. There are four primary types of cover important to the bobwhite quail. The superior quail habitat will be composed of a mixture of all four types. These birds, however, can exist without all four of these types of cover close at hand. The number of birds will generally be proportionate to the adequacy of these cover elements.

The cover types are as follows: grassland, crop fields and areas

of other herbacious plants, brushy areas, and woodland. There are varieties of each of these, and their quality may vary also. The value of each depends upon the adaptability of its plants to the climate and soil. The misuse of soil by man and animal also greatly influences these cover types which are important to the bird. Quail do not depend upon any one type of cover, but find a variety of uses for all four types as will be briefly explained.

Grassland. The natural coastal grassland areas and open forests of the Southeast were the bobwhite's original home. As the white man gradually extended his area, the areas of grassland as well as cropland were also extended. With the advent of this, the quail was able to extend its range also. The best nesting cover for the bird is grass and a large portion of all nests are found in grass cover of one type or another. Hay, fallow fields, broom sedge and prairie grass are among the many types of cover used for this purpose.

During the summer months, after the young birds hatch in these grassy cover areas, they feed upon the abundant insect life found there. The birds prefer mixed fields of various types of grass rather than of one type because these mixtures tend to be not so thick and are more liveable. Nests in hay or alfalfa fields are often destroyed by farm machinery during cutting seasons.

The bobwhite may also nest in the grass cover along roadways and pathways due to the fact they are very seldom cut and nesting operations are not so easily disturbed. These areas are very similar to hedge rows and other forms of good protective cover. Heavily pastured areas are of very little use as cover to the bobwhites.

Cropfields. The cropfields are very important to the quail. Mass

tillage of the soil in ever increasing quantities during the 18th and 19th century has helped the bird to greatly expand its range. It has provided an abundance of food in the form of small grains which provide a large per cent of the birds diet.

During the present decade, however, farming practices have changed from crude agriculture practices to one of gleening the land of every bit of grain possible leaving no waste for the birds. These modern types of farming practices have contributed greatly to the quail's decline in recent years. Modern farming not only clears the fields, but also does not allow for the abundance of weeds which are also a large portion of the birds' diet. Weeds also have proven good cover in these fields for the birds during both summer and fall.

Farming methods must be efficient in this competitive economic world, but some of the farming practices employed now are even detrimental to farmer as well as bird. The soil needs protective blanket of growth the year around to protect it from erosion and to help maintain good tilth. If this were the practice in most of the farming areas of the bobwhites' range, there would be plenty of winter food and cover. Corn fields, for example, often have after harvest corn stalks, shocks, and rough stubble. Ragweed, foxtail, smartweed, and wild millet often grow abundantly in the same field so that fields of this nature provide excellent food and cover for the birds over the winter months. Fields that are plowed in the fall are of little value to the quail.

Other types of field cover that serve the bobwhite are "fallow", meaning a cropfield lying idle for a year or more. This type of field may be incorporated into the farming system to give back to the soil what it has lost due to growing of a crop such as tobacco. Weeds and other

associated annual plants take over the field and provide cover and food for birds of the area. Weed seeds are excellent quail food and are found in abundance in fallow fields as long as perennial plants do not take over the short lived ones.

The fertility of the soil is another important factor in cropland habitat of the bobwhite quail. Fertile soils grow lush cover and heavy fruit or seed yields which are of nutritional value to the bird. The quail usually will survive on moderately fertile land better than rich land because the agricultural practices are not so stringent. Growth of crops is not as heavy and the harvest not so clean, thereby providing the birds with food and cover requirements for this type of range. Poor soils support very little growth of any kind, and therefore are also poor land for the quail.

Brushy areas. In the brushy areas are thickets or overgrown areas of land which are of no primary value to the farmer, but are useful as cover and feeding grounds for the quail. This type of land is dominated by small diameter woody plants or coarse vegetation that grows up from the ground to give a canopy effect to the plants appearance. Cover of this type is in between the cropland or grassland size of cover and is not necessarily woodland.

Often these brushy areas are referred to as tangles, thickets or briar patches and many other names. These areas are sometimes scattered in fields or near the edge of woods and they serve the bobwhite in a variety of ways. These patches offer the bird escape from pursuing enemies as well as shelter from stormy weather.

Some of the many types of cover of this nature are found over a wide area of the quail's range with some producing berries and various

seeds which the birds eat. When the fruit bearing season is over, these thickets then provide cover as mentioned above. Vine tangles of Hall's honeysuckle, green brier, and wild grape are some of the various types of thickets. Multiflora rose and bicolor lespedeja are also excellent types of low woody plants which provide food as well as cover for the bobwhite in the fall of the year. In the summer months, patches of blackberries, raspberries are frequented by the birds as these fruits provide excellent food for the quail.

Brushy areas can be of great importance to the quail habitat for they often extend into and across fields so that the birds have an avenue from dense cover to their food supply. Typical examples of this cover are overgrown field boundaries, fence rows or osage orange living fences which were once used extensively in the Midwest.

Plum thickets are common in the central section of the bobwhite range. In the eastern range of the United States, the scrub oak thickets are very common and are excellent brushy cover for the birds. The brushy cover of the types mentioned are very important in the quail covey's territory. It does not have to be large in acreage, but this cover should be of good quality. Cover of this type helps maintain the covey in the area over the winter. The birds need the shelter and food derived from this type of cover and often could not inhabit the area without it.

Woodland range. Most of the bobwhites' range is generally well supplied with woodland. Florida, and the western prairies are not too well stocked with woodland, but birds still flourish well in these areas. Brushy areas can take the place of woodland and for the most part are better suited for cover and feed than woodland. The quail will not inhabit woods in the spring and summer, but seek shelter there in the late

fall and winter when bad weather sets in.

There is a great variety among woodland stands and all can be of use to the bobwhite as part of the bird's habitat. There are five types as discussed by Edminister (1954) that are considered to be significant to the bobwhite.

The woodlands of the eastern and southeastern range that are associated with quail are the southern pines, loblolly pine, long leaf and slash pines. These woodland pines are found in various areas in this section of the quails' range. Mature stands of pines of this nature do not afford the necessary cover the birds need, but if controlled light burning of ground cover is encouraged, plants needed for food will grow and the quail can survive. Escape shelter in these woodland stands can be provided by plum or honeysuckle thickets when introduced.

In the northern range, stands of mixed oaks, tulip poplar, and beech are used by the birds in their habitat. These trees can provide good shelter, but must be located near grass, crop fields, or brushy cover if they are to be used extensively by the birds.

The black jack oaks, mixed oaks, and oak hickory woodlands predominate. These stands of trees serve the bobwhite much the same as the woodlands of the northern range in as much as grass or crop land must be closely associated with these woodlands. The quail use the edges of the timber for shelter, but do not travel very far into these stands. Long, narrow strips of this type of woodland adjacent to farming land then would be beneficial to the quails' habitat.

In the southwestern part of the bobwhites' range, bottomland hard woods are important as winter quail cover. These hard wood stands occur along stream bottoms and ravines and are very important to the bird in

this predominantly herbaceous range.

Excellent quail habitat is a combination of the aforementioned types of range, grass, cropland, brushy areas, and woodland. Ideal habitat has all four types of range interspread with the cover being of good quality and quantity as well as arrangement. The bobwhite needs edges in its habitat. An edge is produced when two different types of range cover meet. The birds need areas of cover near feed and loafing spots. Good shelter in the form of woodland or brushy thickets should be easily accessible for escaping from enemies. According to Edminister (1954), good quail habitat is a well-interspersed arrangement of the different important cover types.

Management. The bobwhite can be cared for on a small acreage as compared to some of the other upland game birds and is thus considered the most easily managed. Quail management to any large degree is relatively new, but is very important in this era of modern farming if the game bird is going to survive in sufficient numbers to afford the sportsman good hunting. Conservation farming has helped the quail a great deal and therefore has made management of this game bird practical to the farmer as well as the sportsman.

It has been previously mentioned that moderately fertile farmland is best suited for the bobwhites' environment. Poor farmland will not produce the necessary cover and food required by the quail and very fertile soils produce cover stands which are too dense. A sound habitat management program therefore depends upon good farming practices which are mutually beneficial to both farmer and bird.

Cropland practices. The bobwhite depends upon grains and other crops grown by the farmer for much of their food supply. Hay fields

supply the bird with ample nesting and loafing grounds. How these lands are maintained is of great importance to this bird's habitat.

Crop rotation helps maintain soil structure and should be employed in crop land management. Crop residues can be left on the surface of the ground in the winter months where cover crops cannot be grown. Aftermath grazing and burning of crop remains is not recommended as it destroys valuable quail food used in the winter.

The control of erosion is very important in the maintenance of good crop land. Contour strip-cropping is one way to control erosion. This type of farming is also well suited for habitat development for the quail. This allows grains to be planted in between strips of hay which is a good erosion resisting crop. Strip farming of this nature provides maximum interspersion of cover types necessary for good quail habitat. Food patches which are quite far from cover do not appear to provide new covey ranges for bobwhite and are not considered consistent with good range management states Baumgartner (1945).

Other erosion control treatment such as diversion terraces on long slopes used to gather run off water are important to the quail. These terraces are usually kept in grass and can provide nesting grounds for the quail. Terraces of this nature are not mowed during the summer months as often as are hay fields and thus nests are not apt to be destroyed.

Where fields need to be drained, broad v-shaped channels can be employed. Ditch bank vegetation along these channel rims offer good cover for quail. If these banks are allowed to develop brushy types of growth, the bobwhites' shelter requirements can be met also.

In situations where most of the land is cultivated or heavily grazed, habitat improvements are impractical over wide areas since both winter

food and cover are lacking as cited by Duck and Fletcher (1944). In all management practices, winter food becomes an important factor if the quail are to survive.

Grassland practices. Grassland is usually associated with cropland, but in some areas, such as the western range of the bobwhite, grazing lands are predominant. The key factors in grassland management practices are the type of stock, condition of the grass, and the intensity of grazing. Bobwhite winter populations are quite low in areas where there is no grazing, and practically do not exist on farms where pastures and crop residues are severely overgrazed states Duck and Fletcher (1944). Moderate overgrazing is beneficial to this type of range and weeds can be induced to grow which produce seeds that are good quail food.

Pastures can be improved by seeding with the best adaptable grass-legume mixture. Liming, fertilizing and annual mowing before weedseed maturity are also useful management practices for grassland habitat. If the pastures are grazed within their carrying capacity, severe over grazing can be avoided. Strips of pasture can be induced to grow such seed bearing plants as partridge pea, and dove weed by disking in the spring.

Thickets or other brushy areas are best suited for shelter areas for the birds if left ungrazed. If these areas become too dense, quail will not inhabit them. Moderate grazing or rooting by hogs is recommended in such thickets. This will encourage the growth of weeds which are beneficial to the quail, and habitat for winter use of the bobwhite would thereby be improved.

Burning is not a recommended practice for improvement of pasture land habitat. Plants as well as nesting cover are destroyed when burning

is employed. Fall and early winter fires destroy covey ranges for that season, as related by Baumgartner (1945). Late winter fires forced coveys to shift to new ranges and affected the population as much as a year later states Baumgartner (1945). Where plowing and reseeding of areas which are dense and of no practical use to the bobwhite or livestock, light controlled burning is recommended. Late winter is the best time to burn as reported by Edminister (1954).

Pastures can also be rotated so that grass is allowed to grow, thus providing cover for the bobwhite. This is another sound grassland management practice.

Care of woodland for quail. Woodland quail range has variations of growth from dense to very sparse vegetation. Considerations for improving woodland according to Edminister (1954) are the following: the extent of the woods, composition by species, age class of trees, conditions of understory, and ground cover, and the diversification of the various types of cover within and adjacent to the woods. Woodland that is young is best used by the quail because there is more ground cover and weed seeds available than in older stands of timber. Open cover not heavily grazed with scattered thickets is ideal for woodland undercover.

Cutting can be employed as part of the management of woodland habitats. Cutting practices should be those used in the harvest of wood products. Such practices as rotation of small patches every five years, strip cutting and spot lumbering of small groups of mature trees over a large tract are some ways to sustain a yield of trees as well as quail. Some cut over areas can be cleared of stumps and seeded to produce bird feed thereby enhancing the quail habitat. Stoddard (1931) recommended such areas be from 40 to 60 feet wide and spaced at frequent intervals.

Such trees as oak, sweet gum, wild black cherry, flowering dog wood, and black locust should be preserved in woodland quail range for they are valuable food trees for the bobwhite. Trees of this type are especially important to the birds when they are growing near the edge of the woods.

The burning of woodland, if controlled, is a recommended procedure in much of the bobwhites' range land. Areas of the southeast and eastern states have woodland which is thick and heavy with underbrush. Controlled fires not only thin out unwanted cover, but also help protect against destructive forest fires which can occur unexpectedly.

This type of burning induces many dormant weed seeds to grow which then furnish valuable quail food. When areas are burned or cleared off, the weeds are able to grow. This is very similar to moderate over grazing or harrowing of pastures to entice weeds to grow. Some of the wild legumes which will take hold under these conditions are: lespedezas, partridge peas, beggar weeds, milk pea, and butterfly pea. Some of these weed seed foods have been previously mentioned and can occur in all types of range habitat.

Late winter is the best season for burning woodland which is much the same in this respect as grassland. Adequate fire protection should be incorporated into the planned burning of a site. The case of natural or artificial fire breaks can help control fires of this nature.

Most trees larger than four inches in diameter will not be harmfully affected by controlled burning procedures. Long leaf pine such as found in the southeastern quail range of the U. S. and loblolly are best suited for resisting burns.

Controlled burning is recommended for quail management only in the southern long leaf pine range. Northern and western areas of the bobwhites'

range should not be burned because it destroys an already sparse food supply in the winter.

Heavy grazing of woodland is another practice that destroys the habitat's suitability for quail. It was pointed out earlier in management of grassland that heavy grazing was also detrimental there. Grazing in this manner tends to destroy cover and meet the birds' need. Light grazing can benefit woodland ranges where hardwood under story has become too thick. If it is too thick for a man to walk through, then it is too thick for quail. Lay (1940) says that grazing not more than a cow per thirty acres in Texas helps keep woodland open enough for quail. Trees can be planted to provide woodland cover in areas which are unsuited for cropping or grazing. Species planted should be adapted to soils and climate of the area and also suited for purpose planned.

Recapitulation of various habitats. Development of all types of quail ranges depends upon diversifying the vegetation and providing a balance of open woodland, thickets, scattered grass or broomsedge areas, and cultivated or fallow ground. This would give the bobwhite the type of over-all environment needed to maintain adequate numbers the year around. Over a vast area of this nature, the birds will be evenly distributed and with the proper all year around food supply, the land will be able to support a maximum number of coveys. Proper management of existing natural habitats and the development of mediocre habitats will stimulate both the birds and the land to provide a high carrying capacity so that the sportsman can enjoy favorable shooting from season to season.

CHAPTER III

THE BOBWHITE IN THE FIELD AND ITS RELATION TO THE SPORTSMAN AND HIS DOG

Flight. The bobwhite quail is a fast flier and a bird that uses its wings from soon after hatching throughout the life cycle. At the age of three weeks, the birds can fly for very short distances. As the chicks advance in age, their wings gain strength and the length of the flights increase.

As related by Stoddard (1931), the length of flight of the bird from a covey which has been flushed is somewhat under 200 yards. These flights usually end at a sheltered wooded area or thicket in which the birds find cover. During these times, sportsmen find it hard to follow an individual bobwhite from moment of take-off to landing due to the many twists and turns in their flight pattern.

When a covey is flushed, there is a startling whirring sound as the birds gain momentum at the start of their flight. After this initial start, the noise of the flight is nullified due to the gliding action of the birds. When landing, the bobwhite assumes a nearly vertical position and resumes the beating of wings to slow down its glide and drops gently to the ground.

Quail in the woodland are prone to be very difficult targets to the sportsmen due to their fast flight and ability to dodge in and out of the trees. Stoddard (1931) relates the speed of mature birds to be in the range from 28 to 38 miles an hour. Spaulding (1947) is in agreement with

Stoddard in that he says the speed of the quail is slightly better than twenty-five miles per hour. No satisfactory method is known to determine acceleration speed at the moment of take-off.

The bobwhite flies for relatively short distances because it lacks the endurance required for long distance flying. The birds, however, are tireless runners and can travel great distances by this method.

Roosting. Bobwhites in the field roost in a circle with their tails together. This conserves body heat during chilly nights and also provides easy escape for all when danger appears. Circular and smaller massive patches of bird droppings can be found in the field indicating this circular pattern for roosting. Not all roosting is done on the ground. According to Davison (1949), quail can be found roosting on fence rails, grapevines, and thick brushy trees.

Roosting spots can be found in almost any type of cover. The quail usually roosts in areas that provide some protection from above. These areas will always be open enough for escape. The birds' roosting spots will often be shifted from one place to another each night, thereby eliminating the chance of the covey being raided night after night by a predator as was reported by Spaulding (1949). Of contrasting opinion, Stoddard (1931) points out that the bobwhite often frequents the same roosting spot night after night.

The roosting ring breaks up in the morning and the birds then move out into the fields to feed, carefully avoiding the dew drenched vegetation. A quail passing through heavily dew drenched vegetation sometimes becomes wet enough to make flying difficult. As was pointed out earlier, the quail does receive a portion of their water requirements from the dew in the early mornings.

The following is an observation that the author has experienced while caring for young bobwhite quail soon to be released. Through a local sportsman's club, 200 quail were being fed before their release for stocking. While feeding the six to seven week old quail in late evening, their roosting habits were observed. The birds were found huddled together in a circular pattern with tails to the center.

However, the birds often roosted not in this familiar grouping, but stacked one on top of another, sometimes three deep. Stacking of this nature can cause serious difficulties in raising young birds in captivity. In concluding, four birds were lost apparently due to their being trampled to death in the effort to seek the warmth of others.

Sportsmen in the field can predict the presence of bobwhite in the immediate area by finding piles of droppings. The covey size can sometimes be determined also by such evidence. The location of such roosting spots varies with the range in which the birds are located and with various climatic and predatory conditions. These birds are highly intelligent and will select the most favorable roosting site considering weather and protection from enemies.

Dust baths. This is another indication that bobwhites are frequenting a specific range. Dust baths made by the birds can be found in the field and near fallen logs, gopher mounds, and other areas where loose sand and dirt are available. The baths are in the form of a bowl wallowed out of the earth by the bird with its beak and claws. The baths are used to help the birds rid themselves of ticks and lice. The dust created by the bird in a bath helps to suffocate these pests.

Freezing. The sportsman and his dog know this quality of the bobwhite as witnessed by the dog on point with the birds holding steady.

This is truly a marvelous site to the sportsman and lover of upland game. From the time the quail first hatch, this instinct is of paramount importance to their very existence. At the slightest alarm, the birds will remain motionless with wings held tightly clasped to their bodies, thereby blending into the vegetation so as not to be noticed. While hunting in the field, many hunters have witnessed birds pinned to the ground in this state of freezing.

Scent emission. In chapter I of this account, the odor of newly hatched bobwhites was mentioned as a possible danger to the young birds. This odor is most likely to come from the adult bird rather than the chicks themselves according to Stoddard (1931). Bird dogs have been known to pass very close to sitting bobwhites without picking up the scent. This leads us then to the principle governing the emission of scent.

As quail move about in their habitat, dusting, feeding, and exercising their wings, a cloud of scent is emitted from the bird. This cloud of invisible vapor hangs in the air and drifts with the wind. When the bird flies, the scent trails out behind. If the bird sits, it can easily be located by a bird dog that arrives shortly thereafter at the scene. When the bobwhite crouches in a position and remains there, much like the hen during incubation time, the scent cloud dispatches and the bird is hard to locate, even by a well trained dog. Thus quail are sometimes missed in the field by both sportsman and dog because the birds had not moved for long periods of time.

There are other conditions which prevent the dog from picking up the scent of quail. The moisture level on the surface of the ground and the air plays an important part as do various types of decaying vegetation.

Spaulding (1949) points out that in most cases, a good bird dog can locate quail once the dog is reasonably close to the birds. A great deal of speculation remains, however, about the way dogs so easily locate quail.

Behavior in relation to weather. Under certain conditions, quail sometimes run before "freezing". During rainy weather or when found in burned over cover, the birds will often run until suitable cover is found before freezing. This is one fact which makes the birds so interesting to pursue. There is not a set pattern for the bobwhite in the field. They may feed all day or only in morning or evening. This is dependent upon the weather, predators, and the abundance of food. Quail sometimes fly badly in windy weather and are also hard to locate during this time because the scent is blown about. This type of weather causes the birds to run and not set well to a dog.

Wariness. Stoddard (1931) points out in his studies that the bobwhite is becoming more wary. When the birds are hunted in an area over a period of years, they become educated as to the location of the best cover when flushed. Sportsmen have reported that these birds do not light in open country where good single bird shooting would be available. The quail seem to sense this and head for the heavy thicket or timber where they are difficult to pin down and are almost impossible targets when flying low against a background of trees and thickets.

It was pointed out earlier that the first flight of a flushed covey is less than 200 yards. In hunted areas, the birds tend to fly longer distances and make several turns toward the end of their glide pattern. The relocation of coveys of this nature is very difficult for the sportsman and his dog. The longer flight patterns may be logical, for if only

the strong flyers survive to perpetuate the race, the quail may tend to extend their flying capacities and lengthen their flight pattern. Early in the season, the bobwhites usually have short first flights, but as the season progresses, these same birds will become more wary and their first flights will lengthen.

Stoddard (1931) relates that it is safe to conclude that bobwhites will become increasingly difficult to bag as time goes on. It is even speculated that the use of driving as a means of hunting bobwhite will be employed in areas such as the plush plantation regions of the South. This would mean the hunter would be able to shoot at birds flying toward the gun as opposed to shooting at the bird as it goes away in flight. The reason for this speculation is the fact that many sportsmen, in areas where there are many birds, find more than one covey flushing at a time. In these cases, coveys are flushing out of range of the guns and the dogs thereby making the hunt more difficult.

Quail hunting. In the southeastern quarter of the country, the bobwhite is considered by many to be the most important game bird. This bird is hunted every fall over its range by many avid sportsmen and their dogs. In terms of total birds killed per year, the bobwhite is second only to the pheasant. The annual harvest according to Edminister (1954) approximates 10 1/2 to 11 million birds. The bulk of these birds are bagged in the central and southeastern zones of the quail range.

Quail season usually lasts from one to two months during the fall and early winter. In the state of Oklahoma, the season is from November 15 to January 15, with hunting on Tuesday, Thursday, and Saturday, and all holidays. In average quail country, it takes two to four hours to bag one quail. David Miceal Duffey, writer for Outdoor Life in the July 1962

issue, relates in a recent survey that hunters hunting without dogs took on the average of 13 hours to kill one quail. The use of dogs lowered this time to an average of five to six hours required to kill one bird. For an individual, a bag of three to twelve birds for a whole season is considered average. The better hunters will get more, and hunters with well trained dogs will fair much better.

The practice of hunting quail on good quail range rarely influences the subsequent year's population. Baumgartner (1944) relates about Oklahoma quail hunting that reduction of the autumn population by hunting to approximately the normal breeding density does not result in a decline in numbers of birds from year to year and that the removal of approximately 20 - 55 percent of the birds each autumn does not result in any conspicuous change in the breeding population from year to year. If the quail are hunted heavily during poor years on range that is considered mediocre, the possibility of next year's crop of birds becoming somewhat reduced, is greatly enhanced. However, hunting success is usually very poor when bobwhite populations are limited.

Davison (1949) reports that the average number of coveys per farm in quail territory is one, and the acres of land for each quail is about fourteen. With the low density of the bobwhite per acre, the best method for hunting this bird is with the bird dog. The average sportsman hunts the bobwhite afoot following the pointer or setter through field and marsh in quest of the bobwhite quail.

The hunt. Hunting the bobwhite quail in the fall takes place all over the ranges of this bird as was previously stated. The state of Ohio does not allow quail hunting because the bird is listed as a song bird. This is the only state within the bobwhite's range that does not have a

season for the hunting of this bird.

With the coming of September, the foliage in the fields starts to turn a characteristic brown, and during this time, the quail start to form coveys signifying the approach of hunting season. The scent of the birds is more readily detected now and easily picked up by the exploring bird dog. By mid October, the first frost is upon many sections of the quail's range and most of the weedy odors of the field have disappeared.

The bobwhite quail is a very self-reliant bird and is easily adapted to almost any type of range that provides adequate food and cover. Robinson (1946) is of the opinion that the bobwhites are as plentiful today as they were in the early years of this country. Edminister (1954), however, points out that mechanized farming and the increased hunting intensity has resulted in a slow decline in quail numbers. It is apparent that quail will survive abundantly if given the proper habitats as long as there are fields of wheat and corn stubble, meadows and pastures with weed seeds, concealing grasses as well as thickets, old orchards and briar fields, and various other types of feed and cover.

Quail hunting can be found in a wide variety of range conditions. Territory most preferred contains a good assortment of thicket and woodland cover and small valleys with weedy and grass covered coves. This type of land and habitat offers an assortment of shooting conditions which the eager sportsman desires.

The bobwhite quail settles in its customary circle at the first shadowing of the evening and rises early in the morning. These roosting spots are referred to as "sets" by the veteran bird hunter. Finding such sets in the field mark the presence of coveys in that particular range. Droppings of a considerable amount in a round pattern are the signs of

their roosting spots. Quail will usually be found within a mile or even less of their roosting spots. After rising in the early morning, the birds will head for a nearby feeding spot via cover provided by a series of briar patches, sheltered fence rows, weed fields, or other suitable cover. The sportsman and his dog will expect to find the quail traveling early in the morning to favorite feeding rather than in open ground. Edges of fields are also places where the bobwhite will be located early in the morning. The left over grain from the summer harvest will be found by the bird in these edges.

Midday finds the birds loafing in the brushy ravines, heavy briar fields, or woodland habitats. As the close of the day approaches, the bobwhite is found retreating to its roosting spot, often in the same locality as the previous night. The quail will always travel via covered routes rather than open fields unless the fields themselves provide the necessary cover. Understanding some of the general habits of this competitive upland game bird will afford the sportsman more finds and more shooting.

Early cold crisp fall or winter mornings offer a difficult scenting problem to the bird dog. When the bobwhite is traveling over frozen ground, the scent left on the ground or in the air is little if any. After the ground has started to thaw with the rising of the sun, the scent of the bird stays long on the ground and the dog is able to readily pick up this and find the game.

Muggy warm mornings or days where there is a soft breeze or slight drizzle finds the odor of a covey of traveling quail exceptionally strong and pungent. The heavy atmosphere of wet days and damp mornings tends to enliven the bird scents in a quail field reports Robinson (1946).

Climatic conditions of this nature are exceptionally good for working singles with the dog.

Cold, windy, and dry days afford the sportsman and the bird dog poor quail hunting. Bird odors when available are swirled to and fro and the bird dog finds it next to impossible to pin down the birds. This type of conditions often leads to flushing of the birds unintentionally and sometimes missing birds altogether.

In the afternoon during periods of dry autumn weather or cold windy afternoons late in the season, hunting usually tapers off. With the approach of late afternoon, the bobwhite starts its movements back to the roosting grounds along covered avenues. During these periods of the day and just before dusk, the air is starting to get a characteristic dampness which carries on through the night. Hunting likely pathways to known roosting areas during this part of the day will afford the sportsman some fine shooting as well as excellent bird work for the dog. Along old rail or stone fences, fallow cover between fields, and along the edges of timber stands are choice places to look for the quail during these hours.

Babcock (1951) considers the bobwhite quail a creature of routine and habit. Under normal conditions, a covey will proceed from day to day following the same general pattern. The sportsman, realizing this situation, affords himself greater shooting enjoyment by analyzing the range to be hunted. Such factors as time, weather, temperature, and feeding conditions will vary the quail's daily itinerary. The sportsman and his bird dog can adjust to given situations if general habits and characteristics of the bird are kept in mind during the hunting season.

The gun dog. One of the greatest pleasures the sportsman has in upland game hunting is the enjoyment of a working gun dog. A gun dog is a dog primarily used to find game which is shot on the wing. Dogs of this nature are not necessarily breeds, but are dogs trained to find birds for the sportsman to shoot.

Obedience in any animal is a prime factor if an intended job is to be done. Bailey (1948) is of the opinion that this is an important factor in producing a finished shooting companion. A gun dog needs more than sheer obedience to attain the heights most sportsmen would desire. The dog needs to have intelligence and the love of the field as well as stamina and natural drive. Babcock (1951) adheres to the practice of natural development by often taking the young dog to the field to let him nose around. Obedience is the combination of obeying the master while still having a mind of his own when in the field. This enables the dog to explore all facets of the hunting area using his inbred instincts.

Not every gun dog will know just where to look for the bobwhite. This is one reason why the sportsman should be aware of the many phases of the bird's life. With these ideas in mind and with a gun dog of average skill, the hunter can enjoy a profitable day in the field.

There are many ways the sportsman can start a pup on the beginning trail to becoming a gun dog. Most writers such as Babcock (1951) and Bailey (1948) agree that training should be started from the first day the puppy arrives at its new home. This type of training is in the form of obedience training such as to know a name, to come, to sit, to lie down, to know the meaning of whoa, and whatever else the new owner desires. Formal training in the field should not take place until the dog is over

one year old. Most dogs are then mature enough to undertake the beginning of field training.

Young dogs should often be taken to the field to explore the domain they are to hunt. During these exercises, the sportsman can acquaint the pup with the explosion of firearms. Young dogs during these excursions are apt to point many different objects as their natural instinct begins to unfold. It is sufficient here to say that the training of a gunning companion requires patience and persistence. This is a subject in itself and will not be explored further here.

When in the field with the hunter in quest of the bobwhite, the gun dog has the important job of finding and pinning the game for his master to shoot. Once a covey of birds has been found, the dog will assume the characteristic pointing stance, signifying that the birds are there waiting to be flushed. The hunter steps up, flushes the birds and fires, after which the dog retrieves the downed birds.

Gun dogs can be either trailers or dogs which smell the scent of the birds in the air, and are quite often a combination of both. Often bird dogs will sight point game, especially when scenting conditions are poor as was explained earlier in this chapter.

The bobwhite on occasion runs in the field when being quartered by a dog. This presents a somewhat perplexing problem to dog and hunter. The dog will point on occasion, only to have the birds move, in which case the dog will move also. A highly skilled dog will circle such birds and pin them down from the direction they are running. Sometimes this will stop the bobwhite's tactics and cause them to take to the air. If conditions are favorable, the average gun dog will find his game, but often during bad weather, his work will be spotty.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The three aspects that have been considered in this foregoing discussion are some of the most important areas involving the quail and its relation to the sportsman. If the quail are to survive and if the hunter is to enjoy the wild game in the field, he needs to be aware of these facets of quail life. Knowledge of the life history, habitat and special features of the bird in the field are important parts of the general knowledge a sportsman needs. Knowing some of these basic generalities of the quail will enable the sportsman to help assure the continuation of this game bird in many localities.

As the population of the United States increases, the hunters of the bobwhite increase also. This, in time, may become a perplexing problem. The sportsman has an opportunity to help this situation become better by increasing his knowledge of this upland game bird. With some basic knowledge of the bobwhite in mind, he can help the farmer help the bird. In many areas of the bobwhites' range, the farmers have put a great abundance of land in crops. This limits the natural cover and habitat of the bobwhite. In these areas, the birds are unable to reproduce readily, and easily die out. If the hunter could work with the farmer in a conservation program, the birds and the land would benefit.

The hunter today sometimes has to drive many miles to find a locality suitable to the bobwhite, even in the bobwhites' own range, and occasionally the birds are not to be found. In these cases, birds could

be established in these areas by the sportsman, but this would take cooperation on the part of the hunter and the land owner.

Many land owners are mistaken in the belief that hunters kill off all the birds during the season. If these land owners knew some of the characteristics of this bird, they could take better precautions to preserve the quail. Many birds die because the land is able to support only a given number. This has been previously referred to as the carrying capacity of the land. If the land owners were aware of facts such as this, they could more realistically regulate the hunting on their land.

In the more heavily populated areas of the bobwhites' range, hunting costs a considerable amount of money. The sportsman has to pay to hunt on specially stocked game preserves. This can be expensive and not all hunters can afford such hunting conditions. To avoid this type of hunting situation, proper relations between land owners and sportsman will have to be maintained.

Quail will survive from year to year if their habitat is sustained. A program of cooperation between hunter and land owner could insure the maintenance of this exciting upland game bird. Knowing the facts mentioned in this paper will help both the land owner and sportsman to be aware of some needs of the bobwhite quail, and thus help to preserve this game bird.

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