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## RECENT OBSERVATIONS ON BIRDS OF ANAHO ISLAND, PYRAMID LAKE, NEVADA

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Within the last thirty years Hall (1925 and 1926), Bond (1940), and Alcorn (1943) have published observations on the birds of Anaho Island and Pyramid Lake, in west-central Nevada. Data gathered by Hall and others, who made trips to the island prior to Bond's visit, are summarized by Thompson (1932). Anaho Island has long been known for the large numbers of White Pelicans (*Pelecanus erythrorhynchos*) and other water birds which use it for nesting purposes. Thompson lists seven large concentrations of nesting White Pelicans in North America; census figures indicate Anaho Island may be the largest of these. The object of this paper is to record the present status of the nesting populations of this major pelican colony and of other water birds on the island (figs. 1 and 2).



Fig. 1. Anaho Island, Pyramid Lake, Nevada, as seen from the east shore. Long peninsula to left of island will eventually join nearby point of mainland as water level recedes.

### DESCRIPTION OF AREA

In view of recent changes resulting from receding water levels, a short description of Anaho Island appears advisable. The island is situated approximately one-half mile off-shore in Pyramid Lake. At the time of this writing, Pyramid Lake has a maximum length of about 25 miles, a width varying from  $4\frac{1}{2}$  to 11 miles, and averages approximately 205 feet in depth. Maximum depth is about 325 feet. The lake, fed by the Truckee

River, has no outlet. The lake level is dropping rapidly because of the diversion of the river water for agricultural purposes. In December, 1950, the lake elevation stood at 3,803 feet above sea level.

Anaho Island embraces roughly 250 acres at the present time. Its center is characterized by steep, rocky slopes and cliffs which, in 1950, were approximately 557 feet above the water level. From the base of this rocky prominence, the island slopes gently to the water's edge through a descending series of old stranded beaches, relics of ancient Lake Lahontan of Pleistocene times and Pyramid Lake when at higher levels. The vegetation on the island is typically that of the deserts of western Nevada. Patches of saltgrass (*Distichlis stricta*) and alkali weed (*Echinopsilon hyssoifolium*) along the shore give way to sparse growths of big greasewood (*Sarcobatus vermiculatus*), saltbushes (*Atriplex* spp.), and other desert shrubs at higher elevations.

From the description given by Low *et al.* (1950), Anaho Island appears to have a marked similarity, both physically and botanically, to Gunnison Island in Great Salt Lake, Utah, which also is used by White Pelicans for nesting. Both islands are marked by the tiers of beaches left by the receding waters of ancient lakes.

#### EFFECT OF HUMAN DISTURBANCE AND PROSPECTS OF CHANGE

In 1913 Anaho Island became a wildlife sanctuary, the Anaho Island National Wildlife Refuge, established principally for the protection of the large pelican colony. Trespass or unauthorized interference with any type of wildlife on the island is unlawful.

We found no signs of human activity on the island, and indications are that such interference is no longer a serious menace. The lack of disturbance at the present time is attributed to the difficulties involved in transporting a boat across the wide, sandy beaches to the lake, to poor fishing in the lake waters, and to the necessity of purchasing a permit from the Bureau of Indian Affairs, which administers the Pyramid Lake Indian Reservation.

During World War II, the U. S. Navy used Pyramid Lake as a bombing range. The extent of disturbance and its effects on the nesting populations is not known.

Recent efforts to develop the lake for recreational purposes, which include the stocking of kokanee (*Oncorhynchus nerka kennerlyi*), a land-locked form of sockeye salmon, will, if successful, revive the disturbance problem.

There is some question whether Anaho Island will be able to support, for long, its nesting populations. In the not too distant future, possibly as early as 1965, the island will become a peninsula. At the narrowest interval between the island and the east shore of the mainland, the water is shallow and, because of declining lake levels, is growing progressively shallower. Soundings made in 1948 by Thomas J. Trelease of the Nevada State Fish and Game Commission and Ira LaRivers of the University of Nevada revealed a maximum depth of 38 feet at that time. Trelease has since made annual readings of the level of Pyramid Lake which show that between August 29, 1948, and October 23, 1950, the lake receded 6 feet 10 inches, or roughly  $3\frac{1}{2}$  feet per year. This would place the maximum depth between the island and mainland at 31 feet in October, 1950.

The water level drop in 1950 was more than compensated for by floods on the Truckee River late that year. A series of three successive floods quickly filled storage reservoirs, and surplus waters were dumped into the lake. A measured rise of 18 inches occurred in the lake level between November 26 and December 12, and abnormal inflow continued for some time after that period. Floods such as this one, however, occur only occasionally. Under normal water conditions levels may drop even more rapidly in the future if plans which call for an expansion of upstream storage facilities materialize.

## PROCEDURE

The island was visited on May 15, June 26, July 3, and September 21, 1950, and on May 15 and July 6, 1951. Each visit was of about five hours' duration, observations being made during the middle of the day. On all but the September trip, estimates and counts were made of the numbers of the various species present. Banding of young birds took place each year on the July trips. The September trip afforded an opportunity to observe the site after the birds had left and to determine nesting mortality.

## ACKNOWLEDGMENTS

The writers wish to acknowledge assistance rendered by Thomas J. Trelease, Chief Fisheries Technician, and Fred Wright, Waterfowl Technician, both of the Nevada State Fish and Game Commission. Trelease accompanied us on the June, 1950, trip and identified fish regurgitated by young pelicans and cormorants and also provided us with



Fig. 2. Young White Pelicans on Anaho Island churning up clouds of foul-smelling dust as they scramble from photographer.

information on Pyramid Lake water levels. Wright aided in banding operations on the July, 1950, visit. Thomas H. McAllister, of the Oregon State Game Commission, accompanied us on this visit as an observer. On the trip of July, 1951, we were accompanied by Dr. Frank Richardson of the University of Nevada, Ted Frantz, student from the University, and Vincent Mowbray of Reno. Mowbray, assisted by Richardson, banded 150 White Pelicans on this trip. We are grateful also for the use of unpublished notes loaned by Richardson, Mowbray and J. R. Alcorn. Richardson's notes cover a trip made on June 2, 1950, while those of Alcorn cover trips to the island on June 14 and July 21, 1942, and on May 26, 1944. Mowbray had visited the island on May 22, 1948.

## ACCOUNT OF BIRDS

*Pelecanus erythrorhynchos*. White Pelican. The island is noted for its large White Pelican colonies. After observing the numbers of White Pelicans at Anaho Island in 1924, Hall (1925) stated, "This is, therefore, the largest colony of White Pelicans known

to be in existence today." Anaho Island supports the only known nesting colony of this species in Nevada.

Our visits to the island gave us the opportunity to gather comparative data in two different nesting seasons. In both years the White Pelican colonies were found on the northeast side of the island.

On May 15, 1950, a few large downy young were present in a colony at the shore of the lake. On the successively higher beach levels, extending inland, additional colonies were found. In the uppermost colony, at the base of the cliffs, pipping of eggs had begun. The stage of development of eggs or young in any one colony was fairly uniform, but there was a noticeable difference in the age of the individual colonies, those at higher elevations being progressively less advanced.

By June 26, young from the more advanced colonies were wandering about, and additional colonies had been established on the rocky crest at the summit of the island more than 550 feet above the water's surface. By July 3, practically all of the young had hatched, the colonies at the summit containing new young and a few eggs, some of which were being pipped. In the colonies by the lake the young looked almost like their parents and were already spending part of their time in the water. This was an opportune time to make a count of the young, for hatching was virtually complete, yet none of the young had left the island. On that date a total of 4,160 young was found to be present.

The two visits a year later revealed several changes. For one thing, there was less correlation between nesting progress and elevation above water level. On May 15 a small colony, containing young which were estimated to be about one-fourth grown, was found again at the water's edge. Likewise, pipping of eggs was noted in the nests at the base of the cliffs. Between these two colonies, however, were three colonies in which nest-building and egg-laying had just begun. Adjoining the colony of young at the water's edge was another with eggs in the incubation stage. No nesting took place at the summit.

On the trip in May a nest count was made in all colonies having young and in those where egg-laying appeared complete. On the next trip, in July, a count of nests in the colonies previously omitted was made, thus providing a complete nest count for the year. At the same time a count was made of young pelicans. This count came to 3,742, a reduction of 10 per cent from the 1950 total. The enumeration of pods, or flocks of young, and nesting colonies, also indicated a reduction in the number of young pelicans in 1951, as only 11 pods and colonies were found in comparison with 14 found the previous year. Counts based on groups of young only have little value in themselves, for the delineation of such groups may sometimes be subject to individual interpretation. Some colonies are so closely spaced that question arises as to whether they should not be counted as one. Separation of pods may be difficult, too, particularly when the young are old enough to be active, for the pods tend to break apart or combine with one another in various numerical combinations.

Other pertinent data may be noted briefly. Early-nesting as well as late-nesting colonies were much smaller than those which were established in midseason. The number of young to a pod, as separated by us, ranged from eight to 1,400, and the number of nests to a colony varied from 18 to 2,476. Pods consisting of well-grown young exhibited a tendency to move towards the water upon being approached. One could herd these waddling, stumbling young like sheep.

California Gulls were observed piercing and eating pelican eggs and killing newly-hatched young pelicans. Gulls appeared quickly at nest sites when our intrusion caused adult pelicans to leave.

Various writers, after visiting Anaho Island, have attempted to compare their figures

on number of nests, eggs, young and adults with those of previous observers. We find it difficult to establish any reliable population trend. The principal objection to making a comparison of the population estimates stems from the fact that the various observers visited the island at different times in the nesting season; thus, the colonies were not in comparable stages of development. Some observers apparently counted nests before all colonies were established, and others counted young before hatching was complete or after the more mature ones had left the island. In 1951, nesting was not far enough along to make a complete nest count on May 15. This tabulation was finished, therefore, on July 6. It would have been impossible to have made a complete count on the last date also, for many of the early nests had become unrecognizable.

Short-term fluctuations in population are evident. Our 1950 figures, when compared with those of 1951, indicate that even annual changes may be considerable. Alcorn's data for 1944 vary widely from his 1942 findings.

All available records pertaining to numbers of nests, eggs or young pelicans are summarized in table 1.

Most of the observers of the past made estimates also of the number of adults present. With one exception, however, these estimates do not represent the total adult population involved. We found one adult to be present usually at nests containing eggs or small young. Fewer adults accompanied young which had left the nest. Counts of adults

Table 1  
Nesting and Production Records for the White Pelican at Anaho Island.

Observer	Date	Nests	Eggs	Young
Russell	August, 1882			1400
Chapman	1903		139	4000
Evermann	June 3, 1921	2381 occupied		
Hall	June 5 and 6, 1924	4534 occupied	6234 <sup>1</sup>	816 in nests
Cooper	June 9, 1932	2994 occupied		300
Bond	June 21 and 22, 1940	100 occupied		3000 one-half grown
Alcorn	June 14, 1942	1761 occupied		1553 in pods
Alcorn	May 26, 1944	4238 with eggs		5417 total
Marshall and Giles	July 3, 1950		16	4160 total
Marshall and Giles	May 15 and July 6, 1951	5650 total		3742 total

<sup>1</sup> Some eggs known to have been destroyed before count.

thus may vary with the season. Hall found that a large portion of the adults spend their day on feeding excursions, which means these birds must also be accounted for before an estimate of the total adult population can be made. After accounting for pelicans he had seen in surrounding areas, Hall estimated the adult population at 10,000 birds in 1924. Assuming two adults to one nest, our nest count in 1951 would place the adult population at 11,300, and it was almost certainly higher in 1950.

An early morning flight of White Pelicans into the Stillwater marsh, 60 airline miles from Anaho Island, is regularly observed during the nesting season. Many other water areas are present within this distance from Anaho and are used regularly by the pelicans. Low *et al.* (1950) observed similar flights into the Bear River marshes from Gunnison Island in Great Salt Lake, Utah.

When disturbed, the young pelicans will disgorge the fish they have recently been fed. This trait gave us the same opportunity afforded to Hall (1925), Bond (1940), and

Alcorn (1943) to determine the species of fish fed to the young. No attempt was made by us to count the total number of regurgitated fish, but this ran into the hundreds. On June 26, roughly 75 per cent of the fish were carp (*Cyprinus carpio*), the remaining 25 per cent being Lahontan tui chub (*Siphateles bicolor obesus*) and cui-ui sucker (*Chasmistes cujus*). One young pelican managed to expell a grand total of 232 carp averaging

Table 2  
Returns from White Pelicans Banded at Anaho Island National Wildlife Refuge<sup>1</sup>

Date banded	Date of recovery	Cause of death	Location of recovery
June 21, 1940	October 18, 1940	Killed	Oriental, Puebla, Mexico
"	November 2, 1940	Killed	San Pedro Chico Zapote near Oaxaca, Mexico
"	June 2, 1941	Probably found dead	La Huerta, Michoacán, Mexico
"	December 15, 1944	Found dead	Pyramid Lake, Nevada
"	Letter of April 11, 1946	Unknown	Laguna de San Antonio, County of Rosa Morada, Nayarit, Mexico
"	November 15, 1948	Shot	Coamiles, Nayarit, Mexico
July 3, 1950	September 23, 1950	Shot	Lake Henshaw, Santa Ysabel, San Diego County, California
"	Letter of September 27, 1950	Found dead	Highway 395 near Fish Spring, Inyo County, California
"	October 2, 1950	Shot	Lake Henshaw, Santa Ysabel, San Diego County, California
"	November 3, 1950	Found dead	Near Topaz Lake, Mono County, California
"	June 7, 1951	Shot	Near Guadalajara, Jalisco, Mexico

<sup>1</sup> In addition to the above, three bands were taken from young which died on the island after the 1950 banding. One band, used by Bond in 1940, was also recovered on the island.

about two inches in length. In most instances the regurgitated fish were much longer, ranging usually from seven to fifteen inches in length. The only other species noted on this date was one bullhead (*Ameiurus* sp.). On July 3, 1950, the food picture was completely changed, chubs being the only fish recorded. It thus appears that in order to obtain more comprehensive data on the fish taken through the nesting season, one would have to make many visits to the island. According to Trelease, the switch from carp on June 26 to chubs on July 3 may be correlated with the fact that the chubs of Pyramid Lake become more active at the surface of the water about the first of July.

Strangely, very few fish were regurgitated during the two 1951 visits even though these visits took place at the same time of day as in 1950. The only fish seen on May 15 were two cui-ui, four Sacramento perch (*Archoplites interruptus*), two carp and three chubs. On the July 6 visit, a few carp and one cui-ui were all that were noted.

At the colonies on May 26, 1944, Alcorn (MS) reported seeing 92 chubs, one 14½-inch Tahoe sucker (*Catostomus tahoensis*), one Sacramento perch and four cui-ui, one of which was 21 inches long and weighed four pounds.

The food data correspond closely with those gathered by Hall (1925), Bond (1940), and Alcorn (1943). Since the chub, *Leucidius pectiniifer*, is now regarded as a subspecies of *Siphateles bicolor*, and even may not be a valid subspecies (LaRivers and Trelease, 1952), we, like Alcorn, listed all chubs under the latter name. Hall and Bond failed to find cui-ui in the diet of Anaho Island pelicans. Alcorn was the first to list this Pyramid Lake game fish as a food of young pelicans.

On July 6, 1951, Mowbray banded 150 well-grown young pelicans, 50 were banded on July 3, 1950, and in 1940 Bond banded 149 young, making a combined total of 349. At the time of this writing 15 bands have been recovered, all from birds banded either in 1940 or in 1950. Complete data on these returns are given in table 2. A large percentage of the returns have come from Mexico, indicating a migratory pattern similar to that of birds banded at Great Salt Lake. Low *et al.* (1950) reported returns from Mexico for 13 of 23 band recoveries. They found, however, that the birds carry on a northward migration into Idaho before going south. The greatest interval reported between banding and recovery for any pelican at Salt Lake was five years. One of the pelicans banded at Anaho Island by Bond was recovered after a period of eight years.



Fig. 3. A colony of almost fully grown young Double-crested Cormorants. At this stage young often hobble from one nest to another.

On our last visit in 1950 no pelicans were to be seen at the nesting area and 12 were found about the edge of the island. On this date all dead pelicans found were checked for bands. Two bands were recovered from carcasses of young banded on July 3. Banding was not considered a factor contributing to death as both birds were in a more advanced growth stage than when banded.

Human activity may inadvertently cause mortality of young in early growth stages. When approached, the adults leave their young, exposing them to the sun. The naked young seem to shrivel and die quickly from the intense heat if adults are not present to shade them. It appears evident that disturbance in colonies with newly-hatched young should be kept at a minimum and then restricted to the cooler hours of the day insofar as possible.

*Phalacrocorax auritus*. Double-crested Cormorant. The number of cormorants nesting on Anaho Island has made an exceptional increase since 1940. Four active colonies in 1950 and five in 1951 were located along the east shore immediately east of the pelican colonies. One additional nesting site, containing nests used in some previous year, had been abandoned. The total number of active nests in 1950 was tallied at 1,028 and in 1951 at 1,300. The number of nests to a colony ranged from 124 to 495. A count of young made on July 3, 1950, totaled 1,650. Thirty-four unhatched eggs were left at this

time. On this date, young of all stages were present. Though hatching was not complete in some nests, young birds from others dashed for the water. When the birds were in the water, we experienced difficulty in distinguishing offspring from adults. For this reason, our count of young is undoubtedly low. The visit on July 6, 1951, was too late to permit a census of the young. By that time only 50 remained in the nests.

No hatching had taken place on May 15 of either year. Laying had not yet begun in some nests, although in others clutches appeared complete. The average number of eggs per nest was about four, but as many as eight were noted.

The nests were located on slabs of calcareous tufa and were constructed primarily of alkali weed.

Alcorn (unpublished notes) reported finding 123 cormorant nests at the southeast tip of the island in 1942.

Bond (1940) was the last to publish on the cormorants at Pyramid Lake. He reported seeing 50 nests in 1940 on the southwest side of Anaho Island in a colony of gulls. Hall made no mention of cormorants nesting at Anaho Island. Bond wrote of a report that cormorants were nesting on the Pyramid, which is located next to the east shore of the lake, but we found no nesting there in either 1950 or 1951. It is evident that not only have the numbers of nesting cormorants changed, but colony locations as well.

Hall (1926) and other writers found cormorants and gulls nesting on the Pinnacles, tall spires of calcareous tufa projecting up from the lake bed at the north end of the lake. The Pinnacles are gradually losing their identity as islands, for the retreating waters are leaving them stranded on the shore. Only four are still surrounded by water. On June 27, 1951, observations from the north shore revealed the presence of cormorant colonies on the two largest island spires. Nests and young were clearly seen with the aid of binoculars. It was obvious that their numbers ran into the hundreds. No gull colony was visible. Speaking of the Pinnacles, Bond stated, "I observed no cormorant nests there when I drove by in a car." We found that the colonies were not visible until we had walked about a mile from the road across sandy beaches. We doubt very much, therefore, that Bond could have seen the colonies from his car even if they were present.

On July 3, 1950, we banded 25 almost fully-grown young. No returns have been received to date. On September 21, after the birds had left, a count of dead young was made, and the carcasses were examined for bands. We found 7 of the 25 bands, all on birds that apparently had never left their nests. Banding took place in one colony only, and 22.7 per cent of the nests in this colony contained dead young. In the three colonies where no banding was done the percentages of nests with dead young were 4.4, 7.5 and 8.9, respectively. The noticeably heavier mortality in the colony where banding occurred, plus the fact that almost one-third of the banded birds died, would indicate that the banding operations were detrimental. The exact cause of mortality, though, is not clear. Exposure to the heat would not seem entirely responsible, for young in adjacent colonies also received the same exposure.

The fish brought to young cormorants were of the same species as found in the pelican colonies.

*Ardea herodias*. Great Blue Heron. Hall (1926) reported finding 10 nests of the blue heron on the northeast side of the island, and Bond reported "About 25 pairs were nesting in the dead weeds along shore on the east side . . ." On May 15, 1950, we found 10 nests in a heavy growth of *Atriplex* and alkali weed near the cormorant colonies. Small young were present in each. On July 3, two additional nests were found, one with four young, the other with eggs. In 1951, 16 nests were present.

*Branta canadensis*. Canada Goose. Flocks totaling up to 327 were present in the water around the island on all dates but September 21, 1950. One downy young was



seen on May 15, 1951. Fire, of unknown origin, had burned off a strip of saltgrass on the south side of the island, and 25 geese were flushed from new, green growth in this area on May 15, 1950. Bond found 115 geese using the island for feeding and roosting.

*Anas platyrhynchos*. Mallard. Groups of from 2 to 13 adults were seen along the island's edges on all trips. One brood of six was observed on July 3, 1950.

*Mergus merganser americanus*. American Merganser. Commonly seen in numbers up to 25 about the island. Hall (1926) reported this as a species nesting on Anaho Island, and Bond reported seeing 60 males.

*Larus californicus*. California Gull. Like the cormorants, the California Gulls nesting on Anaho Island have increased in number. On May 15, 1951, we estimated 1,800 adults were present at a colony on a sandy beach on the south shore. A nest count, subsequently made, showed about 1,700 nests to be present. The majority of these nests contained two eggs, though egg numbers varied from one to three, and some nests were merely de-



Fig. 4. Part of the colony of California Gulls on Anaho Island. Note young birds. Photographed July 26, 1950.

pressions freshly made in the sand. Nesting was found to be in this same stage on May 15 of the previous year, but no counts were made. On June 2, 1950, Richardson found one young hatched. By June 26 hatching was practically complete. The site occupied by the colony was crescent-shaped with a maximum length of 800 feet and a maximum width of 450 feet.

Mortality was high. The 1,700 nests counted in 1951 should have produced perhaps 3,400 young; yet on July 6 a careful count showed the presence of only 684 live young. A few of the largest could make short flights at this time, but none was believed to have left the colony.

On July 3, 1950, the largest young were not quite ready to fly. Fifty of these were banded. Again, banding activities appeared responsible for considerable mortality. On September 21 we found the remains of dead young throughout the nesting site; all were of the growth stage earlier observed July 3. Their bodies had largely disintegrated, but dried, dismembered fragments littered the ground. A careful search produced 17 bands; there may have been a few others which we failed to find. The quantity of remains, when compared with the number of young seen on July 3, led us to believe that not more than 100 young birds ever reached the flying stage.

Exposure presumably caused much of this loss. The young gulls, like the young pelicans and cormorants, were protected by the bodies and outstretched wings of their parents. When the parents were driven away, the young soon began to suffer from the heat. The young birds, after being banded, instead of scampering for safety, clustered

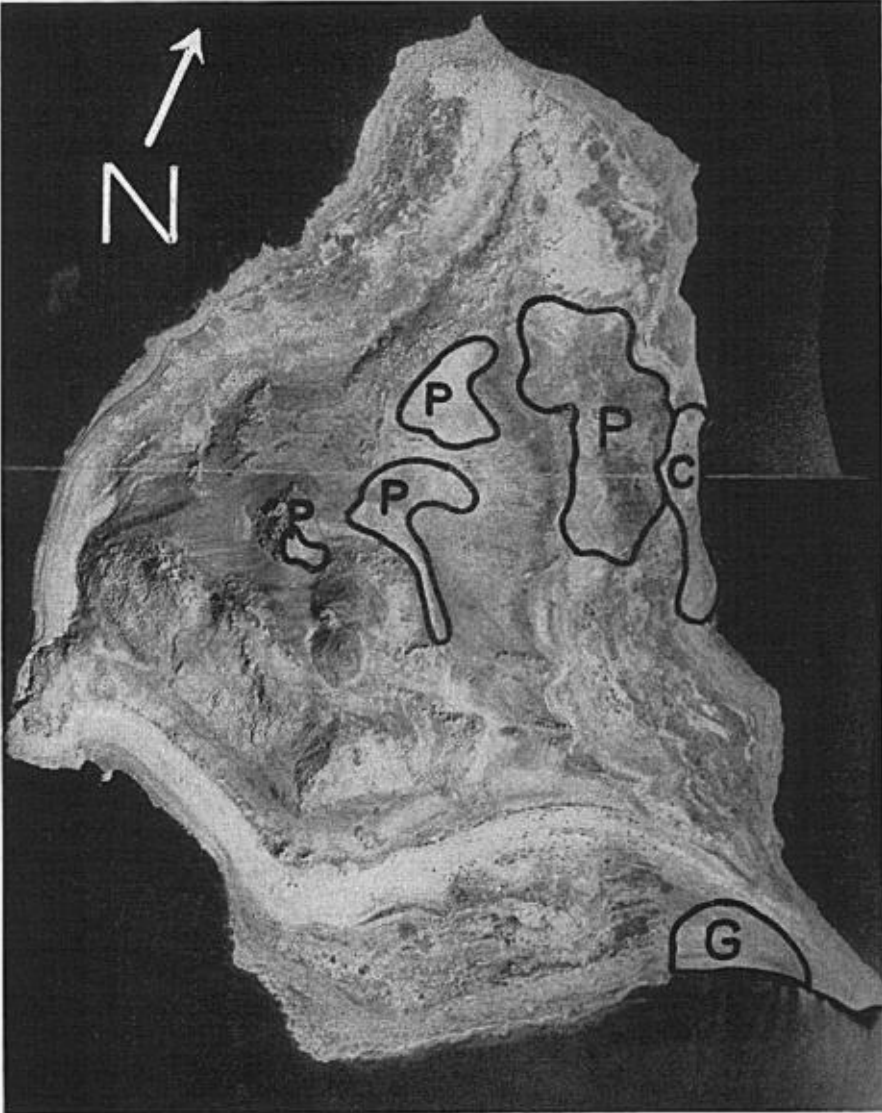


Fig. 5: Aerial photograph of Anaho Island with approximate location of nesting colonies outlined. P = White Pelican; C = Double-crested Cormorant; G = California Gull.

in the shadows cast by our legs or huddled in the shade of a log nearby on the beach. Future banding operations will have to be confined to early morning or late evening hours.

Hall (1926) made no mention of California Gulls nesting at Anaho, but tells of an

estimated 600 adult and immature birds at a nesting colony on the Pinnacles. Gromme (1930) reported finding seven nesting pairs on the island in 1927. Bond, in 1940, found about 200 nesting pairs on the island. He banded 45 young, from which there has been one return, a bird found on July 14, 1942, at Tubbs Island, San Pablo Bay, California. Concerning a trip to the island on July 14, 1942, Alcorn's unpublished notes contain the following statement with regard to the colony. "There were 504 plus or minus nests that contained eggs or small young." Mowbray reported seeing an estimated 1,000 gull nests at the island on May 22, 1948. Thus the colony has grown gradually since 1940.

*Hydroprogne caspia*. Caspian Tern. Mowbray (MS) with reference to his trip to the island on May 22, 1948, reported seeing about 50 Caspian Tern adults in the gull colony. No evidence of nesting was found, the date being too early. On June 26, 1950, 25 nests and 40 adults were observed in the center of the gull colony close to the edge of the water. Most of the nests contained eggs, very few young having hatched. On July 6, 1951, 15 adults and four young were seen. As near as can be determined, this is the third published record of the Caspian Tern nesting in Nevada. Alcorn (1946) tells of a colony on an island in the Lahontan Reservoir, and Marshall (1951) reported on a colony on an island in the Stillwater Point Reservoir on the Stillwater Wildlife Management Area. Both localities are near Fallon in Churchill County.

#### SUMMARY

Anaho Island National Wildlife Refuge in Pyramid Lake, Nevada, was visited on six different occasions in 1950 and in 1951. The ornithological data gathered on these trips are presented at this time for the purpose of recording the present status of the nesting populations of White Pelicans and other water birds on the island. The nesting of seven species of water birds is discussed.

Rapidly declining water levels in Pyramid Lake will make the 250-acre island a peninsula in the near future with the probable loss of the nesting colonies.

Nesting colonies of the White Pelican were found on the northeast side of the island at various elevations from the shore to the summit, which was 557 feet above water level in 1950. Nesting extended over such a long period that the earliest young were on the water by the time the last had hatched. A total of 4,160 young was counted in 1950, and 3,742 in 1951. Nests were counted in 1951 only, when 5,650 were found. Recent estimates of this population appear to be as high as, or higher than, any found by observers in the past. Observations of fish regurgitated by the young indicate that fish food consists largely of non-game species. Band returns show that pelicans from Anaho Island migrate to Mexico.

The number of nests of the Double-crested Cormorant increased from a reported 50 in 1940 to more than 1,000 in the years of 1950 and 1951. Four to five active colonies were found on the east shoreline. Mortality was especially heavy in one colony where 25 young were banded. Nesting extended over a long period with the young from some nests being able to swim while hatching in others was incomplete. Large numbers of cormorants were discovered also nesting on the Pinnacles at the north end of the lake.

In 1950 a total of 12 Great Blue Heron nests was found. The number increased to 16 in 1951.

About 1,700 nests of the California Gull were present on the south shore in 1951. This represents an eight-fold increase in the size of the colony since 1940. Mortality of young gulls was high, there being but 684 well-grown young present on July 6, 1951.

Some losses of young of both gull and pelican were attributed, in part at least, to excessive exposure to the sun during the periods when the parent birds were absent because of our activities.

The Caspian Tern is reported for the first time nesting on the island.

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