

FROM FIELD AND STUDY

Weight Variations of Captive Gambel Quail in the Breeding Season.—In the course of an investigation of the effects of water denial on several pairs of captive Gambel Quail (*Lophortyx gambelii*) in southern Nevada, a female that was being held as a control began laying eggs, and completed two "clutches," totalling 23 eggs, over a period of 60 days. During this period weights were taken at four-day intervals. Since there seem to be few records of the weight changes undergone by females of North American gallinaceous game birds during the periods immediately preceding, during, and following egg deposition, it seems worthwhile to record these events.

The hen (♀ 800) was wild-trapped as an immature bird on March 14, 1952, in an upland desert situation (3600 feet elevation) about seven miles northeast of Searchlight, Clark County, Nevada. She was one of six birds (three pairs) trapped in this area, and together with four pairs captured in the valley near Las Vegas, Nevada (1700 feet elevation), in December, 1951, and January, 1952, was kept in captivity in Boulder City until March 20, 1953.

As shown in figure 1, after 36 days in captivity, on a diet of dry grain and unlimited water, this female commenced a pronounced weight gain from an average weight of about 152 grams. For the next 21 days her weight gain continued, levelling off 25 grams (17 per cent) above her earlier average and 9 grams (5 per cent) above her weight when wild-trapped. While increasing in weight she laid one egg, and after her peak weight (177 grams) was attained, she deposited 15 additional eggs in the next 32 days. In the period of egg deposition her weight reached two more peaks, one equal to the first, and the second five grams lower. However, by the time the last egg of her first "clutch" was laid she had dropped to a level about 15 grams lighter than her peak weight.

Having laid a little more than the equivalent of one average clutch of about a dozen eggs (Grinnell, Bryant, and Storer, Game Birds of California, 1918:541), she stabilized at about the weight reached when her last egg was laid. Had she been in different circumstances she presumably would have begun incubation at this point, but each egg was removed from her compartment soon after being laid.

After eight days at this lower level her weight again rose sharply; one egg was deposited after four days, and the weight then reached a peak equal to that reached early in the laying of the first clutch. Six more eggs were deposited during the next eleven days, and her weight decreased just as it

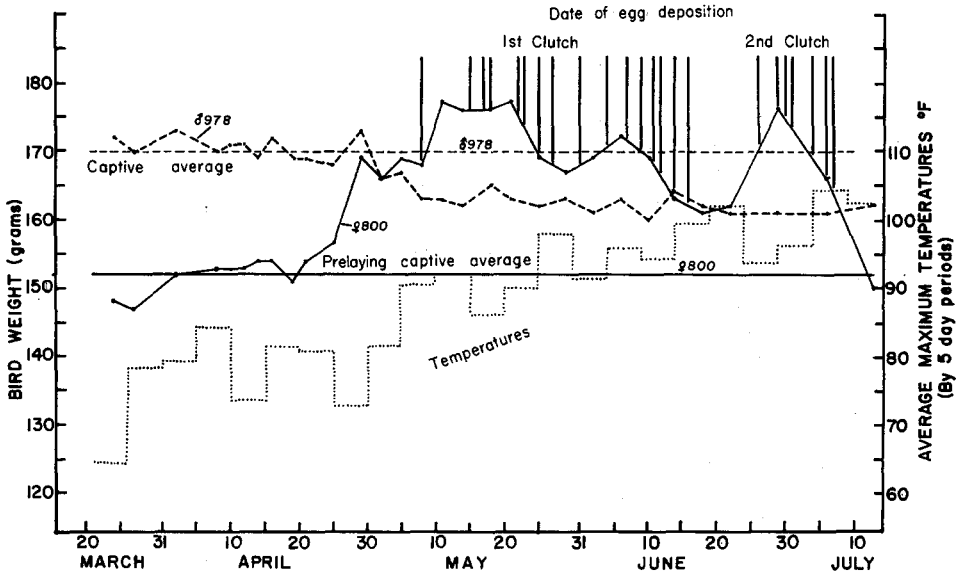


Fig. 1. Weight variations of captive Gambel Quail in the breeding season.

had toward the end of the laying of the first clutch. Again all of the eggs were removed soon after laying, so she still had no clutch to incubate. Following the laying of the seventh egg of the second "clutch" her weight dropped to about her prelaying average. The commencement of experimental work with this pair of quail precluded further observations upon "normal" weight fluctuations. One hundred and ninety-one days later, and after 125 days confinement in a large holding pen with ample food and water, her weight remained at or close to her prelaying average captive weight.

We believe these fluctuations were the result of several physiological changes, including the growth of the ova, the development of the fully formed eggs, and the enlargement of the various other structures and organs associated with egg formation and deposition. Sturkie (*Avian Physiology*, 1954:258), discussing the egg-laying cycle in the domestic chicken, points out that "the weight of the yolk during the 7 days preceding maturity and ovulation increases approximately 16-fold and in a regular and straight line fashion," reaching a weight of about 16 grams prior to ovulation. A Gambel Quail egg weighs from seven to ten grams, which approximates the gain shown in our study during three of the 3- to 4-day periods of rapid weight gain in the initial stages of both laying sequences. As egg laying progressed, the quail's weight decreased, possibly because her supply of enlarging ova became exhausted as she approached the completion of her clutch. Apparently there was little atrophy of the organs accessory to egg laying following the completion of her first clutch, since her weight remained about eight grams above average, and her subsequent regain to peak weight approximates the increasing weight of developing and ripe ova. However, with completion of the second clutch, and still no opportunity to incubate, a rapid atrophy of the accessory organs apparently occurred, followed by a return to normal, prelaying weight within six days.

The weight gain of this captive female equalled in grams, and equalled or exceeded the percentage-wise gains in weight exhibited by wild female Gambel Quail trapped and released in Las Vegas Valley during April, 1952; this is the nesting season in this area. Average weights of 13 wild hens weighed in January and February and again in mid-April showed an increase of 25 grams, or about 15 per cent (from 169 to 194 grams).

The caged female had no green food available from the time of her capture until long after her egg laying had been completed. However, the desert was commencing one of its periodic "green-ups" prior to the time these birds were trapped, and an abundance of green food had been available to this bird for at least two months prior to the date of her capture. We must surmise that the vitamin A deemed necessary for successful reproductive activity had been obtained prior to the 14th of March (cf. Lehmann, *Trans. N. Amer. Wildl. Conf.*, 18, 1953:220-229). Another control bird (♀ 686), wild-trapped in Las Vegas Valley on December 12, 1951, was confined well before the desert greenup had commenced. This latter bird showed no indication of a similar weight variation, remaining within three grams of her average captive weight (151 grams) throughout this entire period, nor did she lay eggs.

The cage mate of female 800, male 978, which may have been her chosen mate in the wild, remained near an average weight of about 170 grams for his first 40 days in captivity (19 grams below his weight at capture). But, coincident with the gain of weight of the hen, he abruptly lost 10 grams in a nine-day period, stabilizing again at a weight which finally averaged about 162 grams (fig. 1). Male 978 remained near this lower average for the next 65 days, this being the period of egg deposition by his mate. He, too, was subjected to experimental water denial at the end of this period, so further weight variations could not be considered "normal." After 191 days in the holding pen he had regained his earlier captive weight (170 grams).

We have no explanation for the decrease in the weight of this male. The fact that his weight remained fairly constant once it reached its lower level makes it seem unlikely that he was excessively harrassed by his mate. The average weights of 13 wild males, weighed in the winter and again in April, showed an average gain of only three grams, or two per cent (from 171 to 174 grams), during this period.

This pattern of gain in weight among female quail during the period of egg deposition seems to be general in this, and other species of quail. Gorsuch (*Univ. Ariz. Biol. Sci. Bull.* 2, 1934:44) shows a gain in the weights of females to levels substantially above males among Gambel Quail in south-eastern Arizona during April. Gorsuch (*op. cit.*:45) also noted a definite increase in the weights of males during this same period, which we did not observe in Nevada. Sumner (*Calif. Fish and Game*,

21, 1935:248) found a similar pattern of seasonal weight variations among California Quail (*Lophortyx californica*) in the central coastal region of California. Stoddard in Georgia (The Bobwhite Quail, 1931:76) and Lehmann in Texas (*op. cit.*, p. 216) indicate that the same seasonal weight variations occur among Bobwhite (*Colinus virginianus*). The weights of female Ruffed Grouse (*Bonasa umbellus*) show a comparable sharp, temporary, increase during the breeding season in New York (Bump, *et al.*, The Ruffed Grouse, 1947:92). Although the male grouse increased in weight during the same period, their increase is shown as being less abrupt and of less magnitude, amounting to only about one per cent as compared to an increase of four per cent for the females.—GORDON W. GULLION and ARDELLE M. GULLION, *Cloquet, Minnesota, June 27, 1960.*

Savannah Sparrow Breeding at Big Bear Lake in the San Bernardino Mountains of California.—On June 28, 1959, while observing birds in the grass-sedge habitat found along the northeast shore of Big Bear Lake in the San Bernardino Mountains, San Bernardino County, California, I discovered a pair of Savannah Sparrows (*Passerculus sandwichensis*) carrying nesting material. Upon returning to the same area on July 13, 1959, the birds could not be found, but while examining the large grass-sedge pasture at the east end of the lake, several pairs and one nest with fledged young were detected. One adult bird was collected and proved to be a female in breeding condition. This specimen was examined by Alden H. Miller and found to be of the race *nevadensis*. While visiting the Big Bear area again this year on June 5, 1960, many pairs were observed in several pastureland localities around the lake and they apparently were breeding. This locality is about 100 miles southeast of the nearest previously known breeding colony in the upper Kern Basin, Kern County, California, as reported by Grinnell and Miller (*Pac. Coast Avif.* No. 27, 1947:484). Possibly the Savannah Sparrow has recently begun to breed in this area because of the greatly increased suitable habitat now available due to the falling level of the lake in the past twelve years.—EUGENE A. CARDIFF, *San Bernardino County Museum, Bloomington, California, September 6, 1960.*

Inland Occurrences of the Red Phalarope in Oregon.—On November 21, 1959, Gene O'Brien reported the presence of a shorebird in his yard in Oak Grove, Oregon, a town in Clackamas County 7 miles south of Portland. Later that day I went to see the bird, which proved to be a Red Phalarope (*Phalaropus fulicarius*). Since that time I have learned of five other records of this species in the Willamette Valley made within a week of the time of my observation. On November 20, two were found dead beside the highway 2 miles southwest of Forest Grove in Washington County. They came into the possession of John Bodley and LeRoy Fish and were prepared as study skins by Fish, who now has them in his collection. On November 21, Bodley and Fish saw and photographed 23 Red Phalaropes at Wapato Lake, 3 miles south of Gaston in Washington County. Another observation on November 21 was Donald Randol's sighting of 15 or 20 phalaropes at Spookum Lake, in Marion County, 2 miles south of Newberg. Of two birds found dead there, one is now in the collection at the Oregon State College Museum of Natural History. On November 22, Asa Thoresen spotted two individuals about 2 miles south of Philomath, in Benton County. On November 26, David B. Marshall observed and took color photographs of seven birds at Westmoreland Park in Portland.

Two storms were recorded in western Oregon at the time of these observations. The first struck the coast on November 15, bringing large numbers of phalaropes ashore along at least 75 miles of the coastline. At Nestucca Bay in Tillamook County, Tom McAllister saw phalaropes on November 16, and at Willapa Bay in Pacific County, Washington, Robert C. Twist, manager of the Willapa National Wildlife Refuge, noted several hundred blown ashore "during the week of November 15 to 21" (personal communication). A number of observations of the Red Phalarope were made between these locations. On November 20 the second storm arose. "Winds in excess of 100 m.p.h. were unofficially recorded by the Coast Guard along the Pacific Coast and by Air Force radar stations atop mountain peaks. Inland valley Weather Bureau and FAA stations recorded gusts in excess of 70 m.p.h. at several points" (U.S. Weather Bureau, Oregon Climatological Data, LXV, 1959:184). The wind direction was generally west to southwest. The appearance of the Red Phalaropes in the Willamette Valley was evidently a result of the second of these storms.

Although it is not unusual for the Red Phalarope to visit the coast of Oregon in large numbers in October and November, it is only a "casual straggler inland," according to Gabrielson and Jewett