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22 Scaled Quail

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Scaled Quail

Callipepla squamata (Vigors) 1830

OTHER VERNACULAR NAMES

BLUE racer quail, blue quail, Cordorniz Azul, Codorniz Escamosa, cottontop quail, Mexican quail, scaled partridge, top-knot quail, Zollin.

RANGE

From southern Arizona, northern New Mexico, eastern Colorado, and southwestern Kansas south to central Mexico. Introduced into central Washington and eastern Nevada.

SUBSPECIES (*ex. A.O.U. Check-list*)

C. s. squamata: Mexican scaled quail. Resident in Mexico from northern Sonora and Tamualipas south to the Valley of Mexico.

C. s. pallida Brewster: Arizona scaled quail. Resident from northern Sonora and Chihuahua north to Arizona, New Mexico, Colorado, Kansas, Oklahoma, and western Texas; introduced into central Washington (Yakima and Grant counties) and Nevada (Elko, Nye, and White Pine counties).

C. s. castanogastris Brewster: Chestnut-bellied scaled quail. Resident in southern Texas south through Tamaulipas, Nuevo Leon, and eastern Coahuila, Mexico.

MEASUREMENTS

Folded wing: Adults, both sexes, 109–21 mm (males average 2 mm longer than females).

Tail: Adults, both sexes, 75–90 mm (males average 2 mm longer than females).

IDENTIFICATION

Adults, 10–12 inches long. The sexes are very similar in plumage. Scaled quail have a predominantly bluish gray coloration (thus "blue quail"), and are extensively marked on the back, breast, and abdomen with blackish "scaly" markings. The crest is bushy, varying in color from buff in females to more whitish in males. Otherwise, the head is light grayish brown, the lower back, wings, and tail are brownish gray to gray, and the flanks are grayish to brownish with lighter shaft markings. Males of one race (*castanogastris*) have chestnut coloration on the abdomen similar to that of male California quail.

FIELD MARKS

The "cottontop" crest is often visible from some distance, and the generally grayish coloration of the bird sets it apart from all other quail in the arid habitats where they occur. They are usually reluctant to fly, preferring to run rather than remain hidden. The distinctive *pey-cos* location calls (stronger in males) will often reveal the presence of scaled quail in an area.

AGE AND SEX CRITERIA

Females may be distinguished from adult males by their less conspicuous crests (males' crests average 40.6 mm, females' 36.8 mm) and by the dark brown shaft-streaks on the sides of the face and the throat, as compared with the unstreaked pearly gray to white coloration of the male in this area (Wallmo, 1956a).

Immatures of both sexes have buff-tipped greater upper primary coverts associated with the first seven primaries.

Juveniles have poorly developed crests, central tail feathers with much cross-barring of darker and whitish coloration (Ridgway and Friedmann, 1946), and whitish shaft-streaks on the upper parts. They are quite similar to juvenile California quail but are paler and more streaked, and they are grayer below mottled with dull white (Dwight, 1900).

Downy young (illustrated in color plate 110) differ from those of elegant quail by their considerably paler lower back and upper leg coloration and from California and Gambel quail young by their grayer over-all body tone, with yellow or cinnamon-buff tints limited mostly to the head area. The two pale lines delimiting the darker middorsal stripe in scaled quail downies are nearly white rather than being buffy or cinnamon as in Gambel and California quail.

DISTRIBUTION AND HABITAT

The geographic distribution of the scaled quail more or less conforms to the Chihuahuan desert and adjacent desert grasslands, just as the Gambel quail's distribution centers on the Sonoran desert. The southern limit of the Chihuahuan desert extends approximately to the southern limits of San Luis Potosí (Leopold, 1959; Jaeger, 1957), whereas the scaled quail is common as far south as Hidalgo in locally arid habitats lying in the rain shadow of the Sierra Madre Oriental. This area represents the southern limit of natural mesquite (*Prosopsis*) grassland, but Leopold (1959) believes that the apparently recent extension of the scaled quail's range farther southward to the Valley of Mexico has been brought about by clearing of the pine-oak forest, overgrazing, and agriculture with the resulting formation of a secondary desert habitat. Leopold reported that in Mexico the bird thrives best where there is a combination of annual weeds, some shrubby or spiny ground cover, and available surface water. The natural desert habitats best provide this combination of characteristics, and the secondary deserts mentioned above, as well as the more extreme creosote bush deserts, support only relatively low populations. Dixon (1959) points out that the scaled quail was noted in all of four different studies of Chihuahuan desert birds and also occurred in a study of Tamaulipan thorn scrub habitat in south central Texas.

In Texas the scaled quail occurs in the Panhandle and trans-Pecos area eastward to the western parts of the Edwards Plateau and southeastward locally to McMullen and Hidalgo counties (Peterson, 1960). Its range is largely complementary to that of the bobwhite (McCabe, 1954), although a slight amount of range overlap does occur. Hamilton (1962) noted that the scaled quail is typically found in mesquite or juniper savanna habitats, while the

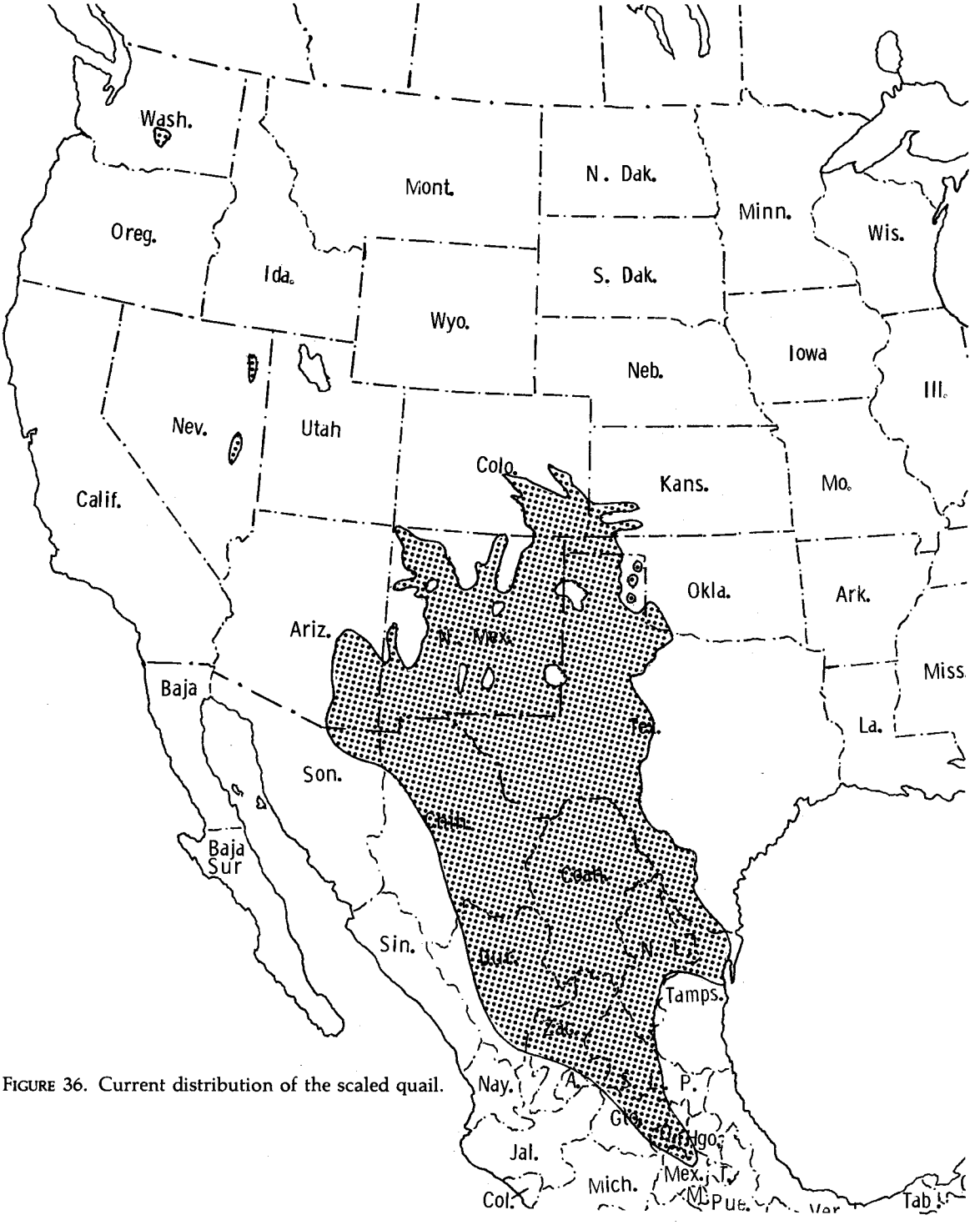

FIGURE 36. Current distribution of the scaled quail.

bobwhite typically occurs in scrub oak woodland, riparian woodland, or juniper-oak woodland. Scaled quail in Texas prefer calcareous soils having a combination of grass and brush and cannot survive where heavy woody cover is lacking (Principal game birds and mammals of Texas, 1945). During the breeding season the Arizona race of scaled quail is also found on open mesquite grassland and farming land, while the chestnut-bellied scaled quail prefers open prickly-pear cactus (*Opuntia*) flats. The winter habitats are around ranches, creek bottoms, and canyons in the case of the Arizona race, while the chestnut-bellied race prefers gravelly hills covered with black brush (*Acacia*).

In Oklahoma the scaled quail is common only in Cimarron County but also occurs less abundantly in sixteen other western Oklahoma counties. Of seventy reports of scaled quail occurrence as to habitat type in Oklahoma, 47 percent were in sand sagebrush (*A. filifolia*) habitats, 21 percent in short grass–high plains habitat, 13 percent on mesquite grassland, 10 percent on mixed-grass prairies, and the remaining 9 percent on shin oak, post oak–black oak, and tall-grass prairies (Schemnitz, 1959).

The range of the scaled quail in Kansas is extremely limited, and it is found locally south and west of Pawnee County in the southwestern part of the state (Johnston, 1964). It occurs in roughly the same areas as the lesser prairie chicken, namely where sandy soils occur along the Cimarron and Arkansas rivers and a combination of grasses and sagebrush predominate (Baker, 1953).

In Colorado the species extends along the Arkansas and Cimarron river basins from the Kansas and Oklahoma borders on the east and the New Mexico border on the south, westward to the foothills of the front ranges of the Rocky Mountains (Hoffman, 1965). Its altitudinal range in the state is mainly from 3,400 feet to 7,000 feet, but it is found as high as 8,000 feet. Based on observed quail usage, the most important habitat type in eastern Colorado is the sand sagebrush community on sandy soils, which in Hoffman's study accounted for over 40 percent of the quail observed. The second most important habitat type is dense cholla cactus and/or yucca grassland, a shortgrass community in which through grazing the cactus or yucca have developed into thick stands. The third most important habitat type is the piñon pine (*Pinus edulus*) and juniper (*Juniperus*) woodland community, which is typical of stony soils and rocky outcrops. All other natural and agriculturally modified habitats are of considerably less value to scaled quail, judging from numbers observed (Hoffman, 1965).

In New Mexico the scaled quail extends over most of the nonforested areas of the state up to an elevation of at least 6,990 feet, and its range is largely coextensive with those of mesquite, blue chaparral (*Condalia*), and cholla cactus (Ligon, 1961).

In Arizona the scaled quail occurs only in the southeastern part of the state, where it is associated with grassland vegetation and is replaced by the Gambel quail whenever the grasses are replaced by mesquite and cholla cactus as a result of overgrazing (Phillips, Marshall, and Monson, 1964). As a result, its range in that state may have decreased considerably in recent decades.

In central Washington state the species has been introduced and is well established in Yakima County and also in the eroded basalt scablands below the potholes of Grant County, where the birds are fairly common in the dense sagebrush (*Artemisia tridentata*) and grass habitats. A similar sage–shad scale habitat is used by the birds in Nevada, where they have been introduced in several eastern counties and now appear to be well established (Tsukamota, 1970).

POPULATION DENSITY

Densities of this species probably vary greatly in different habitats, and even in the same habitats during different years. In southern Texas, concentrations of about 1 bird per acre were reported on areas as large as 200,000 acres during 1940 and 1941 (Principal game birds and mammals of Texas, 1945). By comparison, at the northern edge of its range in Colorado, Figge (1946) reported a winter population of 333 scaled quail on 8,960 acres, or 1 bird per 27 acres. More recent studies by Hoffman (1965) indicate lower scaled quail populations averaging only about 10 birds per square mile, or 1 per 64 acres. Winter covey counts by Schemnitz (1961) in Oklahoma indicated that the population density on an over-all acreage basis on his study area was 1 quail per 12.9 acres, but if occupied ranges only were considered, the density was 0.84 acres per bird. By the same consideration of using occupied range only, Wallmo (1956b) found an average winter density of 1 quail per 10.1 acres. These figures simply point out the great locational and probably yearly differences to be expected in quail populations occupying desert or other habitats that are often marginal for survival.

HABITAT REQUIREMENTS

Habitat usage and requirements of the scaled quail have been well analyzed by Schemnitz (1961), whose work provides the basis for the following summary. During winter, quail fed in soapweed (*Yucca*) or soapweed–sand sage pastures, weed patches, or grain stubble fields during the early morning, then moved to resting cover, often consisting of man-made structures or piles of brush. Escape cover consisted of soapweed or soap-

weed–sand sage–grassland habitat or heavier cover, depending on degree of disturbance. Man-made structures not only served as protective shelter but also were usually associated with food plants in the form of weedy herbaceous plants. Midday periods were spent in the shade of tree cactus (*Opuntia*) plants. Wallmo (1956b, 1957) emphasized the importance of midday shade and loafing cover and noted that night roosting cover must not be so dense or thick that it prevents easy movements by the birds. Schemnitz (1964) also pointed out that scaled quail cover should provide overhead protection but opportunities for ground-level movement, since the species typically runs when disturbed. In contrast, the bobwhite, which more often "freezes" when disturbed, inhabits heavier woodland and brush habitats.

During the spring the birds moved from the heavier cover associated with winter areas to less dense cover, perhaps because of a seasonally lower hawk population. Soapweed and sand sage continued to be used for resting purposes, along with annual forbs and grasses. The nesting cover (based on fifty nests) consisted of a variety of forb or shrub cover types, with two-thirds of the nests being found under dead Russian thistle (*Salsola*), machinery and junk, or mixed forbs and soapweed. Similar nest-site requirements were suggested by Russell (1932), who found sixteen of twenty-three New Mexican nests in Russian thistle, forbs, soapweed, Johnson grass (*Sorghum*), or under overhanging rocks. Schemnitz (1964) found that grassy situations provided nesting cover for only three of the fifty nests. During the summer, the birds studied by Schemnitz foraged in fairly exposed grassland areas and loafed under soapweed clumps, where dry sandy soil was usually available for dusting.

Considering usage by life-form of the habitat, Schemnitz found that the habitats dominated by shrubs three to twenty feet high contributed the majority (54 percent) of more than two thousand flush observations of scaled quail, with man-made cover providing about 30 percent, and the remaining 17 percent more or less equally divided among forb clumps, cropland, and open grassland. In piñon-juniper ranges, skunkbush (*Rhus*), tree cactus, and dense soapweed provided favored shrub cover types, in short-grass habitats skunkbush was used most heavily, and on sand sage habitats a combination of dense soapweed and sand sage represented the major shrub cover type used by scaled quail. Skunkbush and man-made structures are used throughout the year by scaled quail for cover, and where they are available they received a total usage that was far in excess of their relative availability on the habitat. On the other hand, croplands and open grasslands were used much less frequently than their availability might have suggested.

The importance of available water as a habitat requirement for scaled quail is somewhat controversial. Wallmo (1956b, 1957) questioned its importance, and noted that he had observed coveys from three to seven miles from water during his studies. However, Schemnitz (1961) never observed quail farther than one and a quarter miles from water and furthermore found that they were distributed closer to water sources than a random distribution pattern would dictate. However, food or cover distributions might also be positively correlated with water distribution, and thus a direct relationship between the occurrence of water and quail cannot be positively stated. The water requirements of the scaled quail have not been as intensively studied as those of other southwestern quail, but some early observations (Vorhies, 1929) suggest that the birds can survive well without free water.

FOOD AND FORAGING BEHAVIOR

Apparently the usage of insect food by the scaled quail varies considerably in different areas or years, with some studies (Martin, Zim, and Nelson, 1951; Principal game birds and mammals of Texas, 1945; Bailey, 1928) indicating that up to 30 percent of the total food may be of this source, while other persons (Wallmo, 1956b; Kelso, 1937; Schemnitz, 1961) indicate that 7 percent or less of the food may be of animal origin.

Studies in Texas (Principal game birds and mammals of Texas, 1945) indicate that in the plains area of northwestern Texas weed and grass seeds are eaten extensively, while the chestnut-bellied scaled quail of south Texas relies heavily on seeds of woody plants (Lehmann and Ward, 1941). The two most important of these seed sources are elbowbrush (*Forestiera*) and cat's-claw (*Acacia*). Similarly in the trans-Pecos area the Mexican huisache (*Acacia*) is an important food, and on the lower plains and panhandle areas the seeds of mesquite and hackberry (*Celtis*) are relatively frequently taken. Mesquite is also used by birds on the Edwards Plateau, together with the seeds of sennabeans (*Vigna*) and weedy herbs (*Amaranthus* and *Solanum*).

The study by Schemnitz (1961) provides comparable information on scaled quail food usage in piñon-juniper and sand sage–grassland communities. In this area tree fruits are of minor importance, and of the twenty leading foods, thirteen were seeds of annual and perennial forbs, two were agricultural grains, two were insects, and the remaining three were grass seeds, tree fruits, and leafy materials. A variety of weedy forbs, such as pigweed (*Amaranthus*), Russian thistle, sunflower (*Helianthus*), and ragweed (*Ambrosia*) made up the majority of winter foods. Sorghum grain

was the only distinctly preferred food among the cultivated grains, and grass seeds were likewise little utilized. In contrast to the Gambel quail, for which herbaceous legumes are a staple food source, only one species (*Psoralea*) was found to be an important food in Oklahoma. However, leguminous forbs such as lupines (*Lupinus*), locoweed (*Astragalus*), and deervetches (*Lotus*) have been reported in Texas foods. Schemnitz found a surprising diversity of foods consumed, with up to as many as twenty-four food types in one crop, which he considered a desirable foraging adaptation and one that might help support a relatively high bird population.

Schemnitz noted that scaled quail typically foraged from daybreak to about 10:00 A.M., and again from about 4:00 P.M. to dark, varying somewhat with the season and the temperature. Although the birds sometimes foraged during rain, they usually did not feed during snowstorms but waited until the snow had ceased falling. When the snow was fairly deep the birds perched in trees up to twenty-five feet above the ground, where they could reach the seeds of hackberry, skunkbush, and juniper.

MOBILITY AND MOVEMENTS

The only major study of scaled quail home ranges and movements to date is that of Schemnitz (1961), which will be the basis for the following discussion. In the winter, scaled quail gather in fairly large flocks that may number up to 100 or more birds. By marking individual birds, Schemnitz estimated that the average size of a winter home range in 1954–55 was 52.3 acres, but ten such home ranges varied from 24 to 84 acres. During the following winter the average estimated home range was slightly larger (69.5 acres) for the same home ranges, and all ten of the home ranges studied the previous year were again occupied. These winter coveys averaged about 30 birds during the two winter periods, ranging from 7 to 150, and generally larger coveys were present in the sand sage–grassland habitats than in short-grass or piñon-juniper habitats. The maximum diameter of a winter home range found by Schemnitz was 1 mile, or less than an estimated 1.5-mile cruising radius reported by Figge (1946) for Colorado birds, and the 0.75-mile ranging distance from winter roosting sites estimated by Russell (1932) for New Mexico. Wallmo (1956b) found that winter coveys had ranges averaging about 450 acres and restricted their daily movements to areas within 160 acres.

Schemnitz found only a limited amount of cover shifting among the winter coveys, a situation reported earlier by Wallmo (1956b). However, winter home ranges generally overlapped only slightly or not at all, and thus opportunities for covey mixing were rather limited.

Winter home ranges were not distinct from, but rather part of, the larger summer home ranges. The summer home ranges of three coveys studied by Schemnitz were 720, 1,220, and 2,180 acres, but within these larger areas individual pairs probably occupied fairly small home ranges. Studies of individual birds marked on their winter ranges and seen again during the summer indicated movements of from as little as none to as much as 2.75 miles from the winter range. In the case of three pairs, the birds returned with their brood to the winter home range occupied the year previously.

Although scaled quail are not generally considered highly mobile, one documented case of apparent mass dispersal during late fall and winter has been established. Campbell and Harris (1965), while banding over two-thousand birds during the years 1960 and 1964, found that during the late part of 1961 and early 1962 a substantial population dispersal occurred. This dipersal involved both sexes and adult as well as immature birds. Thirteen banded birds were known to have moved at least ten miles or more, and a maximum movement of sixty miles was found for one subadult male. The movements did not have any clear directional tendencies and probably should be interpreted as population dispersal rather than possible migration.

SOCIAL AND REPRODUCTIVE BEHAVIOR

The fairly large winter coveys of scaled quail remain intact until the males begin to come into reproductive condition, and the combination of increasing male aggression toward other males and the separation of paired birds from the coveys gradually cause the dissolution. Schemnitz (1961) noted that in Oklahoma this breakup of winter coveys began to occur shortly after the period from March 1 to April 15, which was marked by male fighting and intolerance among mated pairs. He reported the first *whock* call of unmated males on April 13, and the earliest copulation that he observed was on April 5. Nests, however, were not found until early May, a rather surprisingly late date for a desert-nesting bird. Likewise, Leopold (1959) reported that in Mexico most nesting occurs from June through August and pointed out that it is during this time that the summer rains usually fall, resulting in an abundance of water, insects, and succulent foods. This long nesting period, which extends into September or even October as far north as Oklahoma, no doubt is an adaptation to allow nesting during the most favorable period or possible renesting attempts if initial efforts are unsuccessful.

Nests are usually located under shrubs or some other protected and shady site, and a fairly large clutch is typical. Wallmo (1956b) estimated that

fourteen eggs is an average clutch size based on personal observations and literature sources, and Schemnitz (1961) reported a similar average clutch size of 12.7 eggs. Male scaled quail evidently share in incubation less regularly than do bobwhite males; Schemnitz noted only one definite case and the presence of a second bird in the vicinity of the nest for only six of fifty nest locations. Incubation requires from twenty-two to twenty-three days, although a twenty-one-day incubation period has been commonly estimated.

There is still no clear evidence that males normally take over the care of the first brood, which would enable the female to begin a second one, although this possibility should not be dismissed. Wallmo (1956b) reported one such case in which the male raised the first brood while the female began laying again. The available data (summarized by Schemnitz, 1961) indicate a low average hatching success of scaled quail, generally under 20 percent, and this together with a high adult mortality rate would suggest that persistent renesting or possibly double brooding would be the only way that populations might be maintained. Average brood sizes in Oklahoma were apparently fairly high (7.8 to 11.5 young), but the percentage of adults without broods ranged from 38 to 70 percent during the three years of Schemnitz's study. Similarly, Hoffman (1965) reported an over-all average brood size of 8.7 young for a six-year period, and an average young to adult ratio of 2.8 to 1 during the same period based on these brood counts. A very similar juvenile to adult ratio of 2.86 to 1 (74.1 percent juvenile) was reported for fall hunter samples by Schemnitz. This would suggest that each adult pair must have averaged between five and six young that were raised to the November to January hunting season, which could hardly be possible if roughly 50 percent of the adults were unsuccessful nesters and only a single brood was raised by successful breeders.

During extremely dry summers little or no successful nesting occurs in quail, and the birds may not even attempt to nest. Leopold (1959) attributed this to a possible weakening of the adults because of the resultant poor diet, a reduced hatching success of eggs because of the lack of moisture, or reduced food and water supplies for the developing chicks and consequent high chick mortality.

As the chicks mature, the broods gradually become organized into larger covey units. During trend-route counts from July to early September in Colorado, the covey sizes seen averaged about 11 to 17 birds (Hoffman, 1965). Later area-covey counts made from mid-November to the early winter period provided yearly average covey sizes of 17 to 23 birds, suggesting a gradual merging of broods in late fall to form the fairly large winter coveys that are typical of this species. Wallmo (1956b) noted that seven

fall coveys averaged 38.7 birds, while by spring the average size of twelve coveys observed during two different years had been reduced to 18.8 and 21.7 birds.

Vocal Signals

Surprisingly little has been written on the vocalizations of the scaled quail. The best-known call is the separation call, used by individuals separated from their covey as well as by both sexes when visually separated from their mates. This is a two-syllable, nasal call *pe-cos'* or *pey-cos'*, with both syllables having the same, uniform pitch, although the second syllable is of longer duration and somewhat greater amplitude. The two syllables have sharp starting points that are two-fifths of a second apart, and the call is repeated several times at intervals of about one second. Males which are unmated will respond to the playback of female *pey-cos* calls by approaching the recorder during the breeding season (Levy, Levy, and Bishop, 1966), which provides a census method for male populations. It is not yet established whether mated males can differentially distinguish the separation calls of their mates from those of other females, as is known to occur in Gambel and California quails.

The announcement call of an unmated male is a single-note, slightly nasal whistle, which Schemnitz (1961) described as a *whock* whistle and Wallmo (1956b) called a *squawk* or *kwook*. This is usually uttered from a conspicuous calling point, and is probably uttered during the entire period that unmated males are in reproductive condition, as has been proven for the corresponding call in Gambel quail. Wallmo (1956b) heard it only in males, probably only unmated ones.

Wallmo (1956b), who described the separation or "gathering" call as a *chin-tang'* or *chuk-ching'*, indicated that the group alarm note is similar, but more excited and more rapid, sounding like *chink-chank'-a*. Bendire (1892) also indicated the same similarity in these two calls. When birds were removed from traps they sometimes uttered a fright call, *tsing*. This call is very much like the down-slurred distress calls of other New World quails, as a comparison of sonagrams will readily show.

So far only a single type of male-to-male aggressive call has been noted in my laboratory. When confronted with other males (or a mirror), paired males utter a strong series of nasal calls, each of which is associated with a rapid and vigorous head-throw, with the bill being raised to the vertical and the head drawn well backward. Up to seven or more of these are given in rapid sequence, at intervals approximately one-half second apart. The

female also uncommonly performs a version, weaker both in relative movement and sound amplitude, of the same display under conditions of disturbance, but this does not occur with predictable regularity as it does in males. In both the releasing situation and its sound characteristics the "head-throw" call is clearly homologous to the *squill* of the California quail and the *meah* of the Gambel quail, and male hybrids of the scaled quail and each of these species regularly perform intermediate calls and postures in this situation. Strangely, the scaled quail apparently lacks, or at most has very poorly developed, any aggressive calls that correspond to the *wit-wit* and *wit-WUT* calls of these two species, thus the scaled quail's head-throws are neither preceded by nor alternated with other threat calls, as is the typical situation in the Gambel and California quails. Likewise the scaled quail apparently almost lacks the typically repeated soft *chip* sounds made by these species in situations of mild alarm, with the head-throw call or a variant of it serving to keep the covey together as they retreat through the brush. Daniel Hatch* noted that about a third of the birds he heard calling in this situation uttered the head-throw call (males?), another third produced *chip'* and *chip-eee'* calls, and the remainder uttered only a *chip-eee'* note. Bendire (1892) described this call as a *chip-churr* sound. He also noted that when chased by a hawk the birds uttered a gutteral *oom-oom-oom;* I have not had an opportunity to hear the response of this species to avian predators.

Laboratory-produced hybrids between the scaled quail and the bobwhite produce a call that is intermediate between the *pey-cos* and the *hoy, hoy-poo* complex when placed in a situation that would elicit separation calls. The male call that is uttered in male-to-male aggressive situations lacks a definite head-throw component, but acoustically appears to be intermediate between the head-throw call and the bobwhite's caterwaul call.

The total adult vocal repertoire of the scaled quail is thus a surprisingly limited one, that includes an unmated male announcement call, a separation call used by both sexes, an agonistic call that is largely but not entirely typical of males, an alarm *chip* note that is probably used by both sexes, an avian predator call, and a distress call. Wallmo (1956b) mentioned hearing various "conversational" or contact notes that might be added to this list, and doubtless one or more parental calls also occur. I have not heard calling by either sex during copulation, and the tidbitting display of males to females is likewise silent. It would thus seem unlikely that more than ten call-types are present in the scaled quail, or far fewer than have been found to occur in the bobwhite.

*Daniel Hatch, 1971: personal communication.

EVOLUTIONARY RELATIONSHIPS

Even if *Lophortyx* were not merged with *Callipepla* there could be no question that the elegant, Gambel, and California quails are the nearest relatives of the scaled quail and the lack of a distinctively colored and elongated crest in this species is of no taxonomic significance beyond the species level. It is difficult to judge with which of these three species the scaled quail has the greatest affinities, but the elegant quail bears an interesting allopatric relationship to the scaled quail, and one might readily imagine that speciation occurred following isolation from a common ancestral type by the Sierra Madre Occidental mountains. Both species are desert-adapted and dependent on the presence of shrubby or brushy vegetation in relatively scattered (for the scaled quail) or continuous (for the elegant quail) groupings. Both also have strong similarities in their vocalizations, their downy young, and their general plumage patterns; although differences in adult plumages do occur they are not any greater than between those of the scaled and the California or Gambel quails. However, the only known hybrids between the scaled and elegant quail have apparently been sterile (Banks and Walker, 1964), whereas at least a limited degree of hybrid fertility exists between the scaled quail and both the Gambel and California quails.

There is apparently also a partial sterility barrier between the scaled quail and both the barred quail and the bobwhite quail, with female hybrids representing these crosses apparently either laying no eggs (scaled × barred) or laying subnormally small ones (scaled × bobwhite). One might presume therefore that the scaled quail does not provide a definite "link" between the crested quails (*"Lophortyx"*) and *Colinus*, nor between these species and *Philortyx*. For these reasons, and the very weak morphological criteria for separating *Callipepla* from *Lophortyx*, it seems most reasonable to consider the scaled quail and the three crested quails as a close-knit evolutionary unit.