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## RAPTORIAL BIRDS IN THE CLIFF AREAS OF LAVA BEDS NATIONAL MONUMENT, CALIFORNIA

WITH THREE ILLUSTRATIONS

By JOSEPH S. DIXON and RICHARD M. BOND

Tule Lake, a shallow body of water which at one time covered about 100 square miles, is located in northeastern California a short distance south of the Oregon line. Most of this lake has been drained, and the bottom has been given over to agriculture. However, a small central flooded area remains as a migratory wildfowl refuge administered by the Biological Survey.

Touching on the old south shore line of the lake, but several miles distant from the present body of water, the Lava Beds National Monument is a rugged area of recent lava flows and cinder cones, with a sparse cover of sagebrush, scattered ponderosa pines, and other Great Basin plants characteristic of the dry Transition and Upper Sonoran zones. Two miles northeast of the National Monument, and well out in the level lake bed where it was formerly almost surrounded by water, lies an area of highland, perhaps two miles long and from a hundred yards to three-fourths of a mile wide. This highland is bounded for much of its circumference by rocky cliffs, from 20 to more than 300 feet high, with faces seamed and pitted by innumerable potholes, cracks, ledges and crannies (see fig. 27).

On the smoother walls of the cliffs there is a series of petroglyphs, a number of which are preserved in an isolated tract which forms part of the National Monument. This highland is hereafter referred to as the "Petroglyph Cliff area."

The whole region about Tule Lake is abundantly supplied with birds of prey. Nesting birds of the main body of the Lava Beds National Monument include a dozen or more pairs of Sparrow Hawks (*Falco sparverius*), about eight pairs of Red-tailed Hawks (*Buteo borealis*), two pairs of Prairie Falcons (*Falco mexicanus*), a pair of Bald Eagles (*Haliaeetus leucocephalus*), and a good many pairs of Horned Owls (*Bubo virginianus*) and Barn Owls (*Tyto alba*).

But it is on and about the highland or Petroglyph Cliff area in the lake bed (a part of which is under the jurisdiction of the National Park Service) that birds of prey exist in numbers such as we have never encountered elsewhere. We believe that this extraordinary concentration of raptorial birds primarily results from the abundance of suitable nesting sites and the abundance of rodent prey. The numerous potholes in these cliffs (see fig. 28) offer cool, shaded, and protected nesting sites in an arid, barren region with high summer temperatures. Recent farming activities, with resultant crops of grain and alfalfa, have greatly increased the food supply of meadow mice and other small rodents in this area, thereby further augmenting their natural abundance. The lack of brush or other dense cover, which would conceal the rodents, is no doubt an advantage to hawks and owls and increases the chances for "good hunting." Air conditions suitable for relatively effortless flight are also believed to be a favorable factor for the birds.

Our investigations indicate that the ranges of at least some of the birds extend over about 100 square miles, but that the foraging is mainly confined to an area covering about 15 or 20 square miles. The total length of the cliffs where the birds nest and where our census of nesting birds was taken, according to Geological Survey maps and other maps, is somewhat over three miles, and the average height of these

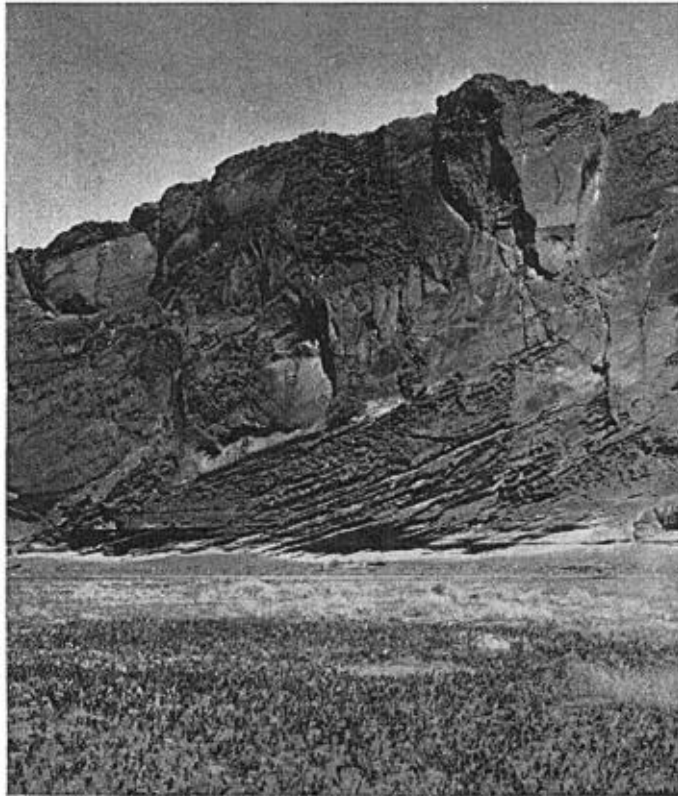


Fig. 27. A section of the 300-foot Petroglyph Cliff showing old shore line at base, and pitted surface. In the small section shown in this photograph there were nesting, in May, 1936: 1 pair Rock Wrens; about 10 pairs of House Finches; about 60 pairs of Cliff Swallows; 1 pair Duck Hawks; 1 pair Prairie Falcons; 2 pairs Horned Owls; and 6 or 7 pairs of Barn Owls.

cliffs is over 100 feet. This rough estimate indicates that the total area of the cliff faces is slightly over one and a half million square feet. Separately or together, we have visited this area in December, 1935, April, May, June, and September, 1936; we have spent a total of 10 days and 2 nights in the region.

We shall discuss the raptorial birds in ascending order of abundance rather than in taxonomic succession. We saw birds or conservatively estimated the numbers as follows:

A pair of Duck Hawks (*Falco peregrinus*) was present in April, and incubating began early in May, but the birds either had been shot or driven away by visitors in June. A female Sparrow Hawk was on one of the cliffs in May, and a noisy pair

was present in late June. They were probably nesting, though the nest was not located. Apparently one or more pairs of Burrowing Owls (*Speotyto cunicularia*) were residents on the west side of the highland, where, for a short distance, there are no cliffs. One bird was seen there in May, and two late in June. Four Prairie Falcon nests were located, and two other localized pairs were seen. Four occupied nests of the Red-tailed Hawk were located, and at least one other nest apparently was present. Four Horned Owl nests were found, but several more probably were present. An adult female, collected May 9, was molting heavily. The stomach contained remains of kangaroo rat, meadow mouse, and cottontail rabbit.

Short-eared Owls (*Asio flammeus*) do not form a part of the true cliff population, but they were more abundant about the cliff area than in other parts of the lake bed. Possibly the air currents about the highland make it attractive. One nest was found by chance near the cliffs on May 9, with 4 nearly half-grown young (see fig. 29) and an addled egg. A dozen or more of these owls were usually seen flying or perched on the ground or on fence posts within half a mile of the north end of the cliffs in May, and another concentration was present about the same distance from the northwest part, where a nest was found. A third aggregation was found west of the south end of the cliffs, and there were scattered individuals elsewhere in the neighborhood. On the morning of May 9, 1936, Dixon counted, in a single hour, twelve Short-eared Owls that came to drink at a drainage ditch a short distance north of the petroglyph region. On this flat open farming land, scores of Short-eared Owls were seen, between 8 and 10 o'clock in the morning, hunting for meadow mice which were unusually abundant, especially in and about the alfalfa fields.

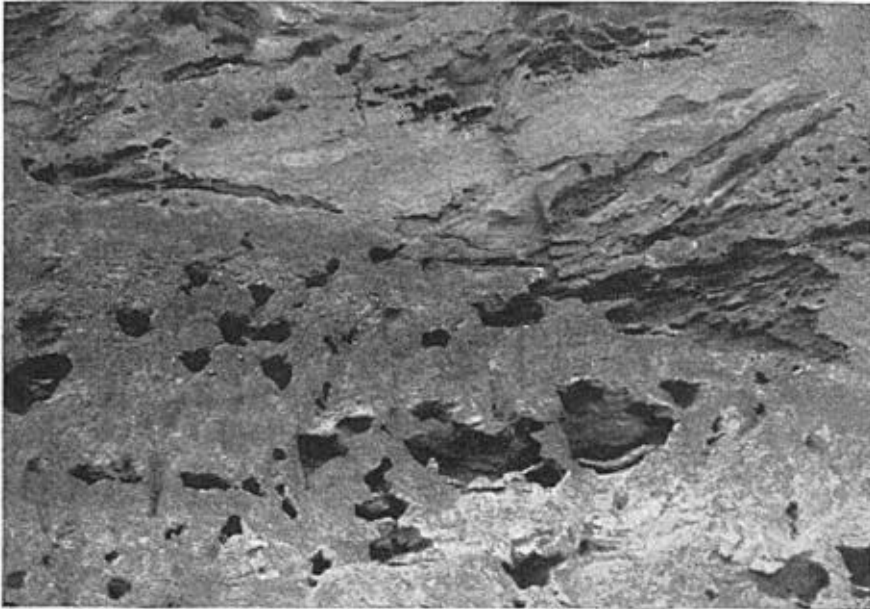


Fig. 28. Detailed photograph of Petroglyph Cliff showing young Horned Owl perched at entrance to nest (lower center). The numerous potholes here shown afford abundant cool, shaded and protected nest sites in an arid, hot, barren, flat region. Hundreds of birds ranging in size from House Finch to Western Red-tailed Hawk nested here in close proximity.

The most abundant nesting bird about the cliffs was the Cliff Swallow (*Petrochelidon albifrons*); possibly second place went to the Brewer Blackbird (*Euphagus cyanocephalus*), but more probably to the Barn Owl. We believe it quite safe to estimate that there were at least 300 Barn Owls on the three miles of cliffs in May, including a fair number of grown young of the year, but omitting nestlings that were unable to fly. Our estimate is based on a census of the owls inhabiting the cracks and potholes of the cliffs. The Barn Owls were not all counted individually, but the count was by "owl holes," that is, by counting each pothole or crack in the cliffs in which one or more owls were visible. A total of 49 owl holes or nesting sites was counted. A count of individual Barn Owls in 9 owl holes totaled 22, or an average of 2.4 per hole, which is considered to be a conservative average for all owl holes. This figure means that the 49 counted owl holes contained about 117 visible owls. Since many of the smaller cliffs were not searched for owls at all, since a great many potholes too deep to see into, showed evidence of use by Barn Owls, and since many of the owl holes or nests were found to harbor more owls than those visible at the entrances, we concluded that it was conservative to place the total barn owl population of the combined cliff areas at 300. Our night observations showed that this estimate was conservative. No careful count or estimate was made in December, but Barn Owls were certainly abundant then. From those seen, and from pellets and dead mice found along the cliff bases, we estimated that at least 100 were present in December.

Other birds of prey seen occasionally at various seasons over or on the cliffs but not found nesting included Turkey Vultures (*Cathartes aura*), absent in winter, Ferruginous Rough-legs (*Buteo regalis*), American Rough-legs (*Buteo lagopus*), and Marsh Hawks (*Circus hudsonius*).

Some interesting notes were made on the inter-relationships of raptorial birds. Despite the concentration of these birds, they appeared to exist with surprisingly little friction. A pair of Prairie Falcons nested slightly over 100 yards from the Duck Hawks' nest, but the two species appeared to be on the best of terms. The various pairs of Red-tails (nesting at a greater distance from the falcons) were never seen to engage in any sort of combat with their neighbors, even the owls. The Duck Hawks became irritable when disturbed, and they vented most of their temper on the Horned Owls nesting almost directly below them, striking at them and trying to dislodge them from the cliffs, though rarely making contact. The owls snapped their beaks and hooted in return, but they stayed where they were. One of the owls was induced to fly by the sound of a gunshot. It was struck by a Duck Hawk before it could reach shelter, but it did not seem to be much damaged. Barn Owls that decided to change their roosts by day were struck at occasionally by the Prairie Falcons, and two were hit though not hurt. One dead Barn Owl was found in June, however, that had been killed apparently by a Prairie Falcon or Duck Hawk. A Prairie Falcon struck at a flying Horned Owl without actually hitting it.

In April, May, and June, below the nest of the Duck Hawk, remains were found of a Mallard, a Ring-necked Pheasant, one Rock Wren, one Mountain Bluebird, one Western Meadowlark, and at least two Brewer Blackbirds. Various Prairie Falcons were believed responsible for remains of a Red-shafted Flicker, Horned Lark, Mountain Bluebird, Western Meadowlark, Brewer Blackbird, and a considerable number of Oregon ground squirrels. A male Prairie Falcon was seen to capture a mouse (probably *Microtus*) and return with it to its nest. The discrepancy between the magnificent stoop of the falcon and the small and ignoble prey seemed ridiculous.

Because of the inaccessibility of Red-tailed Hawk nests on the cliffs, few data

were obtained on the food of this species, though one nest contained part of a black-tailed jack rabbit. Another nest investigated on the lava beds contained, at different times, meadow mice, a kangaroo rat, and a Washington cottontail. The food of the Barn Owls, however, was abundantly evident. The meadow mouse (*Microtus montanus*) must represent well over 90 per cent of it. It is possible, on the strip of ground along the bases of the cliffs, of which perhaps an acre may be said to be practically paved with rodent bones, to find the remains of a good many northern California kangaroo rats, and occasionally white-footed mice, wood rats, pocket gophers (*Thomomys*), jack rabbits and cottontail rabbits. Lower jaws of meadow mice could have been collected by the wheelbarrow load.



Fig. 29. Four young Short-eared Owls in their nest on open ground below the high cliff of the so-called "peninsula" area.

In former times the waters of Tule Lake lapped the base of Petroglyph Cliff, but now, owing to diversion of the water for irrigation, the cliffs are separated from the present lake by several miles of alfalfa and grain fields. These fields afford ample food for meadow mice which in May, 1936, were exceedingly abundant there, and which could be seen running about, hunting for food at all hours of the day.

On the level ground, 30 feet below a Barn Owl nest at the Petroglyph Cliff, Dixon found evidence of the extensive destruction of meadow mice by these owls. In an area 6 by 35 feet, were found the following recently killed but whole rodents: 42 meadow mice, 8 white-footed mice, 1 house mouse and 1 kangaroo rat. These 52 rodents represented merely some discards that accidentally dropped from the owl's nest. It has been our experience that under such circumstances, where mice are abundant, an owl makes no effort to retrieve a mouse once dropped from the nest; the bird prefers to leave it and fly forth in search of another victim. From an examination that we made of a large number of recent pellets under one Barn Owl nest, we concluded that the 52 dead discarded mice that we counted below this Barn Owl nest represented only about one-sixth of all the mice caught by that one pair of Barn Owls in a two-weeks period. As evidence supporting this statement, Dixon counted incisor teeth of 243 meadow mice in fresh pellets collected under another Barn Owl nest. It is obvious that the hawks and owls in the Petroglyph Cliff area kill hundreds of thousands of mice each year.

While there are many other factors to be considered, we wish to point out that present conditions in the farm lands of the Tule Lake Basin seem unusually favorable for a mouse plague such as occurred at Buena Vista Lake in California and in the Carson Valley, Nevada. The helpful part that beneficial species like the Barn Owl play in rodent destruction in such instances should be realized by hunters, farmers and all other residents of the area involved.

Even in a region so thinly populated by people as this, the birds of prey could hardly exist in great numbers unless they were viewed with a degree of tolerance; however, there is still a good deal of room for improvement. On various visits to the area we found a number of dead hawks and owls which, judging from shot or bullet holes, were killed by firearms in the hands of hunters.

In order to secure more adequate protection for the many beneficial birds that nest there, and to protect better the important rock carvings from recurrent vandalism, it is desirable that some cliff areas which now lie largely outside the Monument, receive monument status. These areas have outstanding wildlife values which should be more adequately safeguarded and protected.

*Wildlife Division, National Park Service, October 6, 1936.*

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## COMMUNAL THOUGHT VERSUS INSTINCT

By ROBERT S. WOODS

Modern science rightly insists that when we encounter phenomena the causes of which cannot clearly be traced, we must, before definitely attributing them to influences which have not been proved to exist, demonstrate that they cannot be the results of known forces. Even the most conservative, however, can hardly object to an examination of the implications of any theory, no matter how slight its factual basis; in this task one may open other avenues of approach to a determination of the truth or falsity of the premise.

The work of psychologists of high standing has made it possible for us to speak of thought transference as an entirely natural occurrence, without any taint of the occult or ghostly. The ability to receive such mental messages is conspicuously developed in only a few persons, and it seems to be in no way a product of civilization or learning, but may well be thought of as a vestigial faculty, the need for which has largely been removed by the development of the power of speech. It may be comparable, perhaps, to the accurate sense of direction which is possessed by certain persons, but which is much more general and essential among migratory animals.

According to many credible accounts, social animals such as ants, bees, and even rats show a coordination in their efforts which would be difficult to explain satisfactorily without assuming some form of intercommunication. The performance of remarkable engineering feats further suggests that the common mind, if such there be, must be much superior to that of any single individual. In watching the flight of shore birds or other gregarious species, one is frequently impressed by the more than military precision with which their evolutions are executed. Some authorities have credited this apparent unanimity to an almost miraculous quickness and accuracy of perception and response, together, of course, with the absolute submission of all individuals to the will of some supposed leader; but the explanation would certainly be easier if we could conceive of some sort of volitional coordination among the members of the flock.