

## NOTES ON WATER BIRDS NESTING AT PYRAMID LAKE, NEVADA

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THE OBSERVATIONS here presented\* were made between May 15 and August 3, 1924, during which time the writer was employed by the United States Bureau of Biological Survey in making a study of the food habits of the White Pelican. In his report on the main investigation (see Condor, xxvii, July, 1925, pp. 147-160) some description of the general features of the region was given and need not be repeated here. Due to the sparsity of vegetation about the lake, few nesting sites and little or no food of the kinds required by many waterfowl are available; thus, as would be expected, the water birds nesting here are principally fish-eating species. All the species here listed were observed daily throughout the period spent at Pyramid Lake.

*Larus californicus*. California Gull. Among the water birds this species was second in abundance only to the White Pelican. The estimate made of 600 adult and immature birds at the lake is believed to be a conservative one. California Gulls were to be seen at all hours of the day, sitting on rocks along shore, hovering about the pelican colonies on Anaho Island, or, in company with the pelicans, fishing for minnows far out in the lake. With the setting of the sun, or shortly thereafter, the gulls began making their way north up the shores to the nesting colony. The gulls that were fishing some distance out in the lake usually veered in toward shore when starting for the nesting colony instead of taking the shorter course directly over the water. This suggested that the birds took advantage of the fact that dead fish, as well as the spawning minnows, at certain times, were more often found along the shore than elsewhere.

The nesting colony is located on one of the outlying pinnacles at the north end of the lake. The pinnacle, locally known as "Gull Rock", is separated by over a mile of water from any of the other pinnacles or the nearest shore. All the nests found, with the exception of one, were on Gull Rock. This nest was among the white, water-worn boulders on the south shore of Anaho Island. In this nest a single egg was laid and subsequently deserted. It is interesting to note that fifty-eight years ago Robert Ridgway visited Anaho Island and found the California Gulls nesting there. In reference to his visit to Anaho Island in May, 1868, Ridgway (U. S. Geol. Expl. 40th parallel, iv, pt. 3, p. 631) states: ". . . The more elevated and rocky northern shore was covered by the nests of an immense colony of Gulls (*Larus californicus*) . . .". Whether the California Gulls also nested in 1868 on Gull Rock in the north end of the lake, I do not know. Ridgway makes no mention of having visited the north end of the lake. In 1917 and in 1921, Evermann (Overland Monthly, May, 1923, pp. 16-18, 45) found the gulls nesting on Gull Rock but does not record any nests on Anaho Island. Just why the gulls ceased to nest on Anaho Island is not clear. For some time Gull Rock has been less frequently visited by man than has Anaho Island. This may have had something to do with the abandonment of Anaho Island as a nesting site. Although Ridgway (*loc. cit.*, p. 629) speaks of finding thousands of pelicans on Anaho Island, there may have been fewer pelicans nesting there in 1868 than now. However, there is certainly still ample room for the gulls to nest; thus the possible increase in number of pelicans would not seem to account for the absence of nesting gulls on Anaho Island at present.

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Gull Rock is 90 feet long, 60 feet wide, and rises 60 or 70 feet above the water. The nests are placed on the terraces left by former water levels, in the numerous crevices, depressions, and on level spots on other parts of the rock. They are not bulky affairs, as is sometimes the case with nests of this species, but consist of only a few weed stems, bits of brush, and occasionally a few feathers. I learned that an Indian had visited the colony on May 10 and had taken all the eggs for food. My finding of 300 young gulls on June 28 when I first visited the rock indicated that the birds had laid again. The young sought safety by tumbling into the water or by crawling into the numerous holes and crevices, and several young no doubt escaped notice by the latter means, since the color of the natal plumage harmonizes well with that of the dirty white rock.

On July 21 several young were seen flying about the boat landing at Sutcliffe Station, seventeen miles from Gull Rock. A second visit was made to Gull Rock on June 26 at which time half of the young were able to fly. Some not quite able to fly were pursued in the water and note was made of their inferior swimming powers as compared with those of young Mergansers. While seeking to escape by swimming, the young have a characteristic habit of drawing the head back and down so that anterior and posterior ends of the body can hardly be distinguished except by observing the direction in which the bird is moving.

All food items identified consisted either of Lake Minnows (*Leucidius pectinifer*) or Lake Chub (*Siphateles obesus*). Both fishes are of no direct economic value to man. The California Gull is a scavenger in its summer home at Pyramid Lake as well as in its winter home on the Pacific coast. Several dozen gulls are always to be found near every Indian fish camp, upon which they keep an alert eye, and at the first indications of fish being cleaned they come trooping to the feast. The gulls also abound about the pelican colonies on Anaho Island, rushing in at every opportunity to seize fish that are disgorged by young or old pelicans. While I never actually saw gulls eating pelicans' eggs, I feel certain that they do when opportunity presents itself. A ten-inch Lake Chub was taken from the gullet of an adult California Gull that was shot one evening while on its way back to the nesting colony. On June 28 one Lake Chub eight inches long and three Lake Minnows each seven inches in length were found lying among the nests on Gull Rock. Another Lake Minnow seven inches long was disgorged by a young gull that was pursued in the water.

*Phalacrocorax auritus albociliatus*. Farallon Cormorant. Of the water birds this species was exceeded in abundance by only the White Pelican and California Gull. It was impossible to count the birds or satisfactorily to estimate the number; for when the nesting colonies were approached the birds scattered out into the numerous channels and coves among the pinnacles. There were certainly several hundred and perhaps a thousand adult birds at the lake.

Evidently the cormorants secure all the fish necessary in a short time, for of the thousands of times birds were observed, few were seen in the water unless frightened there from their perches. Only once did I see a bird actually catching fish. The fact that the birds remain for the most part in the immediate vicinity of their nesting grounds might also indicate that they are expert fishermen. They do not wander to the far reaches of the lake and to other lakes and streams, as, for example, do the pelicans. Taverner (Can. Geol. Surv. Bull. no. 13, biol. ser., no. 5, p. 7) suggests that the cormorant may be ". . . deficient in oily matter with which to anoint its feathers, for it does not seem to be as perfectly adapted to aquatic conditions as most other water birds. Like its near relative, the Anhinga, which has a similar habit, it seems to find it necessary to dry its plumage after prolonged submersion. At such times it is a most awkward and ungainly sight, sitting with relaxed wings and body,

limp and flaccid as a garment hung on a bush to dry." If this supposition be true, and my observations at Pyramid Lake bear out Taverner's suggestion, the cormorants are perhaps not so often seen on the water as are the pelicans, not alone because of the superior fishing powers of the former, but also because the cormorants are not so thoroughly adapted to aquatic life as are the pelicans.

At Pyramid Lake the cormorant is a bird of the rocks, not only nesting there, but perching singly or in flocks of as many as a hundred by themselves on rocks six to twenty-five feet above the water. They also often perch in company with pelicans on rocks rising only a few inches to five feet above the water. When away from their nesting grounds they are wary, taking flight when an observer approaches to within 150 to 200 yards. When a mixed flock of cormorants and pelicans is approached the cormorants slide off into the water before the pelicans fly. When cormorants are frightened from rocks several feet above the water they fly rather than swim. Cormorants are clumsy birds. In observed instances when taking flight from the water the cormorants struck the water with the feet no less than twenty and as many as thirty times before getting into the air. When leaving perches they often descend several feet before acquiring sufficient momentum to rise and fly in horizontal lines. This clumsiness is more evident when a mixed flock of cormorants and pelicans takes flight. A pelican, though much larger, strikes the water with the feet only five or six times before getting into the air.

The cormorants nested on the ledges of the chain of steep pinnacles that extended out from, and was connected with, the north shore of the lake, and on adjoining pinnacles and rocks that were surrounded by water. In height above the water the nests varied from eight to twenty feet. Eight nests were also found on Gull Rock. The nests were flat platforms of sticks and weed stems. The usual number of eggs was four, although sets of three and five were sometimes found. Ridgway (*loc. cit.*, pp. 635-636), who visited Pyramid Lake both in 1867 and in 1868, furnishes the following information concerning the nesting of these birds at that time: "The Cormorant was very abundant at Pyramid Lake and along the lower portion of the Truckee River. . . . Small congregations were frequently to be seen during the summer-time, perched upon the snags far out in the lake, the latter being submerged cotton-wood trees which marked, at that time, the former course of the river when the lake occupied more restricted limits. . . . On these treetops many of their nests were found, these being composed of sticks, and containing one to three eggs each."

The lowering of the level of the lake within recent years has moved the lake shore over two miles from the nearest cottonwoods along the river. This no doubt accounts for the fact that the cormorants now nest only on the rocks. The colonies were visited by me June 28 and July 26. On the first visit two sets of fresh eggs were taken from a colony of twenty-two nests on one of the small rocks. On July 26 all the remaining twenty nests contained young, of uniform size, judged to be six or seven days old. This indicated an incubation period of 21 to 23 days. No nests containing live young were found on June 28, though several dead young one-third grown were found at one of the colonies. On July 26, however, nearly all the nests contained young. Some were just emerging from the eggs and others were fully one-third grown. In all stages of development the young are jet black in color. Whether or not this black coat tends to absorb enough more of the light rays to cause the young to succumb more readily to exposure to the heat of the sun than do other young birds I do not know, but they seem more susceptible to the sun's rays than most young birds. Ten minutes' investigation of one small colony, at noon, resulted in the death of a large number of young which normally the old birds shielded at this

time of day. The young just emerging from the shells and those more than one-fourth grown seemed to be affected little or none by the heat, but those between these ages succumbed readily.

There is a very high mortality among the young even when unmolested by man. This is perhaps due to the inequality in size of the young in a single nest. The one that hatches first apparently grows relatively faster than the others and in all ways has much the best chance of surviving. This is obviously at the expense of its sisters and brothers who are soon crowded out of the nest or are denied the amount of food necessary for existence because of the demands of the largest one. Rarely two, and generally only one, young more than half grown, are found in a nest. The nesting colonies of the cormorants are even more filthy than those of the White Pelican, if that be possible. Bent (U. S. Nat. Mus., Bull. 121, pp. 246-247) has faithfully described the atmosphere of a typical colony when he says: "Such a colony is the filthiest place imaginable, for no other birds can equal cormorants in this respect. The nests and their surroundings become thoroughly whitewashed with excrement, which also accumulates in slimy pools swarming with flies; the nests are often alive with fleas, lice, and other vermin; and the odor of decaying fish scattered about adds to the nauseating stench."

The young disgorge food readily. On July 26, from this disgorged food I identified thirty-six Lake Minnows and ten Lake Chubs. The adults, too, often disgorge their food upon the approach of an intruder, evidently sometimes having a load too heavy to carry. One I am sure had a too heavy load, for after three vain attempts to "take the air" it went through some violent contortions and disgorged several fish; then flew off after the fashion of a normal cormorant. By coming around a point of Anaho Island in a boat I surprised a cormorant sitting on a rock at a distance of twenty-five or thirty yards, which disgorged five Lake Minnows, each five and one-half inches long, before taking wing. I hastened to the spot just in time to see one of the disgorged fish slowly swim away. Two of the other fish had sufficient life left to flop vigorously after being placed in the boat.

*Mergus americanus*. American Merganser. This species was fourth in abundance among the fish-eating birds. Until June 2 mixed flocks of males and females, sometimes numbering twenty, were seen, but after this date the flocks seldom numbered more than twelve and were composed largely of males. The Mergansers were most abundant near suitable nesting sites, these being rocky cliffs and crumbling boulders along the shore. The Pyramid, certain steep rocky parts of Anaho Island, and the pinnacles at the north end of the lake were favorite haunts.

On June 2 one nest containing six fresh eggs was found in a hole on the east side of the Pyramid at a height of one hundred feet above the water. Although the eggs were fresh, the female remained on the nest despite my investigation, as I passed up the face of the Pyramid. She displayed a very bold front, hissing and striking viciously with her bill. The eggs lay on the small bits of rock that had shelled off the walls of the cavity. The eggs were surrounded by, but not lying on, a ring of down feathers. No other material was in the nest. When I again examined the nest, during my descent from the top of the Pyramid, the female had gone, but she had not covered the eggs with down. On June 28 another nest containing three fresh eggs was found, in the same type of cavity as the one mentioned above, on one of the pinnacles at the north end of the lake. This nest, however, was only ten feet above the water. Between these two dates, June 2 and June 28, several other females were flushed from holes in cliffs on the east shore of the lake, on Anaho Island and on the Pyramid. Young were first noted on July 18 at Anaho Island when six young accompanied by an old female were seen.

About sundown the females would fly from the nesting holes down to the water where the males usually joined them, and they then foraged in pairs until dark. On June 4, at Anaho Island, three of the females were observed feeding from the time they left the nests until darkness came on. One dived four times but the others, except for a few thrusts of the head below the water, swam about feeding on the surface, sometimes with both mandibles under water and at other times with only the lower mandible below the surface. This method of "skimming", by holding one mandible above and the other below the surface of the water, was first noticed in a male that I observed from behind some large boulders with the aid of field glasses on May 27. Swarth (Univ. Calif. Publ. Zool., vol. 7, pp. 39-40) has previously reported the Merganser as feeding in the manner described above.

On July 26, near Pyramid Post Office, a flock of fourteen young about two-thirds grown and one old female were pursued by me in a motor boat. They maintained their lead of one hundred yards or more for three-fourths of a mile. The old female always set the pace. During the entire chase she did not fly. Dashes in which both the feet and the wings were used, served to carry the birds over the water at a rapid rate. After a time some of the young began to tire and I was able to approach within gunshot of these. During this chase the flock left a train of disgorged food in its wake, that the attending gulls and four pelicans picked up.

The only definite information concerning the food of this species was that obtained June 21 when a female, upon my approach, before taking wing, disgorged three Lake Minnows. Two of these fish were five and one-half inches in length and the third four and one-half inches long.

*Ardea herodias hyperonca*. California Great Blue Heron. This subspecific determination is based on a single specimen about two-thirds grown in juvenal plumage which, according to information furnished by the United States Bureau of Biological Survey, resembles *A. h. hyperonca* more than *A. h. treganzai*.

The only rookery discovered was one of ten nests on the northeast projection of Anaho Island. The flat nests, about four feet in diameter, were made of sticks one-half inch or less in diameter and were placed on the tops of low-growing greasewood bushes along the east face of a ten foot cliff. On May 29, when the rookery was first visited, three nests contained three young each, five nests contained four young each, and one nest contained five young. The tenth nest contained four eggs. At this time none of the young was more than two-thirds grown. In some cases the young showed a savage front by snapping their bills and uttering hoarse cries. In other cases they scrambled from the nests into the large piles of boulders, or crevices in the cliff. The old birds returned to the nests when I had gone less than fifty yards away, but they eyed me intently and took no notice of the young so long as I remained in the immediate vicinity of the nests.

Old nests of this species were found on the sides and top of the Pyramid. Ridgway (*loc. cit.*, p. 616) records finding nests of the Great Blue Heron both on Anaho Island and on the Pyramid in 1867 or 1868. At that time, however, the nests on Anaho Island were on the south side, whereas in 1924 they were only on the northeast arm of the island. Evermann (*loc. cit.*, p. 16) states that: "On the very apex of this pyramid a pair of Great Blue Herons nest regularly every year."

The old birds fished in the early morning or late evening, and long after sundown could be seen standing motionless on jutting points of rock waiting, heron-fashion, for some luckless fish to come within striking distance.

*University of California, Berkeley, April 23, 1925.*