

DISPERSAL AND FLOCK INTEGRITY OF SNOW GEESE
IN LOUISIANA AND TEXAS

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ABSTRACT

During the winter 1972-73, 1,000 Snow Geese (Chen caerulescens caerulescens)² were captured and color-marked at Sabine National Wildlife Refuge in southwestern Louisiana and 592 at Anahuac National Wildlife Refuge in southeastern Texas to determine the distribution patterns and flock integrity. Over 450 subsequent observations of the marked geese on the wintering grounds showed that Snow Geese move considerable distances during the wintering season; most birds dispersed from the capture sites in an east-west direction. Geese from Sabine NWR were observed over an east-west belt 267 miles wide and the Anahuac geese over a belt 183 miles wide. No significant difference was observed between the movements of geese marked early in the winter and those marked late; also, the mean distances that geese had dispersed after a given period of time were similar for both refuges. Snow Geese did not show strong flock integrity; instead, they frequently moved from one area to another, deserting a flock in one area and joining another flock elsewhere. The amount of interchange between flocks was directly associated with the proximity of the flock. The nearer flocks were to each other, the greater the amount of interchange.

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²Scientific nomenclature is from the Supplement to A.O.U. Check-list (1973).

INTRODUCTION

Southern Louisiana and southeastern Texas comprise the major wintering ground for Lesser Snow Geese which breed in northern Canada (Kortright 1967). National and state wildlife refuges in southwestern Louisiana and southeastern Texas serve as important wintering areas for many of these birds.

Within the species, these geese exhibit two color phases, a white phase and a blue phase. The white and blue phases are commonly referred to as snow geese and blue geese, respectively. The white phase predominates in Texas and the blue phase in Louisiana, and according to Cooke et al. (1972), the white phase is more numerous on the western part of the breeding grounds with the reverse true on the more eastern breeding areas. The two color phases will be referred to collectively as Snow Geese in the remainder of this paper.

Total censuses and productivity appraisals are made while the Snow Geese are on the wintering ground because such counts are not feasible on the remote northern breeding grounds. These counts are virtually the only means of evaluating the annual status of the goose population. Productivity surveys on the wintering grounds began in 1947 and are conducted as described by Lynch and Singleton (1964). Prior to the initiation of these surveys, only general observations were made of the activities of Snow Geese on their wintering ground (Bailey and Wright 1931, McIlhenny 1932).

A study was undertaken in 1969 to determine the family and flock behavior of Snow Geese on their wintering ground. The study determined that Snow Geese exhibit strong family ties between the adults and the young of the year and proposed the theory that Snow Geese display a random movement on the wintering ground (Smithey 1973). The present study was initiated with emphasis placed on the behavior of the goose flock in a continuation of wintering ground research on Snow Geese. The objectives of this segment of the investigation were:

- (1) to determine the degree of flock integrity, (2) to determine movements and behavior of flocks, and (3) to determine the amount of interchange between flocks in the study area.

This study would not have been possible without the cooperation received from both state and federal wildlife agencies. Sincere thanks are extended to Managers John Walther and Russell Clapper of Sabine and Anahuac Refuges respectively, for their advice and support during the study. Special recognition is also due Art Brazda, U.S. Fish and Wildlife Service; Hugh Bateman, Louisiana Wildlife and Fisheries Commission; Charles Stutzenbaker, Texas Parks and Wildlife Department and numerous others for reporting marked geese. Special thanks are also due to Prentiss E. Schilling, Louisiana State University, for statistical analysis of the data.

DESCRIPTION OF THE STUDY AREA

Snow Goose banding operations were carried out at Sabine National Wildlife Refuge in southwestern Louisiana and at Anahuac NWR in southeastern Texas (Figure 1). Sabine Refuge contains over 142,000 acres of fresh and brackish marshes and is located in Cameron Parish, Louisiana. Anahuac Refuge, a 9,836 acre tract of coastal marsh, is located in Chamber County, Texas. Both refuges are managed primarily for waterfowl and winter a large segment of the Gulf Coast Snow Goose population. The study area of southwestern Louisiana and southeastern Texas consisted of coastal marsh and coastal prairie (Figure 1). Both areas are flat, mostly treeless plains only a few feet above sea level. The coastal marsh borders the Gulf of Mexico and extends inland about 25 miles in Louisiana and 10 miles in Texas. The coastal prairie is located north of the marsh region and is highly developed for agriculture, mainly rice and pastureland.

METHODS AND MATERIALS

Snow Geese were captured at Sabine Refuge by cannon nets and at Anahuac Refuge by rocket nets. Geese captured were color-marked and released to study dispersal and flock behavior. A total of 1,592 geese were marked, during the winter; 1,000 of these were captured on Sabine NWR, and the remainder on Anahuac NWR.

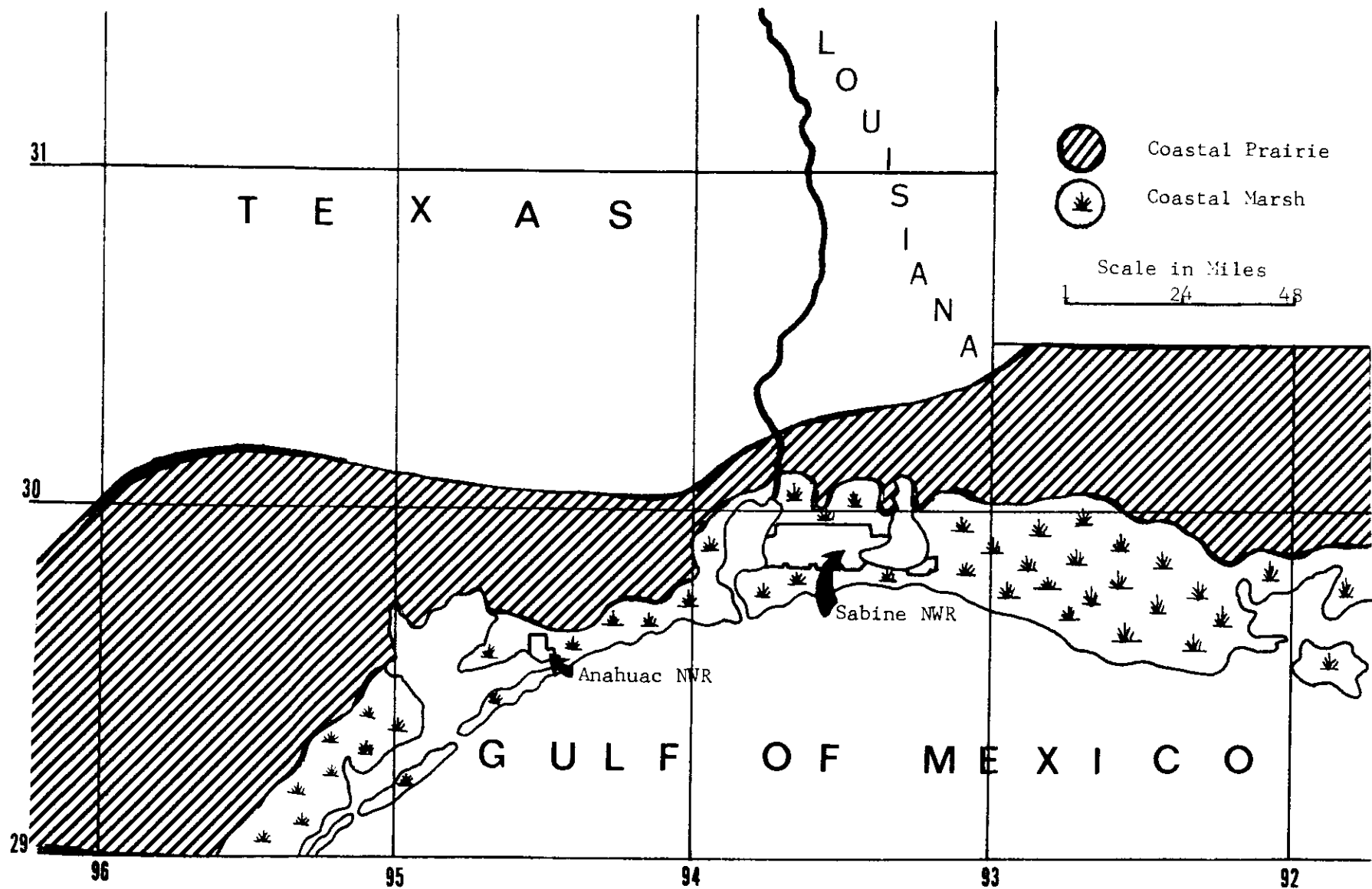


FIGURE 1. LOCATION OF THE STUDY AREAS

Two colors were used to distinguish the birds of one refuge from the birds of the other. A yellow color (Picric acid solution) was used in Louisiana, and orange fluorescent spray paint was used to mark the Texas birds. The geese caught as a group were released as such after being color-marked.

Sightings of the marked geese were obtained from both ground and aerial observations, and the study area was covered as uniformly as possible. Locations of the observations of the color-marked geese from a certain refuge were divided into eight flight directions, each containing 45° (0° - 45° , 45° - 90° , etc.), with the release site on the corresponding refuge as the center point; and the sightings were plotted at ten mile intervals from that point.

RESULTS AND DISCUSSION

Winter Movement of Marked Geese

A total of 337 sightings were made of color-marked geese from Sabine NWR on their wintering ground. The location and maximum distance of these were Eagle Lake, Texas (175 miles west of the release site), Catahoula Parish, Louisiana (141 miles northeast), and Marsh Island Refuge, Louisiana (92 miles east). Snow Goose dispersal from Sabine Refuge covered 267 miles in an east-west direction, going beyond the 92nd meridian on the east and the 96th meridian on the west.

One hundred and fourteen sightings were made of geese dyed at Anahuac Refuge. These observations ranged from 90 miles west of the refuge to 93 miles east and 74 miles northeast. Dispersal of marked Snow Geese from Anahuac NWR was beyond the 93rd meridian on the east and beyond the 96th meridian on the west, covering 183 miles in an east-west direction.

The distance and direction of the sightings of dyed geese were plotted at ten-mile intervals along eight possible flight directions from the release site at Sabine and Anahuac Refuges (Figures 2 and 3, respectively). Movement

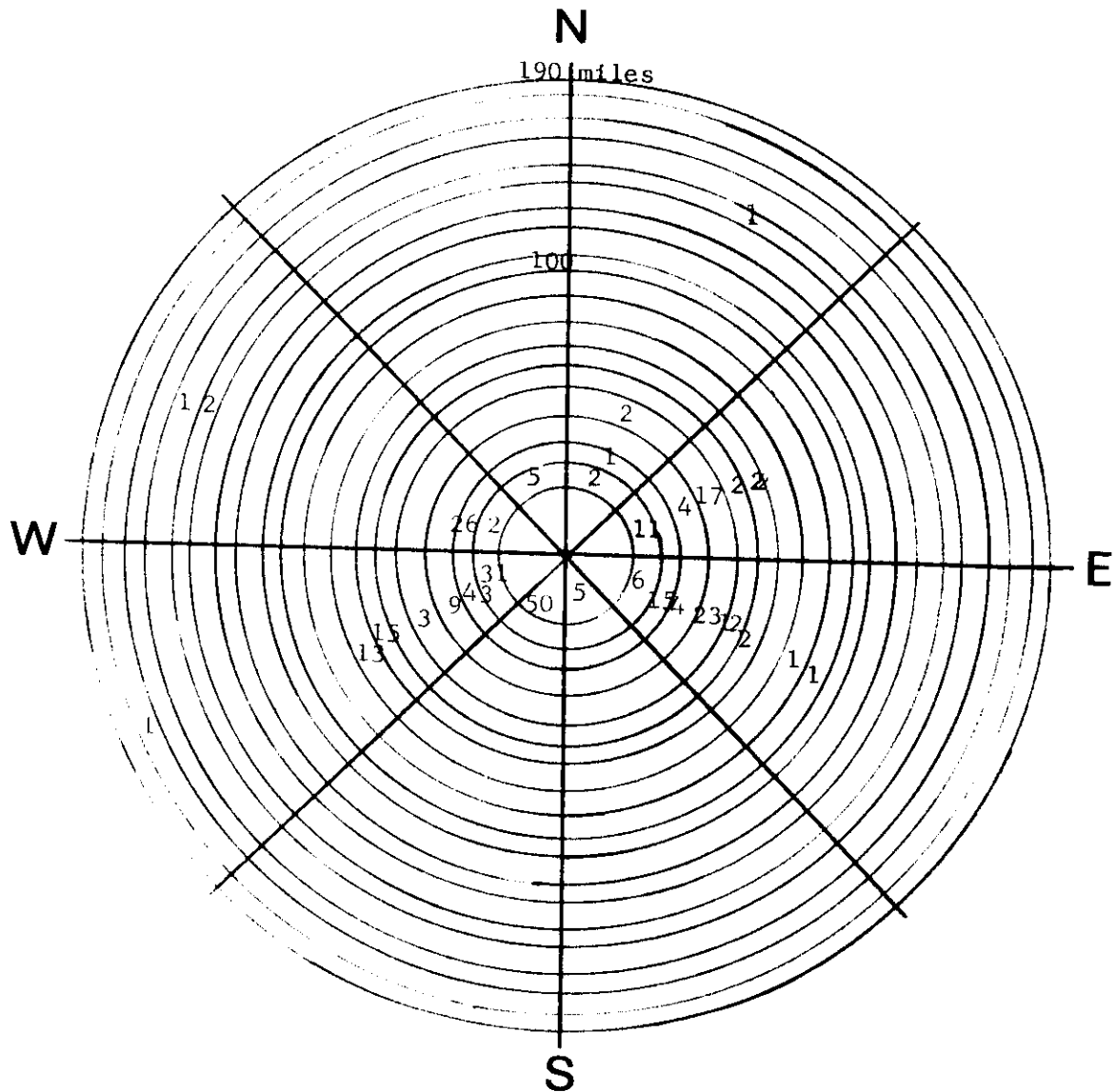


Figure 2. Number and location of all sightings made of Snow Geese color-marked on Sabine National Wildlife Refuge, plotted in the eight flight directions.

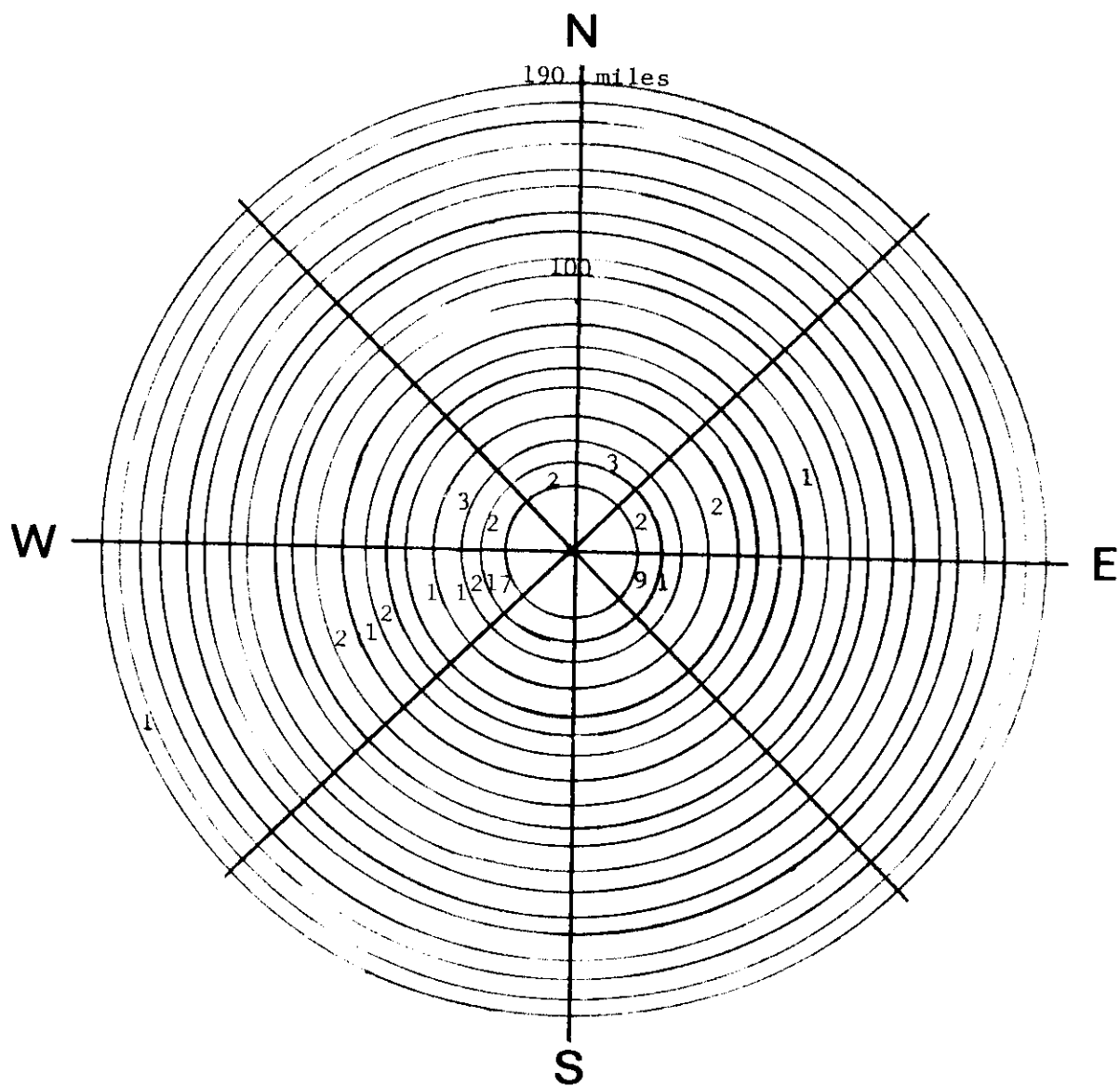


Figure 3. Number and location of all sightings made of Snow Geese color-marked on Anahuac National Wildlife Refuge, plotted in the eight flight directions.

in the south-southeasterly and south-southwesterly directions was restricted by the Gulf of Mexico, which was only 8 to 10 miles from the release site on both refuges.

Data on goose movement from both refuges were compared to determine if the Snow Goose population of the Gulf Coast shifted in any direction during the wintering season. In January, Sabine dyed birds were sighted a greater average distance to the north (105.0 miles) than to the east (61.9 miles) or west (43.3 miles); however, the Anahuac geese were seen more to the east (98.0 miles) and west (117.9 miles) than to the north (45.5 miles). There was no significant difference ($P > 0.05$) in the mean distances the geese were seen to the east and west of either release site.

The mean distances which the geese were found to the east and west of each release site in February were greater than that to the north; however, Sabine dyed geese tended to be a greater distance to the east and the Anahuac birds to the west. Comparisons made on data collected in March indicated no significant difference ($P > 0.05$) in the mean distance to dyed birds were found in any direction from the Sabine Refuge release site. However, during the same period, dyed geese from Anahuac Refuge were sighted more in an easterly direction ($P < 0.05$).

No overall shift in the Snow Goose population was detected during the study. In general, the geese were located more to the east and west of release sites than to the north. This would be expected since the major goose habitat, the coastal marsh, is located east and west of the release sites and a lesser habitat, the coastal prairie, is located to the north. Observations of geese marked on Sabine Refuge in late November and on Anahuac Refuge in late December were used to determine if the amount of goose movement away from the release sites changed as the winter progressed. We assumed that Snow Goose behavior was uniform throughout the Gulf Coast wintering range, and an analysis of variance was used to compare the mean distance the marked geese dispersed from

the refuges. This test disclosed no difference ($P>0.05$) in the mean distance, and the Sabine marked geese were observed an average of 34.8 miles (range: 8 to 175 miles) from the release site during December, and the Anahuac dyed geese were observed a mean distance of 36.7 miles (range: 4 to 90 miles) away from the site during January. Likewise, observations made on the Sabine geese (mean: 26.4 miles, range: 1 to 105 miles) were compared to the observations in February on Anahuac birds (mean: 21.4 miles, range: 3 to 75 miles) and the mean distances sighted from the release sites again showed no difference ($P>0.05$). These comparisons indicated that Snow Geese did not tend to move more during one part of the winter than during another; instead, movement between flocks and areas seemed to be a continual and equal process throughout the winter.

Observations of Sabine and Anahuac marked geese were combined and analyzed by month from December through March in an effort to determine the overall dispersal of wintering Snow Geese (Table 1). An analysis of variance was used to compare differences in the mean distances by directions which the geese were observed from the release sites. Orthogonal comparisons were conducted to determine where the differences occurred. The mean distance which the geese were sighted in an easterly or westerly direction was greater during all four months than that in a northerly direction ($P<0.05$). No differences were found during December, January or February between the mean distances the dyed birds were observed east and west of the release sites ($P>0.05$). However, in March, the average distance was greater to the east of the release sites than to the west ($P<0.05$). Inferences drawn from the data are that overall Snow Goose movement on wintering ground was to both the east and west of the release sites and that movement in an easterly or westerly direction was random, except in March when the trend was for net movement to be in an easterly direction.

Table 1. Mean distance and direction that color-marked Snow Geese were observed from the capture and release sites on Sabine and Anahuac National Wildlife Refuges during the winter of 1972-1973.

Direction	Month			
	December	January	February	March
	-----miles-----			
North	35.7	52.6	35.9	37.2
East	53.6	67.0	72.8	03.1
West	95.4	70.5	65.3	59.2
South	8.0	9.6	11.5	6.0
Monthly means	34.8	26.4	28.1	34.3

McIllhenny (1932) described the Snow Goose as a salt marsh bird, remaining within eight miles of the salt beaches and occupying only coastal marsh. Later observations by Lynch (1952) disclosed that in the late 1940's and early 1950's Snow Geese began using the rice belt just north of the coastal marsh. Linscombe (1972) reported that the percentage of Snow Geese associated with agricultural areas, mainly in the coastal prairie, steadily increased between 1953 and 1971.

The Snow Goose along the Gulf Coast has obviously extended its range since McIllhenny's time. Major Snow Goose winter range still lies in an east-west belt along the southern Louisiana and southeastern Texas coasts. Snow Goose movement from any location would, therefore, likely be in an east or west direction. Our observations of dyed geese confirm that movement in an east-west direction was greater than in the northerly direction. The one instance in which the northerly direction was greater may be an indication of a variation in the movement pattern of Snow Geese on their winter range.

Flock Integrity

The number of geese trapped, marked, and released together ranged from 53 to 341, and they dispersed throughout the study area as singles, pairs or small groups. Cooperators reported sighting 58 flocks containing dyed geese. The flocks ranged in size from 200 to 10,000 geese; however the average number of dyed birds per flock was only 2.1 (range: 1 to 5). Two sightings were made of flocks containing five color-marked geese; however, most were singles. No observations were made of more than four color-marked birds that appeared to be closely associated with each other.

The frequency of finding marked geese in flocks decreased as the distance from the release site increased indicating that the amount of interchange between flocks was directly associated with the proximity of the flock. The nearer flocks were to each other, the greater the amount of interchange. The geese did not show strong flock integrity; instead, they frequently moved from one area to another, deserting a flock in one area and joining another flock elsewhere.

Snow Geese have a white phase-blue phase cline with the white phase more abundant to the west on both their wintering ranges (Lynch 1972) and breeding grounds (Cooch 1961). This supports the theory that certain flocks exist and move as units. From our observations, flocks can be discussed in terms of occupying a particular physiographic area rather than as being a social unit bound together by instinctive ties. In contrast to the closely associated family unit as noted by Smithey (1973), family groups within a flock seem to be loosely bound to one another. The results of this study indicate that Snow Geese move around randomly during their stay on the wintering ground, the wintering ground being characterized as an east-west belt along the Gulf Coast.

The cause of the winter movement pattern of Snow Geese is not fully known. Food did not appear to be limiting, since the areas with the largest flocks were observed to remain as important goose areas throughout the winter. The presence of grit may be an important matter. McIlhenny (1932) discussed the fact that Snow Geese require grit in their diet and stated that southern Louisiana contained very little sand and no gravel. Neither the distance to which geese will travel to obtain grit nor the attraction power of a grit site are known. Smithey (1973) observed that the grit site at Sabine Refuge was heavily used by Snow Geese in that area. Anahuac Refuge also had grit on their trapping sites and received heavy goose usage. Fifteen flocks were observed during this study which contained marked geese from each refuge, and Snow Geese dyed at Sabine Refuge were seen on Anahuac Refuge and vice versa, indicating that the geese were not bound by tradition to a particular area or a certain grit site. The wintering movement of Snow Geese may be more of a behavioral characteristic of the species rather than a movement in search of grit.

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