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THE STATUS OF TERN ISLAND AND THE CAPE COD TERNS IN 1943.

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THE importance of the Tern Island colony to the welfare of the Cape Cod group of terns was demonstrated clearly by the 1943 nesting and hence the necessity of keeping that colony's home site in the best possible ecological condition. The value of the frequent and thorough inspections which this site and its occupants have been given was demonstrated by the prompt discovery and circumvention of a mishap which otherwise might have frustrated a chick yield and survival especially necessary this season. Correlation of the data covering adult death rates and chick production by years and nesting sites for a period of fifteen years has made it possible to estimate in advance with reasonable accuracy what each year's chick maturing should be to maintain the total Cape tern population at its average aggregate. This applies particularly to the Common Tern (*Sterna hirundo*), for the Roseate Tern (*Sterna dougalli*) is far more consistent in the annual raising of young in a stable ratio to the number of breeding adults regardless of the vagaries this species exhibits in the selection of nesting sites. In order to replace known and estimated losses, it was desirable that the Cape Cod group of tern colonies, as this aggregation had been postulated and defined previously (Austin, Some Aspects of Individual Distribution In the Cape Cod Tern Colonies, *Bird-Banding*, Vol. XI, No. 4, October, 1940), should produce in 1943 a slightly larger number of offspring than it had the two preceding years. But during this nesting, the occupancy of all the other terneries was so anomalous, that on the Tern Island colony was placed a fulfilled obligation to deliver considerably more than its usual quota.

In spite of a gradual filling up by mud banks of the channel at the southern end of Tern Island which has been progressing slowly during recent years, the insularity absolutely essential to the security of this nesting site has not lessened materially during the last twelve months. Unfortunately, the project to dredge a new channel close to the south end of the island, a procedure which would prevent for some time

¹Contribution No. 38 by the Austin Ornithological research station.

at least a threatened junction with the mainland, has been postponed for obvious reasons. Last winter's inclemencies eroded slightly the northeast corner of the island but filled in what had been an incipient deep cut-through one third way above the south end. The extensive marsh on the west side of the island's upland has not extended closer to the mainland; it has fewer tide-pools and in several places small, sparsely vegetated hummocks have built up above the usual high-water mark. This season for the first time a few of these were utilized for nesting. The two similar, much older and larger knolls in the marsh near the middle of the island, continue to be the most completely and densely tenanted tracts in this rookery. In late March the annual burning off of dried grass and accumulated flotsam was done, followed by a ploughing and harrowing which eliminated roots and stolons from overgrown tracts and insured the preservation of a few completely bare places which long have been preempted territory of many of the oldest members of the colony. This reclamation work, which has been carried on for ten years, has reduced the number of Roseate Terns in the colony for this species has a dominating preference for heavily vegetated terrain. From the conservation standpoint this is of no import, for nearby Ram and Bird Islands, both luxuriantly verdured, afford them adequate and suitable sanctuary. Their trend toward site-adherence is very much less developed and cogent than it is in Common Terns so that where they elect to breed varies seasonally.

Infestation by the common rat is the most insidious and gravest peril to which a colony of nesting terns can be subjected. It frustrated completely the Tern Island colony in 1933; until discovered and obviated it has done considerable harm in more recent years. Other colonies have been similarly molested such as Pamet Point in the twenties, Hopkins Island in the early thirties and Plymouth in 1941 and 1942. The close proximity of Tern Island to a rat-infested row of fishing shacks on the mainland is a constant menace. This potentiality for rodent invasion of the island can be anticipated best and its incidence most promptly recognized by eliminating as completely as is consistent with the preservation of other necessities, all cover for concealed burrows. Consequently the best interests of conservation appear to be served by giving preferential consideration to the welfare of the Common Tern.

This year grassing up began a bit earlier than usual due to abundant rainfall and was more luxuriant than usual. It reached its peak in time to provide excellently shelter for chicks well in advance of concerted hatching.

The first returning terns arrived at Tern Island on May eighth, five days later than the average date for this event, increasing rapidly in numbers to an estimated four thousand on May thirteenth. This group, contrary to the customary procedure, showed no tendency to the ac-

quisition of individual territories and nest building, but either rafted along the shore lines or flew idly over the island. One week later, the total had diminished to at most twenty-five hundred; there were a few courtship scoop holes in evidence but not one egg had been laid. An investigation of other usual nesting sites at this time yielded no evidence of occupancy. If warmth and sunlight are factors in determining the procreative activity of birds, the inclement weather which occurred during this period may have been responsible for this failure to follow the usual time schedule. But in addition to this some other causative factor probably functioned for it has been observed that elsewhere as well as on Cape Cod, there are years when despite lack of obvious alteration in environmental conditions such as the one just specified, nesting tern colonies fail not only to function according to schedule but also fail to reproduce with normal expectancy. Very little change took place until near the end of May when the greater part of the usual components of the Tern Island colony returned in a body and with concerted intensity proceeded to egg-laying widely over the whole site. This deviation from the usual earliest laying being done by the older members of the flock suggested either an abnormal inhibition functioning in the more mature individuals or a somewhat seasonally precocious sex activity stimulating the younger birds.

In order to allow the colony to become well domiciled, for terns' loyalty to their clutches increases with each day of added tenure, adult trapping was not started until June fourth. It was amazing to find that in this short interim of five days not only had the colony almost doubled in size but also that there was a corresponding increase in the number of egged nests. With a most generous allowance for the increment of three and four year olds coming for their first nesting—these young breeders being usually the last to select territories—it was obvious that the colony, definitely larger than it had been in recent years, contained individuals which normally would have nested elsewhere. So far as could be inferred from counts of these birds and clutches of eggs present, this accretion was not a continuous nor prolonged affair but rather an abrupt, large-scale increment, duplicating and supplementing the coming of the normal constituency of the colony. The plausibility of this surmise was supported by analyses of random samples of trapped banded adults. These showed the presence of an abnormally high percentage of individuals taken last year on other sites.

These two abnormal incidents, the lateness of this nesting and sudden enlargement of the colony, made necessary devoting all available time to work on Tern Island in order to obtain, during an interval much shorter than usual, the data requisite to keeping statistics complete. Thus it was close to the end of June before it was practical to investigate the Cape's other terneries. The results were convincingly explanatory of what had occurred at Tern Island. Nowhere else on the Cape, with

the exception of on the satellite Bird and Ram Islands, had nestings of reproductive value taken place. Billingsgate Island, being used as a target in bombing practice by airmen, was birdless. At Jeremy's Point one hundred and fifty terns were sunning themselves idly on the extreme sandy tip; there were none over the upland; neither a scoop hole nor an egg was found. All of Nauset Point had been washed away during the winter, there remaining not even sandbars on which the habitual Arctic and Least terns could breed. Only five terns were present at Nauset Marsh, with no evidence of breeding. At North Point, where in 1940 a considerable portion of the Tern Island colony had elected to breed, June first this year not one nest was found and July fifteenth there were only about forty small clutches. When their tenants had been trapped they were found to be birds which had been frustrated in their initial nesting on Tern Island. Some years ago this annual changing promontory, now nearly two miles long, was the home site of the entire Tern Island colony. Consequently, in view of the demonstrated trend for terns to select as their second choice some site on which they or their clansmen have had a former tenure, almost yearly birds which have lost eggs or chicks at Tern Island repair to North Point for a re-nesting. Plymouth Point, which in 1940 yielded over twenty-six hundred Common chicks to compensate Tern Island's partial failure that season, was not visited until June twenty-sixth. Geographically and ecologically it appeared to be almost exactly as it had been in summer of 1942 and, in addition, army regulations and supervision were keeping it free from human intrusion yet inexplicably no terns were found breeding. During our entire stay there less than one hundred exceedingly wild individuals remained constantly in the air over the dunes. The only evidence of nesting elicited by an extensive exploration of the site was a half dozen old scoop holes and two broken egg shells. Questioning competent native observers and search by personnel from this station did not bring to light either tern occupancy of any ecologically desirable but heretofore unutilized sites, nor any unusual nesting by scattered individuals along the Cape's extensive beaches. Thus, unless there had been an extensive emigration to breed out of the Cape area, wholly unprecedented and much at variance with the fundamentals of tern behaviour, practically all members of the Cape Cod group of terns which did return from their wintering grounds to breed in 1943 did so to Tern Island.

Ram and Bird Islands, not many miles southeast of Buzzards Bay, have supported prosperous flocks of breeding terns for a number of years. Although, according to the concept of colony grouping already referred to, their original allegiance was to the Nantucket group, annually they have been making a progressively increasing number of interchanges of membership with the Cape aggregation, especially at Plymouth. The latter, a young colony of the mushroom type, like others

of its sort was built up around nuclei from many diverse sites. So it was no surprise to find early in July that the Bird Island colony had more than doubled its usual population, that nesting there was approximately ten days later than customary, and that of the sixty-eight returns, previously banded as adults, taken there this year, forty were from Plymouth. Ram Island furnished another of this season's abnormalities. Its terrain was apparently unchanged, no alterations of environment were disclosed, yet its population was reduced to less than eight hundred exceedingly wild birds, little intent on the duties incident to successful reproduction. The breeding cycle there was a full week ahead of that at Bird Island; the number of nests was much below what the population should have produced. In 1941, 1391 chicks, in 1942, 2100 chicks were banded there; this season a mere 282. Since there was no increase in the number of Ram Island birds taken at Tern Island this year it is assumed that the dispersed members of the first colony either elected to nest on other terneries in the Nantucket group, possibly Penikese or Weepecket Islands, or else failed completely to reproduce.

The causation of this year's unprecedented alignment is not known. We have no evidence to indicate whether it was of intrinsic or external origin. The abandonment of most of the usual nesting sites suggested that, since the behaviour pattern followed by terns is so fixed that trivialities rarely alter it, and since terns are comparatively deficient in adaptability, there must exist for their welfare some essential requirements which we have not yet recognized. The cohesion, this season, of the various emigrés into the Tern Island colony was instigated, probably, by one of the most compelling trends of the pattern, group-adherence. Since a great majority of the members of the several disrupted colonies are direct descendants from the Tern Island stock their repair to the present tenure of the parent colony was a most consistent act and simply duplicated the course previously followed by the now extinct Egg Island and Little Sipson Island colonies.

Through most of June the Tern Island colony fared well. Adult mortality was the lowest ever known and the only owl-killed bird had been found long before egg-laying started. However, though the number of nests was commensurate with the size of the colony, there was a lessening of the average number of eggs per clutch by twenty-five percent, and the total number of eggs present was at least one-fourth below what it would have been had each pair in this year's greatly augmented colony laid as many eggs as has been normal for the past decade. This may have been due to an incomplete development of procreative potency by reason of the lateness of its inception and its slowly paced growth this year. Paradoxically, incubation went on with unusual continuity. Frequent and prolonged human intrusion, due to special investigations carried on in two areas with the use of quadrats and a blind, caused only an incredibly small and negligible amount of disruption and the

abandonment of but a few clutches. On June twenty-seventh a marked change in this demeanor of the colony was observed near the northern end of the island; the following day it was found that from that section a considerable number of clutches had disappeared. As experience had taught by many discomfiting experiences, this was an indication of the presence of rats. Immediately all other activities were foregone and the entire island was searched thoroughly and repeatedly until all existing burrows had been found and their tenants destroyed. So great is the damage one rat can effect in a single day that before it was accomplished at least two hundred eggs had been carried away or destroyed and many other nests abandoned. Happily no other vandalism is known to have occurred during the season.

As anticipated, hatching was both late and concentrated into a relatively short interval, also completed promptly. Owing to the season's small loss of clutches in comparison with that of other years and especially the lateness of that which did occur, together with the almost complete absence of the influx of birds thwarted at other sites, only twelve renesting individuals were trapped as against one hundred and fifty-five in 1942. Since the offspring of renesting birds seldom survive unless hatched early in July, or if late in this month, in considerable numbers in a small area, no extensive search was made for chicks possibly accruing from what second laying did occur.

Clement weather and an adequate amount of grass shelter prevented any great toll being taken of the hatch by exposure during the critical first ten to fourteen days; the death rate of newly hatched chicks certainly was lower than normal. Nevertheless the total chick mortality was more than double that which had taken place the preceding year and ten percent higher than the average for all the years it has been checked. Similar occurrences here on Cape Cod other years, also elsewhere, notably in the Great Lakes region, according to the reports of observers who have worked in terneries in that area, are ascribed, usually, to food shortage, inclement weather, parental neglect, disease and other extrinsic mishaps or ecological deficiencies. However, evidence in support of these postulates is consistently circumstantial at best, even imaginary at times and not deduced from data obtained by competent and adequate observation. Unfortunately, the plausibility of these assigned causes inhibits their being sufficiently evaluated. The absence of nesting in diversified locations afforded ample time to search for some environmental cause for the high chick mortality, all the previously suggested causes for this occurrence being kept in mind. Not only were all such eliminated as probabilities by the absence of substantiating findings but also much was gleaned to discredit their tenability. While it is more than possible that there existed some undiscovered etiological factor extrinsic to the chicks themselves, it is equally credible that the cause was intrinsic, unknown of course, possibly in the

nature of a disturbance of their normal physiology rather than the result of actual disease. The latter has been suggested by the repeated observations that some tern chicks will survive apparently identically deleterious conditions and events which are fatal to others.

In spite of this high chick mortality preceded by a seasonal egg laying much below what a colony of the size of the one at Tern Island this year averages, the output of chicks both exceeded that of the preceding year and equalled what it had been estimated should be the yield of the Cape group as a whole adequate for the maintenance of the group's population at its usual level.

It is believed that the Cape group will maintain its integrity and prosperity in spite of detrimental changes in the ecology of the rookeries, provided these do not occur simultaneously at all adequately large and suitable nesting sites, also that they are neither permanent nor of human causation. At the same time, in view of the irremediable destruction by the elements of several nesting sites and the deterioration of others which has resulted from over-vegetation, predation and the inroads of man, the events of the 1943 nesting indicate the importance of maintaining sanctuary at Tern Island by carefully controlled reclamation work and wardenship.

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FIFTEEN YEARS BANDING AT FARGO, NORTH DAKOTA

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THE writer began banding in 1925 but only 13 birds were taken that year (including one nest of seven young flickers) (*Colaptes auratus*), so the fall of 1926 was really the first active trapping. An unusually good run of juncos (*Junco hyemalis*) and Harris's Sparrows (*Zonotrichia querula*) in 1928 brought the total for the year to 1,365, since when it has ranged from 1,100 to a high of 2,434 in 1937, but dropped to an unexpected low of 870 in 1941. The period 1926-40 makes a convenient one to summarize.

The station has been exclusively a small bird station and has been operated largely during migration periods. About a dozen funnel traps and one or two of the Potter type have been in fairly regular use. In 1931, a Brenckle six-celled water trap was added, a second in 1933 and two more in 1937. These have materially increased the numbers of species captured. To the end of 1940, a total of 22,640 birds of 103 species had been banded.

Trapping has been carried on chiefly in the horticultural gardens of the Agricultural College. This is a favorable place in that there are