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BANDING CANADA GEESE IN CALIFORNIA IN 1931

WITH FOUR ILLUSTRATIONS

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(Contribution from the Division of Fish and Game of California)

Field work conducted by the writer in northeastern California in April, 1931, in the interests of the State of California Division of Fish and Game, indicated that there were large numbers of Canada Geese (*Branta canadensis canadensis*) nesting in this region. Estimates of the total number of birds breeding within the state in 1931 ran between 1250 and 2500 pairs. The breeding grounds are roughly bounded by Lake Tahoe on the south, Lake Almanor, Burney and Macdoel on the west, and the Oregon and Nevada boundaries on the north and east. It is believed that most, if not all, of the California breeding Canada Geese also winter in this state. Individuals of the species are present in this region throughout the year. Opinion among residents of the goose breeding grounds varies as to whether some nesting birds spend the entire year in this vicinity or whether they all migrate in winter, their places then being taken by birds which breed farther north.

It seems probable that all the breeding birds migrate to other points in winter, for it is said that winter specimens are larger than breeding ones. The Sacramento and northern San Joaquin valleys are the wintering grounds of large numbers of Canada Geese and it is reasonable to expect that a number of these birds are bred in the region under consideration. Desiring to secure more definite information on this subject, the Division of Fish and Game in cooperation with the United States Biological Survey arranged to band some of these birds on their California breeding grounds in 1931.

I was delegated to conduct the banding operations with the assistance of Mr. Gordon H. True, Jr., also of the Division of Fish and Game. Honey Lake valley, in Lassen County, was selected as the point of operations both because geese were nesting there abundantly and because local conditions appeared best for capturing them. It was desired to band 100 birds if possible. The most difficult problem was to decide when to commence the work, since it seemed best to band both adults and juveniles, and the former had to be caught when rendered flightless by molt of the flight feathers and the latter before full development of their wings. No

data concerning the period during which the adults become flightless could be obtained from literature or game breeders; but residents of the vicinity thought this occurred in late June or early July. Field work in this region in April indicated that most of the young geese hatched between April 19 and 25 this year; therefore June 21 was decided upon as the day to start banding, when the young would be approximately two months old.

Mr. True and I arrived at Honey Lake valley the evening of June 20, making headquarters at the R. D. Murphy ranch, 8 miles west of Wendel, Lassen County. Here Messrs. Murphy and A. L. Brown were of the greatest possible assistance to our work, and it is a pleasure to acknowledge their kindness.

The original plan was to capture the birds in a net along an irrigation ditch where geese had been plentiful in late April. For this purpose, a fish net 100 feet long by 6 feet deep with 3½ inch mesh was procured. The ditch was 12 feet wide and the net was to be set in a V, the point in mid-stream and the sides angling well back beyond either bank. The birds were to be slowly driven down stream into this wedge. Few tules bordered the ditch to afford hiding places for the birds and it was reasoned they would swim down into the net if not too closely pressed. We were unable to carry out this plan, as we found the ditch was entirely dry, June 21. It is mentioned as a probably effective means of securing the birds under more favorable conditions, for residents state geese frequent such ditches and may be driven in the manner described. If pressed too hard, the birds will break and run from the ditches.

June 21 was spent in searching for geese with Messrs. Brown and Murphy. It is singular that an all-day hunt failed to reveal a goose though these men were familiar with their habits and the country. This is mentioned to show how effectively the birds can hide at this season. Two months earlier, when the young were hatching, geese were observed on every watered field, and numbers were calling and flying about. During our six day stay in Honey Lake valley in June, no goose was heard calling and none was seen flying except when driven to do so by us.

June 22, True and I searched several miles of tule and meadow land for geese without avail. We did succeed in locating where a number of geese were undoubtedly hidden on a reservoir of some few acres extent on the Fleming ranch north of Wendel; but this pond was so overgrown with willows, in which the geese were doubtless hidden, that it would have been impossible to catch them there. Fresh sign, tracks and molted wing quills alone disclosed their presence. Finally at dusk, at the end of two days' search, we were rewarded by finding a gathering of approximately 150 birds on a slough on the Tanner ranch, seven miles southwest of Wendel.

This slough is formed by a dam across its south end, at the old shore line of Honey Lake. It averages fifteen feet in width for a distance of half a mile north. Its depth varied from three to six feet and the bottom supported a dense growth of Water Buttercup (*Ranunculus aquatilis*). The banks were lined with a heavy growth of tule (*Scirpus acutus*) which extended some ten to fifteen feet back from the water, on the other sides of which lay meadows of wild hay. Here and there along its course, narrow tule-bordered sloughs branched off to terminate within 100 yards in the meadows. The water was unusually low, on account of the dry season, and but a trickle was flowing over the dam to disappear in the dry bed of Honey Lake within a few feet.

The geese were found resting on a pond some 30 by 150 feet in extent formed by a widening of the slough immediately above the dam. Haying was in progress in the field to the east of the slough and the grass had been cut. Sign indicated

that geese had been numerous there prior to mowing, but they had moved to the meadow west of the slough, which was still uncut, when disturbed by this operation. They were apparently feeding in this meadow along the slough bank and had knocked down several acres of meadow grass so that it could not be cut. This seems to be the extent of damage wrought by geese in the meadow land, and most farmers overlook it and provide the birds every protection. The dry bed of Honey Lake stretched out to the southward of these fields.

We returned to this locality early on June 23, bringing a light boat and the net. When we appeared, the geese were in the uncut meadow west of the slough. We planned to launch the boat, place the net and drive the birds back to the slough, then down it into the net. As soon as the boat was put in the water, some fifty-odd geese flew; but the majority ran away from the water farther out into the high meadow grass. About forty birds ran south, straight out onto the bare, open bed of Honey Lake. We took after them on foot at top speed; but after a chase of nearly a mile succeeded in capturing only three birds. We did not wish to band and liberate the birds there, almost a mile from water, as they were very hot and winded after the chase, so carried them back to water in a barley sack, slit full of holes. In spite of this precaution, one bird was dead when the slough was reached. The remaining birds, both juveniles, were banded, numbers A 714001-2, and released near the slough. Obviously this method of capture was too severe on both birds and banders so we decided to try the net.

Paddling up the slough in our boat, we observed about twenty-five birds in the meadow near the west bank. There was a break in the tules some twenty feet wide a quarter of a mile up-stream where many tracks indicated that the geese traveled back and forth from slough to meadow. The net was loosely stretched across this opening, the bottom pegged down and the top supported by quarter-inch rope stretched between stakes. We then attempted to drive the birds into the net. Twelve of them flew, ten or more ran farther west to hide in the tall grass, and the remaining few ran into the tules bordering the slough, to hide there at scattered points. The experiment was a complete failure and it was judged impossible to drive the birds where tule or heavy grass offered places of concealment.

We next attempted to catch some of the birds hiding along the slough. After considerable beating of the tules, we flushed three birds into the water and one of them was caught from the boat after a chase lasting more than ten minutes. The bird, a juvenile nearly capable of flight, dove and swam under water, even through thick growths of water buttercup, at a surprising speed. It might have been captured more easily with a large, long-handled dip net; but this method is at best a difficult one.

The bird was banded, number A 714003, and liberated, so that it ran into the net, to see what would result. The goose struck the net at a fast run, the loosely hung webbing gave with the bird and when it sprang back the goose was caught in the meshes by the neck, one wing and both legs. It was liberated at once, and previous ideas of leaving the net in position until geese worked into it of their own accord were abandoned, for it was evident that many casualties would result.

It was then mid-day, so we drove home along a road bordering the west meadow on the south. Here four geese were overtaken in the road when they raced down its center ahead of the car. We pursued them until they left the road after a quarter-mile run, when we sprang out and caught two easily. These were banded, numbers A 714004-5, and liberated there. The ease with which the birds were

caught after a short run with the car suggested this as a likely way to secure those that ran out on the dry lake bed.

On our way to the Tanner slough, at 4:00 p. m., we surprised a band of twenty or more geese in the meadow immediately north of the point where the last two birds were banded. The geese started running north across the open meadow, and since they had but 100 yards start on us we pursued them on foot. Every now and then a goose would hide, so that after a half-mile run there were but twelve individuals ahead of us. (Experience had taught us it was useless to attempt to find a bird once it hid in the grass, even though well marked down.) After this run we were no closer to the birds; but they commenced to tire shortly and scattered in various directions. Four were caught after much running, two of which proved to be numbers A 714001-2, the first birds banded that morning a mile east of the point where the present chase started. The others, both juveniles, were banded, numbers A 714006-7.

Continuing on to the Tanner slough, we drove some 30 to 35 birds out onto the dry lake bed. This was in no way difficult, for as soon as we approached the slough the birds left it, some to seek refuge in the meadow grass, others on the lake bed. We were perplexed as to why the birds ran to the lake bed, which was absolutely flat and supported no vegetation large enough to hide a goose. It seemed the most dangerous spot in the vicinity for the birds, with no water or cover available, where they would be ideal prey for coyotes. The only explanation that occurs to me is that the old birds formerly found safety there when the lake contained water (8 years ago I am told) and now instinctively ran in its direction when alarmed.

We had to drive our car two miles east to a gate to reach the lake bottom and when we returned the geese were a mile and a half from the dam. They were still traveling south toward the center of the lake. The birds were grouped in bands of approximately 8, 10 and 15 individuals. We approached the smallest group first and upon pressing them with the car, they scattered out in all directions, one bird to fly off. We singled one goose out and chased it, one man driving, the other standing on the running board. The bird at first ran with outspread wings at a speed of 18 to 20 miles per hour. After a short run, it quickly tired, which fact could be recognized by a side to side, wobbling or staggering gait, when the man on the running board jumped off and caught it within a 100-yard run. When finally approached to within about 20 feet, on foot, the birds often dropped quickly to earth, wings tightly folded and neck extended along the ground. Many times this ruse resulted in their being over-run, in which case they quickly doubled back on their tracks and another chase resulted.

In this manner, scattering the flocks, picking out one bird and running it down, fourteen individuals, including three adults rendered incapable of flight by molt, were caught the afternoon of June 23. The rest of the birds that ran out onto the lake bed were able to fly. As quickly as a bird was captured, its legs were "hog-tied" with a short piece of soft jute rope and it was placed in the rear of the car. The entire lot was then taken back to the slough where individuals were banded and liberated on the water. Eleven juveniles were banded, numbers A 714008-9, A 714013-21, and three adults, numbers A 714010-2.

The morning of June 24 found us at the slough at an early hour, when we succeeded in running nearly fifty birds out onto the lake bed. They were pursued by automobile and foot and all the flightless birds, 27 in number, were captured. The remaining 20-odd flew off on close approach. We had feared for many repeats of the previous evening's banding, but did not secure any. However,

the two birds that were banded the previous afternoon in the west meadow were taken, numbers A 714006-7. Unfortunately, the latter was inadvertently run over by the car as it dodged back while being caught and its foot so broken it had to be destroyed. Another bird loosened its ties and escaped while banding was in process at the slough, so the net number banded this day was 24. Seventeen juveniles were banded, numbers A 714022-4, A 714032-45, and 7 adults, numbers A 14025-31. We decided to let these geese alone for the rest of the day, and we left the slough at 11:00 a. m. after banding and photographing the birds.

Returning the next morning, no goose could be found in the vicinity of the slough or meadow west of it. Another visit the following morning provided equal results. The birds had simply left the country. We reasoned that the geese had traveled up the slough and waterways above it, and though we followed these for two miles, we failed to find a bird. No doubt this was their direction of travel; but our disturbance had evidently been so severe that they went a long distance.

Fig. 54. CANADA GEESE IN REAR COMPARTMENT OF AUTOMOBILE BEFORE BANDING AND LIBERATION IN HONEY LAKE VALLEY, LASSEN COUNTY, CALIFORNIA; JUNE 24, 1931. NOTE ADULTS IN FOREGROUND AND CENTER BACKGROUND. JUVENILE BIRDS MAY BE DISTINGUISHED BY SHORTER BILLS AND DOWN ON HEAD AND NECK.

In this connection it is interesting to note that no repeat was taken closer than a mile from the original point of capture. It appears that banding (or chasing) greatly frightens the birds and they immediately seek other grounds, not to return to the place of capture for some time at least.

The afternoon of June 24, June 25, and the morning of June 26 were spent in searching Honey Lake valley for more geese. Though many miles of meadow and tule land were visited, the only birds seen were 12 individuals noted on Ward Lake, a considerable body of water where they could not be captured. The work terminated at mid-day of June 26.

I estimated from my field work in Honey Lake valley, April 19-21, 1931, that no less than 400 pairs of Canada geese were nesting in the region. This is a conservative figure. Assuming that each pair of adults raise an average of four young

to the flying age, the total progeny at the time of banding would be 1600. In addition to the nesting birds, many non-breeding individuals were present. These probably sub-adult birds were thought to equal or even exceed the number of nesting geese; but on account of the difficulty in distinguishing the two, their number was conservatively placed at 600 individuals. The total number of Canada geese present in Honey Lake valley at the time of banding could have been no less than 3000 birds. The fact that we saw less than 200 individuals in five and one-half days of field work in June, covering most of the valley, indicates the ability of the birds to hide at this season. In view of conditions as we found them, we felt we were fortunate in banding 45 birds in place of the hundred or more we had anticipated banding.

It has been stated that a number of birds from each large flock flew upon close approach. It was apparent in such cases that the birds flew unwillingly and should have preferred to remain with the flightless individuals. Such flights were

Fig. 55. ADULT MALE CANADA GOOSE BANDED, NO. A 714025, AT HONEY LAKE VALLEY, CALIFORNIA, JUNE 24, 1931. NOTE EXTENSIVE MOLT OF WING FEATHERS IN PROGRESS.

of short distance and upon alighting the birds were sometimes joined by the flightless ones which walked up to them. This indicates the gregarious nature of the birds at this season. It has also been stated that a number of the geese that ran as far as two miles out onto the lake bed were later found to be capable of flight. These birds usually stayed in a separate band from the flightless ones and took to wing on close approach. In cases where one or two geese flew from a small gathering it was apparent the fliers were adult and the flightless ones juveniles. In an instance already alluded to, a single adult flew from a group of eight birds, leaving an adult and seven young which were captured. This was apparently an unusually large family and indicates that both adults do not necessarily become flightless at the same time. Another group of two adults, obviously male and female, and four young, captured June 24, indicated that both old birds may become flightless at once. Of the birds that flew when first approached, most appeared to be adult

(that is birds over a year old); but some juvenile young of the year were definitely observed in these flocks. A few of the juveniles caught on the lake bed could actually fly a short distance. These birds ran and flapped along upon first approach until their wings raised them two or three feet off the ground. They maintained flight at this level for about 100 yards, when they evidently tired, dropped down to running and were unable to rise again. After such exertions they were readily caught.

A total of 10 adult and 35 juvenile geese was banded. This proportion indicates a ratio of one pair of adults to seven young, and confirms our observations that both parents were not always flightless as the young approached the flying stage.

There was considerable variation in the development of the new flight feathers in the adults handled. Figures 55 and 56 depict an adult (banded no. A 714025) which showed the least development of new flight feathers of any caught. Figure

Fig. 56. ANOTHER VIEW OF SAME BIRD SHOWN IN FIG. 55. NOTE THAT THE NEW PRIMARY AND SECONDARY FLIGHT FEATHERS GROWING IN ARE ALL OF ABOUT EQUAL LENGTH, HENCE ARE EVIDENTLY ALL MOLTED AT ONE TIME.

56 shows that the primaries, secondaries and primary coverts were apparently molted at the same time, as the new feathers are all of equal length. Also note that the greater and median coverts have not yet been shed. Figure 55 shows that the lesser coverts are commencing to molt. The scapulars, axillars and underwing coverts have not yet molted, nor have the rectrices or any of the head, neck or body feathers. Six other adults were captured whose new flight feathers were but slightly more advanced than in the specimen photographed. Two adults had the new flight feathers about equally developed and half grown as indicated by one of them (no. A 714026) figured with no. A 714025 in figure 57. One of the adults captured June 23 was even farther advanced and could fly a few feet with its new quills.

Most of the juveniles banded were of the same size. Their wings were developed about as in the adult on the left in figure 57. A few young birds, the ones that could fly a short distance, were still farther advanced, so it was judged that most of them would be a-wing in a few days. In this respect it seems desirable to band these birds when they are as near flight as possible, for when once a-wing

there is little chance of loss from natural enemies. Three juveniles that were banded were considerably smaller than the rest and their primary and secondary flight quills were just commencing to sprout. One of these birds is shown, the second from the left, in the foreground of figure 54. This specimen is representative of the smallest birds banded. The two casualties that resulted from the banding were preserved as specimens. These birds are considered average for the majority of juveniles banded. Their measurements follow:

	Date	Sex	Length	Wing	Weight
No. 1332 (Died in sack)	June 23, 1931	♂	815 mm.	363 mm.	5 lbs., 10 oz.
No. 1333 Banded No. A 714007	June 24, 1931	♂	820 mm.	334 mm.	5 lbs., 11 oz.

Note that while the measurements and weights are close, the smaller bird had farther advanced wings. The condition of these birds was fair, some fat appear-

Fig. 57. ADULT CANADA GEESE PHOTOGRAPHED SEVEN MILES SOUTHWEST OF WENDEL, LASSEN COUNTY, CALIFORNIA, JUNE 24, 1931. THE BIRD AT THE LEFT (BANDED NO. A 714026) HAS MOLTED ITS FLIGHT FEATHERS AND THEIR COVERTS AND THE NEW ONES ARE WELL GROWN. BIRD AT RIGHT ALSO PICTURED IN FIGS. 55 AND 56.

ing on their breasts and flanks. The pectoral muscles were soft and poorly developed. The feet and leg muscles were well developed, about as in an adult bird.

Two of the adults captured, on account of their large size, were certainly ganders, and at least four were unquestionably females. The sex of the remaining four old birds could not be determined. All the old geese were quite thin; but the females were in exceptionally poor flesh, being much thinner than the males. It is unfortunate that we had no scales available on which to weigh the old birds, but I judged some of the females weighed less than eight pounds.

Some conclusions were formed as a result of the work, that will be enumerated briefly for the benefit of those who may attempt further banding of Canada geese in California.

1. The young birds appear to fly from 7 to 8 weeks after hatching.
2. Most adults become flightless just before the young fly.
3. It is impossible to run down and catch any quantity of birds on foot.
4. It is useless to attempt to catch the birds in heavy grass or tules.
5. It is difficult to capture the birds from a boat, unless the water be so shallow as to interfere with their diving. In any case, a dip net should be used.
6. A set net is an effective means of catching geese if they can be driven into it. However, it should be attended constantly or the birds will seriously injure themselves in their struggles for freedom.
7. Trapping is judged a poor method, for only a few birds can be expected at a station, as they appear quickly to leave a locality where disturbed to any extent.
8. Driving the birds into open country and running them down with horse or automobile, then on foot, is considered the most effective means of catching large individuals.
9. Birds over three weeks of age have sufficiently large feet and legs to be banded with safety. However, their chances of survival are less than in larger individuals.

The following table provides a list of the geese banded with annotations concerning their size and development:

BANDED JUNE 23, 1931:

Band Number	Sex	Age	Development
A 714001-9	?	Juv.	Wing feathers nearly grown.
714010	♀	Ad.	New wing feathers about 3 inches long.
714011	♂	Ad.	New wing feathers half grown.
714012	♀	Ad.	New wing feathers two-thirds grown.
714013-8	?	Juv.	Wing feathers nearly grown.
714019	?	Juv.	Bird half grown, flight feathers just appearing.
714020-1	?	Juv.	Wing feathers nearly grown.

BANDED JUNE 24, 1931:

A 714022-4	?	Juv.	Wing feathers nearly grown.
714025	♂	Ad.	New wing feathers half grown.
714026	♀	Ad.	New wing feathers about 2 inches long (see photo).
714027-30	?	Ads.	New wing feathers averaging 3 inches in length.
714031	♀	Ad.	New wing feathers 3 inches long.
714032-41	?	Juv.	Wing feathers nearly grown.
714042-3	?	Juv.	Birds half grown, flight feathers just appearing.
714044-5	?	Juv.	Wing feathers nearly grown.

510 Russ Building, San Francisco, California, July 27, 1931.

Addenda. Subsequent to writing the above article it developed that a number of Canada Geese died near where the banded birds were liberated on June 23 and 24. This fact was first established, July 30, 1931, when Deputy Game Warden C. O. Fisher of Susanville sent in bands numbers A 714013 and A 714037 from birds that had perished.

I visited the region, October 9, and made a search of the locality, finding that much mutilated carcasses of twelve geese. Two of these bore bands numbers A 714030 and A 714040, two were the carcasses from which Fisher sent in the bands, one was an unbanded bird, and the rest were so mutilated that one or both feet and legs were missing and it could not be established whether or not the birds had borne bands.

The cause of the birds' deaths is unknown; but it may be attributed to releasing them in water too soon after catching. In any event it provided a severe disappointment and is mentioned to deter others from handling the birds similarly until further investigation reveals the cause of their mortality.—JAMES MOFFITT, *October 24, 1931.*