

which was still too open to conceal an egg. May 20, the nest was thicker and perhaps an egg was under the sitting female. The male perched near by. Both birds seemed to pass the daylight hours in dozing. Observations were made with binoculars from a path about 100 feet from the tree. Incubation was uneventful. The first nestling was visible June 29. Subsequently, there were three nestlings of different ages; the youngest was last seen in the nesting tree on August 10. Apparently, all survived despite a July of record-breaking low temperature with much rain and wind.—HENRY M. HARFORD, 926 Argyle Bldg., Kansas City 6, Mo.

**Records of Sabine's Gull, *Xema sabini*, in Massachusetts.**—On May 30, 1950, I saw from the beach at the tip end of Nauset Point, Cape Cod, Mass., an adult Sabine's Gull. The bird flew directly away from me at very short range and settled in the water in the middle of the tidal channel not over 100 feet away. I had a good chance to observe it through 7 x 50 Zeiss binoculars, although the bird was easily identifiable without any such aid. This appears to be the thirteenth record for this bird along the Massachusetts coast, since the first specimen was taken in Boston harbor September 27, 1874 (Brewster), and therefore seems worthy of report.

The second report for Massachusetts (Orn. and Ool., 14: 95, 1889) reads "We have in our hands a Sabine's gull taken at Cape Cod, Massachusetts, in 1888. The bird was in immature plumage." The place and date are not given. On August 21, 1889, G. S. Miller, Jr., reported one shot in Cape Cod Bay west of N. Truro. The fourth record for the state was by F. Seymour Hersey of two taken at Chatham, September 2, 1912; the fifth was on August 21, 1927, at Marshfield, by Allen H. Wood, Jr. and John Smith.

The 'Bulletin of New England Bird Life' and 'Records of New England Birds,' from 1945 to the present time, show the following recent records.

September 7, 1937.—One adult collected by Ludlow Griscom at sea—off Chatham, Cape Cod, specimen now mounted in Museum of Science, Boston (in breeding plumage, just starting to molt). July 27 to September 2, 1941.—One adult in winter plumage found by Ludlow Griscom at Monomoy, Chatham, Cape Cod, and present intermittently throughout that time. August 16, 1941.—C. Russell Mason and Jessie H. Mason saw one at Ellisville (near Plymouth). March 8, 1942.—One adult closely observed and well described at Gloucester by Lt. Richard Allyn. May 26, 1942.—One adult closely observed at Monomoy, by Kraus and Winslow; the bird was lame and appeared exhausted. May 20, 1944.—One seen by Ludlow Griscom at Monomoy. September 3, 1945.—One bird in second-year winter plumage observed by Ludlow Griscom and William Cottrell off Chatham. September 27, 1947.—One observed off Nauset, Eastham, Cape Cod, by Ludlow Griscom and party.—C. RUSSELL MASON, *Massachusetts Audubon Society, 155 Newbury Street, Boston, Massachusetts.*

**Method of Feeding of the Black Skimmer, *Rynchops nigra*.**—The feeding habits of the Black Skimmer have been the subject of comment by many different writers, and their accounts are not all in agreement. The earlier writers generally seem to have believed that the bird obtains its food by skimming and taking its food from the surface of the water. Arthur (1921) wrote that the food is obtained mostly by wading and catching food while afoot. Pettingill (1937) and others observed the skimming for food. Later, Murphy (1936) reviewed some of the literature on the manner of feeding and offered a number of theoretical considerations, but seemed to lean to the belief that the skimming behavior had significance other than being a simple direct way of catching food.

It is not intended here to try to refute any previous account, except as may result from a simple account of what has been carefully observed over quite a number of years. During the 1920's and 1930's my work was located so that I was within sight or sound of skimmers for periods that would probably total several years. It was realized that there was a problem in this matter of feeding, and the observations were made with a view to being sure of the truth of the matter.

The following premises seem valid, and the basis for reaching the conclusions will follow:

- 1) The skimmer feeds principally, perhaps entirely, by skimming and catching small fish and shrimp in its bill;
- 2) The food is carried directly to the nest, and not swallowed to be regurgitated later, a fact which limits the feeding range;
- 3) The time of greatest food consumption coincides with a seasonal peak of suitable food in suitable location to be obtained by skimming.

In the skimmer colony there is evidence of the type of food and the condition in which it is delivered to the young birds or to the adult that is incubating. There are dried fish and shrimp in wide variety, and small heaps of the scales and other indigestible matter which have been cast up. It may be difficult for an adult bird, with its mandibles of unequal length, to pick up a fish from the sand once it is dropped, and some of the discarded food in the colony may have been dropped and not recovered. Very young birds often have the tail of a fish, or the appendages of a shrimp sticking out of their mouths, simply because their alimentary canals are not yet long enough to accommodate food of the size furnished. They appear to have been fed food that is very fresh, not partly digested matter.

Just beyond the periphery of the colony the adults may be seen going toward the feeding grounds, or returning with a fish or shrimp held crosswise in the bill.

Somewhere near the colony there is usually a group of resting birds. Some of these are non-breeders, usually identified by the white band across the hind neck and the white back of and over the eye as in typical winter plumage. Perhaps some are birds that are not incubating or hunting food at the time. There are certain activities in this group, such as bathing in shallow water, which might seem to indicate feeding on foot, but if such feeding occurs it is infrequent and incidental.

Our salt creeks and rivers have many shallow sloping mudflats or sandbars. This is where the skimming is done. At certain times of tide there are many skimmers, singly or in groups of several, skimming up against the wind over a beat a few hundred yards in length. At the end they frequently rise a few feet and fly back to the starting point for another beat. There is no difficulty, under favorable circumstances, in seeing fish or shrimp being caught. Now and then a bird will pick up a grass stem, or perhaps strike the lower mandible on some submerged thing; then the head turns under easily, and the long wings lift the bird a little until it can regain its poise before resumption of the skimming. The birds often skim in water an inch or less in depth.

Many of these mudflats have a growth of salt-marsh cord grass, *Spartina alterniflora*, down to about three and a half feet above low water, and during the summer months the shrimp and small fish crowd into the shallow water as the tide rises, ready to move among the grass roots when the water reaches them. There is a similar recession as the tide leaves the grass roots. It is customary for those who catch shrimp with a cast net to go out "when the tide leaves the marsh" and to cease casting when the flood again returns to that level, as most of the shrimp are then in the grass. So there is about half of the tidal cycle when skimming is practicable,

and though there are some shores where the birds can feed throughout the tide, their feeding is done mostly on the low ebb and the low flood, and is not continuous during the day. A stiff breeze will cause enough rough water to drive the shrimp away from all but sheltered banks on some days; this may have some bearing on the night-feeding of the birds, though it is done sometimes in fall and winter, as well as in the summer when there is a much greater demand for food.

The partly grown young of the prawn, *Penaeus setiferus*, migrate into these muddy creeks in great numbers in June, July, and August and are locally known as "June shrimp." The concentration is great, and it is customary to hear cast-net fishermen boast of catching a quart at a throw. The "quart at a throw" is not vouched for here, but told to illustrate how numerous they are. There are also many small fishes in the shallow water at this season. The skimmers lay their eggs in June, and the food requirements per adult pair reaches a peak about July, coinciding with the coming of the "June Shrimp."

When skimming, the birds depress the lower mandible very little. Most of the separation of the mandibles is accomplished by lifting the outer end of the upper mandible as a result of flexing in the nasal region. This kinetic function of the skull has been described by Coues (1892) and involves the movement of several of the bones of the skull. This movement is used in various ways by many different species of birds. The Least Tern, *Sterna albifrons*, in one part of its courtship, uses a motion much like that described here for the skimmer.

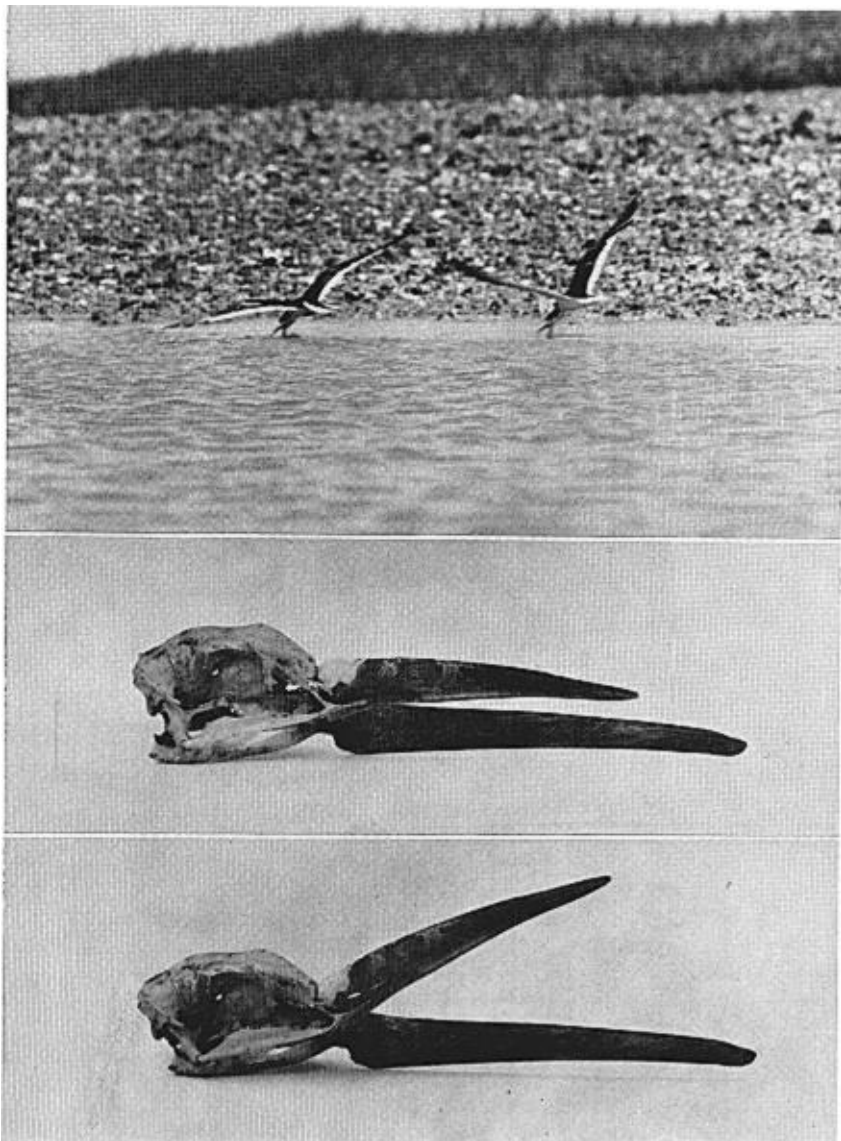
What actually happens in skimming is that the quadrate bone rocks forward on its upper articulation with the cranium, pushing forward on the slender quadrato-jugal bones which in turn bend upward the outer end of the upper mandible. The much shorter pterygoid bones also move forward and assist in the motion.

In order to show more clearly how this is done, two photographs (Plate 8, *center and bottom*) were made of a rough skull with the horny sheath of the bill intact. The sclerotic bones were not considered important and were left out. One photograph shows the bill at rest; in the other it is opened in the approximate skimming position. It will be seen that the conformation of the skull at the forehead is such that this motion may readily be accomplished.

This peculiar manner of opening the bill was first noticed in photographs. Careful watching with binoculars later indicated it to be a common practice.

If the tips of the mandibles of a freshly collected and limp specimen are gently pulled apart, the skull bones readily assume the skimming position. It will then be seen that the lower mandible continues to lie nearly in line with the long axis of the neck, and that the mouth at the angle remains nearly closed. It might almost be said that the bird opens its bill but keeps its mouth closed.

It does not seem probable that the bird could hold one fish or shrimp crosswise in the bill and continue to skim for another, so it may be necessary for each bird to fly a round trip from the nest to the feeding grounds for each bit of food carried to the young or to the female on the nest (courtship feeding has been reported in this species). Thus, the distance from the feeding grounds to the colony must be much less than if regurgitation were practiced. During the summer of 1942, I was assigned to the U. S. Dredge DeWitt Clinton which was working south in the Intercoastal Waterway a few miles south of the Savannah River. We made many trips back and forth each way for several miles. Just below Thunderbolt, Chatham County, Georgia, there was a colony of perhaps 50 pairs of skimmers, the only colony in the vicinity. The dredge worked ahead 500 or 600 feet a day, and at first we saw no food-carrying skimmers. Then at three and one-fourth miles from the colony, we began



(Top) ADULT SKIMMERS SKIMMING. (Center) LATERAL VIEW OF SKIMMER SKULL WITH BILL CLOSED. (Bottom) SKULL OF SKIMMER SHOWING MANDIBLES SEPARATED AS IN SKIMMING.

to see a few and, from two and one-half miles on, the feeding birds were common. The observations were limited to birds that were actually carrying food, in order that no non-breeding birds would be counted, as these might feed for themselves nearly anywhere.

Referring again to the position of the bill, the skimming birds shown in the photograph would show the position more accurately had the camera been more nearly at right angles to the birds' flight.

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**Food of the Barn Owl, *Tyto alba pratincola*, in Hancock County, Ohio.**—The purpose of the present work was three-fold: 1) to discover whether any as yet unreported species of small mammals from Hancock County, Ohio, would be found in the pellets of the Barn Owl; 2) to determine the percentage of occurrence of the various small animals in the pellets; and 3) to determine the value of the Barn Owl as a check upon small mammal populations in this area.

Hancock County is in the northwestern part of Ohio, 45 miles from Lake Erie and 50 miles from the Indiana state line. For the most part the surface of the county is flat, being located in the till plain areas of the state. At its western and eastern borders, however, it becomes slightly rolling. Seventy-seven per cent of the county is under permanent cultivation; 10 per cent is made up of wooded areas, and the remaining 13 per cent of the land area is in permanent pasture, roadways, and town-sites.

During the summer of 1948 I located three nests or roosting places of the Barn Owl. One of these was on a small balcony measuring two feet by three feet that fronted a third-story window at the home of R. W. Kirk in Findlay, Ohio. A brood of five young was reared on this balcony. Another nest was placed on a platform measuring two feet by two feet and located just beneath an opening underneath the eaves of a large barn on the Clyde Worden farm, five miles west of Findlay, Ohio, on state route 224. The third site from which pellets were collected was a roosting place located in a building on the property of the Continental Sugar Company's refinery at the west edge of Findlay.

From beneath the balcony at the Kirk home 20 pellets were collected. There were no recognizable pellets on the balcony, but the floor of the structure was covered to a depth, varying from one to three inches, with a mass of crushed and broken pellets, fecal material, and dry twigs from the nests of pigeons that had nested on the balcony before the owls took possession. The entire mass was felted together by the fur of the mammals that had been consumed. I obtained nine pounds of this material. From the nest on the Worden farm 122 pellets were collected and from the roost at the Sugar Refinery 102 pellets.

All of the lower right mandibles were separated from the pellets or the nesting debris that was collected. Each of these was regarded as one occurrence of an animal. The jaws were retained to enable the author to distinguish between