

FOOD AND HABITS OF SOME BIRDS NESTING ON
ISLANDS IN GREAT SALT LAKE

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WHITE Pelicans, Double-crested Cormorants, California Gulls, and Great Blue Herons¹ have nested commonly during recent years on a number of islands in Great Salt Lake. On July 11 and 12, 1938, Irvin Rasmussen of the U. S. Biological Survey, Lee Kay of the Utah State Fish and Game Commission, and the writers visited Hat and Gunnison Islands, the most important nesting grounds in the lake, made observations and banded a number of fledglings.

Hat Island is about 35 to 50 miles southwest of the extensive Bear River Marshes, which serve as a feeding place for many of the nesting birds. Locally it is known as "Bird" Island, and is a small, roughly circular piece of land some 175 yards in diameter, with a sand bar projecting from the south side. At the present time this bar extends about a mile, but from 1901 to 1905 and from 1931 to 1937 it connected Hat Island with Carrington Island some 5 miles distant. The island for several yards back from the water is relatively flat, and then the ground rises gradually to a rugged, rocky summit some 75 or 80 feet above the water level.

Gunnison Island is approximately 30 miles northwest of Hat Island (65 miles northwest of Saltair), 12 miles north of the Lucin Cut-off, and 45 miles by airline west by southwest of the headquarters of the Bear River Migratory Bird Refuge. This important nesting ground is much larger than Hat Island and has fully 3 miles of shore line; also, despite its more extensive flats and gently rising slopes, the rocky crest, which rises some 150 feet above the water line, is more rugged.

Both islands have a fair covering of typical salt desert shrubs and herbs, among which the greasewood bushes (*Sarcobatus vermiculatus*) predominate. Some *Sueda* sp., *Dondia* sp., *Bromus tectorum*, *Distichlis spicata*, *Atriplex confertifolia*, and *Artemisia tridentata* also occur.

A number of writers have described the nesting bird colonies on the islands of Great Salt Lake (see especially Behle (1935), Palmer (1916), Ridgway (1877), Stansbury (1852), and Woodbury and Behle (1933)). At the late date (July 11) on which we visited the islands, nesting was well advanced or nearly completed. No cormorants were noted, but it is possible that the young produced had already attained their growth and migrated to the mainland. We thought this was the case, as cormorants frequently nest very early in the spring. Many young gulls were flying, and it is probable that many of these birds also followed their elders to the mainland where food was more plentiful. Pelicans and gulls were practically through incubating on Hat Island and only three of the late-incubating pelicans remained on Gunnison

¹ *Pelecanus erythrorhynchos*, *Phalacrocorax auritus*, *Larus californicus*, and *Ardea herodias* respectively.

Island; however, a fair number of gulls still unable to fly were observed. All these had left the nest, and at our approach the older ones scuttled toward the water and the young ones sought safe hiding places among the rocks and weeds. As stated previously, many of the young gulls were on the wing; consequently, an accurate estimate of the population was impossible.

On Hat Island we saw about 425 young pelicans and possibly 3,000 young California Gulls, and on the larger Gunnison Island approximately 1,600 pelican nests and 1,800 of the young birds. On the latter island we observed only 13 juvenile Great Blue Herons, most of them still unskilled in the art of flying, although we found a dozen nests, some of which were deserted.

Pelicans seem to be highly communal, for we noticed that those hatching young at about the same time nested in compact units. Consequently, the young were segregated into social units (pods) according to size, in groups varying from 15 to more than 100 birds. From evidence gleaned at the nests and elsewhere on the islands it appeared that some of the nesting birds and their young had left for the Bear River Marshes, Locomotive Springs, or elsewhere on the mainland, where the food supply was more accessible and dependable.

The reactions of the various species to our attempts at catching the young flightless birds were interesting and noticeably different. The young herons and gulls promptly scattered, the latter species making desperate efforts to reach the water, though remaining more or less in their age classes, or units. Parent gulls were especially solicitous of the young fledglings, and when our party pursued these young, the adults set up a harsh and deafening babble of discordant alarm calls, at the same time circling low over our heads and making aerial dives, occasionally coming uncomfortably close. The parent birds showed the greatest concern for the youngest and most dependent in their broods. This parental instinct to protect the young seemed to be largely wanting in both the pelicans and the herons. When we approached, the young herons showed not the slightest tendency toward grouping as each bird made a frantic and hasty retreat in whatever direction suited his fancy.

The response of the young pelicans to disturbance was quite different from that of the young of other species. Birds of an age class remained together in their pods, closely following a leader, much like a flock of sheep. When we approached, the parents of the older juveniles merely left the scene of danger and flew some distance out in the lake to rest. The parents of the more helpless young appeared to be more solicitous and seemed to realize that long exposure to the extreme heat of the summer's sun would endanger their progeny. These birds were more reluctant to leave their young, and at our approach they laboriously, but mutely, flew off and circled high over the island, apparently hoping to return to their young at the moment danger was over.

The food habits of these nesting, fish-eating birds present a problem of more than ordinary interest because of the great distance between the islands and a possible source of food. It is generally known that fish-eating birds have very rapid digestion. In making stomach analyses it is a common experience to find the anterior part of a fish that has passed through the proventriculus and into the gizzard practically digested, while the median and caudal parts are relatively fresh and unaffected. Feeding observations and experiments indicate that digestion in many of the fish-eating birds may be well-advanced, if not entirely completed, within an hour.

The experienced food analyst obtains many evidences that various bird species have a mechanism for controlling the digestive organs and possibly also the rate of digestion. Kaupp (1924) and others have shown that domestic fowls can retain relatively large quantities of gravel in their gizzards for more than a year. Migratory birds are occasionally taken with food particles in their gizzards far removed from their possible source of occurrence. McAtee (1938) appropriately suggests that gallinaceous birds at least may possibly control what food goes first into the crop and what goes directly into the gizzard. He further adds: "Gizzards are known to have differential powers of retention with respect to grit and there may be phenomena with respect to the flow of food from crop to gizzard with which we are not acquainted." It seems probable that fish-eating birds and others have the power to contract the base of the gullet leading into the cardiac unit of the stomach and prevent digestive fluids from coming in contact with the food.

The Bear River Marshes, Locomotive Springs, and other parts of the mainland where fish might be obtained are more than 30 miles distant. In years past when Utah Lake offered an abundant supply of fish, it was a common sight to see flocks of pelicans in transit to and from Utah Lake, a distance of 75 to 100 miles.

That gulls and pelicans have some control over their digestive processes is indicated by the fact that many of the young birds, recently fed by their parents, regurgitated quantities of practically undigested food when pursued by our party. One young gull regurgitated 62 whole grasshoppers (mostly *Melanoplus* sp.), that showed scarcely any signs that digestion had even started. Other gulls expelled a variety of whole insects, including grasshoppers, beetles, and true bugs. One bird disgorged several whole cherries along with other cherry-fruit partly digested or slightly macerated. Still other young regurgitated small, whole carp, catfish, and minnows, and others a wide variety of garbage including large chunks of cube steak, fried potatoes, cooked beans, and, in one instance, even a standard cloth packet (cup size) of green tea, obviously obtained in the vicinity of one of the mainland towns. Among

both gulls and pelicans, it was noted that even the younger and more helpless juveniles were usually fed whole and undigested food.

That the California Gull is both a scavenger and an omnivorous feeder is well known. Laboratory examination of 6 well-filled stomachs of birds taken on the mainland in the vicinity of Utah's great inland sea gave the following results: Insects, 63.17 per cent (segregated as follows: flies—mostly larvae and pupae of salt flies (*Ephydra* sp.), 46.5 per cent; beetles—mostly ground beetles (Carabidae), 15 per cent; cutworms (Noctuidae), 1 per cent; grasshoppers and hymenoptera, 0.67 per cent; angleworms (Lumbricidae), 15.83 per cent; carrion, 8.33 per cent; miscellaneous vegetable debris, 8.33 per cent; fish, including carp and minnows, 4.17 per cent; and undetermined bone fragment, 0.17 per cent.

The stomachs of 4 White Pelicans taken on the Bear River Refuge showed that the birds had fed exclusively upon minnows (*Leuciscus* sp.) and carp (*Cyprinus carpio*). On the islands of Great Salt Lake numerous young pelicans were seen to regurgitate. All of them had likewise fed exclusively on fish, mostly minnows, carp, and catfish. The uninitiated bird bander who captures these rebellious young, should do so before, rather than immediately after, a meal. When the flightless young are first cornered they make frantic, though awkward and amusing, efforts to escape. When they find themselves captured, their next response is one of fight, a defense in which they show surprising skill. If the assailant is so unfortunate as to find himself holding the struggling legs or wings of 8 or 10 of these nearly mature birds at once, he is sure to obtain memories that will last. The bruises and scratches are minor in comparison with the experience of being given an interior view of a truly gullible young attempting to swallow the head of the intruder. When efforts to escape prove unfruitful, the bird's next procedure is to disgorge its last meal.

It is perhaps not well known that Great Blue Herons, particularly in the West, feed extensively on rodents captured in fields and pastures, and cast up the indigestible remains as pellets, often of unusually large size. On July 12 the writers obtained pellet remains at the nests of several birds on Gunnison Island in Great Salt Lake. The foods recorded from about 10 pellets were as follows: Remains of several ground squirrels (*Citellus townsendi mollis*), 76 per cent; field mice (*Microtinae*), 21 per cent; remains of an undetermined bird, trace; carp (*Cyprinus carpio*), 1 per cent; miscellaneous insect fragments of many species, including grasshoppers, crickets, aquatic beetles, aquatic bugs, and ants, 1 per cent; and plant fiber, including both vegetative material and seeds mostly of aquatic and marsh species, pondweeds, sedges, and grasses, 1 per cent. It is possible, and perhaps probable, that some of the rodents were obtained on Gunnison Island; other food items, however, may have been procured on the mainland 30 or 40 miles away.

That the nesting bird is not averse to eating the young of other birds is shown by the contents of 46 Great Blue Heron pellets obtained at one nest on the Bear River Refuge in 1915. From these 46 pellets 40 young Coots (*Fulica americana*), 5 Avocets (*Recurvirostra americana*), and 4 Black-necked Stilts (*Himantopus mexicanus*), as well as 1 young muskrat (*Ondatra zibethica osoyoosensis*), were recorded.

Examination of 6 stomachs of Great Blue Herons taken at the Bear River Marshes showed that the food consisted mostly (75.83 per cent) of fish. The foods recorded were as follows: Suckers (Catostomidae), 33.33 per cent; minnows (Cyprinidae), 25.83 per cent; carp (*Cyprinus carpio*), 16.67 per cent; diving beetles (*Hydrophilus* sp. and *Dytiscus* sp.), 1.67 per cent; and plant fiber, mostly (*Potamogeton pectinatus* and *Scirpus* sp.), 22.50 per cent.

We also feel that the concentration of herons on the Bear River Refuge may in part be responsible for the paucity of snakes of any sort on the refuge proper. This may prove to be decidedly beneficial to the waterfowl of the area, as in some other localities the larger snakes account for considerable losses among both ducklings and duck eggs.

Besides the data on the fish-eating birds, we obtained and examined 2 huge pellets of the Golden Eagle (*Aquila chrysaetos*). These were found to consist almost entirely of fragments of fur and bones of muskrats. In addition to the muskrat remains, one pellet also contained traces of several aquatic beetles. One pellet measuring 6½ inches long and 2 inches in diameter weighed 53.05 grams when thoroughly dried.

SUMMARY

White Pelicans, Double-crested Cormorants, California Gulls, and Great Blue Herons have nested commonly during recent years on certain islands in Great Salt Lake. On July 11 and 12, 1938, a visit was made to the two most important, Gunnison and Hat Islands. Cormorants had all left the island by this time and nesting was well advanced for all the other species.

On Hat Island we saw about 425 young pelicans and possibly 3000 young California Gulls and on Gunnison Island there were approximately 1600 pelican nests and 1800 young birds and a proportionately larger number of gulls. There were also 13 young Great Blue Herons. Young pelicans were highly communal and were segregated into compact social units (pods) according to size and remained together under all conditions. Young herons showed not the slightest tendency toward grouping when effort was made to capture them.

The various species responded very differently to attempts at catching and banding their young. Parent gulls were most solicitous of their progeny, while pelicans and herons showed little or no concern.

While fish-eating birds normally have rapid digestion, their nesting

on islands 30 to 100 miles removed from their source of food supply suggests that they may have some mechanism for controlling the digestive organs and possibly also the rate of digestion. Young birds of Gunnison and Hat Islands that had just been fed by their parents were seen to regurgitate quantities of practically undigested food. The gulls seemed to be both scavengers and omnivorous feeders and disgorged undigested grasshoppers, garbage and fish, while pelicans seemed to be subsisting entirely upon non-game fish.

Pellets and stomachs of herons showed that these birds had fed on ground squirrels, field mice, fish, young birds, insects, and plant fiber, while two large Golden Eagle pellets showed only the remains of muskrat.

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